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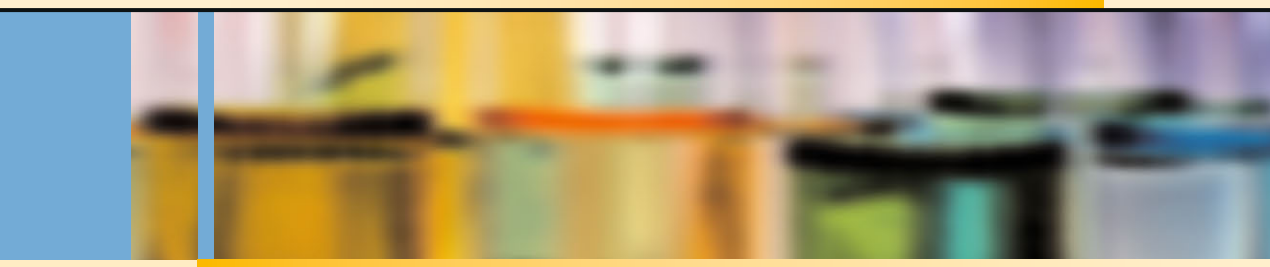
Editors



Entrepreneurship and Culture

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Andreas Freytag • Roy Thurik
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Chapter 1
Introducing Entrepreneurship and Culture

Andreas Freytag and Roy Thurik

1 Introduction

The study of the role of entrepreneurship in the modern economy is rooted in economics but has a distinctly eclectic flavor. See Thurik et al. (2002), Wennekers et al. (2002), Audretsch and Thurik (2004) but above all Parker (2004), for many references. It attempts to introduce the variable 'entrepreneurship' – whatever it may be – in subfields of economics like labor economics, economics of growth and economic development, industrial organization, enterprise policy, applied micro, and business economics, among others. It has the vivid and pervasive interest of policy makers because entrepreneurship is assumed to enhance economic growth (Carree and Thurik 2003; Acs et al. 2004; Audretsch and Keilbach 2004; van Praag and Versloot 2007). One is inclined to think that such interest – coupled with enormous efforts of entrepreneurship policy making which are more and more similar across countries – would lead to a convergence in entrepreneurship levels across countries. This is not the case because, despite this interest, there remain persistent differences of the level of entrepreneurship across countries (Audretsch et al. 2007).

It is well-known that the level of entrepreneurship, for instance expressed as the percentage of owner/managers of incorporated and unincorporated businesses relative to the labor force, differs strongly across countries (Van Stel 2005). This variation is associated with differences in the stage of economic development, and also to diverging demographic, cultural and institutional characteristics (Blanchflower 2000; Wennekers et al. 2002; Thurik et al. 2008). There is some evidence of a U-shaped relationship between the level of business ownership (self-employment) and per capita income (Acs et al. 1994; Wennekers et al. 2005).

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Earlier research points at a long and secular decline of self-employment rates over time (Blau 1987). Recent research in the framework of the Global Entrepreneurship Monitor (GEM) using the rate of nascent entrepreneurship or the prevalence of young enterprises shows the same U-shaped phenomenon (Wennekers et al. 2005; Van Stel et al. 2005). The meaning of this U-shape is not undisputed since it is simply a stylized fact and no indication of any causal relationship. As shown using Eurobarometer material, latent and nascent entrepreneurship also reveal a wide-ranging diversity across nations (Grilo and Irigoyen 2006; Grilo and Thurik 2006; Grilo and Thurik 2008). An explanation for this variation is much needed, as many governments attach high hopes to a positive effect of entrepreneurship on economic growth and, as a consequence, try to promote new business start-ups as well as aspirations to start up.

Whereas a number of individually relevant determinants of entrepreneurship have been widely explored (Parker 2004; Grilo and Irigoyen 2006; Grilo and Thurik 2008), differences across countries remain relatively unexplored. There is a general feeling that, while intertemporal differences can be associated with economic effects such as per capita income and to technological developments, contemporaneous differences are of a mainly demographic, institutional or cultural nature. In other words: the relative stability of differences in entrepreneurial activity across countries suggests that factors other than economic ones are at play (Shane 1993; Wennekers et al. 2002; Grilo and Thurik 2006). Demographic factors include age distribution and ethnic factors (immigration). See Delmar and Davidsson (2000). Institutional factors include regulation of entry, labour market regulation and fiscal (dis)incentives for entrepreneurship. See Lundström and Stevenson (2005) and Henrekson (2007). Cultural determinants of entrepreneurship include the prevalence of 'entrepreneurial values' (Davidsson 1995), 'legitimation of entrepreneurship' (Etzioni 1987) and the 'push explanation for entrepreneurship' (Baum et al. 1993; Noorderhaven et al. 2004).

In order to learn more about the relationship between culture and entrepreneurship, a conference *Entrepreneurship and Culture* was organized at the Max Planck Institute of Economics in Jena, February 7, 2005. The organization of this conference 'got out of hand' in that – predictably – it was shown that there are many more views on the relation between entrepreneurship and culture than the one needed to explain persistent differences in aggregate entrepreneurial activity between countries. Some of the results of the conference are published in a special issue of the *Journal of Evolutionary Economics* in 2007 (Vol. 17, no. 2). Almost at the same time a special issue of *Comparative Labor Law and Policy Journal* appeared based upon material presented at a conference *Entrepreneurship: Law, Culture and the Labor Market* organized by the University of Illinois College of Law in Chicago, March 23 and 24, 2007. The present volume consist of updated versions of the five contributions of the special issue of *Journal of Evolutionary Economics* in 2007 and of three of the contributions of the special issue of *Comparative Labor Law and Policy Journal* in 2007 (Vol. 28, no. 4) together with four entirely new papers and one paper of which an early version appeared in *Regional Studies* in 2008. They give an overview of the breadth of the emerging field of

entrepreneurship and culture. We are grateful to the publishers of *Journal of Evolutionary Economics*, *Comparative Labor Law and Policy Journal* and *Regional Studies* for allowing using (related versions of) their material.

The production of the present volume benefited very much from several visits of Roy Thurik at the Friedrich-Schiller University. Besides the close personal cooperation, the authors would gratefully like to mention their colleagues at Rotterdam and Jena who have provided comments, questions and suggestions in formal and informal manner. In particular, Sebastian Voll and Lutz Märker at the Friedrich-Schiller-University deserve much credit for editing this book. Finally, we have the great pleasure to thank Martina Bihn of Springer whose competence and patience with the editors is beyond imagination.

2 The Present Volume

This volume contains four sections: individual decision making; regional aspects; cross-country differences and the influence of culture on entrepreneurship. The first section deals with analysing individual decision making in a cultural context. Four papers analyse the topic. Inspired by Schumpeter's seminal depiction of the entrepreneur, *Amir Licht* starts his paper "Entrepreneurial Motivations, Culture, and the Law" by recasting this heroic portrait in a more rigorous theoretical framework, leveraging a model of individual value preferences by Schwartz. The entrepreneurial spirit, it is argued, consists of particular value preferences: most importantly high openness-to-change and also high self-enhancement. These hypotheses are consistent with extant empirical evidence. The upshot of this theory – especially when the stability of cultural value orientations is taken into account – is that individual propensities to engage in new venture creation may not be very susceptible to policy measures. Looking specifically at legal measures, this chapter considers instruments that could be narrowly targeted to promoting entrepreneurship by making entrepreneurs even more highly motivated than what they appear to be. Recent research indicates, however, that theoretical and empirical issues, which must be resolved before such measures could be employed with confidence, are intractable at this point. The analysis is followed by *Florian Noseleit* who in his contribution "The entrepreneurial culture: guiding principles of the self-employed" puts forward the question of what makes entrepreneurs different. Using a cross-country dataset, this paper explores essential parts of the value system of entrepreneurs in Western European countries by comparing value items of the self-employed to that of the non-self-employed. The self-employed rate values higher that aim toward openness to change and self-enhancement than those who are not self-employed. In turn, values related to conservation are considered less important. Self-regarding preferences, such as hedonism, that would be closest to a traditional neo-classical argument, do not differ significantly for entrepreneurs in nearly all countries. The higher importance of value items that are related to openness to

change illustrate that there is a motivational background for the entrepreneur being a "jack-of-all-trades."

In the third article entitled "Culture, political institutions and the regulation of entry", Rui Baptista examines the cultural determinants of the different levels of business entry regulation over nations especially towards uncertainty avoidance and power inequality. The level of entry regulation is described by the minimum time and the number of official procedures required in setting up a business. The author finds, among others, that the acceptance of power inequality in favour of a strong state influences the time to register a business. Furthermore, low uncertainty avoidance is strongly associated with English Common Law, which in turn tends to favour less business entry regulation. Finally, in their paper "Prior knowledge and entrepreneurial innovative success", Uwe Cantner, Maximilian Goethner and Andreas Meder discuss the relationship between innovative success of entrepreneurs and their prior knowledge at the stage of firm formation. They distinguish between different kinds of experience an entrepreneur can possess and find evidence that the innovative success subsequent to firm formation is enhanced by an entrepreneur's prior technological knowledge but not by prior market and organizational knowledge. Moreover, they find that prior technological knowledge gathered by the embedment within a research community has an additionally positive influence on post start-up innovative success. This is a first hint towards the importance of collective innovation activities.

In the second section, regional aspects of entrepreneurship are considered. Holger Graf and Tobias Henning in their article "Public research in regional networks of innovators: a comparative study of four East-German regions" take the perspective of regional innovation systems and compare four East-German regional networks of innovators. They show that universities and public research institutions are more interconnected within innovator networks, than private actors, that there are differences between regions with respect to the centrality of public research and that public research organizations which are well-connected within the local network of innovators are crucial for regional innovative performance. In his paper entitled "Entrepreneurial culture, regional innovativeness and economic growth" Sjoerd Beugelsdijk looks at 54 European regions. He develops a measure for entrepreneurial attitude and uses this as exogenous variable for innovativeness (patents per capita) and growth (GDP per capita) in the regions. A measure of 'entrepreneurial culture' is developed using individual value patterns of entrepreneurs and non-entrepreneurs. Extensive robustness analysis suggests that differences in economic growth in Europe can indeed be explained using this newly developed variable, albeit in an indirect way. Differences in growth are partly due to differences in regional innovativeness, which can be explained by differences in entrepreneurial culture. Therefore, culture affects growth through the intermediating mechanism of innovativeness.

The authors of the third section look at cross-country differences In their contribution entitled "Entrepreneurship and its determinants in a cross-country setting" *Andreas Freytag and Roy Thurik* find that the relative stability of differences in entrepreneurial activity across countries suggests that something other than

economic factors are at play. The authors offer some thoughts about the determinants of entrepreneurial attitudes and activities by testing the relationship between institutional variables and cross-country differences in the preferences for self-employment as well as in actual self-employment. Data of the 25 member states of the European Union as well as the US are used. The results show that country specific (cultural) variables seem to explain the preference for entrepreneurship, but cannot explain actual entrepreneurship. In the paper "Scenario-based scales measuring cultural orientations of business owners", *Christine König, Holger Steinmetz, Michael Frese, Andreas Rauch and Zhong-Ming Wang* measure cultural orientations of business owners using a methodological setup. They hold that, whenever research is oriented towards the individual level, that is, whenever individual business owners are studied, researchers should measure cultural orientations at the individual level instead of culture at the aggregate level. They develop scales measuring cultural orientations of business owners using dimensions such as uncertainty avoidance, power distance, collectivism, assertiveness, future orientation, humane orientation and performance orientation. Scenario-based scales are introduced measuring cultural orientations of business owners. These orientations are manifested in the practices business owners apply in their businesses. Scenario-based measurement (as opposed to common Likert item-based measurement) is certainly new in the world of economic analyses. The scales have been validated on some 450 Chinese and German business owners and proven to be invariant across the two countries. Fully configurable, fully metric, and partial scalar invariance are supported, as well as partial factor variance and partial error variance invariance. This suggests that they hold cross-country validity and allow for meaningful cross-cultural comparisons. *Christian Bjørnskov and Nicolai Foss* discuss in their article "Economic freedom and entrepreneurial activity: some cross-country evidence" the importance of institutions and sound economic policy for entrepreneurial activity as captured by the concept of economic freedom. The authors use a sample of 29 countries from the Global Entrepreneurship Monitoring Consortium (GEM) 2001 as micro-level data source concerning individual firm start-ups and the Index of Economic Freedom of the Fraser Institute for their analysis. The overall size of the state, the quality of monetary policy and overall financial environment are strong determinants of entrepreneurship. Interestingly, the size of government lowers not only the number of *necessity start-ups*, i.e. entrepreneurs who engage in self-employment because they want to hold a decent standard of living or to nourish the family, but also the number of *opportunity start-ups*, that is entrepreneurs who engage in an activity for the reason that it represents an economic opportunity to them. This could contradict recent claims by Scandinavian politicians that the welfare state increases economic dynamism. *Kashifa Suddle, Sjoerd Beugelsdijk and Sander Wennekers* investigate in their paper entitled "Entrepreneurial culture and its effects on the rate of nascent entrepreneurship" the relationship between entrepreneurial culture and the rate of nascent entrepreneurship. Embedded in trait research, they develop a new composite measure of entrepreneurial culture using data from the World Values Survey. To corroborate the results obtained when regressing this newly developed measure on 2002 levels of nascent

entrepreneurship in a sample of 28 countries, they also employ existing indicators of entrepreneurial culture. In contrast with the existing measures they find a significant positive effect of their new measure of entrepreneurial culture. They then (1) discuss the strengths and weaknesses of these existing measures, and (2) interpret the wider implications of their findings for research into the role of entrepreneurial culture in explaining international differences in entrepreneurship rates. Finally, in his contribution "Explaining cross-national variations in entrepreneurship: the role of social protection and political culture" *Martin Robson* analyzes the influence of labour market settings on entrepreneurial activities in 56 countries, including OECD countries and countries in transition like Russia, the East European nations and China. Basically, two ways of influence are possible: While social protection systems reduce the risk of lacking success in self-employment and therefore encourage entrepreneurial activities, high levels of social protection also reduce the income risk of employees relative to the self-employed. Beside the strong effect of former central planning in the economy, the generosity of the unemployment insurance system is found to be a determinant for the propensity to engage in entrepreneurship. This includes the overall level of benefit payments relative to earnings, the strictness of the eligibility criteria for the receipt of benefits and the length of the qualifying period before benefits can be claimed.

In the fourth and last section, the influence of culture on entrepreneurial activity is analyzed. First, in their article "Uncertainty avoidance and the rate of business ownership across 21 OECD countries, 1976–2004", *Sander Wennekers, Roy Thurik, André van Stel and Niels Noorderhaven* discuss whether uncertainty avoidance is a source of entrepreneurship. An occupational choice model is introduced to support the macro-level regression analysis using pooled macro data for 1976, 1990 and 2004 and controlling for several economic variables. It yields evidence that uncertainty avoidance is positively correlated with the prevalence of business ownership. A restrictive climate of large organizations in countries with high uncertainty avoidance seems to push individuals striving for autonomy towards self-employment. For 2004 alone, this positive correlation is no longer found, indicating that a compensating pull of entrepreneurship in countries with low uncertainty avoidance may have gained momentum in recent years. Furthermore, an interaction term between uncertainty avoidance and GDP per capita in the pooled panel regressions shows that the historically negative relationship between GDP per capita and the level of business ownership is substantially weaker for countries with lower uncertainty avoidance. This suggests that rising opportunity costs of self-employment play a less important role in this cultural environment, or are being compensated by increasing entrepreneurial opportunities. *Lorraine Uhlaner and Roy Thurik* focus in their contribution "Postmaterialism influencing total entrepreneurial activity across nations" on post-materialism as a source for entrepreneurship using Inglehart's four item post-materialism index. A distinction is made between nascent entrepreneurship, new business formation and a combination of the two, referred to as total entrepreneurial activity, as defined within the GEM. Their set-up is also tested for the rate of established businesses. A set of

economic, demographic and social factors is included to investigate the independent role postmaterialism plays in predicting entrepreneurial activity levels. In particular, per capita income is used to control for economic effects. Education rates at both secondary and tertiary levels are used as demographic variables. Finally, life satisfaction is included to control for social effects. Data from 27 countries are used to test the hypotheses. Findings confirm the significance of postmaterialism in predicting total entrepreneurial activity and, more particularly, new business formation rates. The two papers of this fourth section show that entrepreneurship is definitely influenced by cultural aspects.

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Part I
Culture and the Individual Entrepreneur

Chapter 2
Entrepreneurial Motivations, Culture, and the Law

Amir N. Licht

Based on the entrepreneurial spirit and what the law can do about it (first published in: Comparative Labor Law & Policy Journal, Vol. 28 No. 4, 2007)

Abstract Inspired by Schumpeter's seminal depiction of the entrepreneur, this chapter recasts this heroic portrait in a more rigorous theoretical framework, leveraging a model of individual value preferences by Schwartz. The entrepreneurial spirit, it is argued, consists of particular value preferences: most importantly high openness-to-change and also high self-enhancement. These hypotheses are consistent with extant empirical evidence. The upshot of this theory – especially when the stability of cultural value orientations is taken into account – is that individual propensities to engage in new venture creation may not be very susceptible to policy measures. Looking specifically at legal measures, this chapter considers measures that could be narrowly targeted to promoting entrepreneurship by making entrepreneurs even more highly motivated than what they appear to be. Recent research indicates, however, that theoretical and empirical issues, which must be resolved before such measures could be employed with confidence, are intractable at this point.

1 Introduction

Fostering entrepreneurship has become a central policy goal for economic institutions around the world, ranging from regional to national to international bodies. Underlying this trend is the belief that entrepreneurship is key for a number of desirable social outcomes, including economic growth, lower unemployment, and technological modernization.[1] This chapter therefore asks a simple and at the same

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[1] See, e.g., Baumol et al. 2007; Carree and Thurik 2003, 2006; van Stel et al. 2005; Wong et al. 2005; Wennekers et al. 2005. On unemployment see Baptista et al. (2006).

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time crucial question: What makes some people more entrepreneurial than others? A companion question follows almost immediately: Can policy makers do something to promote entrepreneurship?

To answer these questions, this chapter returns to Schumpeter's (1912/1934) *Theory of Economic Development*. I argue that Schumpeter was right when he described entrepreneurs as special people. While there are several economic accounts of the functions entrepreneurs fulfill in the economy, Schumpeter's account remains most insightful in capturing the essential qualities that distinguish entrepreneurs from others in society. The central goal of this chapter is to recast Schumpeter's depiction of the entrepreneur in modern economic and psychological terms. A sizable body of literature has examined some psychological traits of entrepreneurs. The greatest amount of attention has been paid to entrepreneurs' attitudes towards risk and to their need for achievement. Work has also been done on entrepreneurial perception. In comparison, the motivational goals that guide entrepreneurs as they choose an entrepreneurial course of action have been relatively neglected. These motivational goals, or value preferences, constitute the "entrepreneurial spirit."

This chapter hypothesizes that beyond seeking material success the crucial element in the entrepreneurial spirit is openness to change – an interest in the different and in new experiences while deemphasizing the safe and the proven. (I also briefly explore entrepreneurs' cognitive style). What makes entrepreneurs special is their attitude toward uncertainty more than toward simple risk. Thus depicted, the Schumpeterian portrait of the entrepreneur is not entirely consistent with the standard depiction of economic actors in neo-classical economics. Yet this portrait is truer to reality. It can thus help up understand the cultural and legal institutions that bear on entrepreneurship.

The chapter proceeds as follows. Section "Portraits of the Entrepreneur" surveys the literature on the nature and characteristics of the entrepreneur from two perspectives: economic and psychological. In particular, this section tries to glean the literature's view on whether entrepreneurs are special individuals or rather ordinary people channeled by circumstances to engage in new venture creation. Section "Entrepreneurial Motivations" addresses the first part of this chapter's title by putting forward a small theory on entrepreneurial motivations and arguing that these motivations constitute the entrepreneurial spirit. Entrepreneurial motivations are claimed to stem from particular individual value preferences according to a theoretical model developed by psychologist Shalom Schwartz. Based on this model, this section then derives testable hypotheses, with which Schumpeter's seminal account of the entrepreneur is highly consistent. Section "The Cultural Context" briefly discusses the cultural context of entrepreneurship, primarily to underscore the stability of informal social institutions. Section "Can Legal Measures Foster Entrepreneurship?" addresses the latter part of this chapter's title: Can law help in fostering entrepreneurship? After briefly discussing the importance and (un)likelihood of improving the general legal infrastructure, I address legal measures that regulate the birth of a new venture (i.e., entry) and its death (i.e., bankruptcy). In both cases, it appears, there is disappointingly little room

for effective intervention targeted at fostering entrepreneurship. The last section concludes here.

2 Portraits of the Entrepreneur

2.1 Defining Entrepreneurship

A well-known problem in the study field of entrepreneurship is the lack of an agreed definition for this concept. This has led to considerable disarray in the literature. In particular, it is unclear whether innovation is a necessary element for entrepreneurship, or does self-employment suffice, or whether self-employment and ownership of a small business firm are equally entrepreneurial (see Ulijn and Brown 2003). The etymology of "entrepreneurship" derives from French and German words for "undertaking" (*entreprendre*, *unternehmen*, respectively). Yet the linguistic exercise does not convey the full meaning of being an entrepreneur.

A good definition of entrepreneurship should consider the role of the entrepreneur in the economy. However, the question "what is entrepreneurship?" is usually answered by stating "what entrepreneurs do," which oftentimes transforms into "what are entrepreneurs like." The following describes three major roles for entrepreneurs that the economic literature has recognized and the types of persons who would perform these roles. I then briefly consider more recent discussions of characteristic features of entrepreneurs. Next, I review some personal psychological traits that have been associated with individuals' tendency toward entrepreneurship.

2.2 The Entrepreneur in Economics

In the standard neo-classical economics of the late nineteenth century, things don't change in the general equilibrium. There is no room for entrepreneurship. Prominent economists from the eighteenth and nineteenth centuries, including Cantillon, Smith, and Say, have nonetheless recognized the pivotal role of entrepreneurship in the economy as the source of change, development, and progress (see van Praag (1999); Hébert and Link (1989); Gartner (1990); Kao (1993)).

Schumpeter continued the work of Cantillon by developing a theory of economic development as a dynamic process of change. The entrepreneur in the Schumpeterian scheme brings about the famous "creative destruction" by finding new combinations for production. The entrepreneur differs from other providers of resources such as land, financial capital, labor, and even from inventors who provide patents. The entrepreneur's main function is to overcome the difficulties engendered by uncertainty (Schumpeter 1928). A central premise in Schumpeter's theory

(Schumpeter 1951, p. 248) – which is the focus of this chapter – is that entrepreneurs have special skills for innovation and for dealing with uncertainty.

Knight (1921) provided sound theoretical underpinnings to previous observations about the unique of role entrepreneurs have in addressing uncertainty. Relative to the average person, the entrepreneur is particularly "venturesome," self-confident, and tends to act independently on her own opinion (Knight 1921, p. 269). Kirzner's (1973, 1997) entrepreneur resembles Schumpeter's in that both are agents of change in the economy. Kirzner's entrepreneur operates primarily as a gaps-closing arbitrageur, however, while Schumpeter's archetypal entrepreneur innovates and creates (Kirzner 1999). In Lazear's (2004, 2005) theory too, the entrepreneur differs from most other people in the population. Counter-intuitively, however, what makes him special is that he doesn't excel in anything in particular. He is "Jack-of-all-trades." Lazear and others have shown that entrepreneurs have a more varied curriculum as students and tend to work in a greater number of jobs (Lazear 2005; Wagner 2003; Åstebro 2006). Silva (2006) argues that while entrepreneurs tend to have a broader experience, the choice to become an entrepreneur is driven by unobservable factors. Åstebro (2006) argues that entrepreneurs have a "taste for variety." Santarelli and Vivarelli (2006), in a discussion of this literature, conclude that the reason may be *ex-ante* innate characteristics.

The economic literature has not delved specifically into such "taste for variety." However, two other personal traits of entrepreneurs have attracted some attention, namely, a preference for non-pecuniary rewards and, more specifically, a preference for autonomy (Hamilton 2000; Moskowitz and Vissing-Jørgensen 2002; Kerins et al. 2004; Amit et al. 2001). Benz (2007) and Benz and Frey (2008) thus argue that in essence, entrepreneurship is a non-profit-seeking activity. According to Benz, entrepreneurs derive non-monetary benefits from engaging in entrepreneurship, primary among which is greater autonomy.[2] Benz's theory therefore rationalizes behavioral patterns of entrepreneurs that otherwise could have been dubbed – and likely dismissed – as irrational. In a similar vein, another common observation about entrepreneurs concerns their seeming over-optimism (Arabsheibani et al. 2000; Bernardo and Welch 2001; Cooper et al. 1988).

2.3 *Psychological Analyses of Entrepreneurial Attributes*

The notion, that entrepreneurs may have special personal attributes in comparison to the general population, hasn't gone unnoticed among psychologists. The literature on this subject is broad but quite unorganized, such that surveying it in full is well beyond the scope of the present chapter (see Shook et al. 2003; Krueger 2003 for surveys). Gartner (1988) argued that entrepreneurship research should not focus

[2] See also Blanchflower and Oswald (1998); Blanchflower (2000); Kawaguchi (2004); Beugelsdijk and Noorderhaven (2005); van Gelderen et al. (2003); van Gelderen et al. (2006).

on entrepreneurs' individual personality but rather on entrepreneurial action (i.e., venture creation), which is more socially contextual. Yet the quest for a psychological profile of the entrepreneur continues. The little agreement that used to exist until recently in this respect was that such personal attributes have not yet been identified. Shook et al. (2003, p. 382) thus concluded that "[t]he search for an entrepreneurial personality profile was largely unsuccessful." In recent years, however, psychologists have been revisiting the empirical literature with the tool of meta-analysis such that clearer patterns are beginning to emerge.

In general, the attributes and themes studied by psychologists reflect the special qualities and roles that economists have attributed to entrepreneurs. Early work looked at three major psychological constructs that appear consistent with an "entrepreneurial personality," namely, high need for achievement, internal locus of control, and a risk-taking propensity (Korunka et al. 2003).

Need for achievement was defined by McClelland (1961) as a motivation to excel in attaining goals in competitive settings through hard work, self-challenging, and persistence. Entrepreneurs may have an image of high-achievers, yet studies show that entrepreneurs do not stand out significantly in terms of their need for achievement. Non-entrepreneurs can be equally achievement-seekers at times and entrepreneurs may not exhibit a stable high need for achievement (Rauch and Frese 2000). A recent meta-analysis of the relationship of achievement motivations to entrepreneurial behavior nonetheless finds a positive correlation between the former and the choice of an entrepreneurial career and entrepreneurial performance (Collins et al. 2004). Having an internal locus of control – a personality factor reflecting a belief that one can influence the outcomes of one's life (Rotter 1966) – has also been related to an entrepreneurial personality. The extant evidence is mixed, leading Rauch and Frese (2000) to conclude that there seems to be other variables moderating the relationship between internal locus of control and becoming a small business owner.

In line with the common depiction of entrepreneurs as risk-bearers, the corollary has been that less risk averse individuals will become entrepreneurs, while the more risk averse will prefer wage income (Kihlstrom and Laffont 1979; van Praag and Cramer 2001). A pioneering empirical study by Brockhaus (1980) failed to find support for a link between entrepreneurial action and risk-taking propensity, however. The received wisdom about such link subsequently thus was that it has not been established empirically. Evidence about entrepreneurs' higher risk propensity continues to accumulate, however. For instance, interim results from large surveys directed by economists in Russia and China, albeit without a psychological theoretical framework, indicate such high propensity (Djankov et al. 2005, 2006).

In a meta-analysis of risk propensity differences between entrepreneurs and managers, Stewart and Roth (2001) conclude that the literature as a whole in fact suggests that entrepreneurs do have a somewhat higher risk propensity than managers. Moreover, when a distinction is made between income-oriented and growth-oriented entrepreneurs – i.e., small business owners interested mostly in producing family income versus firm owners interested in profit and growth, respectively – the latter entrepreneurs exhibit a markedly higher risk propensity. While the

clarification of the empirical results is commendable, it should be emphasized that the theory of entrepreneurship revolves around Knightian uncertainty, not around risk. More work is needed in order to empirically test this proposition, for which the currently available evidence is only indirectly relevant.

There are numerous additional studies examining possible links between psychological variables and entrepreneurial personal qualities. Of these, two factors in particular may be mentioned: personality traits and cognitive factors. Traits are dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings and actions (McCrae and Costa 1990, 1997). Psychologists use the five-factor model (FFM, or "Big Five model") as the dominant approach for representing the human trait structure (McCrae and John 1992). The model asserts that five basic factors describe most personality traits: openness to experience, extraversion, agreeableness, conscientiousness, and neuroticism.

Researchers have used the Big Five model to predict individual differences in entrepreneurial attributes. Comparing entrepreneurs to managers, Zhao and Seibert (2006) find that entrepreneurs score higher on conscientiousness and openness to experience, and lower on neuroticism and agreeableness. These finding are in line with the findings on entrepreneurs' risk propensity.[3] Although there is no known direct link from personality traits to entrepreneurial action, the findings suggest that individuals with this personality profile may be more attracted to engaging in entrepreneurship and may find this more satisfying than others do and/or relative to other occupations. Individuals with such personality traits may also be more successful in mobilizing support for their entrepreneurial venture from capital providers, employees, etc.

Kirzner's theory of entrepreneurship postulates that alertness is the special quality distinguishing entrepreneurs from most others. Stevenson and Jarillo (1990), among others, define that entrepreneurship as an orientation toward opportunity recognition. These views point to the importance of entrepreneurs' cognitive faculties, including perception, memory, information processing, and decision making. Entrepreneurs arguably excel in cross-linking and rearranging information in ways that lead them to new projects. Research on these variables among entrepreneurs – what may be called "entrepreneurial cognition" – is still developing.[4] Some researchers question the fruitfulness of this line of research (Alvarez and Barney 2006). Work by others, however, suggests ways for progress. Baron (2006) argues that entrepreneurial opportunity recognition may be analyzed as a specific case of pattern recognition – of "connecting the dots." Baron 2000; Baron and Ensley 2006; see also Gaglio 2004) further argues that entrepreneurs are less likely to engage in counterfactual thinking; when they see a pattern they stick to it.

[3] There is some controversy whether risk propensity is a specific combination of trait positions on the FFM or an additional, sixth, dimension of personality traits. See Zhao and Seibert (2006).

[4] For reviews, see Wadeson (2006); Krueger (2003); Mitchell et al. (2004; 2007); see also Gaglio and Katz (2001).

If true, this particular cognitive style may allow entrepreneurs to come up with new ideas and at the same time to avoid procrastinating about them for too long.

To recap, research on the individual psychology of the entrepreneur after two decades is beginning to yield a clear portrait, the features of which are well-anchored in rigorous analysis. Entrepreneurs are indeed special individuals in that they tend to exhibit a particular combination of psychological attributes compatible with their role in the economy as new venture creators. Needless to say, this does not mean that all entrepreneurs exhibit these attributes equally strongly during their entire career.[5] Nor does this proposition deny the importance of the social context in which potential entrepreneurs emerge and operate. Finally, the focus herewith has been on individual psychological attributes. Proclivity toward entrepreneurship at the firm level – known as "Entrepreneurial Orientation" – raises additional issues not discussed here (see Lumpkin and Dess 1996, 2001).

3 Entrepreneurial Motivations

3.1 The Theoretical Challenge

A comparison of the economic and psychological accounts of entrepreneurial attributes points to a peculiar discrepancy. Economists at a very early stage recognized that entrepreneurs might be driven toward new venture creation by more than a simple desire for wealth attainment. In economics, wealth attainment is a standard proxy for self-utility maximization, which, in turn, is commonly used as a first-cut approximation for rational preferences. One can therefore immediately see that postulating "autonomy", "independence", or "variety" as goals that entrepreneurs pursue in fact challenges basic precepts of neo-classical economics. Absent a general theory of motivations, however, simply assuming that autonomy, or other factors, operate as arguments in people's utility functions would lead to tautology.

The budding literature on non-pecuniary motivations indicates that economic analysis of entrepreneurial motivations may lead to a more fundamental rethinking of economic theory. As the following section shows, however, Schumpeter had already foreseen both the need to account for non-pecuniary motivations and the fundamental challenge they pose to economic theory. Against this backdrop, one may note with surprise the paucity of psychological studies on entrepreneurial motivations.

[5] Schumpeter (1934, p. 78) points out that "being an entrepreneur is not a profession and as a rule is not a lasting condition;. . .everyone is an entrepreneur only when he actually 'carries out new combinations' and loses that character as soon as he has built up his business, when he settles down to running it as other people run their business."

While the survey in the preceding part cannot possibly be exhaustive, it covers the major psychological factors discussed in the entrepreneurship literature. The issue of entrepreneurs' motivational goals has been virtually neglected.[6] One strand of the literature – namely, the studies dealing with entrepreneurs' need for achievement – comes close to addressing this subject. Other variables – such as personality traits, risk propensity, etc. – may correlate partially with motivational goals but they are conceptually different.

The upshot is that a central feature in the economic analysis of entrepreneurial behavior lacks moorings in psychology. Economists thus find themselves making behavioral propositions, which, notwithstanding their plausibility, are detached from behavioral scientific analysis. In this situation, deriving normative prescriptions – and in particular, recommending legal reform with a view to fostering entrepreneurship – would be questionable at best. This part therefore presents a small theory of entrepreneurial motivations that integrates current psychological theory with Schumpeter's classic economic insights.

3.2 Entrepreneurial Values

To generalize from the literature surveyed above, the debate over the nature of the entrepreneur essentially asks whether entrepreneurs are special individuals or is anyone, under certain conditions, equally likely to be an entrepreneur. In the context of motivations, this debate thus suggests our first hypothesis: People who become entrepreneurs have a particular set of motivational goals. Stated otherwise, entrepreneurs stand out in term of the issues that they consider important and worth pursuing in life. The null hypothesis therefore is that entrepreneurs' goals are not significantly different from the goals of the general population.

As already noted, there is evidence, gathered mostly by economists, that entrepreneurs seek autonomy more than wealth attainment. Some preliminary evidence suggests that they also seek variety. However, deriving a general hypothesis from these sporadic observations requires first a general theory of motivational goals. To this end, I use Schwartz's (1992) theory on individual-level value preferences. Values are defined as conceptions of the desirable that guide the way individuals select actions, evaluate people and events, and explain or justify their actions and evaluations. In this view, values are trans-situational criteria or goals (e.g., security, wealth, justice), ordered by importance as guiding principles in life. Values are not objective, cold ideas. Rather, when values are activated, they become infused with feeling. The trans-situational nature of values means that values transcend specific actions and contexts. Obedience, for example, is relevant at work or in

[6]For the present study, I have conducted searches in both JSTOR and Econlit databases and extensive, though obviously not comprehensive, searches of internet resources. A study that bears directly on this subject and is discussed in more detail below is Fagenson (1993).

school, in sports or in business, with family, friends or strangers (Rokeach 1973; Schwartz 1992).

Milton Rokeach (1973) provided a clear definition of values as guiding principles in life and proposed a list of values that was meant to be universal and comprehensive. Schwartz and Bilsky (1987) analyzed cross-national data based on a survey instrument developed by Rokeach and confirmed the existence of certain value types in each country. Schwartz (1992, 1994) advanced a comprehensive model of individual-level values that represent universal requirements of human existence (biological needs, coordination of social interaction, group functioning) as motivational goals. Schwartz extended the Rokeach value inventory with values drawn from other cultures, including Asian and African ones. Table 1 provides definitions of the ten values types distinguished by Schwartz and value items that reflect them.

An interesting feature of the Schwartz model is the structural interrelations among value types. These value types can be drawn as segments of a circle. Figure 1 depicts this spatial arrangement. Adjacent value types are conceptually close to one another whereas opposing value types express conceptually diametrical goals in life. Thus, individuals who put a high emphasis on values of universalism (social justice, equality) would also tend to emphasize benevolence values (helpful, honest, etc.). People who emphasize universalism and benevolence would tend to de-emphasize values that belong to opposing value types (e.g., achievement versus benevolence).

The ten value types distinguished by Schwartz are organized along two bipolar orthogonal dimensions. These dimensions reflect a higher level of conceptual commonality among value types. One dimension, entitled self-enhancement versus

Table 1 The Schwartz individual values and representative items

Self-Direction. Independent thought and action-choosing, creating, exploring (creativity, freedom, independent, curious, choosing own goals)
Stimulation. Excitement, novelty and challenge in life (daring, a varied life, an exciting life)
Hedonism. Pleasure and sensuous gratification for oneself (pleasure, enjoying life)
Achievement. Personal success through demonstrating competence according to social standards (successful, capable, ambitious, influential)
Power. Social status and prestige, control or dominance over people and resources (social power, authority, wealth)
Security. Safety, harmony and stability of society, of relationships and of self (family security, national security, social order, clean, reciprocation of favors)
Conformity. Restraint of actions, inclinations and impulses likely to upset or harm others and violate social expectations or norms (self-discipline, obedient, politeness, honoring parents and elders)
Tradition. Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide (accepting my portion in life, humble, devout, respect for tradition, moderate)
Benevolence. Preservation and enhancement of the welfare of people whom one is in frequent personal contact (helpful, honest, forgiving, loyal, responsible)
Universalism. Understanding, appreciation, tolerance and protection for the welfare of all people and for nature (broadminded, wisdom, social justice, equality, a world at peace, a world of beauty, unity with nature, protecting the environment)

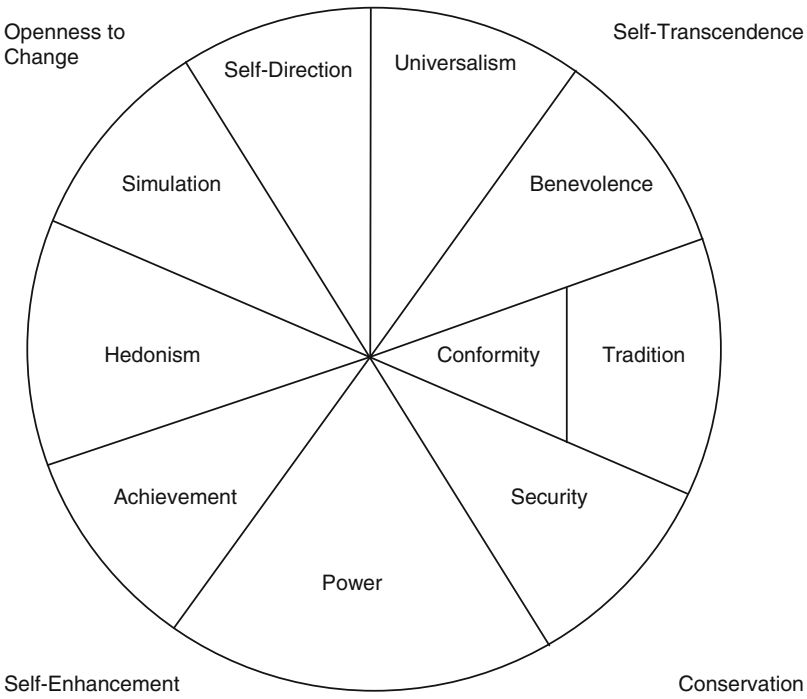

Fig. 1 The structure of relations among individual values according to Schwartz (1992)

self-transcendence, opposes power and achievement values to universalism and benevolence values. The dimension of openness to change versus conservation opposes self-direction and stimulation to security, conformity, and tradition values. Hedonism values share elements of both openness to change and self-enhancement. The Schwartz model thus provides a nearly universal description of the content and structural relations of human values at the individual level (Rohan 2000; see also Bilsky and Koch 2002). Values have been conceptualized as the core of one's personal identity (Hitlin 2003). Value priorities in this model relate systematically with personality traits under the Big Five model (Roccas et al. 2002). Value priorities furthermore have been linked to behavior in a number of studies (Bardi and Schwartz 2003; Barnea and Schwartz 1998; Caprara et al. 2006). The path from values to behavior is not direct and involves mediating factors, however (e.g., Verplanken and Holland 2002).

From an economic analysis perspective, the Schwartz theory provides a comprehensive model of human motivations. Representing the set of conceptions of the desirable, the distinct ten values can be seen as ten distinct arguments in individuals' utility functions. This theory thus may help in advancing the debate over the meaning of rationality among law and economics scholars that took place at the turn of the century. In particular, by providing a framework for generating and testing falsifiable hypotheses, this theory may help in meaningfully integrating

non-material, non-self-utility into economic analysis. It deserves emphasizing, however, that between the two value dimensions, openness-to-change versus conservation and self-enhancement versus self-transcendence, the former is more foreign to standard economic theory.

Consider self-enhancement versus self-transcendence. Not until too long ago, a debate was raging whether "economic man" – i.e., the expected-self-utility maximizer – provides a satisfactory model for economic actors. This debate is largely over (Camerer and Fehr 2006; Rabin 2002). A large body of evidence shows that people may incur substantial costs systematically to promote other people's interests or just "to make a point." In such cases, the self-utility that may accrue to the actor is affected by the utility accruing to others. Stated otherwise, people regularly care about others in the society. Hence the terms "social preferences" and "other-regarding preferences" to describe such motivations.[7] The current debate in economics revolves around the precise content of such other-regarding preferences, namely, the ways in which actors incorporate others' utility into their own utility function (e.g., Fehr and Schmidt 1999; Charness and Rabin 2002).

Within the Schwartz model, self-regarding and other-regarding preferences map onto the self-enhancement versus self-transcendence dimension, respectively. Self-regarding preferences comprise seeking pure pleasure to oneself, which corresponds with hedonism values, as well as other forms of attaining utility, both material and non-material, which is partially covered by achievement values. On the opposite pole of this dimension, altruistic preferences directed to particular others are conceptually compatible with benevolence values. More open-ended other-regarding preferences, postulated mainly by Charness and Rabin, are conceptually compatible with Schwartz's universalism value.

The motivations covered by the openness-to-change versus conservation dimension are relatively less developed in economics. Theoretical work addressing the Ellsberg Paradox (Ellsberg 1961) indicates that people have an ambiguity aversion, or Knightian uncertainty aversion (distinguished from risk aversion) (Segal 1987; Halevy 2007). That is, when asked to choose among risky outcomes, people ascribe lower utilities to outcomes about which they don't know the probability of risk levels. Empirical studies strongly confirm the existence of ambiguity aversion (Halevy 2007). This type of preference is conceptually compatible with high priority on conservation values, while lower ambiguity aversion is compatible with openness-to-change. Elsewhere I argued that from a cognitive point of view, uncertainty, ambiguity, and complexity are linked because they entail a higher cognitive load. Individual priorities on the conservation versus openness-to-change dimension further relate to different psychological constructs of cognitive style (Licht 2004).[8] Specifically, a higher need for cognitive closure is conceptually related to greater emphasis on conservation and vice versa. The emphasis on

[7] "Other-regarding preferences" is a more accurate term than "social preferences" because the latter might mistakenly connote group preferences.

[8] On motivated cognition, see Jost et al. (2003).

preserving the status quo – whether real or an imaginary ideal thereof (consider "family values") – is especially clear in such value items as respect for tradition, honoring parents and elders, and social order. The preference for certainty and stability over ambiguity and change is also reflected in seemingly innocuous value items like cleanliness that convey a sense of clarity.

Within this theoretical framework, several hypotheses can now be derived about individuals' value priorities as representations of their motivational goals and their proclivity to engage in entrepreneurship.

First, at a high level of generality, entrepreneurs would score higher on openness-to-change values than on conservation values. The role ascribed to entrepreneurs in economic theory is that of agents of change. Whether thanks to greater uncertainty tolerance a la Knight, or to an urge for seeking new combinations a la Schumpeter, or to their superior alertness to new information a la Kirzner, entrepreneurs are expected to feel more comfortable with changing circumstances. Relative to the general population, entrepreneurs are expected to ascribe lower desirability to keeping with the "tried, tested and true," to following what their bosses or elders tell them to do, etc. (the latter reflecting higher priority for conservation values). More specifically, one should expect to see entrepreneurs giving especially high priority to self-direction (reflected, e.g., in being independent, curious, creative, and able to choose one's own goals) and also to stimulation (reflected, e.g., in being daring and in having a varied life).

Second, entrepreneurs would score higher on self-enhancement values than on self-transcendence values. This hypothesis might seem somewhat less novel than the preceding hypothesis because a central value in self-enhancement is achievement. Schwartz (1992) defines the achievement value as "personal success through demonstrating competence according to social standards." This definition is close to McClelland's definition of the need for achievement motive. McClleland's need for achievement construct furthermore has been theoretically and empirically linked to the Schwartz achievement value (Bilsky and Schwartz 2006). Thus, we would expect entrepreneurs more than others to consider personal success as a central goal in their life. The Schwartz model predicts that concomitantly with the greater emphasis on personal success, entrepreneurs will ascribe lesser importance to benevolence and universalism values, which constitute the self-transcendence pole. Entrepreneurs will thus be relatively less inclined to endorse other-regarding preferences.

To my knowledge, no study has investigated entrepreneurs' value preferences in the Schwartz framework.[9] Only a handful of researchers have drawn on Rokeach's theory to posit a link between individual value preferences and a proclivity to entrepreneurship. Rokeach postulated a distinction between terminal and instrumental values, where the former represent preferred end-states of being or global goals in life, while the latter represent preferred modes of conduct toward such

[9] Several studies attempted linking values with entrepreneurship but they suffer from serious methodological weaknesses. For a critical survey see Bird and Brush (2003).

end-states. Surveying the literature as of 1989, Barbara Bird hypothesized, based on the Rokeach theory, that entrepreneurs would have a preference for autonomy and independence as instrumental values (cited in Bird and Candida 2003). Bird further conjectured that entrepreneurs' terminal value priorities would emphasize fame, status and power, and that they may consider money primarily as a way of keeping score in an achievement "game."

Fagenson (1993) reported results from the only theory-driven study of differences in value priorities among US managers and entrepreneurs, using the Rokeach framework. Entrepreneurs scored significantly higher on terminal values of self-respect, freedom, a sense of accomplishment, and an exciting life, and also on instrumental values of being honest, ambitious, capable, independent, courageous, imaginative, and logical. Managers scored significantly higher than entrepreneurs on terminal values of true friendship, wisdom, salvation, and pleasure, and on instrumental values of loving, compassionate, forgiving, helpful, and self-controlled. The Schwartz model does not support Rokeach's instrumental/terminal values distinction. However, the Schwartz Values Survey, which was used to confirm the model, includes many value items from the Rokeach Values Survey. Mapping the Rokeach items onto the Schwartz values and higher-level value dimensions indicates that Fagenson's findings are consistent with the hypothesis advanced above. Specifically, entrepreneurs scores higher than managers on items that reflect stimulation, self-direction, and achievement in the Schwartz model.

The evidence gathered by economists lends further support the above hypotheses. Recall the studies mentioned above that demonstrate entrepreneurs' preference for autonomy. Although lacking in theoretical underpinning, the evidence, showing that entrepreneurs prefer to be their own bosses, that they like to be independent, and so forth, is consistent with higher priority on self-direction. The evidence on a preference for variety, which Santarelli and Vivarelli (2006) take to be an *ex-ante* innate characteristic, likewise is consistent with higher openness to change. Similarly, with regard to Lazear's (2005) model, the Schwartz model provides a motivational theory on *why* some people happen to be "Jacks of all trades," happen to pursue studies in several fields as well as several careers, etc., and maybe more likely to succeed as entrepreneurs as a consequence. The (hypothesized) reason is that they have a particular value preference profile.

3.3 Schumpeter Revisited

Although hardly neglected, Schumpeter's theory of the entrepreneurial spirit remains under-appreciated, or at least under-utilized, for informing current theoretical accounts. This section revisits Schumpeter's account of the entrepreneur and demonstrates that it is highly compatible with the theory of entrepreneurial motivations advanced above. The theory of entrepreneurial motivations thus recasts Schumpeter's theory in a rigorous analytical framework that renders the latter susceptible to empirical investigation.

Among the theories of the economic role of the entrepreneur, Schumpeter's theory stands out as the most comprehensive. As noted above, Knight's theory of the entrepreneur as a bearer of uncertainty may be subsumed into Schumpeter's theory. Kirzner himself, in recent writings, pointed to the consistency between his theory and Schumpeter's theory in regards with alertness to new combinations of information. Lazear's theory is devoid of reference to motivation but is nonetheless premised on combinations of skills and experiences that lead one to pursue new venture creation.

Writing nearly a century ago,[10] Schumpeter's account remains insightful, rich, and vivid. It would be a mistake to take it as romantic. Schumpeter likely appreciated the entrepreneurial type ("our type," in his words). Yet the attributes he ascribed to the entrepreneur were not merely romantic embellishments. These attributes derive from his analysis of entrepreneurs' role in the economy. Even today, Schumpeter's analysis is so sharp that to the extent possible, the following section draws on his own words for the presentation of his arguments. I limit myself to providing headlines and to suggesting some interpretation.

- It's the motivations,. . . .

Schumpeter had identified the weak points in the standard economic account of economic agents. These lifeless agents could not bring about economic change and development. Schumpeter (1934, p. 90) thus saw the crux of being an entrepreneur as having an unusual set of motivations.

> We shall finally try to round off our picture of the entrepreneur in the same manner in which we always, in science as well as in practical life, try to understand human behavior, viz. by analysing the characteristic motives of his conduct.

- Psychology can inform economic analysis.

In order to develop a decent account of entrepreneurial motivations economists may draw on psychology. Schumpeter was thus reflecting an interdisciplinary mode (and mood) of analysis, which had had more currency but later on went out of fashion (see Lewin 1996). In an effort to preempt objections from advocates of the strict "revealed preferences" approach, Schumpeter (1934, p. 90) nevertheless emphasizes that his theory is testable even by the standards of revealed preferences.

> Any attempt to [analyze the motives of entrepreneurs' conduct] must of course meet with all those objections against the economist's intrusion into "psychology" which have been made familiar by a long series of writers. . . [N]one of the results to which our analysis is intended to lead stands or falls with our "psychology of the entrepreneur," or could be vitiated by any errors in it. Nowhere is there. . . any necessity for us to overstep the frontiers of observable behavior. Those who do not object to all psychology but only to the kind of psychology which we know from the traditional textbook, will see that we do not adopt any part of the time-honored picture of the motivation of the "economic man."

[10] Schumpeter wrote the first edition of *The Theory of Economic Development* in 1911 and rewrote the text in 1926 for the second German edition, which appeared in English in 1934. Schumpeter (1934, p. ix).

- Entrepreneurs are rational agents, but their self-utility stems from other sources.

Practicing what he was preaching, Schumpeter's account of the entrepreneur and her motivational goals is a masterful demonstration of creative destruction. Schumpeter (1934, p. 91) thus emphasizes that his theory belongs in the mainstream of economic analysis as it is premised on a conventional definition of rationality as self-utility maximization.

> [O]ur type... he may indeed be called the most rational and the most egotistical of all... And the typical entrepreneur is more self-centred than other types, because he relies less than they do on tradition and connection and because his characteristic task - theoretically as well as historically - consists precisely in breaking up old, and creating new tradition...

However, it is impossible to analyze entrepreneurship if self-utility is limited to material consumption and sensuous gratification to oneself. Schumpeter (1934, p. 92–93) thus foreshadowed the current debate in economics over interpreting rationality.

> But [the entrepreneur's] conduct and his motive are "rational" in no other sense. And in no sense is his characteristic motivation of the hedonist kind. If we define hedonist motive of action as the wish to satisfy one's wants, we may indeed make "wants" include any impulse whatsoever, just as we may define egoism so as to include all altruistic values too, on the strength of the fact that they also mean something in the way of self-gratification. But this would reduce our definition to tautology.
>
> Hedonistically, therefore, the conduct which we usually observe in individuals of our type would be irrational. This would not, of course, prove the absence of hedonistic motive. Yet it points to another psychology of non-hedonist character, especially if we take into account the indifference to hedonist enjoyment which is often conspicuous in outstanding specimens of the type and which is not difficult to understand.

- Beyond Hedonism: Achievement and Power

Having clarified that a conventional, hedonistic self-utility cannot explain entrepreneurship, Schumpeter moves on to make his famous argument on entrepreneurial motivations. The motivations posited by Schumpeter (1934, p. 93) read like textbook descriptions of Schwartz's self-enhancement values – achievement and power.

> First of all, there is the dream and the will to found a private kingdom, usually, though not necessarily, also a dynasty... Its fascination is specially strong for people who have no other chance of achieving social distinction. The sensation of power and independence loses nothing by the fact that both are largely illusions... Then there is the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake, not of the fruits of success, but of success itself... And again we are faced with a motivation characteristically different from that of "satisfaction of wants" in the sense defined above, or from, to put the same thing into other words, "hedonistic adaptation."

- Beyond Hedonism: Self-Direction and Stimulation

The desire to demonstrate achievement and power (but mostly achievement) does not exhaust entrepreneurial motivations. Next, Schumpeter (1934, p. 93–94)

turns to the more elusive motivations, those of openness-to-change in the Schwartz model - self-direction and stimulation.

> Finally, there is the joy or creating, of getting things done, or simply of exercising one's energy and ingenuity. This is akin to a ubiquitous motive, but nowhere else does it stand out as an independent factor of behavior with anything like the clearness with which it obtrudes itself in our case. Our type seeks out difficulties, changes in order to change, delights in ventures. This group of motives is the most distinctly anti-hedonist of the three.

4 The Cultural Context

This chapter focuses on entrepreneurial motivations as representations of the "entrepreneurial spirit." The analysis therefore takes place at the individual level. The literature, however, has noted the importance of the social context in which individuals engage in entrepreneurial action. Schumpeter (1934, p. 91) put forward this insight long ago in his discussion of the sources of economic motivations in general, again foreshadowing insights from modern economic sociology:

> [We should] recognise that economic motive so defined varies in intensity very much in time; that it is society that shapes the particular desires we observe; that wants must be taken with reference to the group which the individual thinks of when deciding his course of action – the family or any other group, smaller or larger than the family;. . . that the field of individual choice is always, though in very different ways and to very different degrees, fenced in by social habits or conventions and the like.

Ample research indeed documents the importance of family background, prior education, social connections and networks, and so forth for effectuating entrepreneurial potential.[11] In particular, social norms in individuals' environment have been shown to affect their choice to become entrepreneurs even for a lower income (Giannetti and Simonov 2004).

At the highest level of social context, there is virtual consensus in the entrepreneurship literature that culture bears a profound impact on all facets of entrepreneurship in societies (see Hayton et al. 2002; Licht and Siegel 2006 for surveys). This literature almost invariably draws on a theory of cultural value dimensions advanced by Hofstede (1980, 2001).[12] These culture-level dimensions are conceptually different from individual-level value dimensions such as those from Schwartz discussed above. Without elaboration, extant literature seems to suggest that cultures exhibiting high individualism, high masculinity, low uncertainty avoidance, and low power distance in Hofstede's model are more conducive to entrepreneurship. Much of this literature exhibits considerable methodological disarray, however (Licht and Siegel 2006). According to Hofstede (2001, p. 164), low uncertainty avoidance "implies a greater willingness to enter into unknown

[11] See, e.g., Shane (2000); Saxenian (2002); Guiso and Schivardi (2005); Djankov et al. (2005, 2006); Gompers et al. (2005).

[12] HOFSTEDE (1980, 2001).

ventures." Other studies are consistent with the idea that a climate of high uncertainty avoidance in large organizations pushes enterprising individuals to go out and create their own businesses (Hofstede et al. 2004; Wennekers et al. 2007). In a joint study with Siegel and Schwartz, using a culture-level value dimension model from Schwartz (1999, 2006), we link higher entrepreneurship levels with lower scores on harmony, a cultural orientation related to societal disapproval of assertive change and of venturing (Siegel et al. 2007a). This relation is observed using data from the Global Entrepreneurship Monitor (GEM) as well as data on firm-age-skewness or firm-employment-size-skewness (Alfaro and Charlton 2006).

The literature on the link between culture and entrepreneurship at the national level is still making its first steps. Because culture is a fundamental, deep-seated social institution, its influence on entrepreneurship flows through numerous causal channels. A central channel is individual value priorities. The cultural theories from Hofstede and Schwartz postulate that cultural orientations may significantly affect individual value priorities in the nation.[13] These value priorities include the ones described above as defining the entrepreneurial spirit – namely, high achievement, self-direction, and stimulation. The propensity to engage in entrepreneurship – in other words, the intensity of entrepreneurial spirit – consequently may be affected by the surrounding culture. It is therefore possible to speak not only about entrepreneurial individuals but also about entrepreneurial nations. These are nations whose cultural profile reflects a lower emphasis on uncertainty avoidance or on harmony.

Against this backdrop, policy makers might wonder whether entrepreneurship can be taught? Some optimistic commentators believe that it can. According to Kuratko (2005), "the question of whether entrepreneurship can be taught is obsolete." More level-headed economists point out that the contributions of Schumpeter, Knight, and Kirzner notwithstanding, economics' "limited concept of uncertainty (mere probabilistic risk) sheds little light on how entrepreneurs make decisions in situations characterized by ambiguity regarding key decision variables" (Klein and Bullock 2006).

Granted, numerous technical aspects of engaging in entrepreneurial action can be taught. For instance, the government can provide information – in training centers, through educational programs, in internet websites, etc.- on such issues as different corporate forms and their relative advantages, regulatory requirements for doing business in various industries, etc. This kind of training may be valuable for entrepreneurs in that it would lower their learning costs (and transaction costs more generally). Such training, however, has nothing to do with acquiring entrepreneurial inclinations, which, it is argued, stem from value priorities.

The mechanisms leading to value acquisition are believed to be effective mostly at pre-adolescence age. These mechanisms are influenced by an individual's parenting and other life circumstance (Goodnow 1997). Studies thus have found interrelations between parenting style, personality traits, entrepreneurial orientation, and

[13] I assume for convenience, yet in line with the general literature, that each nation represents a single culture.

entrepreneurial career prospects among German subjects (Schmitt-Rodermund and Vondracek 2002; Schmitt-Rodermund 2004). Cultural value orientations are societies' most basic equilibria on normative issues. Cultural change in terms of significant shifts in value orientations likely takes place very slowly, because of the nature of these orientations as equilibria, or in response to major exogenous shocks. For this and for other reasons, culture is widely believed to be relatively stable over long time periods (e.g., Roland 2004). The causal link from cultural orientations to individual entrepreneurial value priorities consequently would be stable as well and difficult to change. The upshot is that cultural values may induce path dependence in entrepreneurial activity (Woodruff 1999). Many studies indeed find continuity in a country's proclivity for entrepreneurial activity (Minniti et al. 2005). In one case, when the British government under Margaret Thacher attempted to establish an "enterprise culture" in the United Kingdom, the result was failure (Della Guista and King 2006).

5 Can Legal Measures Foster Entrepreneurship?

5.1 Law in Context

Legal measures are the primary tool in the hands of policy makers to engender social change. Other than legal reform, the government can intervene with a view to changing an existing equilibrium in the economy either through fiscal measures or through engaging directly in business activities. (The latter practice has lost its luster in most Western economies, however). In light of the theory – and recently, also evidence – that entrepreneurship is pivotal in processes of economic growth, the question arises whether legal measures could be used by policy makers to promote entrepreneurship. This part explores this subject, first, on a general level and, later, with regard to specific legislation that considers entrepreneurship from the womb to the tomb – i.e., from setting up a business firm to bankruptcy.

A strict construction of the preceding analysis on the role of culture might suggest that culture fully determines entrepreneurship in a society such that *any* effort targeted to foster entrepreneurship would be doomed. Acs and Laszlo (2007), in a recent special journal issue on entrepreneurship policy, thus conclude that "government policy aimed at promoting entrepreneurship or influencing relevant factors cannot be effective in the short run, primarily because of cultural embeddings." The present theory on entrepreneurial values elucidates why this may indeed be the case. The lesson for policy makers should be that measures aimed to fostering entrepreneurship probably should take the surrounding culture into account. At the current state of our knowledge, this is more easily said than done.

Entrepreneurship-promotion programs, centers, and documents, prepared by academics and other commentators alike, are aplenty nonetheless. Policy recommendations that are being proposed in connection with promoting entrepreneurship are not significantly different than the standard reform packages that are intended

to promote market economies in general. Acs and Laszlo's (2007) account exemplifies the sweeping character that such policy recommendations could take. Their list includes trade policy, immigration policy, access to foreign technology, education, science and technology policy, and, finally, litigation and regulation. Baumol et al. (2007) offer a similarly broad program (see also Boadway, R and Jean-François, J.F. 2005; Dixon et al. 2006). While there is no denying that all of the abovementioned issues may bear on entrepreneurship, for the most part they are not limited to entrepreneurship. These issues define economic policy in general – and sometimes much broader policies than economic alone (consider immigration policy) – such that "entrepreneurship" is merely a rallying cry for economic reform, warranted as it may be. Absent a preexisting political conviction, a general analysis of the different public policy measures that could be taken in connection with entrepreneurship is bound to yield ambiguous conclusions.

5.2 Improving Legality

Still on a general level of analysis, a broad consensus among economists holds that social institutions – in particular, "well-defined property rights" and the "rule of law" – are key for economic growth (e.g., Rodrik et al. 2004; Acemoglu and Johnson 2005).[14] The former institution derives from basic welfare theory in economics. In order to enable welfare-enhancing transactions the subject matter of each transaction – who owns what – must be agreed between the parties in privy and also with all third parties.[15] The latter institution, also called "legality", refers to a set of norms and organizations that together lead to general compliance with formal legal rules. Extending this insight to entrepreneurship is straightforward. Boettke and Coyne (2003, p. 67) argue that "[t]he two most important 'core' institutions for encouraging entrepreneurship are well-defined property rights and the rule of law." What is good for the economy in general is good for entrepreneurs. Improving legality, runs the argument, will foster entrepreneurship (Baumol 1990; Harper 1998; Smith and Ueda 2006).

Extant evidence largely supports the above proposition. Examining the emergence of new firms in five former soviet countries, Johnson et al. (1999, 2000, 2002) find that insecure property rights – defined as frequent need to make extralegal payments (bribes), protection, or inefficient courts – were more inhibiting to entrepreneurship than inadequate finance. Desai et al. (2003), using a measure that intertwines both formal delineation and actual protection of property rights, find that in the emerging markets of Europe, greater fairness and more property rights protection increase entry rates, reduce exit rates, and lower skewness in firm-size distribution. Theory and evidence are not limited to transition economies,

[14] This section draws on Licht and Siegel (2006).

[15] It is therefore clear that the scope of "property rights" in this context is broader than the usual legal meaning and includes entitlements to obligatory rights such as debt.

however. Laeven and Woodruff (2007) find that in Mexico, states with more effective legal systems have larger firms, suggesting that a rule-of-law state enables entrepreneurial firms to grow by reducing idiosyncratic risk. Finally, Perotti and Volpin (2007) advance a political economy model and evidence suggesting that lack of political (democratic) accountability and economic inequality hinder entry through decreased investor protection.

The problem with policies intended to improve legality and other related social institutions such as absence of corruption, is that these institutions prove to be very stable. In particular, while these institutions exert a strong influence on a host of social outcomes, including economic development and infant mortality, recent contributions suggest that economic development feeds back to these institutions only weakly or not at all (Acemoglu et al. 2005; Kaufmann and Kraay 2002; Rigobon and Rodrik 2005). In collaborative studies with Schwartz, Siegel, and Goldschmidt, we show that these fundamental institutions, dubbed social norms of governance, are strongly affected by cultural orientations – a finding that helps explain the stability of these institutions (Licht et al. 2007; Siegel et al. 2007b). The upshot is that significant improvements in entrepreneurship levels through improvement in legality are unlikely to take place in the short run.

5.3 Targeted Legislation: Entry

An efficient way to promote entrepreneurship through legislation could be to eliminate unnecessary transaction costs. Suppose that in a particular country – say, Italy – an entrepreneur needs to follow 16 different procedures, pay nearly US$4,000 in fees, and wait some 62 business days for the necessary permits, while in another country, Canada, the same process on average takes two business days, requires only two procedures, and costs about US$280 in fees (Djankov et al. 2002). Few legal reforms look more straightforward than cutting down such superfluous red tape in Italy.

The link between entrepreneurship and regulatory costs of entry, measured by indicators of necessary steps, time, and money required for setting up a simple business firm, turns out to be more elusive, however. Ho and Wong (2007), using GEM data, distinguish three types of entrepreneurship: opportunity-driven (i.e., when entrepreneurs pursue a perceived business opportunity), necessity-driven (when other options for economic activity are lacking), and high-growth potential (when there are expectations for employment growth, market impact, globalization, and use of new technology). In very simple specifications, regulatory costs were found to be negatively linked only to opportunity entrepreneurship, especially in high-income countries. However, no significant link was found either to necessity-driven entrepreneurship and, more surprisingly, to high-growth potential entrepreneurship. Using a more nuanced empirical specification, van Stel et al. (2007) find that these regulatory costs are unrelated to the formation rate of either nascent or young (opportunity-driven or necessity-driven) business firms. An exception is minimum capital requirements,

which indeed have been criticized in the legal literature as redundant and overly burdensome in general (Enriques and Macey 2001).

More research is warranted beyond these preliminary findings. Van Stél et al. conjecture that their surprising result may be due to creative entrepreneurs who somehow find their way around the number of procedures or the amount of time that is required to start up a business. One may note that according to Djankov et al. countries with heavier regulation of entry have higher corruption, while countries with more democratic and limited governments have lighter regulation of entry. Klapper et al. (2006) document a correlation between more intensive entry regulation and lower firm growth as well as lower entry regulation in less corrupt countries. Regulatory entry barriers have no adverse effect on entry in corrupt countries, however. It may be the case that highly motivated entrepreneurs avoid the bureaucratic burden by paying bribes or simply by operating in the unofficial economy (black market). At the same time, in corrupt countries, entry into the official economy is already strongly deterred by systemic institutional weaknesses, including tax rates, corruption, greater incidence of mafia protection, and less faith in the court system (Johnson et al. 2000). The latter conjecture points again to the predominant role of culture in influencing social norms on corruption.

5.4 Targeted Legislation: Exit

Facilitating entrepreneurial activity directly through lower transaction costs of entry does not appear to be a promising strategy in light of currently available evidence. Perhaps, then, policy makers could encourage entry indirectly, by ameliorating entrepreneurs' fear of economic loss – e.g., by making business failure less costly in bankruptcy proceedings. Recall, however, that entrepreneurs are already over-optimistic, above and beyond the level of over-optimism documented in the general population. In particular, financial loss does not deter determined entrepreneurs, who are not "in it for the money," from engaging in new venture creation. Mitigating the financial adversities of business failure therefore may or may not have the intended effect of increasing entrepreneurial activity.[16]

Much of the law and economics theory on bankruptcy has dealt with corporate bankruptcy. For the entrepreneur, however, the relevant bankruptcy in terms of her economic incentives is personal bankruptcy, in which she is called to satisfy her debts from her personal assets. The typical scenario of personal bankruptcy deals with consumers, such as those defaulting on their credit card debt or mortgage payments. Entrepreneurs may face personal bankruptcy proceedings if they operated through an unincorporated firm. In theory, establishing a firm – in most cases, a corporation of one sort or another – should entitle the entrepreneur *qua* shareholder

[16] Another potential adversity of bankruptcy is acquiring a social stigma of failure. I abstract from this aspect here. For a short discussion and further references, see Hahn (2006).

to shield her personal assets from the firm's creditors thanks to the corporation's separate legal personality and to her limited liability. In practice, proprietors of small businesses operating through a corporation are frequently required by their lender to provide collateral and/or personally guarantee the firm's debts. Small entrepreneurs consequently face potential unlimited exposure to their firm's liabilities.

By declaring bankruptcy the debtor may be able to get a "fresh start" if the bankruptcy court does not subject her future earnings to her past liabilities. This type of release is possible under Chap. 7 of the US Federal Bankruptcy Code (11 U.S.C. §701 *et seq*. 2007), which provides for "liquidation," namely, the sale of a debtor's nonexempt property and the distribution of the proceeds to creditors. Although personal bankruptcy procedures in the United States are primarily targeted for consumers such as those defaulting on their credit card debt or mortgage payments, entrepreneurs may take advantage of them as well. The Federal Code leaves room for state legislatures to exempt certain past assets from future liabilities, the most important of which is the homestead exemption.[17]

The homestead exemption essentially creates a "wealth insurance" scheme for the debtor (Fan and White 2003). Even if the business failed, and even if the entrepreneur had to expose her personal wealth to such failure, the exemptions provide a sort of cushion to soften the fall. This insight has led academics recently to advocate a more entrepreneur-friendly bankruptcy law to encourage more vibrant entrepreneurship activity (Lee et al. 2007; Baumol et al. 2007). Hahn (2006) tellingly dubbed his proposal for a swifter, more forgiving discharge in bankruptcy "velvet bankruptcy."

Such exemptions – and leniency in bankruptcy in general – is a double-edged sword, however. On the one hand, the wealth insurance may promote entrepreneurial initiatives as it ameliorates the entrepreneur's fear of losing her home. On the other hand, like any other insurance, this exemption may create a moral hazard problem vis-à-vis the entrepreneur's lenders, thus exacerbating the entrepreneur's credit constraints. In a theoretical model and numerical simulation, White (2005; see also Akyol and Athreya 2005) argues that

> the fresh start is economically efficient except when debtors behave strongly opportunistically... If opportunistic behavior is non-existent or weak, then the optimal policy is the fresh start combined with the highest wealth exemption... However if some or all debtors are strongly opportunistic, then the fresh start policy sometimes becomes inefficient.

[17] There exists an alternative procedure to Chap. 7 liquidation in Chap. 13 of the Code. According to Berkowitz and White (2004, p. 71), "exemption levels are likely to have similar effects on credit markets regardless of the chapter that business owners would choose if they filed for bankruptcy." Another alternative procedure exists when a debtor files for bankruptcy under Chap. 11, which provides for reorganization. The debtor usually proposes a plan of reorganization to keep the business alive and pay creditors over time. Baird and Morrison (2005) have found that the vast majority of Chap. 11 cases deal with small business entrepreneurs trying to extend the life of their business through these proceedings. Bankruptcy judges are aware of and guard against such efforts.

Empirical studies by White and colleagues find support for both facets of the dilemma. Fan and White (2003) find that families are more likely to own and start businesses if they live in states with higher bankruptcy exemption levels (see also Armour and Cumming 2005). In tandem, Berkowitz and White (2004) show that lenders are more likely to turn down small firms in states that have higher exemptions. The question which effect dominates thus becomes an empirical one – that is: are potential entrepreneurs highly opportunistic or not? From a policy perspective, the dilemma becomes more complicated because the same set of exemptions is currently available both to consumers and to entrepreneurs. The issues become complex further yet when the entrepreneur can choose to conduct business in a neighboring jurisdiction with more favorable exemptions. Mathur (2005) indeed finds that higher bankruptcy exemptions in neighboring states lower the probability of starting a business in the state of residence. This, in turn, may engender a race among states to attract entrepreneurs to conduct business in and perhaps even migrate to their jurisdiction.

Lest the reader thought that the problem becomes intractable, two recent studies by Hall and colleagues cast a shadow over the entire discussion. These researchers investigated how the bankruptcy homestead exemptions influence rates of entrepreneurship over time in eight US states, with entrepreneurship being represented as the share of business proprietors (regardless if that business is incorporated) in the working-age population. These researchers find an S-shaped relationship between the homestead exemption and entrepreneurship. Specifically, an increase in the homestead exemption from very low or very high levels acts to reduce the number of entrepreneurs, while an increase in the middle range acts to increase the number of entrepreneurs.

The results are striking. Garrett and Wall (2006) unequivocally indicate that the best policy for promoting entrepreneurship is zero exemption. Georgellis and Wall (2006) at first blush suggests that there may be some room for promoting entrepreneurship through a homestead exemption in approximately the 50–70% range. In a personal exchange with the present author, however, Wall advised that the differences between the two studies may stem from a small difference in year coverage of the data and, more importantly, that the positive section of the curve from Georgellis and Wall (2006) may not be significantly different from zero. Stated otherwise, these econometric analyses, which appear the most sophisticated thus far, suggest that the best entrepreneurship-promoting policy would advocate abolishing the homestead altogether. Perhaps entrepreneurs are too highly opportunistic, as White has cautioned; perhaps lenders cannot distinguish entrepreneurship-debtors from consumption-debtors; perhaps the reason remains to be discovered.

6 Conclusion

Inspired by Schumpeter's seminal depiction of the entrepreneur, this chapter sought to recast this heroic portrait in a more rigorous theoretical framework. To this end, I leverage a model of value preferences developed by Schwartz. The entrepreneurial

spirit, it is argued, consists of particular value preferences: high self-enhancement and high openness-to-change. These hypotheses are consistent with extant empirical evidence. The upshot of this theory – especially when the stability of cultural value orientations is taken into account – is that individual propensities to engage in new venture creation may not be very amenable to policy measures. Looking specifically at legal rules, this chapter attempted to identify measures that could be narrowly targeted at promoting entrepreneurship by making entrepreneurs even more highly motivated than what they appear to be. Recent research indicates, however, that theoretical and empirical issues, which must be resolved before such measures could be employed with confidence, are intractable at this point.

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Chapter 3
The Entrepreneurial Culture: Guiding Principles of the Self-Employed

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The entrepreneurial culture: guiding principles of self-employment (not published)

1 Introduction

Many scholars claim that culture, understood as general values, is important for the level of entrepreneurial activities in a society. Further, the claim that growth differences may be related to differences in entrepreneurial culture was stressed very early (Baumol 1968). This paper aims to analyze the differences in the values of the self-employed in Western European countries. In order to do so, we use a model of values developed by Shalom Schwartz. We try to find values that are important for the entrepreneurial culture. From a traditional perspective, values can be understood as basic criteria that people use to evaluate other people, their actions, and what should happen in a society (Rokeach 1973). Since values can be considered a motivational construct that refers to goals people want to attain, they are of special importance with respect to general economic decisions. Given that values are abstract in nature and that they are distinguishable from other concepts like attitudes or norms that "refer to specific actions, objects, or situations" (Schwartz 1997, p. 71), the concept of values is useful in analyzing whether entrepreneurs share a common value system that distinguishes them from others. In reference to the values concept developed by Schwartz, Licht (2007) noted, "The distinct ten values can be seen as ten distinct arguments in individuals' utility functions" (p.838). Because values serve as guiding principles for people, they are of special interest in determining whether entrepreneurs are different with respect to their guiding principles.

Often, economists describe the Schumpeterian type of ideal as a Superman-like person. However, this is the result of narrowing the concept of entrepreneurship to a very small group of self-employed people with outstanding achievements – thus,

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we find our Superman. But what about the average self-employed person – does he or she differ from non-self-employed people with respect to value systems? In the second section, this paper briefly reviews the literature linking different concepts like values, attitudes, and norms to the self-employed and entrepreneurial activities. The third second section discusses data and methodology issues. The differences found in the value systems of the self-employed are documented in section four. Section five forms the conclusion.

2 Entrepreneurial Culture: Attitudes, Norms, and Values

In general, the idea of cultural aspects that are based on values and influence entrepreneurial behavior goes back to Max Weber. Weber (1920) argued that entrepreneurial activities are influenced by cultural and religious factors – especially relating his concept to the Protestant work ethic. In 1961, McCelland found that the personality of entrepreneurs could be associated with achievement, preference for novel activity, responsibility for failure and success, and a moderate risk-taking propensity. In the past, attempts to measure national culture have been linked in example to growth (Lynn 1991) or inventiveness (Shane 1992). Studies that linked cultural differences and entrepreneurship more directly found that personality measures were able to explain some part of observed growth in a sample of small Swedish firms (Davidsson 1991). In a later study, Davidsson and Wiklund showed that for a small sample of Swedish regions, cultural variation is small and relatively less important for new firm formations (Davidsson and Wiklund 1997). Steensma et al. (2000) discovered that cultural differences impact the attitudes of entrepreneurs with regard to cooperative strategies. In a study focusing on differences in managers and entrepreneurs' value priorities in the United States, Fagenson (1993) learned that an exciting life, sense of accomplishment, freedom, and self-respect are more important to entrepreneurs. In turn managers rated true friendship, wisdom, salvation, and pleasure as more important than entrepreneurs did. Beugelsdijk and Noorderhaven (2005) analyzed differences of the self-employed using attitudes toward social issues, qualities to teach children, and explanations of why people are living in need. They found differences regarding individual orientation, responsibility and effort, and important qualities to teach children. However, the link between a well-developed, theoretical concept of value orientation to entrepreneurship is missing since most other studies aim toward other aspects of the psychology of entrepreneurs. In an elaborate overview, Licht (2007) linked the Schwartz value items to economists' concept of entrepreneurs. Table 1 gives the definitions of the ten value items of the Schwartz model.

Licht theoretically analyzed the concept of value items in the economic framework of entrepreneurial activities. He suggested that entrepreneurs rated benevolence and universalism values lower than non-entrepreneurs while achievement, self-direction, and stimulation were rated higher. Furthermore, Licht argued that

Table 1 Definitions of the Schwartz value items (value items in parentheses)

Self-Direction	Independent thought and action-choosing, creating, exploring (creativity, freedom, independent, curious, choosing own goals)
Stimulation	Excitement, novelty, and challenge in life (daring, a varied life, an exciting life)
Hedonism	Pleasure and sensuous gratification for oneself (pleasure, enjoying life)
Achievement	Personal success through demonstrating competence according to social standards (successful, capable, ambitious, influential)
Power	Social status and prestige, control or dominance over people and resources (social power, authority, wealth)
Security	Safety, harmony, and stability of society, of relationships and of self (family security, national security, social order, clean, reciprocation of favors)
Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (self-discipline, obedient, politeness, honoring parents and elders)
Tradition	Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide (accepting my portion in life, humble, devout, respect for tradition, moderate)
Benevolence	Preservation and enhancement of the welfare of people whom one is in frequent personal contact (helpful, honest, forgiving, loyal, responsible)
Universalism	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature (broadminded, wisdom, social justice, equality, a world at peace, a world of beauty, unity with nature, protecting the environment)

Source: Schwartz (2003), pp. 267–268

value items related to openness to change (like self-direction and stimulation) might indicate a greater preference for variety. Openness to change can also provide economists with a motivational theory to answer the question of why some people tend to be "Jacks-of-all-trades" (Licht 2007). Now it is time to translate the economic image of entrepreneurship into a well-developed concept of human value orientation.

3 Data and Methodology

The data is taken from the European Social Survey 2006/2007 (ESS Round 3). We limit this analysis to a group of nine Western European countries, excluding former socialist East European countries as well as South European countries. Although the Schwartz value concept is nearly universal and applies to all kinds of countries, many facets of the economic concept of entrepreneurship apply especially to Western industrialized countries.[1] The underlying behavioral concept of entrepreneurship includes assumptions about capitalism and the Protestant work ethic,

[1] The main results of this analysis do not change when other (non-West European) countries are included. Nevertheless, the results are not that clear cut, which suggests that the limitations of the concept of entrepreneurship are actually important. In fact, analyzing the boundaries of the entrepreneurship concept from the perspective of entrepreneurial values would be an interesting but different topic.

which are not easily transferable to non-Western industrialized countries (compare Thomas and Mueller 2000 for a discussion of the boundaries of the concept of entrepreneurship). The countries included are Belgium, Switzerland, Germany, Denmark, Finland, France, the United Kingdom, Norway, and Sweden. All analyses are limited to individuals between 18 and 68 years old. In order to compute the scores for the ten human values, a set of 21 questions is used. The following values are derived: security, conformity, tradition, benevolence, universalism, self-direction, stimulation, hedonism, achievement, and power. For a detailed overview of how value orientation is measured, see Schwartz (2003). In order to correct for differences in individual response behavior, centered value scores are computed (compare Schwartz 2003, p. 275). The final data set contains 12,220 observations with 9.82% self-employed people and 90.18% non-self-employed people.

Using European Social Survey data, Schwartz and Rubel (2005) found that men and women construed the value items in the same way. We carried out multidimensional scaling analysis (MDS) that revealed nearly identical spatial representations for entrepreneurs and non-entrepreneurs. This indicates that entrepreneurs also construe the value items as non-entrepreneurs did.

First, the value items are ranked by their mean values for the total sample, the non-self-employed, and the self-employed. Next, the ten human values are used as dependent variables, and a dummy for self-employment is included in a regression. Additional control variables are gender, age, years of full-time education, and total net household income. The results should not be interpreted as a causal relationship and are only used to analyze differences between the self-employed and the non-self-employed. Standard regression models underestimate standard errors and, therefore, overestimate test statistics because of the nested structure of the data. Thus, we estimate a mixed model, allowing for country- and region-specific random intercepts. For a detailed discussion, see Baltagi et al. (2001). Finally, we analyze changes of group means for the self-employed and the non-self-employed for different characteristics of age, education, income, and sex.

4 Results

The left side of Table 2 presents the mean rating and ranking of ten value items for the representative sample of 18–68 year-olds of nine Western European countries. The values are measured on a Likert-scale where 6 means “very much like me” and one means “not like me at all”. The centering of value scores to correct for individual differences in use of the response scale results in negative and positive values. Larger numerical values indicate higher ratings of the respective guiding principle. The observed order of value ratings shows similarities to observed value hierarchies by Schwartz and Bardi (2001). The middle and right sections of Table 2 present the mean importance and ranking for the non-self-employed and the self-employed. Both groups have nearly the same value hierarchy with respect to their importance. The only difference is that the group of self-employed people ranked

Table 2 Cross-national importance of individual value items

Value type	Representative		Non-self-employed		Self-employed		
	Mean rating	Mean rank	Mean rating	Mean rank	Mean rating	Mean rank	Difference
Benevolence	0.811 (0.622)	1	0.817 (0.621)	1	0.761 (0.629)	1	0.056***
Universalism	0.698 (0.661)	2	0.701 (0.660)	2	0.674 (0.671)	3	0.028*
Self-Direction	0.480 (0.769)	3	0.453 (0.765)	3	0.724 (0.764)	2	−0.271***
Security	0.139 (0.897)	4	0.156 (0.892)	4	−0.025 (0.933)	4	0.181***
Hedonism	0.002 (0.912)	5	0.012 (0.914)	5	−0.085 (0.889)	5	0.097***
Tradition	−0.114 (0.899)	6	−0.112 (0.899)	6	−0.135 (0.896)	6	0.024
Conformity	−0.275 (0.971)	7	−0.267 (0.969)	7	−0.345 (0.985)	7	0.077***
Achievement	−0.506 (0.921)	8	−0.515 (0.921)	8	−0.428 (0.912)	8	−0.087***
Stimulation	−0.575 (0.961)	9	−0.584 (0.956)	9	−0.488 (0.996)	9	−0.097***
Power	−1.011 (0.833)	10	−1.013 (0.831)	10	−0.997 (0.849)	10	−0.016

Note: Standard deviations in parentheses. T-test significance at: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

self-direction second and universalism third, while non-self-employed people ranked universalism second and self-direction third. Although the average value priorities of non-self-employed and self-employed people are quite similar, eight out of ten value items show significant differences in the mean rating between non-self-employed and self-employed people.

Table 3 reports the results of the multilevel regression analyses for ten human values. A significant positive coefficient indicates that the respective guiding principle is rated higher when the independent variable becomes larger. We find that the self-employed rated achievement, self-direction, and stimulation higher. In turn, they rated security, conformity, and tradition consistently lower. Benevolence, universalism, hedonism, and power show no signs of clear cut differences. Table 4 lists those countries with significant differences for self-employed people based on regressions for each single country. The country-wise regressions reveal that security is rated as less important for self-employed people in almost all countries and that self-direction is rated as more important for self-employed people in all countries. For all other value items, we do not observe clear cut differences for the country-wise regressions. Figure 1 [2] displays the estimated differences of Western European self-employed people using an adjusted figure by Schwartz and Rubel (2005) that structures the relations among motivationally distinct values. The respective values show the estimated coefficients for the self-employed dummy in Table 3. Darker shaded areas indicate that the self-employed rate these values as more important than the non-self-employed. On the other hand, darker non-shaded areas indicate that the self-employed rate these values as less important than the non-self-employed.

Note that the value items with the largest mean differences between the self-employed and the non-self-employed (self-direction and security) belong to the values that are ranked in the top 4 of value priorities. These relatively large

[2]The shaded areas indicate higher ratings of the respective value item, non-shaded areas indicate lower ratings of the respective value item, and white areas indicate no significant difference. The estimates represent the coefficients for self-employed = 1.

Table 3 Regression results for differences in human values (allowing for random intercepts at the country level and the regional level)

	Security	Conformity	Tradition	Benevolence	Universalism	Self-direction	Stimulation	Hedonism	Achievement	Power
Self-employed (1=Yes)	−0.184*** (0.026)	−0.125*** (0.028)	−0.0652** (0.026)	−0.0220 (0.019)	−0.0260 (0.019)	0.247*** (0.023)	0.145*** (0.028)	−0.0395 (0.026)	0.0913*** (0.027)	−0.0181 (0.025)
Gender (1=Male)	−0.163*** (0.015)	0.0366*** (0.017)	−0.0677*** (0.016)	−0.210*** (0.011)	−0.173*** (0.011)	0.0107 (0.014)	0.172*** (0.017)	0.130*** (0.016)	0.150*** (0.016)	0.210*** (0.015)
Age	0.00878*** (0.00057)	0.0153*** (0.00062)	0.0145*** (0.00058)	0.00228*** (0.00041)	0.00935*** (0.00042)	0.00192*** (0.00051)	−0.0170*** (0.00062)	−0.0168 (0.00057) ***	−0.0158 (0.00059) ***	−0.00735*** (0.00054)
Years of education	−0.0430*** (0.0021)	−0.0232*** (0.0023)	−0.0246*** (0.0022)	0.00211*** (0.0015)	0.0224*** (0.0016)	0.0289*** (0.0019)	0.0110*** (0.0023)	−0.0104*** (0.0022)	0.0201*** (0.0022)	0.00496** (0.0020)
Household's total net income	−0.0159*** (0.0038)	0.00239 (0.0041)	−0.00866** (0.0039)	−0.00433 (0.0027)	−0.0154*** (0.0028)	−0.0106*** (0.0034)	−0.00461 (0.0041)	0.0100*** (0.0039)	0.0137*** (0.0039)	0.0404*** (0.0036)
Constant	0.542*** (0.085)	−0.654*** (0.095)	0.324*** (0.060)	0.825*** (0.043)	0.187*** (0.052)	0.0539 (0.054)	0.0310 (0.064)	0.764*** (0.093)	−0.275*** (0.072)	−1.166*** (0.063)
Observations	12220	12220	12220	12220	12220	12220	12220	12220	12220	12220
No. of groups (countries/ regions)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)	(9/81)
P-value Wald test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4 Country differences for the self-employed (allowing for random intercepts at the regional level) [a]

	Country	Direction
Security	BE*, DE***, DK*, FI**, FR*, GB***, NO**, SE***	−
Conformity	CH*, DE***, FI**	−
Tradition	BE**, CH**, DE*, NO**	−
Benevolence	GB**(−), NO**(−)	(−)
Universalism	SE**(−)	(−)
Self-Direction	BE***, CH***, DE***, DK***, FI***, FR**, GB***, NO***, SE***	+
Stimulation	BE**, FI***, FR***, GB**, SE***	+
Hedonism	CH***(−)	(−)
Achievement	BE*, CH***, DE***	+
Power	GB* (−)	(−)

[a]Results are based on country-wise regressions controlling for gender, age, education, and income. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ reports the significance level of the self-employment dummy. The arithmetic operator in parentheses indicates the sign of the coefficient. Parentheses indicate that the difference was only significant for the respective country but not on average over all countries in the sample (compare Table 3)

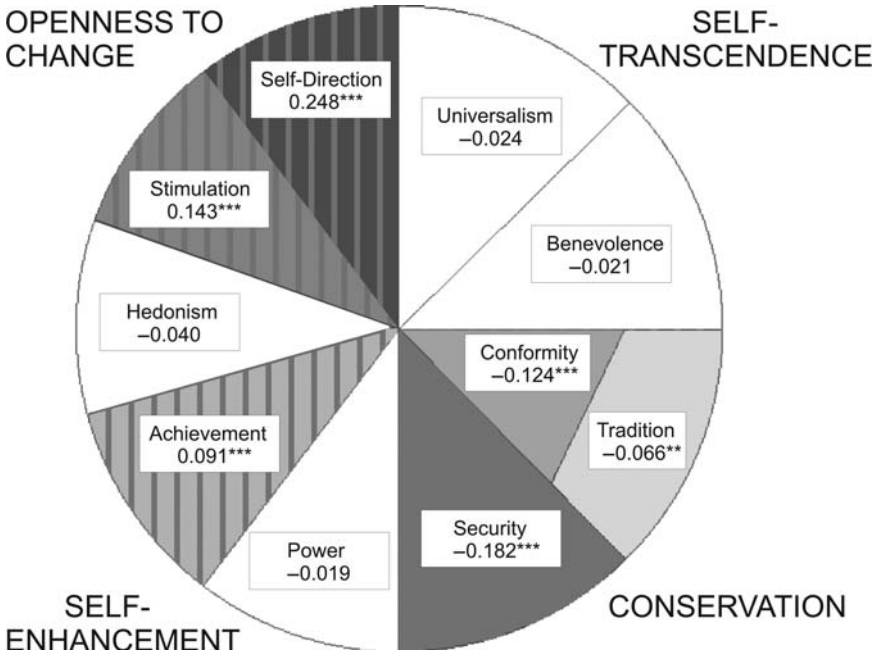

Fig. 1 Differences in the guiding principles of the self-employed
Source: Own illustration based on Schwartz and Rubel (2005, p. 1011)

differences can be observed in Table 2 as well as in the multivariate regression in Table 3. This is interesting because self-direction (ranked second for the self-employed and third for the non-self-employed) is rated as more important by the self-employed, while security, which is ranked fourth by both groups, is rated as less important in comparison to the non-self-employed. This means that we observe the largest mean group differences, which have an opposite deviation, for value items that are ranked as relatively important in the value hierarchy of the self-employed and the non-self-employed.

Next, we analyze how mean values for the non-self-employed and the self-employed differ across age and income groups. Exemplarily, this analysis is limited to self-direction and security since these value items showed the most distinct differences for the self-employed. Figure 2 plots the mean values for the self-employed and the non-self-employed over five different age groups. In all age groups, the self-employed rated security as less important in comparison to the self-employed group. Nevertheless, both groups (the non-self-employed and the self-employed) rate security as more important with increasing age. As a result, young non-self-employed people rate security as less important than older self-employed people. For example, the group of young non-self-employed people (18–30 years old) rate security as less important than the group of self-employed people in the three age groups 31–40 years, 41–50 years, and 51–60 years.

Figure 3 plots the mean values of self-direction for different age groups. As the multivariate regression reveals (Table 3), the impact of age is much smaller on self-direction than on security. The average importance of self-direction is always higher for the self-employed. The difference in the mean value is less pronounced for the

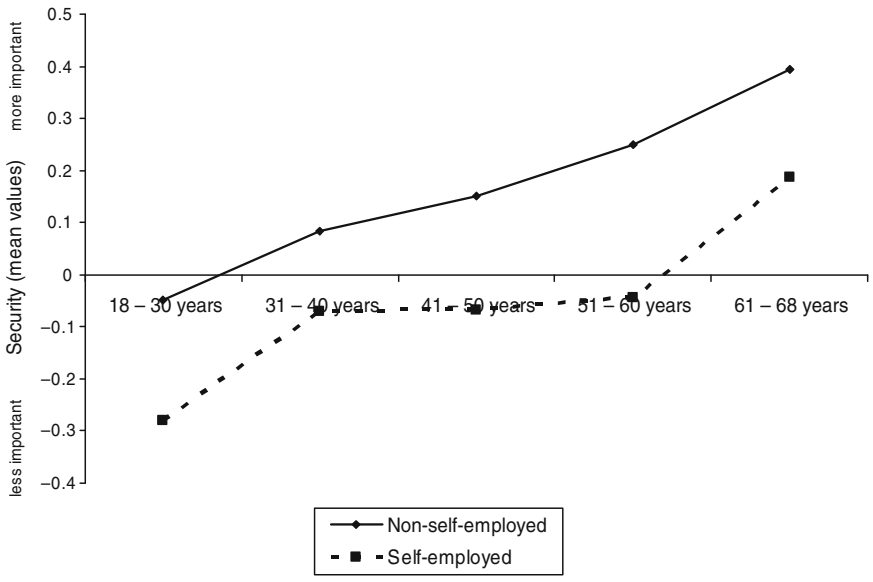

Fig. 2 Mean security values by age for the self-employed and the non-self-employed

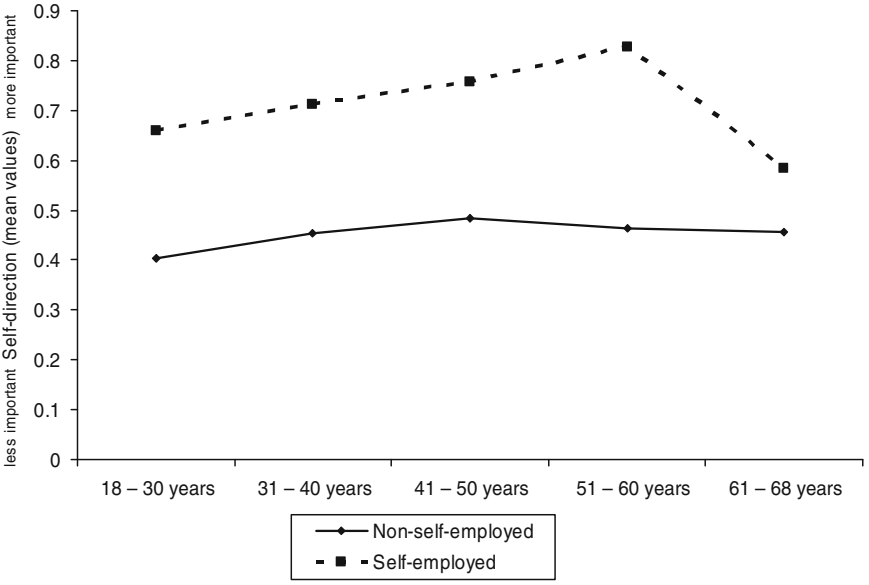

Fig. 3 Mean self-direction values by age for the self-employed and the non-self-employed

group of people 60–68 years-old (but still significant). Due to the relatively small differences between age groups for the value item self-direction, self-employed people of all age groups rate this value item as significantly more important.

The mean values for different levels of education are presented in Figs. 4 and 5. Self-employed people rate security as less important for nearly all levels of education (there are no significant group mean differences for self-employed and non-self-employed people having completed post-secondary and the second stage of tertiary education). At the second stage of tertiary, the group means for security are about the same as those for non-self-employed and self-employed people.[3] In addition, both groups rate security as less important at higher educational levels. The educational group differences seem to be dominant in the sense that non-self-employed people with higher levels of education rate security as less important than self-employed people with lower levels of education.

For self-direction, a similar pattern can be observed. Again, the self-employed rate self-direction as more important over nearly all levels of education (there is no significant difference for the self-employed and the non-self-employed having completed the second stage of tertiary), and a higher degree of education results in a higher mean rating of self-direction for both groups. Additionally, self-employment does not dominate the importance rating of self-direction, since

[3]Note that the group of self-employed people having completed the second stage of tertiary education in the sample is rather small and contains only 35 observations.

Fig. 4 Mean security values by level of education for the self-employed and the non-self-employed

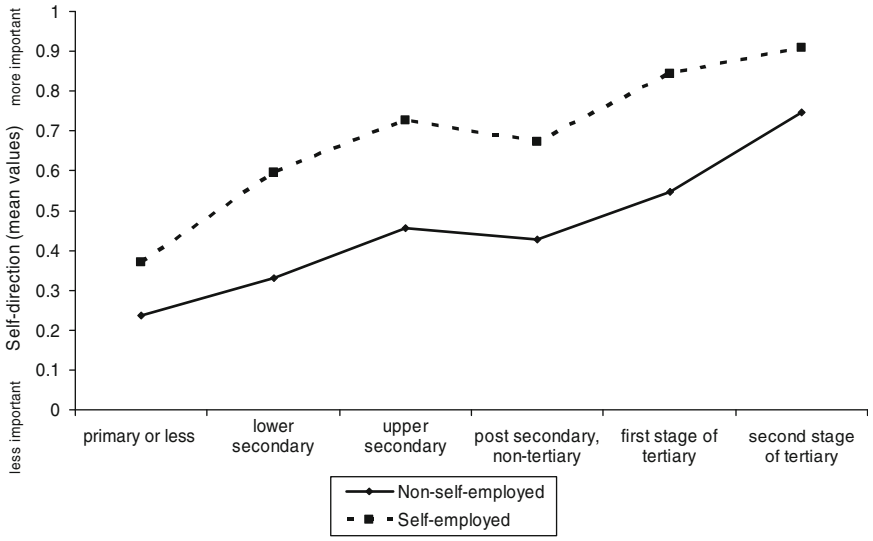

Fig. 5 Mean self-direction values by level of education for the self-employed and the non-self-employed

non-self-employed people with higher levels of education rate self-direction as more important than self-employed people with lower levels of education.

Comparing the group means of self-employed and non-self-employed people for different categories of household income, security is rated as less important with

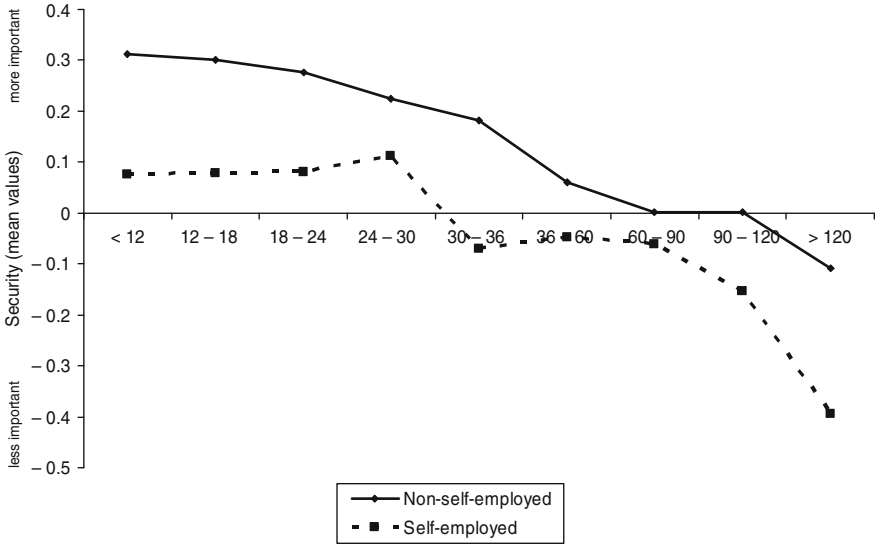

Fig. 6 Mean security values by income for the self-employed and the non-self-employed (annual household income in thousand €)

increasing income in both groups. For most income levels, self-employed people rate security as less important in direct comparison to the same income level of non-self-employed people (no significant difference for income groups 60,000–90,000 and 90,000–120,000 € can be observed). But for high income groups of non-self-employed people, the group mean for security shifts above the group mean for low income groups of self-employed people (Fig. 6).

The value item self-direction is not only rated as more important by self-employed people over all income levels but also dominates such that even non-self-employed people at higher income levels rate self-direction as less important than self-employed people with low levels of household income (Fig. 7). This result is mainly due to small intra-group mean differences for different income classes of self-employed and non-self-employed people.

Mean group differences for gender are important for the value item security but not for self-direction (compare Table 3). Self-employed women rate security as more important than self-employed men. The same is true for non-self-employed women in comparison to non-self-employed men. When comparing the group of self-employed women to non-self-employed men, security is similarly important (Fig. 8). Furthermore, self-employed women are more similar to self-employed men than they are to the same sex in the other group. This finding is in line with the results of Fagenson (1993).

The major implication of Figs. 2–5 is that other important group differences (like age and educational groups) have a similar effect with respect to value differences for the group of self-employed and for non-self-employed people (for example, at higher levels of education, self-direction becomes more important for the

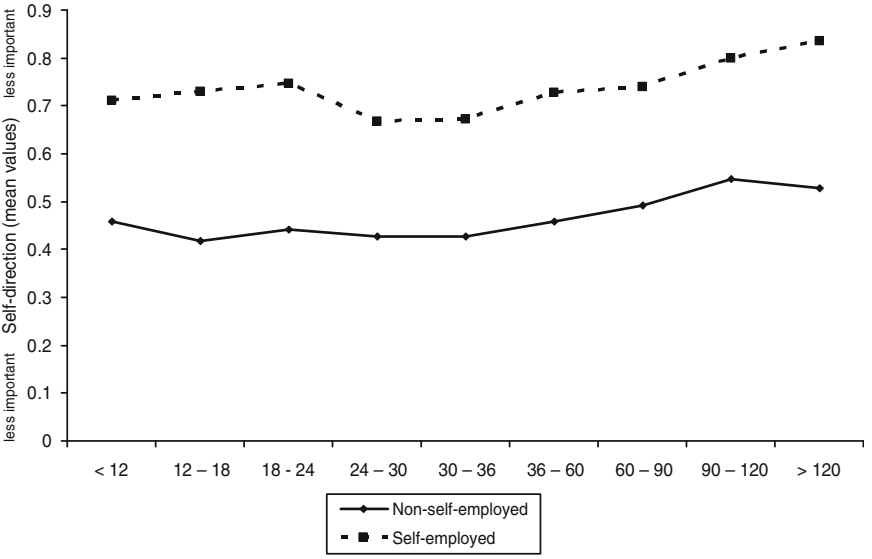

Fig. 7 Mean self-direction values by income for the self-employed and the non-self-employed (household income in thousand €)

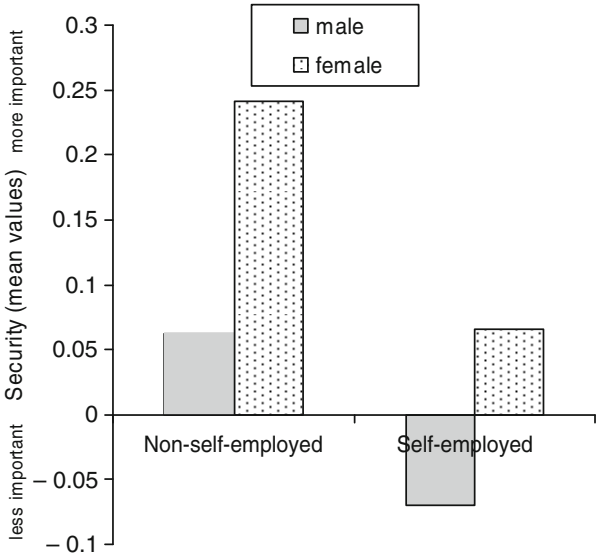

Fig. 8 Mean security values by sex for the self-employed and the non-self-employed

self-employed as well as for the non-self-employed). Furthermore, self-employment does not dominate other important group differences in value ratings (for example, the group of highly educated non-self-employed people rates self-direction as more important than the group of self-employed people with low education).

5 Discussion

Exploring differences in the value system of self-employed and non-self-employed people for Western European countries, we observe that self-employed people differ significantly. Self-direction, stimulation, and achievement are rated as more important, while security, conformity, and tradition are rated as less important. These differences indicate that observed differences in the value system of the self-employed are in line with values that are generally attributed to entrepreneurs. Self-regarding preferences, such as hedonism, that would be closest to a traditional neo-classical argument, do not differ significantly for entrepreneurs in nearly all countries. The higher importance of value items that are related to openness to change illustrate that there is a motivational background for the entrepreneur being a "jack-of-all-trades." In addition, for those value items that distinguish the self-employed people from the non-self-employed, relatively stable differences of group means can be observed for different characteristics of age, education, household income, and gender. Nevertheless, group mean value differences for self-employment are not dominating intra-group differences. For example, the self-employed always rate security as less important than the non-self-employed when directly compared at the same educational level, but the less educated self-employed rate security as more important than the highly educated non-self-employed.

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Chapter 4
Culture, Political Institutions and the Regulation of Entry

Rui Baptista

Culture, Institutions and the Regulation of Entry (first published as "Culture, Political Institutions and the Regulation of Entry" in Comparative Labor Law & Policy Journal, Vol.28, No.4, 2007)

1 Introduction

The purpose of the present work is to examine the relationship between socio-cultural attitudes toward uncertainty and power inequality versus public policy, particularly with regard to entry regulation. Countries differ significantly in the way in which they regulate new businesses entry through various administrative and screening processes. Such differences are not just associated with different levels of wealth and economic development; indeed, they can be observed among countries with similar levels of *per capita* GDP (GDPpc). For instance, around the year 2000, in order to meet requirements to operate a business in Italy, entrepreneurs had to follow 16 different procedures, pay US$3946 in fees, and spend at least 62 business days acquiring the necessary permits. To do the same in Canada, at around the same time, an entrepreneur had to follow two procedures, pay US$280 and could complete the process in as little as 2 days (Djankov et al. 2002).

Economic theory recognizes entry regulation – and, indeed, all kinds of market regulation – as a product of two different kinds of influences and motivations regarding the behavior of governments. In the first view, government regulation is pursued solely toward social welfare; the second current of thought views regulation as an activity pursued for the benefit of specific interest groups, such as industry incumbents, politicians and bureaucrats.

First, the "public interest" theory of regulation (Pigou 1938) holds that unregulated markets exhibit frequent failures, ranging from monopoly power to externalities. A government that pursues social efficiency counters these failures and protects the public through regulation. As applied to new firm entry, this view holds that the government screens new ventures to make sure that consumers buy

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safe, high quality products from "desirable" sellers (Djankov et al. 2002). Hence, stricter regulation, as measured by a higher number of screening procedures, should be associated with socially superior outcomes.

Second, the "public choice" theory sees the government as less benign and regulation as socially inefficient. In the form suggested by Stigler (1971) and later by Peltzman (1976), industry incumbents are able to acquire regulations that create rents for themselves since they typically face lower information costs than do consumers. In this view, stricter entry regulation raises incumbents' profits by keeping out potential competitors, thus leading to greater market power.

Another strand of the "public choice" theory holds that politicians and bureaucrats are the main beneficiaries of government regulation as they use it to extract rents from incumbents and potential entrants in the form of campaign contributions, votes and bribes (see De Soto 1989). This view, also called the "tollbooth" theory of regulation (De Soto 1989; Djankov et al. 2002) sees the requirement of multiple permits and other screening procedures from new ventures mostly as a way to provide politicians and bureaucrats with the power to extract rents from incumbents and/or entrepreneurs, regardless of the overall effects of entry on efficiency and welfare.

The present work does not debate the significance of these theories as motivators for different levels of entry regulation. In fact, it is acknowledged that, over a wide variety of regulatory modes and practices, economic regulation theories provide a solid foundation sustaining the explanation of the economic incentives to regulate the emergence of new ventures. Nevertheless, it is argued that the intensity with which governments regulate entry reflects the attitudes of legislators, public administration officials and the general public in different societies or countries toward public governance, private individual initiative and the uncertainty associated with market competition and industrial restructuring.

The present paper follows Licht (2001), and Licht et al. (2005), in sustaining that regulatory and governance systems are, to a certain extent, path dependent because society's cultural values are embedded in its laws and institutions. Hence, the intensity of government regulation should be positively associated with society's attitude toward uncertainty, as well as with the degree of power inequality. Both factors should influence the chain of policy and legislative decisions that shape a country's entry regulation system over time. Such attitudes are based on socially realized intrinsic cultural values that are individually instilled long before the behavior of individuals is affected by the economic incentives and motivations inherent to their positions as politicians, government officials, public bureaucrats, industry incumbents or entrepreneurs. Hence, such cultural values should mediate the intensity with which economic incentives affect regulatory outcomes.

The present work aims to test whether there is a significant correlation between cultural attitudes toward uncertainty and power inequality, and the administrative regulations governing new firm creation. To do this, it uses data for 53 countries collected from a variety of sources. Once constructed, the data set was used to formulate and test a series of hypotheses regarding the correlations between the regulation of entry and a series of economic, political, and institutional variables, as well as the way such correlations may be affected, or mediated, by variables that measure

a society's intrinsic cultural attitudes toward uncertainty and power inequality. Such hypotheses are tested using regression analysis that allows for interaction, or contingency, effects (see Ayken and West 1991; Jaccard and Turrisi 2003).

The results of the analysis suggest that variation in administrative and screening procedures toward new firms reflect different levels of wealth, legal traditions and standards of public governance among countries, lending general support to public choice theories of regulation, as found by Djankov et al. (2002). However, entry regulation also reflects the way people in different countries deal with uncertainty and accept inequality of power in their dealings with government. Moreover, these intrinsic values act as mediators for the correlation between economic and political variables, and the regulatory intensity, suggesting that economic regulation theories have different impacts on regulatory practices depending on culture.

The following section discusses recent studies of the impact of legal traditions and political institutions on governance, public policy and economic growth; it also introduces the relevant research on cultural values and cross-cultural psychology – in particular with regard to societies' attitudes toward uncertainty and power inequality. Such discussion provides background for section "Hypotheses Formulation", which formulates hypotheses for empirical testing with regard to the correlation between regulatory practices toward new firm entry and political, economic, legal and cultural variables. Section "Data Used in the Study" gives a detailed description of the data set assembled for testing the hypotheses. Section "Estimation Methodology and Results" addresses methodology issues and presents the results of the empirical analysis. The last section concludes.

2 Background

2.1 Recent Research on Comparative Political Economy

Recently empirical work in comparative economics has started looking specifically at the significance of differences in ethno-linguistic groups, legal traditions (British common law, French, German or Scandinavian civil law, and socialist law), political institutions and inclinations, religious beliefs and practices as determinant factors of heterogeneity between countries with regard to a variety of issues in governance and economic performance. Djankov et al. (2002) provide an important precedent to the present paper by offering a first examination of the data on entry administrative procedures used here, finding evidence that greater regulatory intensity is associated with lower *per capita* income, higher levels of corruption, less democracy and more government intervention, and not with better quality of public and private goods.

Botero et al. (2004) examined the labor market regulation finding that regulatory intensity is negatively correlated with wealth and employment rates. Labor regulation is positively correlated with political power of the left and, particularly, with civil and socialist legal traditions.

The analysis of regulatory intensity and economic performance, based primarily on factors such as legal tradition (see, for instance Glaeser and Shleifer 2002) and political institutions (see, for instance Beck et al. 2001), has offered new perspectives for comparing modern economies by suggesting significant factors determining heterogeneity between countries. Work in this vein explores the relationship between legal systems and corporate governance (La Porta et al. 1998), and between legal and political traditions and the "quality of government" with regards to its "goodness" for economic development (La Porta et al. 1999). Djankov et al. (2003) examine the efficiency of legal systems and institutions in facilitating economic activity. Other related work examines the determinants of corruption (Shleifer and Vishny 1993; Mocan 2004). Barro and McCleary (2003) explore the relationship between religious traditions, practices and diversity, and economic growth, while Kaufmann and Kraay (2003) examine the relationship between governance and growth.

It can be argued that variables influencing heterogeneity between countries such as legal traditions, political institutions and ethno-linguistic and religious differences are closely associated with cultural differences between countries. Hence, cultural values, once defined and measured, may provide additional insight of the issues included within the scope of this literature stream, particularly since law, religion and ethnicity do not necessarily translate directly into specific cultural characteristics such as attitudes toward uncertainty and power inequality (even though they may be strongly correlated with them).

2.2 Cultural Values and the Field of Cross-Cultural Psychology

An extensive stream of literature considers the impact of differences in cultural values in the management field. For instance, significant work on the effect of culture on work motivation and job attitudes emerged (recent examples include Steers and Sanchez-Runde 2001; and Steers et al. 2004). Work on the influence of culture on leadership behavior was also undertaken, an important and recent example being the GLOBE study (House et al. 2004). Cross-cultural research has questioned the universality of key concepts in management theory with varied results (see, for instance Schneider and de Meyer 1991; Triandis 1994; Earley and Singh 1995; Gelektanycz 1997; Trompenaars 1993; Trompenaars and Hampden-Turner 1998; and Schneider and Barsoux 2002).

An effective way to facilitate the discussion of international differences between cultural characteristics, is to treat culture within the framework offered by the concept of "cultural values". Theoretical work in cross-cultural psychology reflects the idea that different people and societies face similar issues, goals and challenges. Cultural values express socially shared, subjective beliefs that refer to desirable goals and conveys to society or other culturally bounded groups "what is important, good and desirable" (House et al. 2004). Values transcend specific

actions and situations, serving as standards to evaluate behavior, people and events.

In his pioneering work in this field, Hofstede (1980) uses values to represent dimensions of cultural variation that can be appraised and measured, thus providing a basis for comparison and hypotheses generation. For each central issue faced by societies, he defines a cultural value "dimension" that reflects different possibilities for how members of a society can cope with a problem. Each value dimension represents a range of possible stances between two opposing limits, illustrated by four basic issues: individualism; feminism; power distance; and uncertainty avoidance. Of these, the last two are of particular importance for the analysis in the present work.

Power distance, or inequality refers to the extent to which a society accepts an unequal distribution of power in social organizations and institutions (such as government, business, universities, and family) as legitimate or illegitimate. Uncertainty avoidance refers to the extent to which a society feels uncomfortable or at ease in risky, unstructured, uncertain or ambiguous situations, particularly regarding the future, and hence valuing or devaluing beliefs (religion) and institutions (government) that provide certainty and conformity.

Several international studies have introduced a variety of theories and methodologies with regard to cultural value concepts (see, in particular: Trompenaars 1993; Schwartz 1994; Inglehart 1990, 1997; Trompenaars and Hampden-Turner 1998; and House et al. 2004). While displaying significant differences in their objectives and approaches, in general these studies show that cultural values differ significantly across countries and across different groups within societies.

2.2.1 Power Distance

A society's institutional structure can be perceived as reflecting the trade-off between controlling public disorder, which pushes toward greater government intervention, and controlling abuse of state discretion, which pushes against governmental intervention. Djankov et al. (2004) propose a simple model of institutional structure based on the four most common strategies of institutional control: private orderings (self-regulation); private litigation; government regulation; and state ownership. These four strategies can be viewed as points on an institutional possibility frontier, ranked in terms of levels of government intervention. As government intervention increases, we can observe progressively diminishing social costs of disorder and progressively rising social costs of government intervention.

Different societies display different preferences toward institutional structure and control. The power inequality intrinsic in a society is probably embedded in its institutional control practices. The present work proposes that societies with greater acceptance of power inequality are more likely to rely on stronger forms of governmental control, and therefore will develop and implement more intense and demanding regulatory rules and procedures.

2.2.2 Uncertainty Avoidance

Ever since Knight's (1921) work, it is common to distinguish between uncertainty and risk in the social sciences. The term uncertainty is defined in several ways. It is the lack of information about cause-effect relationships (Lawrence and Lorsch 1967); the inability to assign probabilities as to the likelihood of future events (Duncan 1972); the inability to accurately predict what the outcome of a decision might be (Downey and Slocum 1975); or, as Milliken (1987) summarizes, it is the individual's perceived inability to predict something accurately.

Uncertainty is a basic fact of life, related to the occurrence of unexpected, unique events. Individuals experience uncertainty because they believe they lack enough information or because they feel unable to discriminate between relevant data and irrelevant data (Gifford et al. 1979). Researchers examined the influence of uncertainty in organizational behavior (March and Simon 1958) and organizational decision-making (Cyert and March, 1963).

Risk can be seen as a special case of uncertainty, related with specific, unpleasant events (Wennekers et al. 2003). Unlike the wider concept of uncertainty, risk is often expressed as a percentage or probability, based on past observations of specific phenomena. Measures of risk can then be weighed against measures of opportunity and reward. It can be argued that societal uncertainty avoidance is strongly associated with personal attitudes toward risk. Even though the individual degree of risk aversion might vary widely within a society, all individuals in that society should respond to some collective level of "mental programming" (Hofstede 1980) that manifests itself attitudes toward uncertain situations. Individuals in societies displaying greater uncertainty avoidance look for structure in their institutions in order to make events clearly interpretable and predictable. This structure is often provided by more intense regulation. DeLuque and Javidan (2004) define uncertainty avoidance as "the extent to which members of collectives seek orderliness, consistency, structure, formalized procedures, and laws to cover situations in their daily lives." Law, as a way to cope with uncertainty, is perhaps the mechanism receiving the most attention in the cross-cultural literature.

3 Hypotheses Formulation

To a large degree, regulatory legislation and public administration systems are the result of historical determinism associated with cultural, legal and political traditions. Different institutional and legal arrangements represent alternative modes of dealing with market failure (Glaeser and Shleifer 2002, 2003). In order to shed light on these relationships, a series of hypotheses are formulated, seeking to encompass the main findings of the research streams reviewed in this paper as they apply to entry regulation. Testing these hypotheses should bring out correlations between the intensity of entry regulation and variables associated with a country's wealth, legal tradition, political institutions and governance, as well as

the general cultural attitudes toward risk and uncertainty and power distance, or inequality.

Djankov et al. (2002) and Botero et al. (2004) found negative correlations between GDPpc and the regulation of both entry and labor. This is consistent with the notion that public choice theories of regulation provide a better explanation of entry regulation than public interest theories. Countries with different levels of economic development should adopt different regulatory structures. If more regulation is not associated with greater efficiency, then:

Hypothesis I. *There should be a significantly negative correlation between measures of entry regulation and countries' wealth.*

Countries with different legal traditions use different "institutional technologies" for social control of business (Djankov et al. 2004). Common law countries, such as the UK, Canada, the USA and Australia, tend to rely more on markets and contracts, while civil law countries, such as France, Germany, and Japan, as well as the Scandinavian and Latin countries, tend to rely on regulation and governmental intervention. In countries previously under the influence of the Soviet Union., such as Bulgaria, Poland and the Czech Republic, traces of socialist law, where regulation and government intervention were manifest are still present. One can therefore predict that:

Hypothesis II. *Countries with a common law tradition should display significantly less entry regulation than other countries.*

Public choice theories of regulation suggest that politicians and bureaucrats are likely to use regulation to obtain benefits in the form of, among others, corruption payments and campaign contributions, while incumbents may use entry regulation to protect above normal (monopolistic or oligopolistic) rents. These views suggest that one should expect greater regulatory intensity from countries where the checks and balances controlling political power are weaker and the perceptions regarding government quality and the control of corruption are lower. Moreover, countries with more regulations usually display a greater weight of unofficial, unregulated economic activities. This leads to the formulation of the following hypotheses:

Hypothesis III. *There should be a significantly negative correlation between measures of entry regulation and measures of the separation of powers between different political institutions (divided government).*

Hypothesis IV. *There should be a significantly negative correlation between measures of entry regulation and perceptions of government effectiveness, regulatory quality and control of corruption.*

Hypothesis V. *There should be a significantly positive correlation between measures of entry regulation and estimates of the weight of the unofficial economy on countries' GDP.*

The amount of power inequality a society is willing to accept should affect the way its political institutions structure and implement regulations. If there is a greater degree of power inequality inherent in a society's institutions, laws, rules and traditions, the greater should be the incentive and the ability of public authorities to discourage change and preserve the current socio-economic structure; hence, the regulatory burden on new firms should be greater:

Hypothesis VI. *There should be a significantly positive correlation between measures of entry regulation and a society's acceptance of power inequality, or power distance.*

Different attitudes toward risk and uncertainty affect the way societies perceive the changes associated with greater degrees of innovation and firm turnover usually brought about by higher levels of new firm entry (see Caves 1998 for a review on the issue of firm entry and mobility). Societies that are more inclined to avoid uncertain outcomes should regulate entry more, hence:

Hypothesis VII. *There should be a significantly positive correlation between measures of entry regulation and a society's uncertainty avoidance.*

Furthermore, being intrinsic to each society, cultural variables may act as mediators of the correlations observed between measures of entry regulation and other variables, i.e. one should expect a significant interaction between cultural and economic, legal and political variables, making the relationship between entry regulation and the latter variables dependent on the values of the cultural variables. This leads to a final hypothesis:

Hypothesis VIII. *The correlation between measures of entry regulation and economic, legal and political variables should depend significantly on the values assumed by the measures of uncertainty avoidance and power inequality/distance.*

4 Data Used in the Study

In order to test the hypotheses formulated above, the present study put together a data set originating from a variety of sources. 1999 data on entry regulation was assembled and reported by Djankov et al. (2002).[1] It records the number of administrative procedures required of new entrants, as well as the amount of time and the cost of following these procedures, for a standardized type of new business in a cross section of 85 countries. The data describe legal requirements that need to

[1] A comprehensive version of the data set, including detailed information on the nature of entry regulation procedures for each country and on how specific data collection and assembly problems were dealt with can be found in: http://post.economics.harvard.edu/faculty/laporta/papers/data.pdf.

be met before a business can officially open its doors, the official cost of meeting these requirements, and the minimum time it takes to meet all requirements.

Specifically, the present study considers two variables: the number of official procedures required (NPROC) and minimum time required (TIME). The data collected by Djankov et al. (2002) include no measures for extra delays due to corruption and administrative inefficiencies that would further raise the entry costs.

TIME increases at a rate greater than NPROC. This suggests that increasing the number of entry procedures increases the time taken to complete all the procedures exponentially, even though these delays are not associated with corruption and are just a result of more demands on the entrepreneurs and public officials. This motivates examining the relationship between entry procedures and public perceptions of governance and regulatory quality, and the way it may be affected by cultural variables (in particular, the acceptance of power inequality). Histograms depicting frequency distributions[2] show that both variables are normally distributed for the present data set.

The data on entry regulation procedures is coupled with data on national cultural value scores based on Hofstede (2001). Using Hofstede's terminology, data on cultural value scores focus on power distance (PDI), the acceptance of power inequality in society, versus uncertainty avoidance (UAI). Cross-cultural psychology studies use questionnaires to elicit the participant's evaluation of the various values hypothesized by theory. Questionnaires must cover a large sample covering a number of different cultures/countries in order to verify that the value types are actually universal. Substantial samples are needed in each country to yield reliable estimates of national cultural orientations. Hence, representative surveys of cultural values covering a significant amount of countries are costly, and consequently rare.

The cultural value scores reported by Hofstede (1980, 2001) result from a project designed audit morale among IBM employees, incorporating responses from over 117,000 respondents in 50 countries in the period from 1967 to 1973. This research has since gone through several updates, increasing the number of nations covered and considering additional cultural value dimensions such as the need/propensity to plan for the future. However, as more cultural value dimensions are considered the probability of significant collinearity between the scores for different dimensions is likely to increase, thus making empirical analysis based on the scores less reliable. Even though the cultural variables reflecting uncertainty avoidance and power inequality correspond to indices based on data originally collected some three decades ago, it should be pointed out that these indices have gone through considerable updates since then, which are reflected in the results published in Hofstede (2001).

Hofstede's work has endured criticism (see, for instance, Gernon and Wallace 1995; Jackson 1997; and, more recently, House et al. 2004). In particular, the concept of uncertainty avoidance has been criticized on two counts: neutrality and interpretation (D'Irbarne 1997). Neutrality refers to the fact that while two

[2]Histograms are not presented here, but are available from the author upon request.

cultures may have the same level of uncertainty avoidance they may have different ways to cope depending upon their culture (Schneider and de Meyer 1991). Interpretation refers to the fact that other cultural variables make the picture more complex. For example, in Italian culture the letter of the law is taken less seriously than in American culture, which causes Italians to take for granted the qualifiers in the question "rules should not be broken, even when the person thinks it is in society's best interest" while the Americans would not (D'Irbarne 1997). In addition, as Hofstede (1980, 2001) himself recognizes, the scope of his measures was restricted by the available data, which was originally collected for a different purpose. However, works such as those of Franke (1987), Bond (1988) and Hofstede (2006) show significant correlations between the cultural factors or measures found by subsequent studies and Hofstede's original cultural value dimensions. In particular, (2001), argues that Hofstede's cultural value concepts have remained relevant and operational when explaining cross-country variations in matters associated with corporate governance.

Assembling data from the two aforementioned sources – Djankov et al. (2002) and Hofstede (2001) – leads to a data set comprising 53 observations (countries). This data set does not include any African or Middle Eastern countries, but still provides a reasonable cross-section of cultural variables and approaches to entry regulation. Table 1 presents variable definitions and descriptive statistics. Mean centering has been performed whenever the reported mean equals zero.

In order to control for the relationship between economic development and entry regulation levels, data for each country/geographical area *per capita* GDP (GDPpc) was obtained from the World Bank's World Development Indicators[3] from 1999 – the same year as the entry regulation data.

The correlation between regulatory intensity and legal tradition is tested using data concerning legal origin, which identifies the legal origin of the Company Law or Commercial Code of each country. There are five possible origins: English common law; French Commercial Code (French civil law); German Commercial Code (German civil law); Scandinavian Commercial Code (Scandinavian civil law); and socialist/communist laws. Data was obtained from La Porta et al. (1998). Two dummy variables were constructed: the first, LOUK, assumes the value one for English common law countries, and zero for all other countries; the second, LOSOC, assumes the value one for socialist/communist law countries and zero for all others. Hence, regression coefficients for these variables estimate the variation in regulatory intensity that results from a country having either common law or socialist law, when compared to civil law countries.

In order to test the hypotheses regarding the relationship between the extent of entry regulation and the limits to executive political discretion, a measure of the level of checks and balances in each country is required. Data concerning this variable was obtained from the World Bank Database of Political Institutions (DPI). This database is analyzed at length in Beck et al. (2001) and covers 177 countries

[3] www.worldbank.wdionline.com.

Table 1 Variable definitions and descriptive statistics

Variable	Definition	Descriptive statistics[a]	Data source
NPROC	Number of procedures that a start-up has to comply with in order to obtain legal status (mean centered)	0 4,417 53	Djankov et al. (2002)
TIME	The time it takes to obtain legal status to operate a firm, in business days (mean centered)	0 30,555 53	Djankov et al. (2002)
PDI	Power inequality/distance index (mean centered)	0 22,817 53	Hofstede (2001)
UAI	Risk aversion/uncertainty avoidance index (mean centered)	0 24,700 53	Hofstede (2001)
LNGDPPC	Natural logarithm of per capita gross domestic product for 1999	9,078 1,380 53	Computed from World Bank World Development Indicators Database
LOUK	Dummy variable assuming the value 1 for countries with English common law origin and 0 otherwise	0.264 0.445 53	La Porta et al. (1998)
LOSOC	Dummy variable assuming the value 1 for countries with socialist/ communist law origin and 0 otherwise	0.170 0.379 53	La Porta et al. (1998)
DIVGOV	Probability that two randomly chosen deputies will belong to a different party in a given year (1975–1995)	0.564 0.230 53	World Bank Database of Political Institutions
REGQLT	Public perceptions of the incidence of market-unfriendly policies, inadequate supervision and burdens imposed by Excessive regulation – increases as these perceptions decrease (mean centered).	0.747 0.672 53	World Bank Database of Governance Indicators
UNOFEC	Estimates of the size of the shadow economy as a percentage of GDP (varying time periods)	26,255 12,971 53	Djankov et al. (2002)

[a]The values presented are the mean, standard deviation and number of observations, in this order

over 21 years, 1975–1995. Among the variables introduced in the DPI data set are several measures of checks and balances, political tenure, and stability; identification of party affiliation with government or opposition; and fragmentation of opposition and government parties in legislatures.

The variable selected to represent the pervasiveness of checks and balances throughout the political system measures the level of "divided government" (DIVGOV), i.e. the probability that two randomly chosen deputies will belong to a different party in a given year. Hence, it takes the value of zero if there are no opposition party seats.

In order to examine the relationship between regulatory intensity and public perceptions of the quality of public governance, in regard to political stability, regulatory effectiveness and control of corruption, the present paper turns to a different World Bank data set, that of Worldwide Governance Indicators.[4] The creation of this data set is described extensively in Kaufmann et al. (2003, 2007). These authors present estimates of six dimensions of governance covering 199 countries and territories for four time periods: 1996, 1998, 2000, and 2002. These indicators are based on several hundred individual variables measuring perceptions of governance which are assigned to categories capturing key dimensions of governance. An unobserved components model is then used to construct six aggregate governance indicators: voice and accountability; political stability; government effectiveness; regulatory quality; rule of law; and control of corruption. Point estimates of the dimensions of governance as well as the margins of errors are presented for each country for the four periods.

Even though the Worldwide Governance Indicators reflect different realities of public governance, point estimates (and their averages over the four time periods) tend to be highly correlated with each other.[5] Accordingly, using more than one measure to account for perceptions of the quality of public governance would cause multicollinearity problems. For the purposes of the present study, the regulatory quality indicator (REGQLT) is used as the measure of good governance. Its high correlation with corruption control indices[6] means that conclusions can also be drawn with regard to the association between regulatory intensity and corruption.

Finally, in order to examine the correlation between entry regulation and the extent of the unofficial economy, estimates of the size of the shadow economy as a percentage of GDP (varying time periods) were obtained from Djankov et al. (2002).[7]

The variables concerning the levels of risk aversion/uncertainty avoidance and the acceptance of power inequality/distance assume that cultural values are homogeneous across entire countries. Homogeneity might be conditioned by the diversity in ethnic origin and social upbringing within the same country. Hence, it was deemed relevant to include in the regressions a control variable that would reflect "ethnolinguistic fractionalization". This variable was obtained from La Porta et al. (2004) and represents the average value of different indices of

[4] www.worldbank.org/wbi/governance/govdata2002/.

[5] For instance, the correlation between the values of the regulatory quality and the control of corruption indices (averaged over the four observations) for the sample of 53 countries used in the present work is 92,4%. The correlation between the regulatory quality and government effectiveness indices is 92.1%.

[6] The high correlation levels between regulatory quality and control of corruption reported above remain if corruption perceptions measures obtained from other sources – such as the corruption perceptions index from Transparency International (http://www.transparency.org) – are used.

[7] These authors' estimates were computed mainly from data in Schneider and Enste (2000).

ethnolinguistic variety.[8] The more significant of these indices are: the probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group; probability of two randomly selected individuals speaking different languages; percent of the population not speaking the official language; and percentage of the population not speaking the most widely used language.

However estimation results were not significantly changed by the inclusion of this last variable. In fact, not only did the ethnolinguistic fractionalization variable have an insignificant effect on entry regulation, but its inclusion in the regressions did not affect the significance and signs of the two cultural variables (UAI and PDI). Hence, it was decided to omit this variable from the reported results.

5 Estimation Methodology and Results

5.1 Methodological Issues

The nature of the data and the methodology adopted in the present study – testing a set of hypotheses encompassing the main findings of the more relevant literature – lends itself to the use of multiple regression analysis. Simple multiple regression (OLS) procedures are appropriate for testing the hypotheses formulated in the previous section, including that regarding interaction effects between cultural scores and other variables.

For estimation of the correlation between the intensity of entry regulation and the different variables hypothesized, NPROC and TIME are used as dependent variables. In order to maintain focus on the hypotheses being tested, particularly with regard to the interaction between cultural values and other variables, the dependent variables, as well as the cultural value variables, were transformed through mean centering. This transformation (making the mean of each transformed variable equal to zero) facilitates the interpretation of interaction effects. Whenever heteroskedascity was detected, the estimation of covariance matrix was corrected using White's (1980) procedure.

Two methodological issues need to be addressed beforehand. First, one should expect a strong positive correlation between some of explanatory variables, particularly with regard to the relationship between country wealth, as measured by LNGDPPC, and variables representing governance quality, political checks and balances, law origin and cultural attitudes toward power inequality and risk/uncertainty. Table 2 displays the correlations between all the explanatory variables used the study.

In general, correlation coefficients between explanatory variables are not very high, so collinearity should not significantly affect the results. Acceptance of power

[8]The methodology for the construction of the data reported by these authors can be found in Easterly and Levine (1997).

Table 2 Variable correlation matrix

	PDI	UAI	LNGDPPC	LOUK	LOSOC	DIVGOV	REGQLT	UNOFEC
PDI	1.000	0.194	−0.507	−0.253	0.343	−0.229	−0.580	0.508
UAI	0.194	1.000	−0.102	−0.509	0.085	0.280	−0.112	0.384
LNGDPPC	−0.507	−0.102	1.000	0.072	−0.483	0367	0.512	−0.532
LOUK	−0.253	−0.509	0.072	1.000	−0.271	−0.135	0.158	−0.142
LOSOC	0.343	0.085	−0.483	−0.271	1.000	−0.442	−0.333	0.002
DIVGOV	−0.229	0.280	0.367	−0.135	−0.442	1.000	0.168	0.050
REGQLT	−0.580	−0.112	0.512	0.158	−0.333	0.168	1.000	−0.459
UNOFEC	0.508	0.384	−0.532	−0.142	0.002	0.050	−0.459	1.000

inequality is negatively correlated with perceptions of regulatory quality, suggesting that when individuals accept greater distance from political decision-making, such distance leads to a predisposition to judge government quality negatively. However, since greater power inequality is also correlated with lower levels of income, such judgment may be generally correct. It is also worth mentioning the existence of a negative correlation between uncertainty avoidance in society and the existence of an English common law tradition (−51%), suggesting that greater reliance on market mechanisms and courts is associated with a culture of less risk aversion.

A second issue which requires addressing is that of causality. Even though causality cannot be extracted from what is in essence cross-section data, it is reasonable to assume that the main features of a regulatory system are to a significant extent a result of a cumulative process, associated with historical determinism and legal and political tradition as much as with economic interests. Cultural values should therefore influence regulation regardless of specific moments in time. It is submitted that this contributes to the validity of the present study, although the data only allow for simple correlation analysis, and any conclusion about causality is seriously limited.

6 Results

Table 3 presents the results of estimation for both NPROC and TIME using all explanatory variables selected to test the hypotheses postulated in section "Hypotheses Formulation" (Complete Model).

The significant negative coefficients displayed by LNGDPPC, LOUK and REGQLT for both measures of regulatory intensity lend support to hypotheses I, II and IV. However, the results do not support hypothesis III, suggesting that the pervasiveness of checks and balances in the political system is not significantly associated with the intensity of entry regulation.[9] Hypothesis V, regarding a

[9]Similar results were achieved when using other variables to account for checks and balances, such as the number of political agents with veto power and the longest tenure of a veto player (also from the DPI).

Table 3 Regression results: complete model[a]

	NPROC (OLS)	TIME (OLS)
Number of Observations	53	53
R^2	76.36%	63.69%
F	17.61	10.37
Constant	15.138 (0.001)	8.240 (0.028)
LNGDPPC	−0.851 (0.031)	−3.508 (0.036)
LOUK	−3.814 (0.000)	−19.730 (0.001)
LOSOC	−2.060 (0.149)	−2.301 (0.826)
DIVGOV	−1.217 (0.509)	−11.133 (0.398)
REGQLT	−2.433 (0.001)	−22.570 (0.000)
UNOFEC	0.113 (0.007)	0.462 (0.263)
PDI	0.065 (0.003)	0.384 (0.016)
UAI	0.057 (0.003)	0.013 (0.929)

[a]Values between parentheses are p-values. Coefficients in bold are significant at the 95% confidence level

positive relationship between regulatory intensity and the weight of the shadow economy is supported when the dependent variable is NPROC; however, the UNOFEC variable has no significant effect on TIME.

Results show that the degrees of a country's uncertainty avoidance and power distance both have a significant positive correlation with NPROC, thus confirming Hypotheses VI and VII. However, only Hypothesis VI is supported for the variable TIME: acceptance of power inequality is associated with longer times to fulfill the required entry regulation procedures – likely due to a lower efficiency of public institutions, which may be associated with power distance.[10]

6.1 Interaction Effects

In order to examine interaction effects between the cultural variables – risk aversion and acceptance of power inequality – and other relevant variables within the framework of linear regression, the present study conceptualizes interaction effects in terms of moderated relationships (Jaccard and Turrisi 2003). Given a dependent variable Y, an explanatory variable X and a interaction variable Z, an interaction effect is said to exist when the effect of the explanatory variable on the dependent variable (regression coefficient) differs depending on the value of the interaction variable Z.

[10]As previously pointed out, the correlation coefficient between regulatory quality and power distance is high and negative (−58%). Since other governance quality indicators such as government effectiveness, voice and accountability and control of corruption are all positively and very significantly correlated with regulatory quality, there will also exist a negative relationship between such indices and power distance/inequality.

Assuming a simple linear model for the relationship between the dependent variable Y and variables X and Z:

$$Y = a + b_1X + b_2Z + e. \quad (1)$$

Equation (1) displays the simple "main effects" regression model where e is the normally distributed residual. If one assumes that the relationship between Y and X is moderated by Z through a linear relationship[11], this means that:

$$b_1 = b_0 + b_3Z \quad (2)$$

According to this formulation, for every unit change in Z, the value of the regression coefficient b_1 is assumed to change by b_3 units. Substituting (2) in (1) we have:

$$Y = a + (b_0 + b_3Z)X + b_2Z + e \quad (3)$$

which finally yields:

$$Y = a + b_0X + b_2Z + b_3XZ + e \quad (4)$$

Equation (1) shows the interaction regression model in which the effect of an explanatory variable X on the dependent variable Y is said to be a linear function of a interaction variable Z. Of course, the model in (4) can be generalized in order to include multiple interactions in which the effects of several explanatory variables (country wealth, governance quality, legal origin, etc.) on a dependent variable (regulatory intensity) are moderated by another variable (power distance/inequality or risk aversion/uncertainty avoidance). In order to analyze the significance of interaction effects, one can simply estimate the main effects model (without the product terms) and the interaction model (with the product terms) through ordinary least squares and compare their respective performances through a simple F test (Ayken and West 1991; Jaccard and Turrisi 2003). In order to simplify the analysis, only the variables found to be significant in the complete model are now included in the main effects models. This means that, for the dependent variable TIME, only interaction effects for PDI are examined, since UAI was found not to be significantly correlated with that dependent variable.

Table 4 displays the results of main effects and interaction effects models for the dependent variable NPROC. Interaction effects are examined separately for PDI and UAI. Results do not change considerably when considering product terms for both variables together. Hence, the analysis of the interaction effects which follows focuses on the results for the models considering interaction effects for the two

[11] Evidently, the interaction or moderating effect does not have to assume a linear form. However, this assumption means that the new model with interaction effects will remain linear.

Table 4 Regression results: main effects and interaction models[a]

NPROC (OLS)				
R^2	66.98%	82.94%	66.77%	81.62%
F	19.07	32.54	18.89	32.05
Models	Main effects with PDI	Interaction with PDI	Main effects with UAI	Interaction with UAI
Constant	7.312 (0.045)	14.23 (0.002)	10.77 (0.000)	8.528 (0.022)
LNGDPPC	−0.378 (0.017)	−1.131 (0.008)	−0.665 (0.012)	−0.408 (0.038)
LOUK	−4,572 (0.000)	−4,799 (0.000)	−3,716 (0.000)	−5.245 (0.000)
REGQLT	−2,171 (0.004)	−1,531 (0.006)	−3,071 (0.000)	−3,613 (0.000)
UNOFEC	0.036 (0.027)	0.047 (0.063)	0.053 (0.049)	0.042 (0.069)
PDI	0.059 (0.010)	0.405 (0.122)		
UAI			0.050 (0.008)	0.023 (0.863)
PDIxLNGDPPC		0.055 (0.025)		
PDIxLOUK		0.001 (0.979)		
PDIxREGQLT		−0.072 (0.013)		
PDIxUNOFEC		0.008 (0.971)		
UAIxLNGDPPC				0.016 (0.318)
UAIxLOUK				0.093 (0.035)
UAIxREGQLT				−0.032 (0.219)
UAIxUNOFEC				−0.001 (0.355)

[a]The number of observations is 53 for all models. Values between parentheses are p-values. Coefficients in bold are significant at the 95% confidence level

variables separately; Table 5 reports the results of the main effects and interaction models for NPROC considering interaction effects for both PDI and UAI simultaneously. Results of main effects and interaction effects models for the dependent variable TIME, considering PDI as the interaction variable, are also reported in Table 5.

In all the cases under analysis, the F test comparing the main effects model with the corresponding interaction model including product terms rejects the null hypothesis.[12] Hence, Hypothesis VIII formulated in Sect. 3 of this paper is supported by the analysis.

Interpretation of the coefficients estimated for the interaction models is fairly straightforward. Keeping (4) in mind, the total effect of the explanatory variable X on the dependent variable Y is given by:

$$b_0X + b_3XZ = (b_0 + b_3Z)X \tag{5}$$

Hence, the predicted variation in the dependent variable Y when X increases by one unit is given by b_0+b_3Z, i.e. the effect of X on Y will depend not just on the two regression coefficients, but also on some parameterized value of Z. If $Z=0$, the effect of X on Y will be given by b_0. This result is particularly interesting since

[12]F tests results are not reported here. The values for the R^2 and the F statistic are presented for each model in Tables 4 and 5.

Table 5 Regression results: main effects and interaction models[a]

NPROC (OLS)			TIME (OLS)	
R^2	78.35%	91.29%	57.63%	69.32%
F	25.06	41.79	12.79	26.97
Models	Main Effects with PDI and UAI	Interaction with PDI and UAI	Main Effects with PDI	Interaction with PDI
Constant	8,957 (0.001)	10.40 (0.029)	17.61 (0.485)	18.94 (0.016)
LNGDPPC	−0.466 (0.044)	−0.700 (0.002)	−4,081 (0.034)	−4,490 (0.029)
LOUK	−3,171 (0.000)	−4,186 (0.000)	−18,979 (0.020)	−17,599 (0.028)
REGQLT	−2,333 (0.002)	−2,537 (0.000)	−17,902 (0.001)	−18,084 (0.044)
UNOFEC	0.079 (0.041)	0.057 (0.158)		
PDI	0.062 (0.021)	0.181 (0.308)	0.252 (0.035)	0.033 (0.953)
UAI	0.053 (0.000)	0.044 (0.701)		
PDIxLNGDPPC		0.033 (0.050)		−0.059 (0.041)
PDIxLOUK		0.022 (0.469)		0.351 (0.386)
PDIxREGQLT		−0.094 (0.000)		−0.186 (0.029)
PDIxUNOFEC		0.001 (0.594)		
UAIxLNGDPPC		0.019 (0.140)		
UAIxLOUK		−0.074 (0.039)		
UAIxREGQLT		−0.039 (0.218)		
UAIxUNOFEC		−0.001 (0.400)		

[a]The number of observations is 53 for all models. Values between parentheses are p-values. Coefficients in bold are significant at the 95% confidence level

the sample average for the two interaction variables, PDI and UAI, is zero, since the cultural value scores on power inequality/distance and risk aversion/uncertainty avoidance were mean centered. It is therefore quite easy to calculate the value for the total interaction effect of the significant explanatory variables on NPROC and TIME. Table 6 presents the effects calculated for the relevant (significant) cases considering three possible values for PDI and UAI: the mean (zero) and plus or minus one standard deviation.

Departing from the value of the interaction effect when PDI equals its mean (zero), it is possible to verify that the acceptance of power inequality has a negative interaction effect on country income: the negative correlation between LNGDPPC and both measures of the intensity of entry regulation, NPROC and TIME, becomes weaker when PDI increases and stronger when PDI decreases. The PDI variable has the opposite interaction effect on perceptions of governance quality: the negative correlation between REGQLT and both NPROC and TIME becomes stronger when the acceptance of power inequality/distance in society increases. The interaction effect of uncertainty avoidance on the legal origin variable corresponding to English common law is negative: the negative correlation between LOUK and NPROC is weakened when UAI increases.

Table 6 Total interaction effects of PDI and UAI on NPROC and TIME

Explanatory variable	Dependent variable	Value for the interaction variable PDI	Value for the interaction variable UAI	Total interaction effect
LNGDPPC	NPROC	+One Std. Dev.		0.127
		Mean		−1,131
		−One Std. Dev		−2,389
LNGDPPC	TIME	+One Std. Dev.		−3,144
		Mean		−4,490
		−One Std. Dev		−5,836
REGQLT	NPROC	+One Std. Dev.		−3,166
		Mean		−1,531
		−One Std. Dev		0.104
REGQLT	TIME	+One Std. Dev.		−22,329
		Mean		−18,084
		−One Std. Dev		−13,839
LOUK	NPROC		+One Std. Dev.	−2,938
			Mean	−5,245
			−One Std. Dev	−7,551

7 Concluding Remarks

The present paper tests a series of hypotheses regarding the correlation between entry regulation in different countries and economic, political and cultural variables. The hypotheses tested were derived from the growing literature on comparative political economy and from views on how a society's risk aversion and acceptance of power inequality in its political processes and institutions, variables intimately associated with fundamental cultural values, may contribute to shape a country's regulatory system.

Evidence supports the following hypotheses:

1. There should be a significantly negative correlation between measures of entry regulation and countries' wealth
2. Countries with a common law tradition should display significantly less entry regulation than other countries
3. There should be a significantly negative correlation between measures of entry regulation and perceptions of government effectiveness, regulatory quality and control of corruption
4. There should be a significantly positive correlation between measures of entry regulation and estimates of the weight of the unofficial economy on countries' GDP
5. There should be a significantly positive correlation between measures of entry regulation and a society's acceptance of power inequality, or power distance

6. There should be a positive correlation between measures of entry regulation and a society's uncertainty avoidance
7. The correlation between measures of entry regulation and economic, legal and political variables should depend significantly on the values assumed by the measures of uncertainty avoidance and power inequality/distance.

This last hypothesis was tested using regression models including linear interaction effects taking the two culture-based variables, risk aversion and acceptance of power inequality, as interaction variables. According to the results, increasing power inequality in societies tends to reinforce the negative correlation between regulatory intensity and perceptions of good public governance, probably because individuals feel greater distance from decision making processes. However, increasing power inequality in societies reduces the negative correlation between a country's per capita income and the intensity with which entry is regulated. This means that a country with greater levels of power inequality should have stricter regulations for new entrants than a country with similar wealth but less power inequality.

The paper also finds that low uncertainty avoidance is strongly associated with the prevalence of English common law. While countries with this legal tradition tend to have less entry regulation, this effect is reinforced because the society's propensity to avoid risk is lower.

The empirical work found that, regardless of economic development level, there is a significant correlation between cultural heterogeneity amongst countries and entry regulation practices as regards both the number of procedures required and the minimum time required to complete those procedures. One can then argue that the embedded cultural values play a role in determining how politicians, bureaucrats and private interests (incumbents and entrepreneurs) interact to mold entry regulation. Such influence is likely to occur, at least in part, through the gradual shaping of legal political and governance systems.

Greater acceptance of inequality of power within society, and therefore greater reliance on government institutions, is connected with higher levels of regulation. In addition, reduced propensity to risk-taking – leading to the need to avoid uncertain outcomes such as the ones that may result from high levels of entry and market re-structuring – also leads individuals to rely more on government. Higher levels of entry regulation thus appear to emerge as a response from government institutions (whether the power is exerted mostly by politicians or bureaucrats) to societies' needs deriving from basic cultural values.

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Chapter 5
Prior Knowledge and Entrepreneurial Innovative Success

Uwe Cantner, Maximilian Goethner, and Andreas Meder

Prior knowledge and innovative success (not published)

1 Introduction

Cohen and Levinthal (1990) argue that there is a knowledge-based barrier to enter new markets where a certain level of knowledge is a prerequisite to being able to recognize and interpret new external information. This is particularly true for technologically dynamic industries and emerging markets. Accordingly, new business formation – and the setting up of a new, innovative firm in particular – is not widespread and ubiquitous phenomenon, but of rather rare occurrence. It only emerges when specific opportunities for entrepreneurial profits such as market inefficiencies or newly discovered scientific insights meet prior knowledge of potential entrepreneurs, thus, triggering opportunity exploitation by means of new venture creation. Given that an opportunity for entrepreneurial profits exists, an individual can earn this profit only if he recognizes that the opportunity exists and is of any value (Shane and Venkataraman 2000). According to Austrian economists, no two actors share all the same knowledge or information about, e.g., a particular scarcity, a new producer or a new method of production (Hayek 1945; Venkataraman 1997). Hence, different people will discover different opportunities because they possess different prior knowledge. The entrepreneur's prior knowledge further influences the relative success of the entrepreneurial outcome. Recent contributions in the literature argue that survival and performance of new firms are fundamentally shaped by prior experience of the entrepreneurial person (Carroll et al. 1996; Klepper and Sleeper 2005; Helfat and Lieberman 2002). They bring their knowledge and experience gathered through previous occupational episodes to the new firm. The technological expertise the entrepreneur alienates to the new firm may, in addition, determine the new firm's innovative success.

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By using patent data statistics and information gathered from the German "Handelsregister" this paper analyzes the influence of prior knowledge on innovative success, measured as the probability that the entrepreneur files a patent subsequent to firm formation. In order to do so, the next section reflects upon the literature on entrepreneurial prior knowledge to derive a set of testable hypotheses. The third section introduces the data sources and variables as well as a description of the data used in the analysis. Empirical results are presented and discussed in the fourth section. The paper concludes with remarks on future work that remains to be done.

2 Entrepreneurial Opportunity and Prior Knowledge

Following the trail of issues raised by Austrian scholars, entrepreneurship is both alertness to new entrepreneurial opportunities and the sequence of innovative actions following the discovery of an opportunity. To put it another way, innovative action is based on opportunity discovery, which cannot occur without alertness. Hence, if the entrepreneur is truly alert, he discovers profit opportunities and acts upon them (Koppl and Minniti 2003). By contrast, if a discovered opportunity is not followed by any action, the entrepreneur probably was not able to act, either due to a lack of knowledge, lack of will or lack of vision. Possibly, it was not a profit opportunity worth pursuing, at least not for the particular entrepreneur (Koppl and Minniti 2003). Not surprisingly, Shane and Venkataraman (2000) posit that a unique aspect of entrepreneurship research pertains to the questions of how, why and when individuals recognize opportunities for business creation while others do not.

The modern theory of entrepreneurship holds that opportunities are real and independent of the entrepreneurs that perceive them (Acs et al. 2005). Entrepreneurial opportunities may appear as imprecisely defined market needs or as un- or underemployed resources or capabilities (Kirzner 1997). Underutilized or unemployed resources as well as new capabilities may offer possibilities to successfully introduce new goods, services and raw materials that can be sold at a profit (Casson 1982; Shane and Venkataraman 2000). But, "opportunities rarely present themselves in neat packages. They almost always have to be discovered and packaged." (Venkataraman 1997). In this respect, Shane (2000) argues that people possess different information and beliefs, and as a result some actors recognize opportunities that others cannot yet see. Therefore, for entrepreneurship to occur, resource owners must not share the particular entrepreneur's beliefs and information, as they would try to capture the entrepreneurial profit by adjusting the price of resources to the point where the entrepreneurial profit would be eliminated (Shane and Venkataraman 2000). Likewise, if other entrepreneurs possessed the same beliefs and information, competition would eliminate the entrepreneurial opportunity (Schumpeter 1934).

However, simply being in possession of valuable information is insufficient for entrepreneurship (Venkataraman 1997). Thus, another central question most

notably for our concern is what triggers the search for and exploitation of opportunities in some actors, but not in others. To give answers, Venkataraman (1997) centers the actors' distinctive stocks of information acquired through each individual's own circumstances including occupation, on-the-job routines, social relationships and daily life. Accordingly, no two actors share all the same knowledge or information about e.g. a particular scarcity, an invention or a new method of production (Hayek 1945; Venkataraman 1997). This prior related knowledge confers to the recipient an ability to recognize the value of new knowledge and information, assimilate it and apply it to commercial ends (Cohen and Levinthal 1990; Venkataraman 1997). Shane (2000) as well as Shane and Venkataraman (2000) elucidate that each actor's idiosyncratic prior knowledge creates mental schemata. These provide a frame of reference, the "knowledge corridor" (Ronstadt 1988), which influences the entrepreneur's ability to comprehend, extrapolate, interpret and apply new information in ways that those lacking that prior information cannot replicate. Accordingly, even if information about newly discovered scientific insights and techniques is open to public, only a subset of actors will possess prior knowledge that is complementary with this new information and, thus, triggers the discovery of a particular entrepreneurial opportunity (Shane and Venkataraman 2000).

3 Prior Knowledge and Experience as Pivots of Success

All prospective entrepreneurs possess specific knowledge and skills acquired by their past occupational activities and their educational background. As mentioned, this can be of value in searching for new business opportunities as well as in the day-to-day running a firm (Shane 2000). Thus, the primary assets of new businesses are the capabilities and routines embodied in their founders (Hannan and Freeman 1986). The central argument of recent contributions in the literature is that survival and success of these new ventures are fundamentally shaped by the prior experience of the entrepreneur (Carroll et al. 1996; Klepper 2001; Helfat and Lieberman 2002). Moreover, it is argued that not resources and capabilities alone affect the likelihood of new venture success, but rather it is the match between the market entered and the start-up's pre-entry experience and capabilities that matter. Empirical findings suggest that the greater the similarity between pre-entry firm resources and required resources in an industry, the more likely a firm will enter that particular industry, and the greater the likelihood of firm survival and prosperity (Helfat and Lieberman 2002; Dahl and Reichstein 2005).

Reviewing the findings on the farm tractor industries Buenstorf (2006) suggests that the performance of diversifying entrants may not primarily have been caused by technological capabilities. Diversifiers' decisive competitive advantage may have been a close knowledge of customer needs and potential demand for products as they could draw from almost the same customer base in the new industry. Hence, their pre-entry experience enabled the new competitors to introduce commercially

successful product innovations. This is in line with conclusions Shepherd and DeTienne (2005) draw from a study that relates the entrepreneur's prior knowledge to entrepreneurial opportunity identification. They assert that those entrepreneurs with more in-depth prior knowledge of customer problems identified more opportunities and opportunities with a higher degree of innovativeness. Having prior knowledge of customer needs, thus, relates to a concerted awareness of market inadequacies and to a superior creative tension (Shepherd and DeTienne 2005).

Kakati (2003) observed that the development of a new technology or product does not necessarily lead to commercial success for firms operating in emerging markets. Rather, the presence of diversified skills and capabilities in which technological expertise is balanced with organizational skills in areas such as management, marketing, personnel, and accounting, are likely to positively affect the new venture's performance. Technological experience is certainly important to obtain innovation, but the innovative success also depends on the entrepreneur's capacity to assemble, coordinate, manage and execute resources and processes within and between firms (Brüderl and Preisendörfer 1998). As learning is an important source of human capital, such organizational knowledge and skills are best acquired by being an entrepreneur (Westhead and Wright 1998). Comparing the performance of habitual and novice entrepreneurs, Westhead and Wright (1998) spot entrepreneurial pre-entry experience to be a crucial determinant for higher chances for firm survival and success. The trial-and-error process which took place during prior self-employment may be the best preparation for the current entrepreneurial role (Brüderl and Preisendörfer 1998). Enterprising individuals who have previously been involved in entrepreneurship can rely on already existing business contacts and profit from an established legitimacy with financiers, customers and suppliers (Shane and Khurana 2003; Metzger 2007). Furthermore, the experience of bankruptcy or voluntary firm exit can be deemed to be a special type of business ownership experience, which might have a specific effect on the current innovative success of an entrepreneur. As indicated by these arguments, we hypothesize that:

Hypothesis 1. *The entrepreneur's prior market and organizational prior knowledge enhances the probability of being successfully innovative subsequent to firm formation.*

Before technological change leads to entrepreneurial innovative success in terms of marketable products and services or more efficient processes, entrepreneurs have to discover opportunities in which to exploit the invention (Shane 2000). However, new scientific insights that may pave the way for successful innovations can be complex, tacit and embodied within the entrepreneurial person (Pavitt 1991; Dasgupta and David 1994). Therefore, some familiarity with the inventor's technological knowledge is a prerequisite to recognize a certain entrepreneurial opportunity inherent in the new technology. Logically, the inventor holding tacit knowledge about his invention should be best suited to conduct the entrepreneurial role (Shane 2004). In the same line, Shane (2000) emphasizes the importance of technological prior knowledge for subsequent entrepreneurial innovative success. Applying an experimental approach, he shows that individuals with technological

knowledge from different backgrounds tend to recognize different business opportunities when faced with the same technological invention.

The significance of technological capabilities in determining competitive advantage of a new firm has been well documented in the literature (Teece 1986; Cohen and Levinthal 1990). A historical example is the U.S. television receiver industry, which was dominated by diversifying radio producers although they were only a minority among the entrants (Klepper and Simons 2000). Klepper and Simons (2000), thus, show how technological prior knowledge affects new venture performance. In their examination, entrants from the closely related, matured radio industry possessed technological expertise as well as resources and capabilities that matched with what was needed in the emerging television receiver industry. Therefore, these diversifying entrants benefited due to their ability to leverage their technological skills in the new industry and to gather advantages pertaining to production and product quality. Diversifying entrants survived longer, had higher rates of innovation and finally outperformed other entrants that lacked their technological prior knowledge. Similar evidence was found for the U.S. shipbuilding industries (Thompson 2005) as well as for U.S. census data spanning a broad range of industries (Dunne et al. 1988). Based on this evidence, we propose the following testable hypothesis:

Hypothesis 2. *The entrepreneur's prior technological knowledge enhances the probability of being successfully innovative subsequent to firm formation.*

According to a sociological perspective of entrepreneurship, social capital is considered as a main factor of success for the establishment and growth of young firms (Aldrich and Martinez 2001). Especially the formation of a new innovative firm is to a great extent "peoples' business," as it draws from the entrepreneur's social context that shapes and forms the entrepreneurial outcome (Brüderl and Preisendörfer 1998; Sorensen 2003; Elfring and Hulsink 2003; Taylor and Morone 2005). Thus, the entrepreneur is not to be seen as an isolated and autonomous actor, but is rather embedded in a network of pre-established social relationships which play a crucial role for venture creation and development. Thus, the entrepreneur's embeddedness in a network of pre-established social ties to other actors plays a crucial role for venture creation and development (Brüderl and Preisendörfer 1998; Sorensen 2003).

The network literature, further, suggests that economic actors gain access to information through interaction with other actors, who in turn are linked to knowledgeable others. Availability, timing and quality of information accessed depends on network characteristics. Pertinent argumentations are based on Granovetter's (1973) notion of the "strength of weak ties." According to that, weak ties, including casual acquaintance, are more likely to provide unique information than the individual's strong-tie relationships to close friends and family members. Consequently, less cohesive networks may be vital to obtain exclusive knowledge (Burt 1992), which is complementary with the entrepreneur's prior knowledge and, thus, triggers the recognition of a business opportunity in a particular segment or market niche of the economy (Hills et al. 1997). Since new entrants to the entrepreneurial profession

often suffer from a lack of financial capital, skilled labor and capabilities to exploit the opportunity, they can leverage their social relationships to gain access to scarce resources (Sorensen 2003).

Beyond the sociological literature (Granovetter 1973), only recently an economic literature dealing with knowledge networks and its impact on the rate of knowledge diffusion (e.g., Cowan and Jonard 1999; Cowan 2004; Morone and Taylor 2004; Cantner and Graf, 2006) has emerged. Empirical and simulation analysis of network structures and its influence on knowledge diffusion show that the rate of diffusion is maximized in networks that exhibit small world properties, i.e., networks with short average path length and high degree of clustering (Watts and Strogatz 1998). The main body of network literature remains at a network level, describing network structure and development. Cantner and Graf (2006) test for the relationship between network embeddedness and individual innovative performance. They find evidence pertaining to a relationship between network position and innovative performance in terms of persistence in an inventor network. Additionally, they find hints for the importance of short term interpersonal linkages in shaping networks of cooperations and even entire local innovation systems (Cantner and Graf 2006).

The entrepreneur's social network might, therefore, function as a channel for knowledge transfer while enabling connections to, e.g., a research community (Burt 1992). Today's inventive and innovative activities more often than not show the systemic character of "collective invention" (Allen 1983). More commonly, it is the formal and informal collaboration of the entrepreneur with different actors which makes successful innovation more likely (e.g., Cantner and Graf 2004). In this respect, dense social networks often prove useful because they foster the flow of information between individuals as they imply reciprocal obligations, mutual understanding and trust (Coleman 1990). Coleman (1990) further points out that close interactions with other actors are valuable in terms of information quality provided. Hence, we expect that:

Hypothesis 3. *Entrepreneurs with prior knowledge gathered through formal and informal exchange are more likely to be successfully innovative after firm formation than others.*

4 Data Sources and Variables

We resort to two data sources. First, the database of the "Handelsregister"[1] provides information about German firm formations of the years 1990 till 2004. The name of the firm, information about firm founders, their residence and age as well as data concerning firm status and development are available. The second data source used

[1] The "Handelsregister" is a public register that contains information about all entrepreneurs and founded firms in a register court district. All data about ownership and legal status are included.

is the "Deutsches Patentblatt," a database containing all patents applied for at the German Patent Office or at the European Patent Office for Germany. These data provide information about the names and addresses of the inventors who applied for a certain patent. Following Balconi et al. (2004), we assume that multiple inventors that are listed on a patent application are known to each other and have had contact during the process of developing patentable knowledge. We use patents applied for between 1997 and 2004. As we are interested in the inventors' technological prior knowledge and their collective innovation experience, the subsequent decision whether the patent is granted or not is not of interest for our purpose.

Additionally, we are interested in determinants of the innovative success of recently founded firms. We, therefore, use patents as an indicator of innovative success. One of the major drawbacks of using simple patent counts as a measure of innovative output is that not all patents are of similar quality and importance. Patents, like publications, can vary greatly in their commercial impact and technological influence. Nevertheless, and even more important for our concern, Griliches (1990) as well as Acs and Varga (2002) have shown that patents provide a fairly reliable measure of innovative success. This reliability may, however, be restricted to technological innovations and has some shortcomings in regression fitness (e.g., Encaoua et al. 2006). In the present study, an entrepreneur is deemed as innovatively successful if either he or his newly founded firm file a patent in the period after firm formation.

The hypotheses are tested on a sample of entrepreneurs who founded a firm in the region of Jena in 2000 or 2001. During this period a total of 80 firms are established by 85 founders. In the following analysis, data of these 85 firm founders are used in the analyses. A description of the variables used is provided in Table 1. In order to clarify the relationship between depend and independent variables according to time, we have included a time bar graphic in Fig. 1.

As shown in Fig. 1, the innovative success (*INNO-SUC*) of firms founded in the years 2000 and 2001 is measured by patents applied for in 2002–2004. Table 2 shows that within this time, 16 of the 85 founders examined filed for a patent as inventor or applicant or their firms were labeled as an applicant. So nearly 19% of the new firms can be considered as successfully innovative.

The information provided by patent data is further used to indicate the prior technological knowledge (*TECH-EXP*) the firm founder possesses at the stage of formation, between the years 1997 and 1999.[2] As Table 2 shows, 21 of the sampled

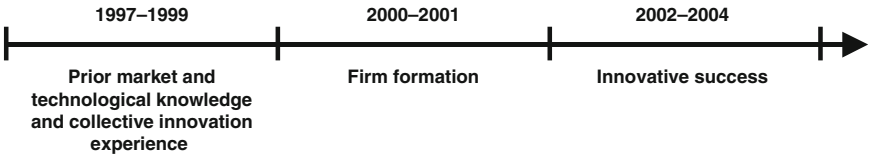

Fig. 1 Phase model

[2]Patents applied for in the years 2000 and 2001 are excluded here because the invention cannot be categorized into the pre- or post-formation phase.

Table 1 Description of the variables used

Variable	Description
INNO-SUC	Indicates whether the new firm is names as applicant or the entrepreneur is named as inventor of a patent. This variable takes the value of 1 if a patent was applied for in the period 2002–2004, 0 otherwise.
MARKET-EXP	Indicates the entrepreneur's experience with "how-to-found-a-firm" at the stage of firm formation. This variable takes the value of 1 if the entrepreneur has already founded a firm before 2000, 0 otherwise.
PATENT-INT	Indicates whether the firm has been founded in a patent intensive sector. This variable takes the value of 1 if the sum of all patents applied for in the respective sector is above the value of the median sector, 0 otherwise.
TECH-EXP	Indicates the entrepreneur's technological knowledge at the stage of firm formation. This variable takes the value of 1 if the entrepreneur is named as inventor on a patent application in the period 1997–1999, 0 otherwise.
PRE-NET	Indicates the embeddedness of the entrepreneur within a research community. Only entrepreneurs with prior technological knowledge are considered. Here, we used the normalized Freeman degree to account on the one hand for the possibility of repeated cooperation between two partners and, on the other hand, for the size of the whole network.

Table 2 Descriptive statistics

	Obs.	Cases	Mean	Median	Max	Min	SD
INNO-SUC	85	16	0.188	0.000	1	0	0.393
MARKET-EXP	85	12	0.141	0.000	1	0	0.350
PATENT-INT	85	40	0.471	0.000	1	0	0.502
TECH-EXP	85	21	0.247	0.000	1	0	0.434
PRE-NET	21	20	0.749	0.589	3.028	0	0.731

firm founders are identified either as an inventor or as an applicant on a patent in 1997–1999. Another kind of knowledge which may be beneficial to a newly founded firm comprises founders' market and organizational experience. We assume that all observed entrepreneurs who founded a firm before 2000 have already gathered this experience. The binary variable *MARKET-EXP* takes a value of 1 in that instance and 0 otherwise. In our sample, 12 entrepreneurs do possess prior market experience (Table 2).

While *TECH-EXP* indicates whether the firm founder possesses technological prior knowledge, a further assumption is made on inventor's embeddedness in a research community as the source of this kind of knowledge. Embeddedness in a research community is measured on the basis of an innovator and inventor network developed from the information provided by patent data. To test the impact of connections to other inventors in the pre-founding phase on innovative success after firm founding, we include the normalized degree centrality[3] to indicate the embeddedness of each inventor (one vertex) within the innovator-inventor

[3]The number of vertices adjacent to a given vertex in a symmetric graph is the degree of that vertex. The normalized degree centrality is the degree divided by the maximum possible degree as a percentage (Borgatti et al. 2002).

Table 3 Covariance matrix

	INNO-SUC	MARKET-EXP	PATENT-INT	TECH-EXP	PRE-NET
INNO-SUC	0.153				
MARKET-EXP	−0.003	0.121			
PATENT-INT	0.064	0.028	0.249		
TECH-EXP	0.083	0.024	0.025	0.186	
PRE-NET	0.200	−0.030	0.013	0.000	0.509

network. Naturally, the influence of embeddedness can only be measured for those inventors who have been active within a network, meaning those who gathered technological experience prior firm formation. As a result, only 21 inventors with prior technological knowledge can be considered. Table 2 shows that among these only one inventor applied for a patent as a single inventor (*PRE-NET* value of 0), while all other inventors applied for a patent together with at least one co-inventor.

To control for the sector the firm is founded in and the respective intensity of patenting, we use the binary variable *PATENT-INT* which takes the value of 1 if the firm belongs to a sector with patent intensity above the median sector and 0 otherwise.

In a first descriptive analysis, the bilateral relationships between each of these variables are provided. Table 3 shows the respective covariance matrix. This measure is used because of the binary nature of four of the variables. It simply indicates whether both variables are independent of each other (value close to zero). The value of the covariance itself, however, cannot be interpreted. In general, we find rather low values except the relation between *INNO-SUC* and *PRE-NET*. The covariance between *MARKET-EXP* and *INNO-SUC* is most closely to zero. The covariance between *TECH-EXP* and *PRE-NET* is zero by definition.

Beside these descriptions of our data, we make use of Social Network Analysis (SNA) to investigate the issue of embeddedness in cooperative research and to find differences among firm founders who possess technological experience at the stage of formation. For these entrepreneurs, we distinguish between two groups: firm founders who are successfully innovative (*INNO-SUC* = 1; n = 16) and firm founders who show no further innovative success (*INNO-SUC* = 0; n = 69).

The ego net[4] for each actor of the latter group is depicted in Fig. 2 Except for one, inventors of this group are embedded within so called cliques prior to firm formation. A clique is defined as a set of actors who are all connected to each other. This finding can be explained by the fact that inventors in a particular clique are stated as multiple inventors of one and the same patent. Only one actor filed a patent as single inventor.

Figure 3 shows the ego nets of the former group, inventors who applied for patents prior to as well as after founding a firm.

[4]The egocentric network (or "ego net") of vertex v in graph G is defined as G(v(N(v))) (i.e., the subgraph of G induced by v and its neighborhood) (Butts 2008).

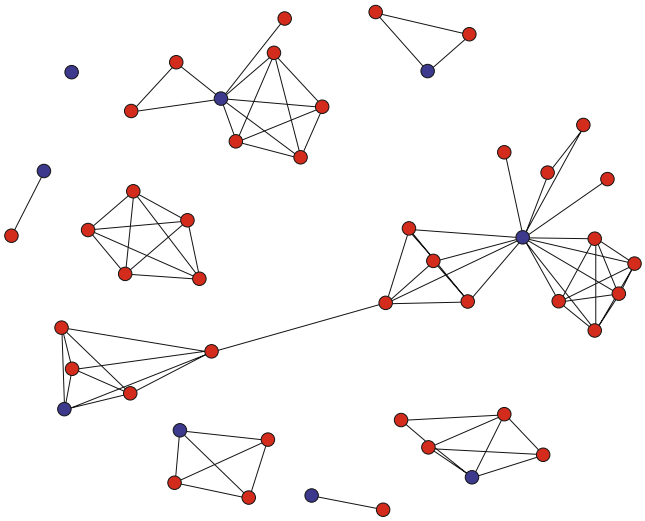

Fig. 2 Group of technologically experienced entrepreneurs without innovative success after firm formation

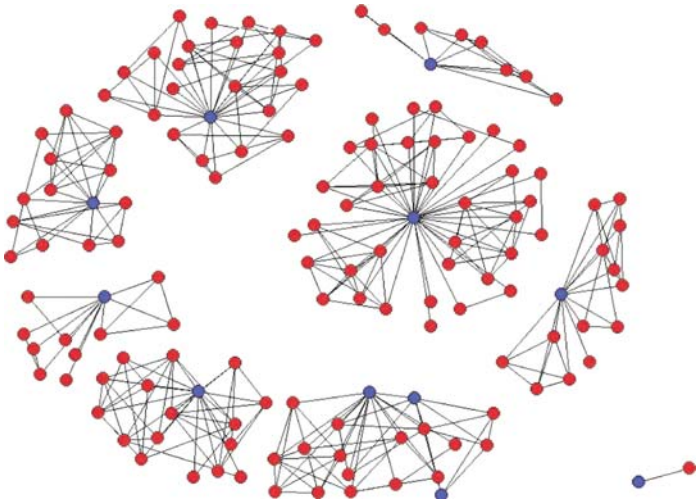

Fig. 3 Group of technologically experienced entrepreneurs with innovative success after firm formation

It is obvious that almost each member of this group has more connections to other inventors than the members of the first group. Additionally, we found no cliques structure as we did for the first group in Fig. 1. This outcome may be attributable to two facts. First, inventors with innovation success after firm formation hold more patent applications in the pre-entry-phase (on average 3.5 patents for

group 2 compared to 1.4 patents for group 1). Second, these patents show a higher number of co-applications and co-inventions than the patents of the group 1 inventors.

After this descriptive analysis of the determinants influencing the innovative behavior of newly founded firms, we apply regression models to test the hypothesized relations in the following.

5 Models and Regression Results

To test the hypotheses related to the innovative success of newly founded firms, we apply a binary Logit model. This is due to the binary dependent variable *INNO-SUC*, taking a value of 1 if the newly founded firm has applied for a patent in the period after firm formation or if the entrepreneur is named as an inventor in this period. The hypotheses to be tested refer to the influence of entrepreneurial knowledge assets of new venture at the stage of firm formation on further innovative success.

In order to test for hypothesis 1 we start with Model 1 analyzing the impact of market experience (*MARKET-EXP*) on the innovative success:

$$P_{(INNO-SUC=1)} = \beta_0 + \beta_3 * MARKET - EXP + \beta_4 * PATENT - INT \quad (1)$$

In a second step, we included the variable *TECH-EXP* which indicates whether firm founders possess technological experience in terms of patent applications in the period before firm formation:

$$\begin{aligned} P_{(INNO-SUC=1)} = {} & \beta_0 + \beta_1 * TECH - EXP + \beta_3 * MARKET - EXP \\ & + \beta_4 * PATENT - INT \end{aligned} \quad (2)$$

As mentioned above, the embeddedness within a research community is represented by a connectivity indicator based on the ties each firm founder shows in a patent network. Taking this connectivity indicator for the whole database would explain roughly the same as the *TECH-EXP* variable introduced above. To get additional insights we reduce our data base to the 21 cases where entrepreneurs possess prior technological knowledge. On the basis of this smaller sample, we then test for the impact of collaborative research experience additionally to the technological experience in general:

$$\begin{aligned} P_{(INNO-SUC=1/TECH-EXP=1)} = {} & \beta_0 + \beta_2 * PRE - NET + \beta_3 * MARKET - EXP \\ & + \beta_4 * PATENT - INT \end{aligned} \quad (3)$$

Table 4 Regression results

	Model 1	Model 2	Model 3
Dependent variable	INNO-SUC	INNO-SUC	INNO-SUC
Method	Binary Logit	Binary Logit	Binary Logit
Variables			
(INTERCEPT)	−2.598(0.000)	−4.072(0.000)	−8.874(0.108)
TECH-EXP		3.212(0.002)	
PRE-NET			8.282(0.082)
MARKET-EXP	−0.583(0.501)	−1.890(0.105)	−3.818(0.176)
PATENT-INT	1.973(0.005)	2.553(0.005)	6.784(0.118)
McFadden R^2	0.124	0.367	0.625
Total obs.	85	85	21
No. of correct forecasts	69	71	18

p-value in parenthesis

Our estimation results are reported in Table 4. Each column represents the results for one of our models: model 1 only contains the control variables, model 2 provides an estimation on the impact of prior technological knowledge and finally, model 3 testing for the collaborative research experience with the reduced data base.

The results for model 1 indicate that experience of "how-to-do-a-business," labeled as *MARKET-EXP*, does not have an effect on the start-up's innovative success. Accordingly, our data do not support hypothesis 1. Moreover, the variable indicating a firm formation in a patent intensive sector (*PATENT-INT*) has a significantly positive influence on the probability to become successfully innovative. This is a first hint towards the influence sectoral conditions have on start-up's innovation performance. The fitness of the estimation result is expressed by the McFadden pseudo-R^2 value and the number of correct forecasts. The McFadden pseudo-R^2 of model 1 is 0.124, which means that 12.4% of the real observations are explained by the independent variables included in this model. The number of correct forecasts is a post-estimation classification under the minimum mean squared discrete prediction error criterion. In our first model 69 of 85 observed values are correct forecasts.[5]

The variable capturing prior technological knowledge (*TECH-EXP*) is included in model 2. The coefficient for this independent variable has a significantly positive value. Therefore, for our sample we can not reject hypothesis 2. If a firm founder possesses technological knowledge at the stage of firm formation, the likelihood to become successfully innovative in the following period increases. This effect is independent from the average propensity to patent in the new firm's industry sector. Again market knowledge as another dimension of prior knowledge does not determine the probability of further innovations.

[5] Terza (2006) has shown that for binary regression models the threshold parameter is not arbitrary and that other values than 0.5 are not optimal. Following from this, an estimated result is correct if the estimation error is below 0.5 in the case of binary regressions.

Having showed how different kinds of prior knowledge affect a start-up's innovative performance, we now test the influence of collaborative research experience. We, therefore, use the sub-sample of cases in which firm founders possess prior technological knowledge. Hence, the third model in Table 4 captures entrepreneurs' prior established embeddedness in a research community. The metric variable *PRE-NET* shows a positive influence on further innovative success, although on a significance level of 10%. However, given the small number of cases considered, we argue this effect to be quite sufficient. Accordingly, contacts to other inventors in terms of being co-inventor on a patent application in the period before firm formation foster the innovative success in the pre-founding phase. Our data provide support for hypothesis 3. The predictive ability of this model is quite sufficient with McFadden pseudo-R^2 of 0.625 and correct predictions for 18 of the 21 observations.

6 Interpretation and Conclusions

This paper is concerned with the influence of different kinds of an entrepreneur's prior knowledge on start-up's innovative success. We, therefore, combine patent statistics with official data on firm formations. We distinguish between two types of prior knowledge, namely market and technological knowledge. Measuring start-up's innovative performance in terms of the probability to file a patent, our empirical results suggest that prior market or organizational knowledge has no effect. Contrary to comparable studies (e.g., Buenstorf 2006; Dunne et al. 1988), this finding is probably due to the dependent variable capturing innovative success instead of economic performance.

Concerning the technological experience and knowledge of entrepreneurs, our finding is in line with comparable empirical studies (e.g., Agarwal and Bayus 2005; Klepper and Simons 2000; Shane 2000). We show that start-ups by technologically experienced founders are more likely to be successfully innovative than firms set up without such prior knowledge. Furthermore, the technological knowledge an entrepreneur possesses prior to start-up may have evolved from research projects either conducted by the single entrepreneur or within a research community. We found evidence that the entrepreneur's involvement in a team of inventors positively predicts the likelihood for being innovatively active subsequent to venture creation. This is a first hint towards the importance of collective activities for further innovative success. In general, this finding is congruent with previous studies showing a positive influence of networking activities on the individual (e.g., Combs and Ketchen 1999; Belderbos et al. 2004) as well as systemic innovative success (e.g., Fritsch and Franke 2004; Asheim and Coenen 2005).

In further steps, we want to enlarge this study both quantitatively and qualitatively. The current data base contains only a small sample of firm formations in the area of the city of Jena. Therefore, in future analyses we will rely on data from the "Thuringian Founder Study," providing information about growth and

development of all firm formations between 1994 and 2006 in the entire eastern German state of Thuringia. With this additional data, we will be able to gain deeper insights into the relation between prior knowledge and firm performance.

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Part II
Regional Cultural Aspects and the Entrepreneur

Chapter 6
Public Research in Regional Networks of Innovators: A Comparative Study of Four East-German Regions

Holger Graf and Tobias Henning

Public research in regional networks of innovators: a comparative study of four east-german regions (first published in: Regional Studies, 2008, iFirst Article, 99999:1)

1 Introduction

We analyze regional networks of patenting innovators in four East German regions with special attention to the role of public research within these networks. The work is exploratory in nature and is led by the general assumption that a region's innovative output is influenced by the quality and intensity of regional innovative networking. This in turn is somehow influenced by the presence of public research in the region. As a first step, we describe the structural differences *between* the four regional networks. We then demonstrate the constitutive role of public research *within* each of the local networks. Across our sample, we find correspondence between the connectedness of the network, the importance of public research organizations within the network, and regional innovative output.

Adopting the system of innovation approach as a conceptual framework (Edquist 1997), we view innovative activity as a collective process, characterized by a transfer of knowledge between networked actors. Knowledge, especially if it is partly tacit, can only be transferred via personal relationships. Geographical proximity facilitates these face-to-face contacts, even though it is certainly not a sufficient condition (Breschi and Lissoni 2003; Boschma 2005). Therefore, regions are a reasonable level of analysis (Cooke 1998). Innovative activity can then be modelled as a social network "boxed" in a region.

Following Cantner and Graf (2006), we use relational patent data to construct these networks. More precisely, we link patent innovators both by joint application and the mobility of inventors switching between them, and we interpret these links as knowledge flows. According to a distinction put forth by Breschi and Lissoni (2004), we analyze relationships based on co-patenting as well as on co-invention.

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However, patents are also used in the traditional way as an indicator of innovative output both to weight the network actors and to assess the innovative performance of the regions as a whole.

Among the network actors, we are explicitly interested in public research organizations, i.e., universities and non-university publicly funded research institutes, since geographical proximity seems to be especially important for their interactions with industry (Fritsch 2001). One function public research is usually expected to serve within local innovation systems is the provision of innovative input to the region by (1) generating and accumulating basic scientific knowledge, (2) collecting knowledge external to the region and integrating it into the regional knowledge stock, and (3) educating a highly skilled workforce to keep the region's private economy capable of performing high-level industrial R&D (Fritsch and Schwirten 1999). Furthermore, since public actors have different motives and incentives than private actors, they may well play a specific and presumably essential role within the process of collective invention and shape the regional networks.

We proceed as follows: The following section introduces the four sample regions and compares their innovative performance using employment and patent output data. Section "Regional Innovator Networks and the Role of Research Institutions" exposes the methodological approach, presents visualizations of the regional networks of innovators and comparatively analyzes the networks' structures and characteristics. Section "Comparative Network Structures" elaborates the distinctive role of public research organizations as network actors. The last section concludes.

2 The Regions: Dresden, Jena, Halle, and Rostock

2.1 Selection of Regions

In our explorative study, we restrict the analysis to four East German regions: Dresden, Jena, Halle, and Rostock.[1] With the exception of Rostock, all regions are of comparable size, ranging from 800,000 to one million inhabitants (Table 1). Each region contains a research university and a number of public research organizations such as institutes of the Fraunhofer-Gesellschaft, the Leibniz Association, and the Max Planck Society. All regions have a considerable tradition in manufacturing industries: electronics and mechanical engineering in Dresden, optics and precision mechanics in Jena, chemicals in Halle, shipbuilding and mechanical engineering in Rostock. Two types of regions can be distinguished, as Jena and Dresden, on the one hand, are often labelled as East-German boom regions that have successfully managed the economic transformation after German

[1]A comprehensive investigation of the role of public research in local innovator networks should include all 97 planning regions or at least those which meet the requirement of local public research organizations. Unfortunately, we have not yet been able to do the necessary data processing for all regions.

Table 1 Regional innovative potential and patent output (mean yearly values)

	Dresden	Jena	Halle	Rostock
Population (1994–2000)	1,035,486	794,471	893,614	438,643
Private sector (1994–2000[a])				
Establishments[b]	26,976	20,059	19,775	10,923
Employees	291,791	201,167	226,668	111,401
Natural scientists and engineers[c]	12,052 (4.13%)	5,170 (2.57%)	6,990 (3.08%)	2,901 (2.60%)
Universities[d] (1994–2000)				
Total research and teaching staff	3,775	2,633	2,642	1,741
in natural sciences and engineering[e]	2,172 (58%)	918 (35%)	1,098 (42%)	656 (38%)
Professors	704	452	425	289
in natural sciences and engineering	454 (64%)	193 (43%)	185 (44%)	142 (49%)
Patents (1995–2001)				
per year	467.0	253.7	167.0	67.1
per 100,000 inhabitants	45.1	31.9	18.7	15.3
per 1,000 employees[f]	1.16	0.94	0.53	0.42
Per 1,000 natural scientists and engineers[f]	32.0	38.1	21.0	17.3

[a]Natural scientists and engineers in Dresden: 1996–2000
[b]Includes all establishments with at least one employee
[c]Employees with tertiary education in natural science or engineering
[d]Includes research universities and technical colleges ("Fachhochschulen")
[e]Includes three groups of scientific disciplines: natural sciences, agricultural and nutritional sciences, and engineering. Excludes medical sciences, cultural and social sciences, law and economics, and arts
[f]Total of private and public sector
Source: German statistical office (population, university staff), establishment file of the German Social Insurance Statistics (establishments, employees), German patent office (patents)

reunification, whereas Rostock and Halle, on the other hand, are said to lag behind. We will confirm this preconception by reporting pronounced regional differences in innovative performance, and propose to consider the role of public research in the respective innovation systems as a possible factor to explain these differences.

The geographical boundaries of the regions are defined as German planning regions ("Raumordnungsregionen"). Designed to represent socio-economic entities, they normally comprise several districts ("Kreise," i.e., German NUTS3 level units), namely a core city and its surrounding area. We consider planning regions to be more suitable than districts. In the first place, the core city districts seem to be too small because local innovation systems may well include some R&D capacities located somewhat beyond the boundaries of the core city. The second reason is methodological: Since patents are assigned to regions in accordance with the inventors' residence, this larger regional unit allows us to account for commuting inventors who work in the city but live in the surrounding areas.

2.2 Innovative Potential and Patent Output

As a starting point and to provide a reference framework for the following investigation of the networks of innovators, we present basic comparative data of the regions and their economic potential for patenting as well as of regional patent efficiency (Table 1).

The regional differences are small with respect to the share of private sector employees in total population (25–28%) as well as to the average establishment[2] size (10.0–11.5 employees per establishment). But we observe striking differences regarding the share of private sector natural scientists and engineers. Halle displays only about 75% of the Dresden value, Rostock and Jena only about 62%. The absolute number of natural scientists and engineers employed is by far highest in Dresden.

Why do we stress this point? Most patents refer to technical solutions applicable in the fields of natural science and engineering. Performing research with a patentable output normally requires skilled experts in these fields. Yet the number of natural scientists and engineers employed is a reasonable proxy for the regional pool of potential inventors.[3]

In a similar way, the scientific staff at universities in natural sciences and engineering disciplines may be interpreted as the pool of potential academic inventors. Again, Dresden shows the most distinctive orientation towards fields most likely to generate academic patents. In absolute figures, the number of natural scientists and engineers in Dresden employed by the university is twice as high as that of Halle, which ranks second. In all regions, the pool of potential inventors at universities is of significant size compared to the respective private sector pool (between 16% in Halle and 23% in Rostock).

Relating patent numbers to the numbers of potential inventors results in patent efficiency measures, as reported in the last section of Table 1. A substantial gap between the leading regions of Dresden and Jena, on the one side, and the lagging regions of Halle and Rostock, on the other, can be observed. The three different measures of patent efficiency can be read as a step-by-step approximation to the relevant input pool as a reference for patent output. Patent density, defined as patents per capita, is highest in Dresden, followed by Jena, Halle, and Rostock. With an average yearly patent density of 45 patent applications per 100,000 inhabitants, Dresden is ranked somewhere in the middle of all German planning regions (Greif and Schmiedl 2002). The order between the regions is left unchanged, but with Jena closing the gap with Dresden and Halle lagging behind, if employees are used as a more appropriate measure of innovative potential.

[2]Data are from the establishment file of the German Social Insurance Statistics, which does not allow the aggregation of information to the firm level. See Fritsch and Brixy (2004) for a detailed description of the database.

[3]In fact, the number of private sector natural scientists and engineers turns out to be highly significant in explaining regional patent output (Fritsch and Slavetch 2005).

Finally, if we apply the number of natural scientists and engineers that we assume best represents the pool of potential patent inventors, Jena takes the lead from Dresden and the gap between the leading regions and Halle and Rostock widens.

This short inspection of the regions' innovative potential and performance reveals two main results: First, Dresden is the region with the largest potential to generate patents, both in terms of the share of natural scientists and engineers and in terms of their absolute number. Second, natural scientists and engineers in Jena exhibit the highest patenting productivity, though Jena's pool of potential inventors relative to all employees is not larger than in Rostock and is still smaller than in Halle in absolute figures.

There are two possible explanations for these differences in patent efficiency: First, it may be due to differences in the sectoral structure, and second, it could be a result of differences in the organization of the innovation process. While both factors are obviously intertwined, the present study is an investigation of the latter though we have to keep the former in mind when interpreting our results.

2.2.1 Sectoral Structure

Patents are granted for technical solutions, occuring mainly in manufacturing industries and, with the exception of the rising importance of software patents, even less so in the service sector (Mairesse and Mohnen 2003). Within manufacturing, the propensity to patent inventions differs across industries for various reasons. Industries with a relatively low level of patenting activity may not be less innovative but prefer other means to appropriate the results of innovative activity, such as secrecy and lead time, or they innovate in an incremental way that is not compatible with the requirements of being granted a patent (Pavitt 1985; Arundel and Kabla 1998; Brouwer and Kleinknecht 1999).

Information about the sectoral distribution of employees reveals that, in Jena, 22.1% of all employees work in the manufacturing sector, whereas in Dresden, the respective share is 18.7, in Halle 15.9% and in Rostock 13.1%. This corresponds to the order of the four regions with respect to patent efficiency, as shown in Table 1, supporting the argument stated above that regions in which manufacturing is more important will show a higher innovative efficiency in terms of patents per employee.

2.2.2 Organization of the Innovation Process

Besides the influence of sectoral structure, regional differences in patenting efficiency may also occur because the regions are not equally successful in generating novelty from a given knowledge base. The theory of innovation systems suggests that relationships between the actors involved in innovative activity are of crucial importance as knowledge flows between the actors are a prerequisite for learning processes that lead to higher innovative output (Lundvall and Johnson 1994; Capello and Faggian 2005; Malmberg and Maskell 2006). In the following section,

we construct networks of personal relationships between innovators which can be interpreted as channels of knowledge transfer. The characteristics of the networks as a whole, and the special role of public research organizations within them, will be presented and used to derive some possible explanations for the observed regional differences in innovative performance.

3 Regional Innovator Networks and the Role of Research Institutions

3.1 Social Network Analysis and Patent Data

Social network analysis is a methodology developed mainly by sociologists and researchers in social psychology.[4] It is based on the assumption that relationships among interacting units matter and has proven to be an attractive tool for many other disciplines such as sociology, economics, marketing, or industrial engineering (Wassermann and Faust 1994, p. 4).

One important concept for the analysis of actors in social networks is centrality. There are (at least) three broad concepts that we will discuss at this point.[5] The first and most simple idea is *degree centrality*, which is just the number of ties of an actor. In our context, it is the number of transmission channels through which an actor can exchange knowledge with others. An actor can also be defined as being central if he "controls" many knowledge flows between other actors (*betweenness centrality*). The third concept looks at the distance of an actor to all other actors in the network; the closer one is to all others, the higher is his *closeness centrality*. The problem with this last measure is that, in unconnected networks, it is difficult to determine the distance to actors who are not reachable, and therefore we do not use it here.

An empirical application of the network approach poses rather strong constraints on the underlying data. Taking samples of firms might be misleading, since one might miss firms that link otherwise unconnected parts of the network or the most central players of the network. Samples can only be taken on the level of relations, i.e. not all types of relations between firms have to be analyzed, only the ones in the focus of the study (Scott 2000). Patent data have the advantage of being widely available and databases are complete in the sense above. As a consequence, a growing number of studies use patent information to apply social network analysis in the field of economics. Some authors link inventors directly by assuming relations between inventors who worked on joint patents (Balconi et al. 2004; Fleming et al. 2004a, b), while others link the applicants via common inventors (Breschi and

[4]Scott (2000) provides a very good introduction to social network analysis.

[5]For a detailed discussion of the concept of centrality, please refer to Freeman (1978–1979) or Wassermann and Faust (1994).

Lissoni 2003; Singh 2003, 2005; Cantner and Graf 2006). We pursue the latter approach to map the regional networks of innovators and analyze patent applications at the German Patent Office which were disclosed between 1995 and 2001. The regional assignment of patents is based on the inventors' residence, i.e., we use all patent applications with at least one inventor residing in the respective region to construct the networks.

As noted above, the use of patents is of course problematic since not all novelties are or can be patented and information about the quality of patents is difficult to retrieve. But since we are interested in the connections between actors in the process of innovation, the output in terms of patent quality is not of critical importance. In our opinion, the insights that are obtained by accounting for specific linkages and the resulting structure outweigh the drawbacks. One should always be aware of the restrictions of the underlying database, though.

Our innovator networks are constructed in the following way. On each patent application, we find information about the applicant (for which we use the term innovator[6]) and about the persons involved in the process of development of the patent (the inventors). We assume two innovators to be related if at least one inventor has developed a patent for both innovators. In other words, a relation is established between innovators A and B if we find an inventor on a patent applied for by A and on a patent applied for by B. There are two possibilities of how this might occur:

1. The innovators jointly apply for a single patent. In this case, we assume a previous research *cooperation*.
2. The same inventor is named on two distinct patents applied for by different innovators. In this case, we assume *mobility* of the inventor between the innovators.[7]

As these two cases are quite different from one another, we analyze them separately throughout the paper. We combine them to the network of *personal relationships* whenever it seems appropriate.

The sub-sample of public research includes the following organizations: research universities, technical colleges ("Fachhochschulen"), and non-university scientific institutes. The latter are in most cases members of one of the big German scientific institutions: the Max Planck Society, the Leibniz Association and the Fraunhofer-Gesellschaft. In addition, we include a heterogeneous group of research organizations which are in many cases the successors of former socialist applied research institutes with close ties to industrial R&D. To enter the group of public research, an organization has to rely at least partly on public funds to finance its regular budget.

[6]Following Balconi et al. (2004), we use the term 'innovator' to avoid confusion with the term 'inventor' which is used for the scientists and engineers involved in the process of novelty creation. Of course, we do not know, whether the patent applications lead to a marketable product.

[7]Mobility includes also cases of inventors contracted by different innovators without actually being their employee, e.g., consulting inventors.

3.2 Patent Data from Research Institutions: Critical Remarks

Until 2002, the German patent law allowed university professors to patent for their own account and not under the name of their university. In private firms as well as in non-university public research organizations, the intellectual property rights connected to employees' inventions have always been in possession of the employer. As our data refer to a period previous to 2002, the number of university patent applications is underestimated. In refining the database, we made an effort to compensate this bias by checking each individual innovator with a professor's degree as part of his name, if he or she was enrolled at one of the regional universities within the inspected period. If this was confirmed, the patent was added to the respective university's account.

The number of patent applications from public research is further underestimated because intellectual property rights are often traded against financial support. In university-industry cooperation projects, the private firm sponsors the research carried out in the university's lab, but claims the exclusive right to patent the invention in exchange. In consequence, there is not only an underestimation of public research patent activity, but even more importantly, a number of university-industry cooperations leading to patent output will not be identified as cooperative activity at all.

Another issue related to public research patenting is headquarter application: as with big private companies, universities frequently centralize their patenting activities. They appear as monolithic actors, but actually the inventions are made in the departments. Because of disciplinary boundaries, it cannot be assumed that there are steady knowledge flows between the departments. Therefore, if two actors both maintain patent relationships with the same university, this does not ensure that information is transferred between these two actors through the university.

3.3 Graphical Analysis

Before we investigate the network visualizations, some basic comparative statistics of the four regions are given in Table 2. The first observation is that the regions differ strongly in the level of overall patent activity. Dresden shows 3,269 applications during the 1995–2001 period or 467 applications per year. Jena ranks second with slightly more than half of the Dresden numbers, followed by Halle (36% of the Dresden value), and Rostock (14%).

A second observation regards the differences in the importance of public research. In Dresden and Jena, public research organizations account for more than one quarter of all patent applications. In Halle and Rostock, the shares of public research are about half as much. Compared to other German regions, these figures are very high. According to Greif and Schmiedl (2002), in the period 1995–2000, only Berlin and Munich filed more patents from public research than Dresden, while Jena is ranked 6th. Among all 97 German planning regions, Dresden and Jena show the highest share of public research in all patent applications.

Table 2 Characteristics of regional patenting and the involved actors

	Dresden	Jena	Halle	Rostock
Patents				
Number	3,269	1,776	1,169	470
Co-applications	343	237	154	93
Share of co-applications	10.5%	13.3%	13.2%	19.8%
Patents by private applicants	2,552	1,378	1,050	438
Patents by public applicants[a]	874	527	148	67
Share of private patents	74.5%	72.3%	87.6%	86.7%
Share of public patents	25.5%	27.7%	12.4%	13.3%
Actors				
Applicants	1,132	679	538	350
Private	1,078	629	511	336
Public	54	50	27	14
Inventors	4,127	2,686	1,682	614

[a]Private and public patents do not sum up to total number since they are double counted in cases of more than one assignee

The high share of cooperations in Rostock is striking but probably due to the lack of corporate innovators and the accordingly high share of inventor applications, i.e. patents that are applied for by individuals who are also the inventors of the novel technical solution. Cooperative research in terms of research performed by teams of inventors then leads to a large number of cooperative linkages between individuals, whereas in other regions the co-researchers are more likely to work for one employer and we do not observe the relations within this single innovator.

In the following, we describe the specificities of each of the four networks as revealed by the networks' graphical representations. The visualizations of the regional networks of innovators (Figs. 1–4) show the networks of personal relationships – cooperation and scientist mobility combined – over the whole 7 year period 1995–2001 and should provide a general impression of the regional networks. Each innovator is represented by a node, where public research institutions are represented by square-shaped nodes and private firms or individuals by circles. The size of a node is proportional to the number of patents filed by the respective actor. Edges between the nodes represent cooperative relationships by joint patent application (dark-grey) or relationships by scientist mobility through joint inventors (light-grey). If two innovators have both types of relationships, edges are black. The width of the edges is proportional to the number of relations between the respective actors. The position of nodes and the length of the edges is produced by multidimensional scaling with node repulsion and equal edge length bias (Borgatti et al. 2002). A direct interpretation is of course difficult, but more central actors are generally positioned at the center of the network. For the sake of readability, those nodes without any links to other nodes ("isolates") are omitted. Further, only the largest component is shown. A network component is defined as a subset of all network nodes in which there is a path between all pairs of nodes in the subset but no path to any node in other subsets (other components). For each region, detailed information about the most active patentees and their ranking according to centrality is given in Tables 8–11 in the appendix.

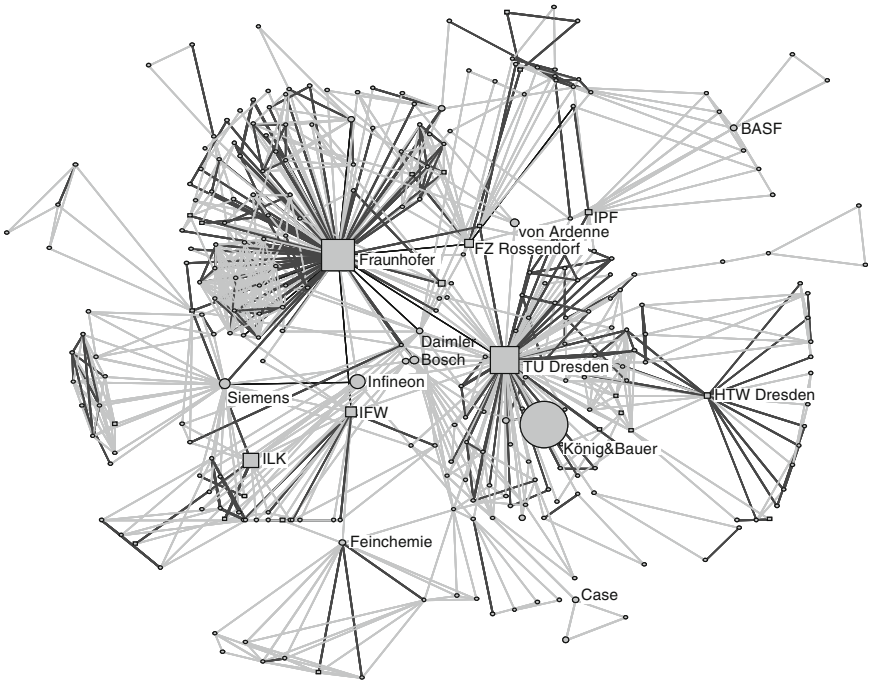

Fig. 1 Main component of Dresden 1995–2001
Note: Cooperations are dark-grey, scientist mobility is light-grey, and if both are present, lines are black

3.3.1 Dresden

The innovator network of Dresden (Fig. 1) can be characterized as bi-polar. It is dominated by two large public research organizations, the Fraunhofer-Gesellschaft and the Technical University (TU) Dresden, with highest ranks in terms of centrality and the number of patents filed. Koenig & Bauer, a printing press manufacturer, has filed even more patents but ranks only 15th in terms of centrality (see Table 8). This company should be seen as a special case due to the fact that its products, huge printing machines for newspapers, often have the character of singular devices adapted to each customer's special needs where each single step of adaptation seems to be patentable. As all patents generated by one of the eleven Fraunhofer institutes located in Dresden are filed centrally at the society's headquarters in Munich, we cannot distinguish between different institutes. Taken as a single entity, these institutes appear as something like a second technical university (between whose departments we cannot differentiate either) covering many fields of research, especially in engineering disciplines.

The two central actors are strongly connected both by cooperative relationships and by scientists moving from one organization to the other. Each pole is the central actor of a subnet mainly consisting of private firms. The Fraunhofer subnet seems to

be more tightly interconnected and more cooperative than the TU Dresden subnet. Between the two subnets there are few linkages. While there are some intermediates, such as the Rossendorf Research Institute (FZ Rossendorf) and the Institute for Solid State and Materials Research (IFW), most of the connections between the subnets stem from direct relations between the two big research organizations.

Seven out of the ten most central patentees are public research organizations, including the technical college (HTW Dresden) in the TU Dresden subnet and the Institute for Air-conditioning and Refrigeration Engineering (ILK) with a more independent position (see Table 8 in the appendix). The other three are Siemens, Infineon, and Bosch. The very strong connection between Siemens and Infineon is due to the fact that Infineon is a 1999 semiconductor spin-off of Siemens.

3.3.2 Jena

Different from Dresden, the network of innovators in Jena (Fig. 2) is multi-polar. The most active patentee is a private firm, Carl Zeiss, which is a successor of the former 'Kombinat' VEB Carl Zeiss which dominated the economic structure of Jena during the socialist era in the GDR. Carl Zeiss also ranks high in terms of centrality,

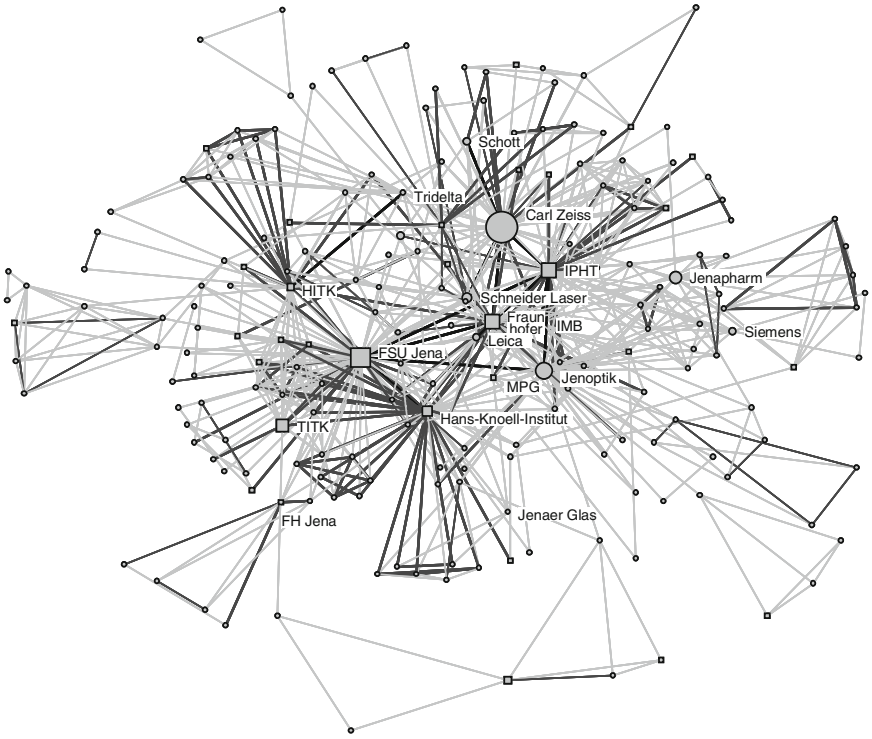

Fig. 2 Main component of Jena 1995–2001
Note: Cooperations are dark-grey, scientist mobility is light-grey, and if both are present, lines are black

but the most central actor of the network is the university (FSU Jena), followed by two public institutions of applied research, the Institute for Physical High Technology (IPHT) and the Fraunhofer-Gesellschaft. In contrast to Dresden, private companies such as Carl Zeiss, Jenoptik (another successor of the Kombinat), Jenapharm, and Schneider Laser are clearly visible actors and are tightly connected within the network. The same holds for non-university research institutes such as the Hermsdorf Institute for Technical Ceramics (HITK), the Thuringian Institute for Textile and Plastics Research (TITK), and the Hans-Knoell Institute. The linkages between all the central actors are dense and no separated subnets can be identified. The picture supports the assumption that Jena's lead in terms of patent efficiency might be the result of intense knowledge flows within the region's network of innovators.

3.3.3 Halle

In Halle (Fig. 3), Buna Sow Leuna, with 142 patents and first rank in terms of centrality, is the dominating actor, followed by Martin-Luther University (MLU)

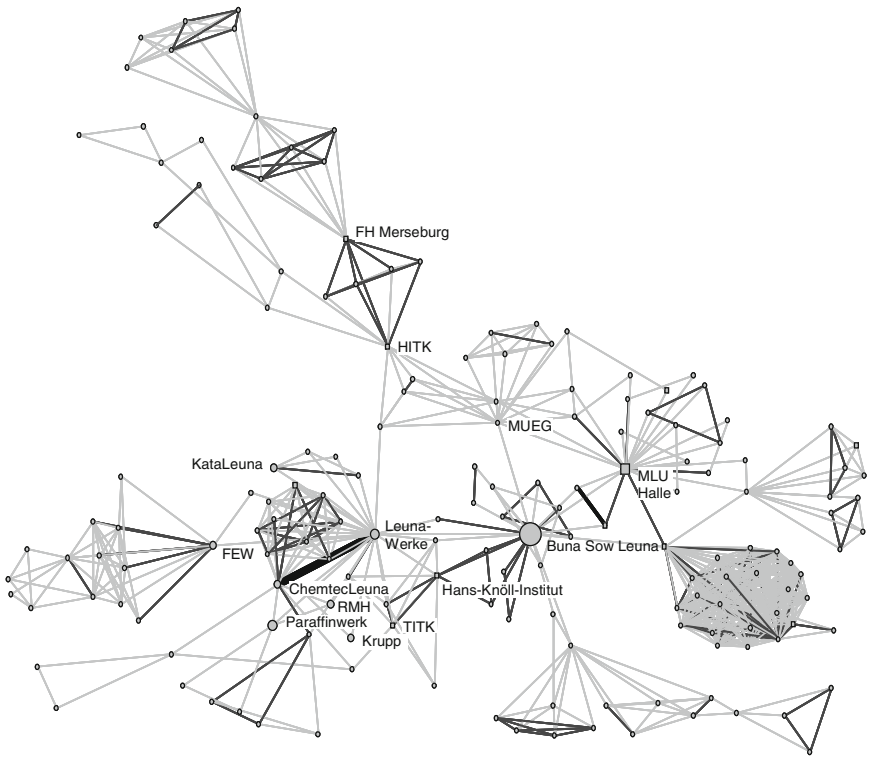

Fig. 3 Main component of Halle 1995–2001
Note: Cooperations are dark-grey, scientist mobility is light-grey, and if both are present, lines are black

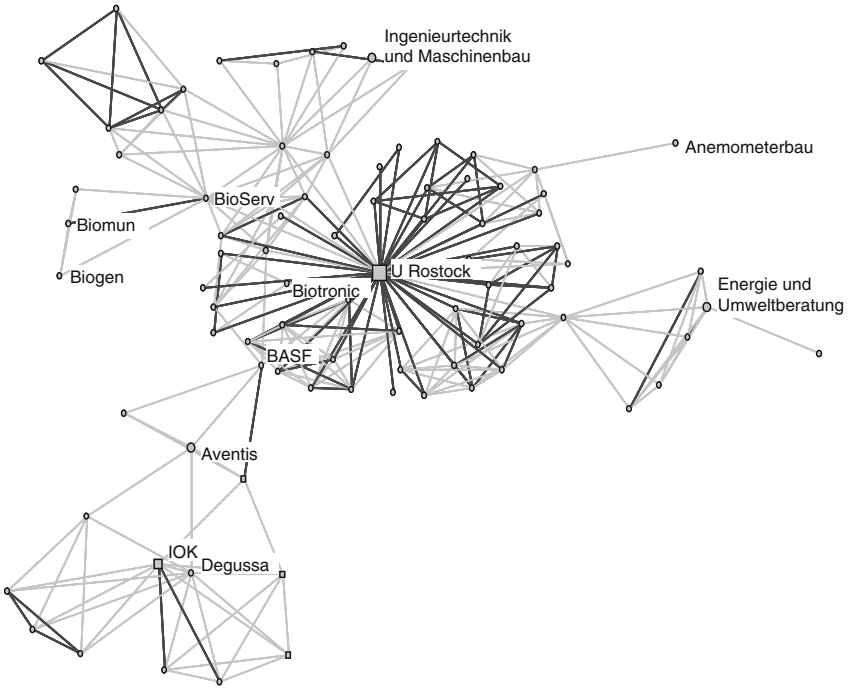

Fig. 4 Main component of Rostock 1995–2001
Note: Cooperations are dark-grey, scientist mobility is light-grey, and if both are present, lines are black

Halle-Wittenberg, the only research organization of importance, and the former Leuna-Works (Table 10). In 1995, Dow Chemical took over the former Buna-Works, whereas Leuna was split up into several smaller firms, namely KataLeuna, Chemtec Leuna, and RMH Polymers. Strong (light-grey) ties between Leuna and its successors indicate that former Leuna researchers often work for (or are the founders of) the smaller firms which developed from former Leuna departments. The third important location of chemical industry, Bitterfeld-Wolfen, has its own subnet, too. The main actor here is FEW Chemicals. The ties between the three locations are not prominent. The university is connected with Buna Sow Leuna, but does not have direct ties with the Leuna or the Bitterfeld complex. The Leuna-Works apply for patents only until 1996, the year Buna Sow Leuna appears in the list for the first time.

At large, the innovator network of Halle is more fragmented than those of Dresden or Jena. The actors forming the main component are organized in clusters, connected only through a few bridging actors ("cutpoints"), which makes the network vulnerable to breakup.

3.3.4 Rostock

In Rostock, patent activity is dominated by the Rostock university as the center of the main component. The university displays many cooperative (dark-grey) links to

individual innovators, which is partly in consequence of the data refinement procedure by which individual applications of professors were assigned to the university. Presumably these professors often set their staff as co-applicants, resulting in cooperative links between the university and these staff members which are in fact intra-university relationships. But we cannot correct for this as it is nearly impossible to verify these persons as former university staff. Surrounding the university, a number of innovators are biotech firms, indicating some progress towards the officially promoted new focus on biomedical sciences. Engineering disciplines close to industries traditionally located in the region, such as machinery and shipbuilding, do not play a prominent role in the main component around the university, but still live on in the smaller components. Compared to the three other regions, the innovator network in Rostock is very small in size and faces a severe lack of private firm R&D.

4 Comparative Network Structures

4.1 Static Analysis

The network visualizations presented above show only the largest component of the networks. General characteristics of the complete networks for the whole 1995–2001 period are given in Table 3.[8]

Looking at the most comprehensive type of network, the network of personal relationships, we find that the main component integrates between 25% (Rostock) and 37% (Jena) of all innovators. This order between the four regions is reversed when it comes to the share of isolated innovators, but the inter-regional variation is lower. Assuming that knowledge flows only occur between connected actors, in Jena more actors can participate in the sharing of common knowledge. The Jena network integrates the highest share of innovators into the largest component and at the same time leaves the lowest share isolated. Rostock, by contrast, is least able to exploit its networking potential in terms of the share of actors in the largest component. The absolute size of the largest component is, of course, highest in Dresden.

To analyze the cohesiveness of a network, density is a widely used measure. If g is the size of the network as measured by the number of actors and d_i is the degree, i.e. the number of connections, of actor i, $i = 1, \ldots, g$, then the density D of the network is defined as the number of all linkages divided by the number of possible linkages within the network $D = \left(\sum_{i=1}^{g} d_i\right) / (g^2 - g)$. This measure is somewhat problematic in comparing networks of different sizes, as the number of possible linkages increases geometrically, while the actual number of linkages usually

[8]For details on the calculation of network statistics, please refer to the widely cited book by Wassermann and Faust (1994).

Table 3 Characteristics of regional innovator networks in the period 1995–2001

	Dresden			Jena		
	Personal relationships	Cooperation	Social mobility	Personal relationships	Cooperation	Social mobility
Nodes	1,132	1,132	1,132	679	679	679
Share in largest component	30.9%	12.0%	26.7%	37.4%	15.0%	34.8%
Share of isolates	35.8%	58.0%	55.6%	32.7%	55.1%	52.3%
Centralization	0.094	0.052	0.067	0.114	0.037	0.098
Density	0.004	0.003	0.002	0.010	0.006	0.004
Mean degree	5.083	3.081	2.002	6.483	3.935	2.548
Mean degree (binary)	2.231	0.820	1.429	2.695	0.919	1.817
	Halle			Rostock		
	Personal relationships	Cooperation	Social mobility	Personal relationships	Cooperation	Social mobility
Nodes	538	538	538	350	350	350
Share in largest component	34.9%	4.1%	30.5%	25.1%	12.3%	18.3%
Share of isolates	35.9%	58.7%	52.6%	37.4%	51.4%	63.4%
Centralization	0.050	0.021	0.048	0.144	0.118	0.046
Density	0.011	0.006	0.005	0.014	0.010	0.005
Mean degree	6.093	3.230	2.862	5.034	3.434	1.600
Mean degree (binary)	3.022	0.803	2.230	2.200	1.006	1.194

does not. Therefore, we also report the mean degree, i.e. the average number of ties, of the networks based on the actual number of connections and based on the dichotomized (binary) networks to account for the number of related actors. With a mean degree of 6.483, the actors in Jena are more interrelated than actors in the other regions. If we look at the number of linkages not accounting for intensity (i.e. based on the binary network), we find the actors in Halle to be connected to more different actors than elsewhere. The distinction between the types of relations reveals that the high level of connectedness in Halle is mainly based on linkages through scientist mobility, which is probably more the result of the reorganization processes mentioned above than to mobility in our – idealized – interpretation.

With respect to the centralization of the networks,[9] i.e., the extent to which they are concentrated on one or few dominant actors, we observe that Rostock comes closest to the extreme of a "star." As the university is the only larger actor, this result is not really surprising. Rostock is followed by Jena with a rather small core consisting of several large actors heavily interacting, and Dresden with its bi-polar structure. The graphical impression of Halle corresponds well to the low centralization in this network, where the large actors are lined up like pearls on a string.

[9]The normalized degree centrality of actor i is the number of its ties d_i divided by the number of possible ties, $C_D(i) = d_i / (g - 1)$, where g is the size of the network. The network centralization is then given by $C = [\Sigma^g_{i=1} \max C_D(i) - C_D(i)\ ] / (g - 2)$.

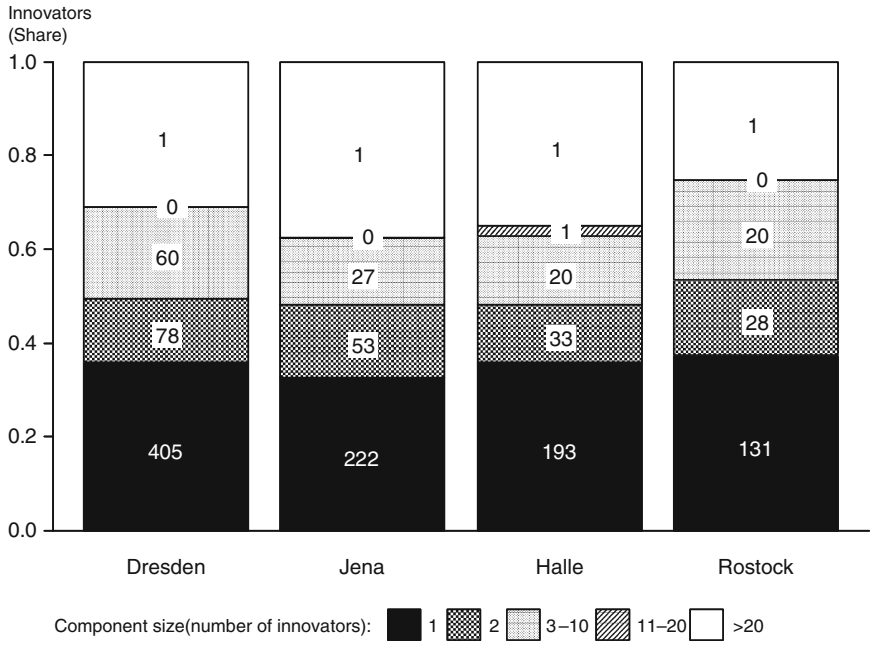

Fig. 5 Component distribution of the network of personal relationships 1995–2001
Note: Numbers on bar segments indicate the number of components of respective size. Example: In Dresden we find 405 components of size one (isolated innovators) – this is equivalent to a share of 35.8% in all innovators of the region (see Table 3). Only one component consists of more than 20 innovators. This is the main component of the network (as shown in Fig. 1) collecting 30.9% of all innovators of Dresden

We present the size distribution of components in Fig. 5. A common feature of all networks is the existence of a single main component, which is at least ten times larger than the second largest component with a maximum size of 12 innovators in Halle and no more than 10 in the other regions (Fig. 5). This is somewhat remarkable, as the main component includes many different technological fields, and thus one might have expected to see several big components, each focused on one technology, or on a few related fields. Instead, the tendency to connect to a giant component does not seem to be hindered by the boundaries of disciplines, or, stated in a positive sense, we seem to observe cross-fertilization between innovators from different technologies. In all regional networks, we also observe a considerable share (12–16%) of paired actors. To justify the identity of pairs of innovators as networking entities is obviously difficult. Sticking to the components with at least three connected actors reveals that, in Dresden, Jena and Halle, half of the patentees are embedded in one of these sub-networks. In Rostock, the share is slightly lower.

So far we have inspected networks of personal relationships. We now disaggregate these networks and investigate relations through cooperation and scientist mobility separately in Fig. 6 (see also Table 3).

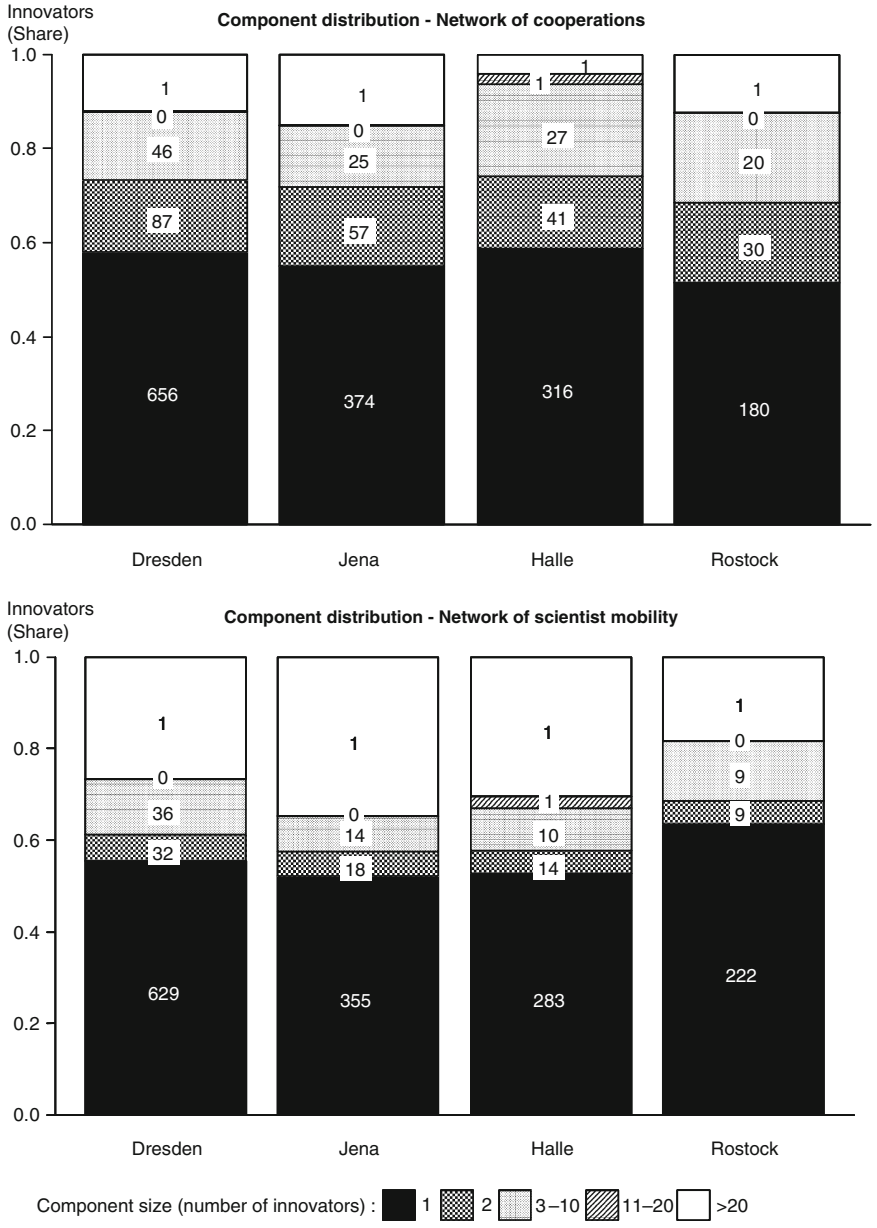

Fig. 6 Component distribution of the networks of cooperation and scientist mobility 1995–2001
Note: Numbers on bar segments indicate the number of components of respective size

In the network of personal relationships, a number of actors are connected only through paths that are composed of both cooperative (dark-grey) and mobility (light-grey) links. These paths are broken up if we inspect exclusively cooperative, or mobility, relationships. By definition, this leads to smaller main components. But the extent to which the "combined" main component drops in size is dependent on the type of relationship. If innovators are linked only by scientist mobility, the largest components show up only slightly smaller. In Jena, the main component still includes 93% of its original actors. Even in Rostock, the main component is no less than 73% of its original size. If, on the other hand, only information about joint patent applications (cooperation) is used to build the networks, the main components drop sharply in size and comprise about half the original actors in Rostock and around 40% in Jena and Dresden. In Halle, the main component is only a 12% fraction of the combined main component. With 22 vs. 12 innovators, the difference between the largest and the second largest component has nearly disappeared so that, in the case of the network of cooperative relationships in Halle, it is hard to speak of a main component at all.

It turns out that scientist mobility is more powerful in connecting innovators than is joint patenting. This is because mobility is more open and less formal – the innovators do not have to cooperate, nor do they even need to know each other. It is only the inventor moving from one employer (or, more general, innovator) to another that constitutes the link between the two. In contrast to cooperative patenting, reciprocity is not necessary. Instead, scientist mobility can even constitute a link between innovators who filed patents at opposite ends of the time period under inspection. Nevertheless, mobility relationships can still be a channel of knowledge transfer (Almeida and Kogut 1999).

It is not only the main component that makes the difference between the two types of networks. The networks of cooperation are generally more scattered than the networks of scientist mobility. The share of isolated actors is slightly higher (exception: Rostock), and especially the share of pairs of innovators is about three times higher than in the networks of mobility (15–17% compared to 5–6%). In many cases, two actors just decide to file one or more joint patent(s), but do not cooperate with other actors within the period under inspection. On the other hand, if innovators are connected through joint inventors, it is less probable that the resulting component consists only of two innovators, since each inventor who moves to any other employer will add his new employer to the component. In consequence, the fraction of innovators in network components with at least three actors is generally higher in the networks linked by scientist mobility than in the networks linked by cooperative ties.

The higher cohesiveness of the networks of social mobility is also reflected in the generally higher number of connections to different partners, indicated by the binary mean degree, which is always larger for the mobility subnet than for the cooperative subnet. Compared with the cooperative networks, the networks of social mobility are also more centralized (exception: Rostock), i.e., they are more focused on a few dominant actors. A possible explanation is that research staff from universities and big firms is spread to smaller firms in the region.

4.2 Network Dynamics

In general, the structure of the types of networks we analyze is highly dependent on the assumptions about the longevity of personal relations. In choosing a period from 1995–2001, we implicitly assume that, after 7 years of having worked together, there are still connections between inventors. To check for the robustness of our results, we therefore also analyze shorter time spans of 3 years. In dividing the sample period into three overlapping sub-periods of equal length, 1995–1997, 1997–1999, and 1999–2001, we can also inspect network dynamics. In the following, we restrict ourselves to the combined network of personal relationships (Fig. 7 and Table 7 in the appendix).

First of all, the regional networks show an increase in size,,as the number of nodes in later periods is always higher than in the preceding period. Whereas in Jena and Halle growth was higher between the first and the second period, Dresden and Rostock grew faster between the second and third period. Looking at the development over three periods, Rostock, starting at the smallest network size of 137 innovators in the first period, made the greatest step forward, with a 54% growth in the number of innovators between the first and the third period. Jena, although starting at a size twice as large as Rostock, still realized a growth in the number of innovators of 42%, which is also the greatest absolute increase (+117). Halle started with a size not much smaller than Jena but grew only by 26%. In Dresden, the number of patentees grew only by 16%. Even if one accounts for the fact that Dresden has by far the largest pool of innovators, which leads to lower relative growth given the same absolute increase compared to regions with smaller-sized networks, the dynamic is still significantly lower than in the Jena region.

The growing number of innovators can be seen as a growing networking potential. To assess how far the regions actually use their potential, we have to look at the links between the network actors. The development of the largest

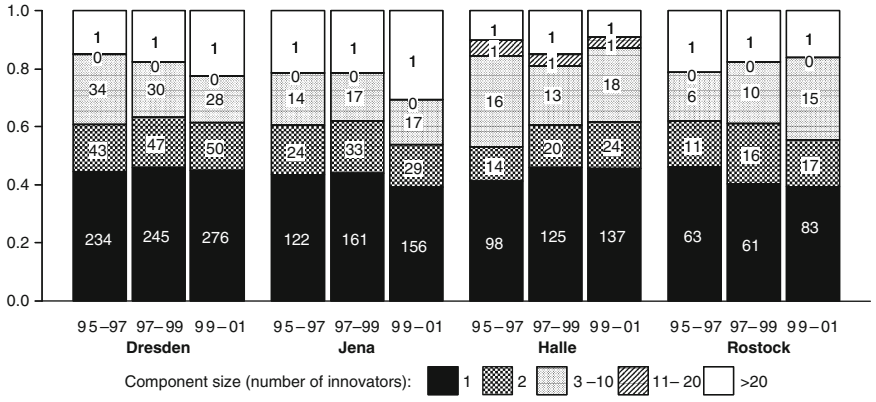

Fig. 7 Development of the component distribution of the network of personal relationships
Note: Numbers on bar segments indicate the number of components of respective size

component over time gives some hint about how network connectivity changes from period to period. In Jena, the share of the largest component in all network actors does not change between the second and the first periods, despite the significant growth in the number of innovators. However, in the last period, the share of the largest component in all actors rises impressively from 22 to 31% (a rise of 54%). In Dresden, the share of the largest component rises continuously, but only up to a level of 23%. Both Jena and Dresden manage to increase integration into the main component, despite a simultaneously growing number of actors.

In Halle and Rostock, the main component of the third period does not integrate as many actors as in the first period. In Halle, despite a relatively slow growing number of actors, the share of the largest component drops from 10 to 9%. Besides this development, the absolute figures in Halle are of special interest. If we look at the whole period, there is almost no difference between Halle and Jena with respect to this measure. After splitting the period, we find the largest component in Halle to be broken up, which documents the fragility of this network mentioned above. In Rostock, a fast growing number of patentees cannot fully be integrated into the main component at the same time. This leads to a decrease in the share of main component from 21% in the first to 16% in the third period.

If we compare the first and the last period, we observe an increasing centralization in Dresden and Jena, while the networks in Halle and Rostock become less dominated by few main actors. The mean degree increases significantly only in Jena (from 4.0 to 5.2) and remains almost constant in Dresden and Rostock, while it decreases in Halle. If we only count the related actors but not the intensity of the link, we find an increasing mean degree in all regions except Dresden.

To summarize our descriptive results, we can state that all four networks have grown but the structural differences between regions are evident: (1) only in Dresden and Jena do we observe that an increasing share of actors is integrated in the largest component, (2) the average number of linkages is only increasing in Jena, (3) Dresden and Jena become more centralized, while Halle and Rostock become more dispersed, (4) Dresden and Jena are especially dominated by public research. Dresden is a bi-polar network especially dominated by public research; in Jena, a group of core actors is well-balanced between public research and private firms; in Halle, large firms dominate; and in Rostock, there is a rather central university and a mixture of individuals and smaller patenting firms.

It seems as if there is a relationship between the prevalence of valuable public research and the connectedness of local innovator networks. To assess this relationship in greater depth, we now turn to the specific role of public research.

5 Research Institutions as Distinguished Network Actors

To assess the importance of public research for local innovation activity based on patent data, one fundamental point has to be stressed in the beginning. As said in section “The Regions: Dresden, Jena, Halle, and Rostock,” patents are granted for

new solutions to technical problems. To produce patentable knowledge, a scientific discipline has to be, in principle, applicable and technical in nature. Therefore, large university faculties such as social sciences, cultural studies, and arts, though potentially of considerable importance for a region's economic success by providing organizational know-how and creativity (Florida 2002), are not within the scope of this investigation. The same holds for research institutes explicitly designed to perform basic research, namely the Max-Planck institutes: Despite being well-funded and staffed, they hardly show up in the networks of innovators based on patent information. In contrast, the Fraunhofer institutes, with their mission of applied research and the need to partly finance themselves through contract research for private firms, are important patentees.

Furthermore, even if we stick to the fields of research where patent output is to be expected, networks built from patent relations still reflect just a fraction of the interaction actually going on between public research and private firms. Aside from measurement problems already discussed in section "Regional Innovator Networks and the Role of Research Institutions," this is because a wide variety of informal contacts as well as contract research activities just do not lead to (and are not aimed at) patent output.

The above-mentioned points hold for purely private relationships, too, but to a lesser extent: As they are forced to survive in the market, private firms perform generally more applied research and have higher incentives to protect results from R&D by patents. Consequently, when interpreting the role of public research within networks of patent innovators, one should keep in mind that their importance is systematically underestimated both in terms of the absolute amount of knowledge transfer and relative to exclusively private relationships.

For a first picture of the public research landscape, we provide information about the funding of local universities and technical colleges in Table 4. To compare their orientation towards natural sciences and engineering, we report absolute figures as well as the respective shares of these fields of study. Further, we distinguish external funding with respect to the source, where funding from firms is an indicator of market oriented research and the motivation to cooperate with actors outside academia. Funding from the federal government and the DFG (National Science Foundation in Germany) can serve as an indicator of the quality of academic research.

In general, the technical colleges have much smaller budgets and rely less on external funding than the co-located universities. The higher share of the budget devoted to natural sciences and engineering indicates their rather technical orientation. We also observe an overall high share of natural sciences and engineering in the acquisition of external funding. If we analyze the sources of external funding more deeply, we find the technical colleges to rely more on funding from private firms compared to the universities, which receive most of the external funding from the state and the DFG. All these figures show that the role of the technical colleges is different from the universities in the sense that research in universities is more oriented towards fundamental insights, whereas technical colleges are more application oriented.

Table 4 External funding and patenting of research universities and technical colleges (TC) in the four regions (1,000 EUR; 1994–2000 mean yearly values)

	TU Dresden (University)	HTW Dresden (TC)	FSU Jena (University)	FH Jena (TC)	MLU Halle (University)	FH Merseburg (TC)	Uni Rostock (University)
Total budget funds	542,717	34,953	424,095	28,426	421,659	23,382	321,905
Share of natural sciences and engineering[1]	80%	57%	79%	24%	72%	30%	75%
External research funds	61,343	1,983	24,505	431	23,363	979	16,155
Share of natural sciences and engineering	88%	91%	80%	62%	79%	81%	85%
Share of external research funds in total budget	11%	6%	6%	2%	6%	4%	5%
Funds from federal government and federal states	26,998	589	7,367	94	8,290	291	6,871
Share in total external research funds[2]	44%	30%	30%	22%	35%	30%	43%
Funds from Geman Science Foundation (DFG)	13,778	80	8,978	50	8,954	110	4,757
Share in total external research funds	22%	4%	37%	12%	38%	11%	29%
Funds from private firms	13,518	1,142	4,640	150	3,344	523	2,961
Share in total external research funds	22%	58%	19%	35%	14%	53%	18%
Funds from other external sources[3]	7,048	172	3,520	137	2,774	54	1,565
Share in total external research funds	11%	9%	14%	32%	12%	6%	10%
Patent applications (1995–2001)	231	18	115	3	47	5	45
Share in regional patenting	7.1%	0.6%	6.5%	0.2%	4.0%	0.4%	9.6%
Co-applications	27	8	30	3	10	3	30
Share in all patent applications	11.7%	44.4%	26.1%	100.0%	21.3%	60.0%	66.7%

[1]Includes three groups of scientific disciplines: natural sciences, agricultural and nutritional sciences, and engineering. Excludes medical sciences, cultural and social sciences, law, economics, and arts

[2]External research funds from different sources are not reported separately for disciplines

[3]Includes funds from international organizations (EU, OECD, etc.), foundations, municipalities, the national labour office, and other public organizations

Source: German federal statistical office

This orientation towards applied research also shows up in the co-applications of patents. Obviously, the high shares of firm funding in technical colleges compared to universities correspond to higher shares of co-applied patents. Overall, universities patent more frequently than the technical colleges and play a major role in regional patenting, as documented by a share between 4 in Halle and 9.6% in Rostock. While these figures give us a hint about the importance of public research in regional innovation systems, we are now interested in the more specific role in the transmission of knowledge, i.e. their integration in the local network of innovators.

We already introduced the measure of centralization in section "Regional Innovator Networks and the Role of Research Institutions." This property of a whole network is an aggregation of individual measures of centrality, which can be calculated in different ways. We now look at the individual measures and restrict ourselves to the centrality based on degree and on betweenness. By counting the direct links between a node and its neighbors, the degree-based centrality measure provides us with an idea of how connected an actor is. The betweenness measure tells us how important an actor is for knowledge flows between other, different actors, and therefore for the connectivity of the network as a whole (Freeman 1978–1979). Technically, high betweenness centrality means that an actor lies on many shortest paths between pairs of other actors in the network.[10] In the appendix, we report rankings based on both centrality measures of the most active innovators in the four regions for the networks of cooperation, scientist mobility and its aggregate – personal relationships. In the second column of each tables (8–11), we indicate whether or not an actor is a public research organization. From a glance at these tables, it becomes apparent that Dresden and Jena are dominated by public research,[11] while in Halle and Rostock, this is not so clear.

For a first systematic approach to the differences between public and private actors in terms of centrality, we calculate averages for each type in Table 5. It becomes evident that, in all regions and for all types of networks, the public actors are more central than the private ones, according to degree as well as betweenness centrality.

Of course, centrality is not independent of the size of the innovators. Larger actors should have more cooperations and more linkages through mobility. Public research institutes are, in general, larger than the average innovator, which might lead to our observation of a higher centrality of public research. To control for this effect, we perform a simple OLS regression with the degree centrality as the dependent variable, as shown in Table 6. The independent variables are a dummy

[10]Let g_{jk} be the number of shortest paths between actor j and k, and $g_{jk}(i)$ the number of these paths that contain actor i. The between ness centrality of actor i is then given as $C_B(i) = \Sigma_{j<k}\, g_{jk}(i)/g_{jk}$, *for* $i \neq j,k$.

[11]Within the top ten central actors, there appear only three (Dresden) and two (Jena) private actors, respectively.

Table 5 Comparing centrality of public and private actors

		Degree		Betweenness[a]	
		Private	Public	Private	Public
Network of personal relations	Dresden	4.2	22.2	89.2	3,389.3
	Jena	4.8	27.3	96.6	1,485.0
	Halle	5.8	12.6	146.0	1,279.9
	Rostock	4.5	18.1	22.5	527.6
Network of cooperations	Dresden	2.5	15.2	3.5	656.3
	Jena	2.8	17.7	6.9	355.5
	Halle	3.0	7.1	1.0	21.1
	Rostock	3.0	14.2	0.1	118.3
Network of scientist mobility	Dresden	1.8	7.0	114.3	2,406.8
	Jena	2.0	9.6	108.3	1,219.3
	Halle	2.7	5.5	131.1	705.2
	Rostock	1.5	3.9	25.7	198.6

[a]Dichotomized networks

variable for public institutions (Public) and a proxy for size. Since we cannot observe size directly, we approximate size by the number of patents filed by each innovator (Patents). In all regressions, the number of patents has a significant explanatory power for centrality. In Dresden and Jena, the positions of public research are also significantly more central than those of private actors. In Halle, this only holds for the overall network of personal relations and the sub-network of cooperation, while in the subnet of scientist mobility, the coefficients of the Public dummy are positive but not significant at a level of 5%. In Rostock, public actors are more central than their private counterparts in all networks, too, but again, the differences are not significant at 5%.

Why are public research organizations still more central network actors even if size differences have been taken into account? First, what really matters may not be size but the diversity and variety of research conducted, which makes them a promising knowledge source for a great number of private firms specialized in very different business areas. This holds especially for the big research universities that are by definition 'universal'. Second, public research organizations might be more willing to cooperate and share their knowledge. This would be in line with Dasgupta and David's (1994) concept of 'open science', where disclosure and diffusion of research results are seen as the original mission and fundamental norm of public research. This again holds first of all for universities. Third, and less idealistic, it may just be the need for financial capital that forces public research institutions to seek for contract research partners. This is most apparent for non-university public research institutes, e.g., the institutes of the Fraunhofer-Gesellschaft, which are only partly supported by public funds. Patent cooperations can then be seen as aiming at the joint marketing of new knowledge. Public research organizations act as substitutes for private research service providers, and the observed patent relations are just tracing their business relationships.

Table 6 Influence of actor type and size on degree centrality in different networks

	Network of personal relations				Network of cooperation				Network of scientist mobility			
	Dresden	Jena	Halle	Rostock	Dresden	Jena	Halle	Rostock	Dresden	Jena	Halle	Rostock
Constant	5.883 (0.000)	4.513 (0.000)	8.626 (0.000)	0.234 (0.804)	3.194 (0.000)	2.872 (0.000)	4.511 (0.000)	−1.459 (0.088)	2.689 (0.000)	1.640 (0.000)	4.115 (0.000)	1.693 (0.000)
Public	22.544 (0.000)	27.769 (0.000)	9.323 (0.006)	7.786 (0.065)	16.266 (0.000)	20.337 (0.000)	5.794 (0.010)	6.006 (0.114)	6.277 (0.000)	7.432 (0.000)	3.529 (0.079)	1.780 (0.319)
Patents	0.976 (0.000)	2.078 (0.000)	1.201 (0.000)	5.393 (0.000)	0.667 (0.000)	1.135 (0.000)	0.645 (0.000)	4.580 (0.000)	0.309 (0.000)	0.943 (0.000)	0.557 (0.000)	0.813 (0.000)
R^2	0.381	0.624	0.227	0.523	0.322	0.468	0.161	0.491	0.289	0.656	0.147	0.125
adj. R^2	0.380	0.623	0.224	0.520	0.321	0.466	0.158	0.488	0.288	0.655	0.144	0.120
Obs.	1,132	679	538	350	1,132	679	538	350	1,132	679	538	350

p-values in parentheses

6 Conclusion

This work is an exploratory study with the goal of analyzing differences between regional innovation systems by applying social network analysis methods based on patent data. Our first impressions of the networks and its actors led our research towards investigating the role of public research. It became clear that two regions, Dresden and Jena, perform quite well with respect to innovative efficiency. The innovator networks in these two regions differ from the other two networks, Halle and Rostock, as they integrate a larger share of the innovating actors. They have also been able to increase this share over time, and their networks show growing centralization. At the same time, public research organizations seem to be especially prominent within these two networks.

With respect to the role of public research, our results can be summarized in two points (1) universities and public research institutions are significantly more central, i.e., more interconnected within innovator networks, than private actors, (2) there are differences between regions with respect to the centrality of public research. While in Dresden and Jena, the institutions of public research seem to fulfil their function quite well, public research in Halle and Rostock is found to be less integrated.

Our research provides exemplary evidence that public research organizations which are well-connected within the local network of innovators are crucial for regional innovative performance. It is only through cooperating and interacting that their genuine occupation with generating new knowledge and collecting external knowledge becomes fruitful for the region. While the education of skilled labour is most important for the long-term increase in regional absorptive capacity, well-connected actors of public research provide direct input of relevant knowledge for the regional economy.

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Appendix: Dynamic network statistics and actor centrality

See Tables 7–11.

Table 7 Network statistics – Network of personal relations – Sub-periods

	Dresden			Jena		
	1995–1997	1997–1999	1999–2001	1995–1997	1997–1999	1999–2001
Nodes	527	535	613	281	367	398
Share in largest component	15.0%	17.8%	22.5%	21.4%	21.5%	30.7%
Share of isolates	44.4%	45.8%	45.0%	43.4%	43.9%	39.2%
Centralization	0.070	0.060	0.081	0.056	0.073	0.101
Density	0.007	0.006	0.006	0.014	0.012	0.013
Mean degree	3.556	3.110	3.667	4.000	4.431	5.171
Mean degree (binary)	1.423	1.196	1.409	1.495	1.520	1.965
	Halle			Rostock		
	1995–1997	1997–1999	1999–2001	1995–1997	1997–1999	1999–2001
Nodes	238	273	300	137	152	211
Share in largest component	10.1%	15.0%	9.0%	21.2%	17.8%	16.1%
Share of isolates	41.2%	45.8%	45.7%	46.0%	40.1%	39.3%
Centralization	0.065	0.039	0.053	0.160	0.126	0.122
Density	0.020	0.014	0.014	0.030	0.022	0.020
Mean degree	4.681	3.780	4.253	4.117	3.382	4.246
Mean degree (binary)	1.714	1.546	2.167	1.620	1.289	1.716

Table 8 Centrality ranks within 25 most active applicants in Dresden

Applicants	Patents	Public[a]	Personal relationships		Cooperations		Scientist mobility		Mean rank[d]
			C_D[b]	C_B[c]	C_D	C_B	C_D	C_B	(sort)
TU Dresden	231	1	1	1	2	2	1	1	1.3
Fraunhofer-Gesellschaft	278	1	2	2	1	1	2	2	1.7
IFW Institut fuer Festkoerper- und Werkstofforschung	68	1	4	3	4	3	5	3	3.7
Siemens AG	65	0	3	4	11	9	3	4	5.7
Forschungszentrum (FZ) Rossendorf	50	1	7	6	6	6	4	5	5.7
ILK Institut fuer Luft- und Kaeltetechnik	98	1	6	9	5	5	5	9	6.5
HTW Dresden	18	1	5	5	3	4	14	13	7.3
IPF Institut fuer Polymerforschung Dresden	27	1	8	8	7	8	9	11	8.5
Infineon AG	98	0	10	7	12	12	7	6	9.0
Robert Bosch GmbH	42	0	9	12	12	12	7	8	10.0
Feinchemie GmbH	16	0	10	11	7	10	12	10	10.0
Saechsisches Textilforschungsinstitut e.V.	21	0	13	10	18	12	10	7	11.7
VTD Vakuumtechnik Dresden GmbH	15	0	12	19	7	7	12	16	12.2
Koenig & Bauer AG	427	0	15	13	18	12	15	12	14.2
von Ardenne Anlagentechnik GmbH	36	0	15	16	12	12	15	15	14.2
BASF AG	28	0	13	15	18	12	10	17	14.2
Case Harvesting Systems	21	0	19	14	18	12	17	13	15.5
Meyer, Dirk	19	0	17	20	7	11	21	20	16.0
WHD Prueftechnik GmbH	18	0	17	20	12	12	17	19	16.2
Fortschritt Erntemaschinen GmbH	19	0	19	17	18	12	17	18	16.8
Huels Silicone GmbH	58	0	21	17	12	12	21	20	17.2
ABB Patent GmbH	41	0	21	20	18	12	20	20	18.5
VEAG Vereinigte Energiewerke AG	21	0	23	20	12	12	25	20	18.7
Arzneimittelwerk Dresden	35	0	23	20	18	12	21	20	19.0
VEM-Elektroantriebe GmbH	19	0	23	20	18	12	21	20	19.0

[a]Dummy variable, 1 = public research organisation
[b]Degree centrality
[c]Betweenness centrality
[d]Unweighted mean of colums 3–8

Table 9 Centrality ranks within 26 most active applicants in Jena

Applicants	Patents	Public[a]	Personal relationships		Cooperations		Scientist mobility		Mean rank[d]
			C_D[b]	C_B[c]	C_D	C_B	C_D	C_B	(sort)
FSU Jena	115	1	1	1	4	5	1	1	2.2
IPHT Institut fuer Physikalische Hochtechnologie	72	1	2	3	3	3	4	4	3.2
Fraunhofer-Gesellschaft	79	1	3	5	2	1	5	5	3.5
Carl Zeiss Jena GmbH	222	0	4	4	5	4	3	3	3.8
Jenoptik	107	0	6	2	7	7	2	2	4.3
Hans-Knoell-Institut	50	1	5	6	1	2	7	8	4.8
HITK Hermsdorfer Institut fuer Technische Keramik	26	1	7	7	6	6	6	6	6.3
TITK Thuer. Institut f. Textil- u. Kunststoff-Forschung	63	1	8	8	8	8	10	11	8.8
IMB Institut fuer molekulare Biotechnologie	11	1	9	9	9	11	8	9	9.2
TRIDELTA GmbH	9	0	10	11	14	11	9	7	10.3
SCHNEIDER Laser Technologies AG	39	0	10	15	9	9	10	13	11.0
Jenapharm GmbH	54	0	12	13	19	11	12	12	13.2
Aesculap Meditec GmbH	17	0	17	10	14	11	18	10	13.3
GESO GmbH	10	0	14	12	9	10	16	20	13.5
MPG Max-Planck Society	9	1	13	16	14	11	13	16	13.8
Leica Microsystems GmbH	14	0	14	18	9	11	14	18	14.0
Siemens AG	17	0	16	14	19	11	14	17	15.2
Schott Glas AG	13	0	19	20	9	11	19	14	15.3
Textilforschungsinstitut Thueringen-Vogtland	14	1	19	17	14	11	19	19	16.5
Jenaer Glaswerk GmbH	9	0	21	19	19	11	19	15	17.3
inocermic GmbH	10	0	17	21	19	11	17	21	17.7
Plasttechnik Greiz GmbH	22	0	24	22	14	11	24	22	19.5
Agfa-Gevaert AG	11	0	22	22	19	11	22	22	19.7
Altenburger Industrienaehmaschinen GmbH	10	0	23	22	19	11	23	22	20.0
Ahlers, Horst	19	0	25	22	19	11	24	22	20.5
Geraer Maschinenbau GmbH	9	0	25	22	19	11	24	22	20.5

[a]Dummy variable, 1 = public research organisation
[b]Degree centrality
[c]Betweenness centrality
[d]Unweighted mean of columns 3–8

Table 10 Centrality ranks within 29 most active applicants in Halle

Applicants	Patents	Public[a]	Personal relationships		Cooperations		Scientist mobility		Mean rank[d]
			C_D[b]	C_B[c]	C_D	C_B	C_D	C_B	(sort)
Buna Sow Leuna GmbH	142	0	2	1	2	3	4	1	2.2
MLU Halle-Wittenberg	47	1	2	3	3	2	2	3	2.5
Leuna-Werke GmbH	37	0	1	2	6	6	1	2	3.0
Chemtec Leuna GmbH	14	0	7	6	4	4	6	6	5.5
FEW Chemicals GmbH	22	0	8	4	4	7	9	4	6.0
Haack, Eberhard	11	0	4	11	1	1	7	16	6.7
SynTec GmbH	9	0	8	5	11	10	7	5	7.7
Inofex GmbH	8	0	5	17	8	10	4	12	9.3
Deutsche Waggonbau AG Berlin	21	0	10	12	6	8	10	13	9.8
OvGU Magdeburg	10	1	14	9	8	5	16	9	10.2
KataLeuna GmbH	12	0	12	8	11	10	13	8	10.3
Maschinenfabrik Dornhan GmbH	9	0	5	17	19	10	2	11	10.7
Paraffinwerk Webau GmbH	36	0	12	7	19	10	10	7	10.8
Schweisstechnische Lehr- und Versuchsanstalt Halle GmbH	10	0	14	13	11	10	13	14	12.5
Rothe, Lutz	30	0	11	17	11	10	10	17	12.7
Krupp VDM GmbH	22	0	17	9	19	10	16	9	13.3
BASF AG	8	0	14	14	19	10	13	15	14.2
Air liquide GmbH	11	0	17	15	8	9	19	18	14.3
Siemens AG	11	0	20	16	11	10	20	18	15.8
Slowik, Guenter	10	0	20	17	11	10	20	18	16.0
Kohlmann, Juergen	8	0	20	17	11	10	20	18	16.0
RMH Polymers	12	0	17	17	19	10	16	18	16.2
TU Dresden	9	1	23	17	11	10	26	18	17.5
MPG Max-Planck Society	14	1	23	17	19	10	20	18	17.8
Romonta GmbH	10	0	23	17	19	10	20	18	17.8
ZEMAG GmbH	8	0	23	17	19	10	20	18	17.8
KSB AG	10	0	27	17	19	10	26	18	19.5
Deutsche Telekom AG	8	0	27	17	19	10	26	18	19.5
Omros GmbH	8	0	27	17	19	10	26	18	19.5

[a]Dummy variable, 1 = public research organisation
[b]Degree centrality
[c]Betweenness centrality
[d]Unweighted mean of colums 3–8

Table 11 Centrality ranks within 22 most active applicants in Rostock

Applicants	Patents	Public[a]	Personal relationships		Cooperations		Scientist mobility		Mean rank[d] (sort)
			C_D[b]	C_B[c]	C_D	C_B	C_D	C_B	
Uni Rostock	45	1	1	1	1	1	2	1	1.2
BioServ GmbH	8	0	2	3	6	5	1	4	3.5
BASF AG	6	0	6	2	6	5	5	2	4.3
Degussa-Huels AG	5	0	3	5	9	5	2	5	4.8
IOK Institut fuer Organische Katalyseforschung	10	1	4	6	4	4	4	9	5.2
Aventis GmbH & Co KG	10	0	8	4	9	5	5	3	5.7
Geier, Helrath	5	0	5	9	2	3	8	8	5.8
Energie- und Umwelt-Beratung e.V.	14	0	6	7	6	5	5	7	6.0
Biotronik GmbH & Co.	6	0	10	11	9	5	8	6	8.2
Maschinenbau und Umwelttechnik GmbH	5	0	10	8	9	5	8	10	8.3
Dudszus, Alfred	7	0	9	10	4	5	11	12	8.5
Stolz, Holger	7	0	10	11	3	2	16	13	9.2
GfE GmbH	6	0	13	11	9	5	11	11	10.0
Ingenieurtechnik und Maschinenbau GmbH	11	0	13	11	9	5	11	13	10.3
Gregor, Manfred	7	0	15	11	9	5	14	13	11.2
Anemometerbau GmbH	5	0	15	11	9	5	14	13	11.2
Noell-KRC GmbH	8	0	17	11	9	5	16	13	11.8
Dieselmotorenwerk Vulkan GmbH	7	0	17	11	9	5	16	13	11.8
Schnell, Ludwig	6	0	17	11	9	5	16	13	11.8
Buechler, Dirk	5	0	17	11	9	5	16	13	11.8
Kordelle, Rainer	5	0	17	11	9	5	16	13	11.8
Rossmann, Ulrich	4	0	17	11	9	5	16	13	11.8

[a]Dummy variable, 1 = public research organisation
[b]Degree centrality
[c]Betweenness centrality
[d]Unweighted mean of colums 3–8

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Chapter 7
Entrepreneurial Culture, Regional Innovativeness and Economic Growth

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Entrepreneurial culture, regional innovativeness and economic growth (first published in: Journal of Evolutionary Economics, Vol. 17, No. 2, 2007)

1 Introduction

The claim that differences in national and regional economic success are related to the presence or lack of an entrepreneurial culture is not new (Hoselitz 1957; Baumol 1968; Leff 1979; Soltow 1968). Theoretically, several attempts have been made to either formally model the role of the entrepreneur (Lucas 1978; Kihlstrom and Laffont 1979; Schmitz 1989; Jovanovic 1994) or to provide conceptual frameworks (Leibenstein 1968; Kirzner 1997). Empirically, however, there are two problems. First, empirical studies are either case based (Saxenian 1994), limiting the scope for generalization, or – in the occasional case of large samples – entrepreneurial culture is 'measured' by the residual or a fixed effect (Davidsson 1995; Georgellis and Wall 2000; Guerrero and Serro 1997; Wagner and Sternberg 2002). Except for the Achievement Motivation Index as developed by McClelland (1961) and Lynn's (1991) analysis of the entrepreneurial orientation of students, to our knowledge there have been no empirical attempts actually to measure entrepreneurial culture and to relate it to economic development. Although most recently several scholars have provided valuable insights regarding the relationships between entry and exit rates, new business formation, and regional economic growth (Audretsch and Keilbach 2004a; Fritsch 2004), we are not aware of empirical studies on the role of entrepreneurial *culture* specifically. Secondly and related, in order to measure a concept such as entrepreneurial culture, one has to combine different strands of literature in the field of entrepreneurship, thereby crossing disciplinary boundaries (Acs and Audretsch 2003).

The field of entrepreneurship is scattered across different paradigms (Stevenson and Jarillo 1990; Suarez-Villa 1989). Economists are mainly concerned with the effects of entrepreneurship, and social psychologists are more interested in

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the origins of entrepreneurship. Measuring entrepreneurial culture automatically implies one has to incorporate insights from the social psychological literature, more specifically entrepreneurial trait research (McClelland 1961; Rotter 1966; Brockhaus 1982; Cromie 2000; McGrath et al. 1992). In order to assess its economic significance, one has to relate to the empirical economic growth literature (Barro 1991; Mankiw et al. 1992; Barro and Sala-I-Martin 1995). Hence, the added value of this paper lies not so much in making a contribution to the before mentioned disciplines individually. It is the recombination of existing inputs that forms the core of this entrepreneurial venture to relate empirically entrepreneurial culture to economic development by means of large scale statistical tests. Formally, we test the hypothesis that entrepreneurial culture positively affects regional economic development.

The contribution we aim to make in this paper is confined to an empirical attempt to complement existing, mainly conceptual, literature on the role of entrepreneurial spirit in explaining economic success, and the relation between culture and economic development in general. Despite the lack of well-developed theory, a number of scholars have provided useful starting points to the analysis of the way in which entrepreneurial culture may affect the process of economic development. We theorize on the direct and indirect links between entrepreneurial culture and economic growth. In doing so, we explicitly include the literature on entrepreneurial traits. Our empirical approach consists of several steps. First, we construct a micro-based measure of entrepreneurial culture by comparing the value pattern of entrepreneurs and non-entrepreneurs. Based on the distinctive pattern of entrepreneurs at this individual level, we calculate the average score of a population on these entrepreneurial characteristics. As this unique European Value Studies (EVS) dataset is only available for Europe, we calculate the score on this new variable 'entrepreneurial culture' for our final sample of 54 European regions. In our final step, we correlate this micro-embedded measure of entrepreneurial culture with regional innovation patterns and economic growth. Hence, we test for direct and indirect effects of entrepreneurial culture.

2 Literature Review

2.1 Entrepreneurial Traits and Entrepreneurial Culture

The field of (economic) psychology has a long history of measuring traits of entrepreneurs (Brockhaus and Horovitz 1986; McClelland 1961; Rotter 1966; Timmons 1978; Davidsson 2004; Shane 2003). Reviewing the literature on entrepreneurial trait research, a number of authors have related specific personality characteristics to entrepreneurs. Central to the trait research is the notion that entrepreneurs are different (Brenner 1987). Brockhaus (1982) identifies three attributes consistently associated with entrepreneurial behavior: need for achievement, internal locus of control, and a risk-taking propensity. Sexton and Bowman (1985) conclude that entrepreneurs need autonomy, independence, and dominance.

Chell et al. (1991) associate entrepreneurs with traits such as being opportunistic, innovative, creative, imaginative, restless, and proactive, and perceive them as agents of change. Thomas and Mueller (2000) find similar personality characteristics as Brockhaus. In an attempt to summarize the personality trait literature, Cromie (2000) concludes there are (at least) seven characteristics distinguishing entrepreneurs or business owners from non-entrepreneurs. Although the differences are not equally strong for *all* groups of non-entrepreneurs (e.g. he found that managers or university professors score equally high on some of the seven dimensions), he lists the following seven. First is the 'Need for achievement' (cf. McClelland 1961). This reflects a person's need to strive hard to attain success. According to Cromie, 'high achievers set demanding targets for themselves and are proactive and bold in setting about accomplishing objectives' (Cromie 2000, p. 16). Second is locus of control (cf Rotter 1966; Brockhaus 1982). This depicts the extent to which an individual feels in charge. It reflects the extent to which people feel that luck and fate do not determine what happens to them ; in other words, they feel they control the environment by the actions *they* take, and do not respond to some third party. The third aspect Cromie (2000) mentions is risk taking. Despite the complexity of the concept of risk, entrepreneurs are generally considered to have a greater propensity to take risks. The fourth characteristic is creativity. Enterprising individuals develop new ideas, spot market opportunities and recombine existing inputs in order to create added value (Leibenstein 1968). Finally, there is the need for autonomy, tolerance for ambiguity, and self confidence. Need for autonomy refers to the ability and will to be self-directed in the pursuit of opportunities (Lumpkin and Dess 1996). Tolerance for ambiguity is related to the uncertainty inherent in entrepreneurial action (see also Wennekers et al. 2007). Entrepreneurs are associated with the ability to deal effectively with situations or information that are vague, incomplete, unstructured, uncertain or unclear, without experiencing psychological discomfort (Scheré 1982). Self confidence, finally, is related to self-efficacy (Chen et al. 1998), which can be defined as an individual's cognitive estimate of his 'capabilities' to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over events in their lives (Wood and Bandura 1989).

Obviously, personal attributes are important but not all-pervading determinants of behavior (Cromie 2000 p. 25). The economic environment, family background, employment history, organizational experiences, social networks, national culture and personality traits *all* affect the probability that some one will act entrepreneurially (Rauch and Frese 2000). In the context of this paper, it is interesting to point to the role of national cultures. McGrath and colleagues (1992) have pushed trait research even further by investigating whether this supposed set of entrepreneurial characteristics transcends cultures. In other words, do entrepreneurs have a predictable set of values other than non-entrepreneurs without regard of the home culture? To answer this question, McGrath et al. (1992) and McGrath and MacMillan (1992) use Hofstede's four dimensional cultural framework to compare the value orientation of non-entrepreneurs and business owners in a sample of eight, respectively nine, countries. They find that entrepreneurs have a persistent and characteristic value orientation, irrespective of the values of their national culture.

However, it is also found that societies differ in their orientation towards entrepreneurial activity (Wennekers et al. 2005) and that some societies have higher rates of entrepreneurial activity than others. A number of authors have suggested that, irrespective of the economic and environmental conditions, a society's cultural orientation towards entrepreneurship may play an important role in this respect. The high levels of entrepreneurship in the United States have been related to cultural values such as freedom, independence, achievement, individualism and materialism (Morris et al. 1994; Spence 1985). To our knowledge, the first author who systematically described this idea was McClelland. The concept of achievement motivation, originally developed by Murray in 1938 and popularized by McClelland in 1961 in his seminal work *The Achieving Society* has been argued to be crucial for economic development (McClelland 1961). Though his analysis of 22 countries has been criticized for lack of robust results and questionable proxy measures, such as the use of changes in electricity generation to measure economic development (O'Farrell 1986; Schatz 1965; Frey 1984; Gilleard 1989), McClelland made the first attempt actually to measure entrepreneurial culture and to relate it to economic development.

Hofstede's (2001) seminal work on culture's consequences (including entrepreneurship) triggered a number of studies relating his four cultural dimensions to entrepreneurship and entrepreneurial activity. In addition to the studies mentioned earlier by McGrath and colleagues, Shane developed a theoretical framework (Shane 1992) and tested the relationship between national cultures and rates of innovation (Shane 1993). Morris et al. (1994) relate one of Hofstede's dimensions – individualism/collectivism – to corporate entrepreneurship. They focus on individualism as it has been linked to the willingness of people to violate norms and their level of achievement motivation (Hofstede 2001), both of which are associated with entrepreneurship, and showed that entrepreneurship declines the more collectivism is emphasized (Morris et al. 1994). Though it was also found that dysfunctional (high) levels of individualism exist, this result suggests that in cultures in which group-thinking may outweigh individual initiative, few individuals would put their (perhaps latent) entrepreneurial ambitions into action.

In this paper, we build on insights from trait research by applying an aggregate psychological trait explanation. This is based on the view that if there are more people with entrepreneurial values in a country, there will be more people displaying entrepreneurial behavior (Uhlaner and Thurik 2005). We perceive an entrepreneurial culture as a collective programming of the mind (Hofstede 2001) in which the underlying value system is oriented towards such behavior and the above described associated traits. Before doing so, we explore the role of the entrepreneur in economic theory and theorize on the relationship between entrepreneurial culture and economic performance.

2.2 Entrepreneurs in Economic Theory

There is no well-developed theory as to the way in which entrepreneurial culture may affect national or regional economic development processes. This lack of

a sophisticated framework may at least partly be caused by the fact that mainstream (neoclassical) economic theory does not leave much room for the role of the entrepreneur (Leibenstein 1968; Baumol 1968, 1993; Kirzner 1997). According to Leibenstein (1968), the main difficulty of the misfit of the entrepreneur in mainstream (neoclassical) thinking is caused by the conventional theory of the production function, in which the complete set of inputs is specified and known and has a fixed relation with output. He argues that this is not realistic. In his view, the entrepreneur is someone who extends the production function by broadening the existing set of inputs. Leibenstein calls this the 'input-completing capacity' of entrepreneurs. This input-completing capacity of the entrepreneur implies that the entrepreneur has to employ ill-defined inputs which are vague in their nature and the output of which is indeterminate. The capacity to do so is not uniformly distributed and the ability and willingness for such a risky process of gap-filling and input-completing can be considered a scarce talent, which is exactly what trait research suggests. In his view, the entrepreneur as a gap-filler and input-completer is the prime mover of the capacity creation part of the economic growth process (Leibenstein 1968).

This view of the role of the entrepreneurial process corresponds with that of the Austrian school (Kirzner 1997; Rosen 1997; Yeager 1997). Building on the works of Mises (1949) and Hayek (1948), scholars in this tradition theorize that the market is an entrepreneurially-driven process in which market participants acquire better knowledge concerning the plans made by fellow market participants. Entrepreneurs are crucial in this process for their willingness to take risk in pursuing market opportunities. Entrepreneurial activities are only possible when knowledge and information are incomplete and dispersed. In contrast to the neoclassical world, an entrepreneur in the Austrian approach operates to change price/output data (Kirzner 1997). For Mises, an entrepreneur is 'an acting man in regard to the changes occurring in the data of the market' (Mises 1949, p. 255 on cit. Kirzner 1997), and entrepreneurship is human action 'seen from the aspect of uncertainty inherent in every action'.

Entrepreneurship is not only associated with the formation of new firms, but with action in the sense of starting something new. It is a process that often leads to new business formations, but it may very well include innovative and enterprising behavior inside existing organizations (Cromie 2000). Intra-preneurship or corporate entrepreneurship plays an important role in the process of strategic renewal of existing firms. It may be associated with alertness, finding new product-market combinations and innovation (Wennekers and Thurik 1999). Entrepreneurs are important for the growth of firms since they provide the vision and imagination necessary to carry out opportunistic expansion (Penrose 1959). Entrepreneurial activity shakes up existing business routines (Schumpeter 1934, 1951). In the long run, it is expected to affect positively firms' competitiveness (Leibenstein 1968).

2.3 Entrepreneurial Culture and Economic Success

The logic developed above is interesting and relevant for the thesis on the relationship between entrepreneurial culture and (regional) economic growth we aim to

put forward in this paper. In Leibenstein's view, the set of individuals with gap-filling and input-completing capacities is exogenous and the personality characteristics of these entrepreneurs are important. The Austrians argue that it is this relatively scarce willingness to take risk that allows an economy to develop and to grow. Hence, if more people possess these entrepreneurial traits, it can logically be argued that this results in increased economic dynamism and economic growth in the end (Davidsson 1995; Uhlaner and Thurik 2005). In other words, entrepreneurship, innovation and economic growth are logically linked through the recognition and exploitation of opportunities in economic and social arenas (Drucker 1985; Schumpeter 1951). Despite the intuitive attractiveness of Leibenstein's concept of the entrepreneur and the Austrian school, their abstract concepts of the entrepreneurial process only indirectly allow for theorizing on the relationship between entrepreneurial culture and economic growth.

However, the lack of a well-developed framework has not stopped scholars from developing and/or testing hypotheses on the relationship between entrepreneurial culture and economic success. As sketched earlier, a number of authors have argued that entrepreneurial culture may affect aspects of economic performance (Shane 1993) or economic growth in general (McClelland 1961; Freeman 1976; Suarez-Villa 1989; Lynn 1991). Without specifying the causality - for example, via the production function (Leibenstein 1968) – the core idea is that entrepreneurial culture is beneficial for economic performance. Entrepreneurial culture may affect economic growth in an indirect way as well. A society characterized by an entrepreneurial culture may lead to higher levels of entrepreneurship (Suddle et al. 2006), subsequently triggering a process of economic dynamism, resulting in economic growth (Carree and Thurik 2003).

In an empirical analysis of the effects of regional characteristics on new firm formation in Finland, Kangasharju (2000) argues there are a number of significant local characteristics. Besides local market growth, agglomeration and urbanization effects, and government policies, he argues that 'entrepreneurial ability' is an important factor in explaining the probability of firm formation. A regional analysis of entrepreneurship in Sweden showed that regional rates of new firm formation partly depend on entrepreneurial values (Davidsson 1995). Georgellis and Wall's (2000) study of rates of self-employment across British regions suggests that the 'entrepreneurial human capital' of a region is an important explanatory factor. Recent research on Florida's idea of creative classes suggests a positive link exists between the regional existence of creative classes and firm formation rates (Florida 2002; Lee et al. 2004).

Recent contributions on the relationship between entrepreneurship and economic growth suggest that this relationship is not as straightforward as initially thought (van Stel et al. 2005; Carree and Thurik 2003). First of all, it is found that the effect of entrepreneurial activity on economic growth depends on the level of development. There is a positive relationship (as for example found by Braunerhjelm and Borgman 2004), but the effect is stronger in well-developed countries than in poorer countries (see also Van Stel et al. 2005 and Wennekers et al. 2005). Secondly, van Stel (2005) finds that high start-up rates do not necessarily translate

into employment growth at the aggregate level (see also Van Stel and Storey 2004). Audretsch and Fritsch (2002) suggest the lack of robust empirical evidence may be due to the relatively long time lags for the effects of new entries to take shape. Fritsch and Mueller (2004) explain the insignificant or sometimes even negative effect of entrepreneurship on growth through the crowding out of competitors, improvement of supply conditions and improved competitiveness. On the other hand, Acs and Armington (2004) have found that this is exactly the reason new firms may be crucial in taking advantage of knowledge externalities, because entrepreneurship is the vehicle by which spillovers contribute to economic growth. In this case, entrepreneurial culture increases start-up rates yielding innovation and subsequently contribute to economic growth.

In sum, despite the lack of well developed theoretical framework, there is the general idea that entrepreneurial culture may translate into economic outcomes including growth, even though the empirical evidence on the indirect effect on growth through higher start-up rates is mixed.

3 Measuring Entrepreneurial Culture

The majority of the studies that aim to link entrepreneurial values to aggregate economic outcomes only do so indirectly. For example, in explaining the regional variance in innovation rates among European regions by so-called 'innovation-prone' and 'innovation-averse' societies, Pose (1999) does not actually measure culture. In most cases, entrepreneurial culture is included in some kind of region-specific fixed effect (Guerrero and Serro 1997; Wagner and Sternberg 2002). A notable exception to this is Lynn's (1991) attempt to score the value system of students and to combine these into one national indicator of entrepreneurial attitude. Though again, as did McClelland (1961), Lynn does not use economic models to test for alternative explanations, his analysis does suggest that especially a society's orientation towards competitiveness is related to economic growth rates.

In our study, we proceed in the following way in developing a measure for entrepreneurial culture. In order to construct an empirically founded measure, we compare the value pattern of entrepreneurs with non-entrepreneurs. Based on the insights from personality trait research, we may expect to find distinguishing characteristics related to a preference for innovation and own responsibility for success (and failure). Having done so, we calculate the score of the average population (excluding the entrepreneurs) on these distinguishing characteristics.

3.1 Value Patterns of Entrepreneurs vs. Non-Entrepreneurs

The data-set we use to trace the distinguishing characteristics of entrepreneurs and subsequently to construct our regional measure of entrepreneurial culture is the

European Values Survey (EVS). EVS is a large-scale, cross-national, and longitudinal survey research program on basic human values, initiated by the European Value Systems Study Group (EVSSG) in the late 1970s. The EVS aimed at designing and conducting a major empirical study of the moral and social values underlying European social and political institutions and governing conduct. Our goal to develop a micro based measure of entrepreneurial culture provides a methodological limitation in the sense of available data. This European sample allows us to embed our aggregate measure of culture at the individual level of the entrepreneur.

Using the EVS, we relate the value pattern of individuals to their occupation. Given the cross sectional nature of our study, entrepreneurship is measured in terms of self-employment. Our dependent variable is self-employment as indicated by the respondent himself. We estimate two different regression equations. In the first analysis, we compare self-employed with the rest of the population, including, e.g. unemployed, retired people, students, and housewives. The number of observations equals 14,846, of which 888 are self-employed (6%). In our second analysis, the reference category in the self-employment equation is the wage- and salary earners. Here, the number of observations is 8,332, of which again 888 are self-employed (10.6%). All data refer to 1990. Countries included in this analysis are France, Germany, Great Britain, Spain, Italy, Belgium and the Netherlands.

Following the literature on trait research referred to earlier, we selected a number of questions from the EVS. These questions pertained to ascribed reasons for personal success or failure, values instilled in children, attitudes towards future developments, preference for equality versus freedom, preference for state vs. private ownership of business, state versus individual responsibility for welfare, and the relative importance of freedom versus equality. The exact wording of the questions used in our test can be found in Table 1. As both self-employment and personality characteristics are related to other factors, we also control for sex, age, income and socio-economic status. For reasons of privacy, income is measured on a 10-point scale. With respect to age, we expect a curvilinear relationship, as very young and very old people are not expected to be self-employed (Evans and Leighton 1989; Storey 1994; Cowling and Taylor 2001). We control for level of education or human capital by including information on socio-economic status (non-manual workers, skilled or semi skilled manual workers, unskilled manual workers). As countries with higher levels of GDP and corresponding lower shares of the agricultural sector (Chenery 1960) are characterized by lower levels of self-employment, we also include the GDP per capita (in 1990) (taken from Penn World Tables). Finally, we include country dummies to control for country-specific effects other than GDP.

Our empirical test consists of two logit regressions. In the first model, we relate self-employment to the general population. The second model uses wage- and salary-earners as a reference group. When a variable is statistically significant, it implies that entrepreneurs are different from non-entrepreneurs. A positive coefficient means that

Table 1 Comparing entrepreneurs and non-entrepreneurs

People live in need	Model 1: Self-employed versus general population	Model 2: Self-employed versus wage- and salary earners
Because they are unlucky	−0.23 (−1.22)	−0.22 (1.10)
Because of laziness and lack of willpower	0.13 (0.73)	0.12 (0.69)
Because of injustice in our society	−0.12 (−0.70)	−0.11 (0.59)
Because it's an inevitable part of modern progress	−0.15 (−0.82)	−0.16 (0.84)
Important qualities to teach children		
Independence	−0.03 (−0.37)	−0.05 (0.63)
Hard work	0.17 (2.03)**	0.10 (1.18)
Imagination	0.85 (1.01)	0.11 (1.24)
Thrift	−0.006 (−0.07)	0.04 (0.45)
Determination, perseverance	−0.05 (−0.63)	−0.025 (0.30)
Obedience	−0.12 (−1.46)	−0.11 (1.24)
Evaluation of future developments		
More emphasis on the development of technology	0.05 (0.63)	0.05 (0.60)
Greater emphasis on the development of the individual	−0.073 (−0.69)	−0.16 (1.53)
Freedom is more important than equality	0.12 (1.58)	0.089 (1.16)
Attitude towards social issues		
There should be greater incentives for individual effort	0.02 (3.34)***	0.02 (3.05)**
Government ownership of business should be increased	−0.02 (1.88)*	−0.027 (2.22)**
The state should take more responsibility	−0.03 (2.36)**	−0.029 (2.03)**
Unemployed should have the right to refuse a job	−0.03 (2.50)**	−0.027 (1.91)*
Competition is harmful. It brings out the worst in people	0.007 (1.07)	0.005 (0.75)
Success is a matter of luck and connections	−0.04 (2.85)***	−0.04 (3.02)***
Control variables		
GDP per capita 1990	−0.1 (8.79)***	−0.1 (8.84)***
Age	0.18 (11.28)***	0.027 (1.55)
Age squared	−0.002 (11.25)***	0.00005 (0.25)
Sex	0.71 (9.30)***	0.25 (3.15)***
Income	0.03 (1.74)*	−0.03 (1.79)*
Socio-economic status	−0.096 (2.73)***	−0.028 (0.81)
N	14846	8332
χ^2	658.02	512.28
Log Likelihood	−3032.95	−2570.89

The dependent variable is 1 if self-employed. The reference group in model 1 is the general population, whereas the reference group in model 2 are the wage- and salary earners. Key-words in variable names in italics. T-statistics are in parentheses. *** = significant at 1%, ** = significant at 5%, * = significant at 10%. GDP per capita in 1000 USD. Country dummies not reported. Estimation is logit in STATA. For the exact formulation of the questions see http://www.europeanvalues.nl

the independent variable tends to increase the probability that one is self-employed; a negative coefficient signifies the opposite.[1]

The results of the binomial regressions are presented in model 1 and model 2 in Table 1. Both models converge after five iterations, and have a high explanatory power. Chi-square is 658.02 ($p < 0.0001$) in model 1 and 512.28 ($p < 0.0001$) in model 2. In order to assess how well our maximum likelihood model fits the data, we compare the classification rate to the rate that would have been obtained by chance (Amemiya 1981). Results indicate that the model's ability correctly to classify people who are self-employed and those who are not is higher than the success rate obtained by chance (results are not shown but are available upon request).

Our logit comparison of self-employed and those who are not yields five distinguishing characteristics. The self-employed distinguish themselves both from the general population as well as from wage- and salary earners in their stronger preference for greater incentives for individual effort and their opinion that the state should not take more responsibility. This corresponds with the findings by McGrath et al. (1992). They also find that entrepreneurs score lower on the preference for equality and feel more personal responsibility (McGrath et al. 1992, p. 128). The latter is in line with what locus of control theorists tell us. Moreover, our analysis suggests that entrepreneurs feel that private ownership should be increased, that the unemployed should not have the right to refuse a job, and that success is not a matter of luck and having connections, but of hard work. Again, this is in line with the findings of McGrath et al. (1992), and reflects the personal responsibility entrepreneurs are expected to feel for their actions (more than non-entrepreneurs). Our result regarding the possibility to refuse a job fits the finding by McGrath and MacMillan (1992). McGrath et al. (1992) also found that entrepreneurs link positive results to merit, which fits our finding regarding the notion of hard work versus luck. Finally, our results suggest that the self-employed differ from the general population with respect to values that they think are important in raising children. The self-employed attach significantly more importance to *hard work* than the rest of the population. The non-significant finding in model 2 suggests that this characteristic is not a distinguishing factor between wage and salary earners and those who are self-employed. In other words, our results suggest that *hard work* as a quality to teach children does not have to do with being self-employed, but with having a job, either as a wage or salary earner, or as an entrepreneur. All in all, we find in our data significant characteristics of the self-employed associated with the issues suggested by trait research, specifically the need for achievement, risk-taking attitude, and internal locus of control.

[1]Acknowledging that these type of binomial regressions are normally used to predict the probability of a certain outcome (in this case someone becoming self-employed), this would require more information, such as panel data on the moment (and the period before) people decide to become an entrepreneur. Our data set does not allow us to do so, but, more importantly, this is not the goal of our analysis.

3.2 A Micro Based (Aggregate) Measure of Entrepreneurial Culture

The next step in our analysis consists of constructing a regional aggregate that captures the characteristics we distinguish in our individual level comparison of entrepreneurs and non-entrepreneurs. First, we apply principal components analysis on the five items that were significant in both model 1 and model 2 of the logit regression. We estimate the principal components by making use of the interval-scaled items 'individual effort', 'government ownership', 'state responsibility', 'unemployed' and 'success' (0–10). Results suggest that the five items can be grouped in one component (groups of items), yielding a Cronbach's alpha of 0.56. Given a threshold of 0.60 for exploratory studies such as ours, we base the construction of our new variable on these five items (Nunnally 1978, p. 245). For the analyses in the following sections, we calculate regional scores on entrepreneurial attitude for all (interviewed) inhabitants of a specific region on the basis of this five-item-based factor score (excluding the entrepreneurs). Following Porter (2003), our regional aggregate reflects the entrepreneurial 'spirit' at the regional level. Table 2 summarizes the items included in our measure for entrepreneurial culture.

Before actually calculating and analyzing the new variable at the European regional level, we analyze the stability of the culture variable over time. There are two reasons to do so. First, we need to assess whether our measurement in 1990 is not biased in any way, as it only provides a snapshot in time. Second, the distinguishing characteristics that we obtained after the comparison of entrepreneurs with the two reference groups can be argued to reflect attitudes instead of values. Unfortunately, it is not possible to calculate the scores on the distinguishing features in other years and correlate these scores over time. We can, however, calculate the scores for the different age groups and perform a cohort analysis.

As the number of observations is reduced in this cohort analysis, we can only do this analysis at country level. If the scores of the entrepreneurial culture variable

Table 2 Items included in the measure of entrepreneurial culture

	Non-entrepreneurs score high on:		Entrepreneurs score high on:
*	Incomes should be made more equal	Versus	There should be greater incentives for individual effort
*	Government ownership of business and industry should be increased	Versus	Private ownership of business and industry should be increased
*	The state should take more responsibility to ensure that everyone is provided for	Versus	Individuals should take more responsibility for providing for themselves
*	People who are unemployed should have the right to refuse a job they do not want	Versus	People who are unemployed should have to take any job available or lose their unemployment benefits
*	Hard work doesn't generally bring success – it's more a matter of luck and connections	Versus	In the long run, hard work usually brings a better life

Source: EVS (1990). Scales range between 1 and 10 and higher scores imply a higher score on the measure of entrepreneurial culture

yield consistent rankings for each country in each age cohort, this suggests that differences between countries are relatively stable. Alternatively, if countries do not have overlapping culture scores, especially in the lower age cohorts, we may assume that the values of our culture variable are relatively stable. We calculate the score on entrepreneurial culture for the following age cohorts: 18–29, 30–39, 40–49, 50–59 and 60+.

Of the seven countries in our sample for which we are able to do a cohort analysis, only three of the 28 possibilities ($7 + 6 ....+ 2 + 1 = 28$) yield inconsistent rankings of countries on our score of entrepreneurial culture. This is the case for Italy with the Netherlands, Italy and Belgium, and France and Belgium. These country pairs have one age cohort that is not consistently lower (or higher) than the other country in this pair. Whereas Spain always scores lowest for each age group, Germany scores highest for each cohort. Acknowledging that we cannot assess the scores on our measure of entrepreneurial culture over time, our cohort analysis of the 1990 data suggests that the relative rankings of the countries in our sample hardly changes. Hence, we have no reason to assume that our culture variable is unstable or severely biased due to the single moment of observation.

After these validity checks, we calculate the scores for each region. We are able to calculate scores on this new variable for 54 European regions of the seven countries mentioned earlier. In order to correlate this culture variable with regional economic data, we follow the standard regional classification of the European Statistical Office (the so-called NUTS 1 level). This implies that France is divided in 8 regions, Belgium 3, Italy 11, Germany 11 (former German Democratic Republic excluded), Spain 7, The Netherlands 4 and Great-Britain 10.

4 Analysis

Our final step consists of a comparison of our entrepreneurial culture variable with measures of (regional) economic success. We relate culture to two economic variables, innovation and economic growth. Acknowledging that innovation is only one of the channels through which an entrepreneurial culture may translate into economic growth (Acs and Armington 2004), data limitations at the European regional level do not allow us to use other variables, for example, regional entry- and exit rates of (new) firms or the actual number of entrepreneurial ventures at the regional level. In the growth analysis, we also perform regressions in which we use entrepreneurial culture as a potential explanatory variable for innovation subsequently affecting economic growth. Hence, we both test for a direct and indirect effect.

4.1 The Model

We use a standard regional growth framework, in which economic growth is explained by a number of key economic variables (Barro 1991; Baumol 1986;

Mankiw et al. 1992). We closely follow Barro and Sala-i-Martin (1995), who explain regional growth differentials in Europe between 1950 and 1990.[2] Complementing the data used by Barro and Sala-i-Martin with more recent economic data, we initially analyze the period 1950–1998. In the robustness analysis, we also test for alternative periods. The 1998 data on GRP are based on information from the European Statistical Office (Eurostat). The basis for the regression analyses is the standard "Barro-type" of growth regression, including investment in physical capital, human capital and the initial level of economic development. To control for country specific effects, we use weighted least squares, where regional standard errors are adjusted on the basis of belonging to the same country. This cluster adjusted standard error method is an extension of White's heteroskedasticity consistent standard errors, where standard errors are corrected for dependence within (in this case) countries. Cluster (hence country) based adjusted standard errors basically correspond to random effects, and using dummies would be a fixed effect estimator. In the robustness analysis in the next section, we check for this alternative method of directly including country dummies.

4.2 The Data

Due to the unavailability of reliable regional investment data,[3] the investment ratio is measured at country level as the average investment over the period observed. Our measure of the investment ratio is taken from the Penn World Tables (Summers and Heston 1991). Data limitations at the regional level do not enable us to measure the school enrolment ratio as some average over time, but there are data on the total number of pupils at first and second level in 1977, divided by total number of people in the corresponding age group.[4] Our measure for school

[2]Similar to Barro and Sala-I-Martin (1995), we compute the regional growth figures by relating the regional GDP per capita information to the country mean. There are two reasons to use the country mean as a correction factor. First of all, we do not have regional price data. Second, the figures on regional GDP are provided in an index form that is not comparable across countries. Hence, we use Gross Regional Product (GRP) figures that are expressed as deviations from the means from the respective countries. An additional advantage of using relative data versus non-relative data is the direct control for national growth rates that might bias regional growth rates. The 1950 data are based on Molle et al. (1980), except for the data for Spain which refer to 1955, and are based on Barro and Sala-I-Martin's (1995) calculations. By using the log value of this ratio, our analysis corresponds with including country averages as independent variables, also referred to as a quasi fixed effects approach (Hsiao 1986).

[3]Eurostat and Cambridge Econometrics provide data on Gross Fixed Capital Formation. However, data are incomplete for some countries or in time.

[4]The basic growth period we analyze is 1950–1998. The school enrolment rate in 1977 falls in between these dates and, given the fact that school enrolment rates have increased since 1950, the 1977 information may be a reasonable proxy for the average over the entire period. Data on school enrolment rates in Spanish regions refer to 1985.

enrolment (human capital) is obtained from the European Statistical Office. We have taken uncorrected regional figures because it has been shown that migration plays only a minor role in European regions and the relation with per capita GDP is weak (Barro and Sala-i-Martin 1995; Begg 1995).

In order to control for concentration of human capital in agglomerations, we include an interaction variable, which consists of a dummy variable for an agglomeration multiplied by the score of the school enrolment rate.[5] This proxies the concentration of human capital in agglomerations. Furthermore we control for spatial correlation. Acknowledging that testing for spatial dynamics is important (Le Gallo and Ertur 2003), it is beyond the scope of this paper to do so extensively. Ideally, one should use interregional input-output tables to calculate regional multipliers and to construct a variable that controls for spatial correlation.[6] However, this information was not available. Instead, we chose to control for spatial autocorrelation in a limited way, i.e. by applying Quah's (1996) approach of the neighbor relative income. This method implies that we use average per capita income of the surrounding, physically contiguous regions to control for spatial auto-correlation.

4.2.1 Regional Innovation

We measure regional innovativeness by developing a new variable based on two underlying indicators reflecting the innovativeness of a region. Both indicators are based on patent information. The first indicator was developed by Paci and Usai (2000) and measures the patent density at the regional level between 1980 and 1990. Their 'Crenos' data set is based on information from the European Patent Office. The second indicator is taken from the European Statistical Office (Eurostat) and measures the average number of patents per capita between 1990 and 2003. Although both indicators relate to patent information, it is unfortunately impossible to simply add them and calculate the 'new' average patent density for the overall period 1980–2003. The indicators correlate strongly, however (correlation is 0.83), suggesting that they reflect a similar underlying phenomenon. To use one single measure of regional innovativeness in our analysis covering the entire period, we factor analyze the two indicators and use the factor scores to calculate our measure for regional innovativeness. Whereas the regression is based upon the overall measure of regional innovativeness 1980–2003, additional analyses (not shown) indicate that all empirical results are similar when using the two indicators for the different time periods separately.

Acknowledging the potential weaknesses of patents as an indicator of innovativeness, it has been shown that it is correlated with aggregate measures of

[5]Major agglomerations are the Western parts of the Netherlands, Greater Paris, Berlin, London, the Barcelona area, Brussels, and the Italian region Lazio (Rome).

[6]There exist other ways to have a more refined control variable that can be taken into consideration, for example the physical length of abutting boundaries or the physical characteristics of the border terrain. However, these kinds of extensions go beyond the scope of the current paper.

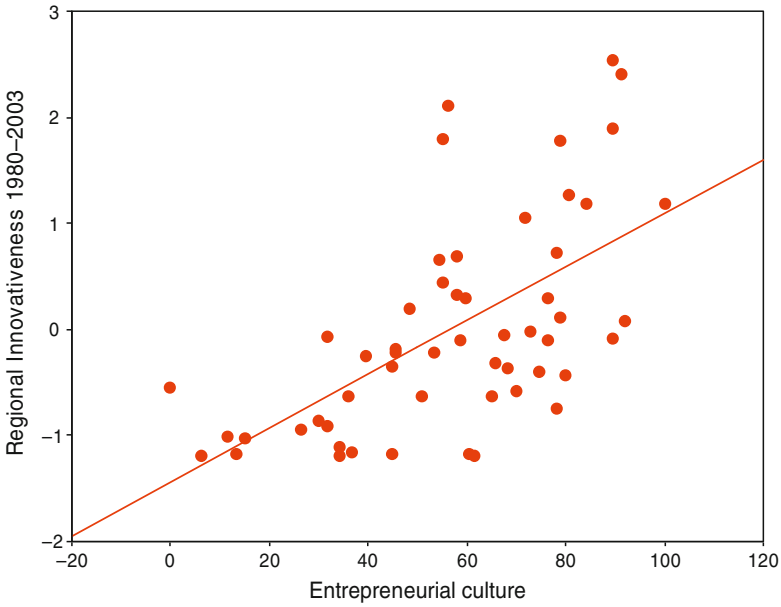

Fig. 1 Scatter plot of entrepreneurial culture and regional innovativeness 1980–2003
Note: The correlation between entrepreneurial culture and regional innovativeness 1980–2003 equals 0.61

economic performance such as labor productivity (see Paci and Usai 2000 for EU regions). In an analysis of US regions, Porter (2003) showed that regions differ considerably in their innovation rate, which subsequently affects differences in overall regional economic performance.

Figure 1 shows the relation between regional innovativeness 1980–2003 and our measure of entrepreneurial culture. For reasons of convenience, the latter is re-scaled between 0 (low entrepreneurial culture) and 100 (high entrepreneurial culture). The upward slope of the line plotted in Fig. 1 suggests a positive relationship; the correlation between entrepreneurial culture and regional innovativeness 1980–2003 is 0.61, while the correlation between entrepreneurial culture and the 'Paci and Usai' (2000) measure for regional innovativeness for the sub period 1980–1990 equals 0.54. The correlation for the period 1990–2003 equals 0.63.

4.3 Estimation Results

Our basic regression analysis includes initial level of GRP per capita, investment ratio, school enrolment rate, spatial correlation and a variable that captures the concentration of human capital in major agglomerations. In addition, we include the culture and innovation variables.

Table 3 Descriptive statistics and correlations

Variable	Mean	S.D.	1	2	3	4	5	6	7
Growth 1950–1998	0.029	0.33							
Initial GRP per cap.	−0.002	0.25	−0.55						
Investment	24.25	3.74	0.14	0.00					
Schooling	0.51	0.067	−0.17	0.30	−0.28				
Spillover	0.92	0.30	0.05	0.17	−0.18	−0.08			
Agglomeration	0.06	0.17	−0.07	0.34	−0.03	−0.08	−0.18		
Regional innovativeness	0.00	1.00	0.39	0.21	0.16	−0.12	0.23	0.12	
Entrepreneurial culture	56.95	24.06	0.42	−0.02	0.41	−0.29	0.18	0.02	0.61

$N = 54$

Table 3 provides the descriptive statistics of all variables. Correlations between the independent variables are typically moderate to low, implying few multicollinearity problems. Model 1 in Table 4 presents the OLS regression results for the default growth model, only including basic economic variables. As the results in Table 4 show, all variables except for Investment are significant. This result is not surprising given our control for country specific effects and the fact that the investment ratio is measured at the country level. Schooling is significant at the 10% level. Economic growth is negatively related to the initial level of GRP per capita, which corresponds with other findings on regional convergence in Europe (Martin and Sunley 1998).[7]

In model 2, we test whether differences in economic growth can be explained by differences in entrepreneurial culture. The results of the OLS regression indicate that entrepreneurial culture is positively and significantly related to regional economic growth ($p < 0.05$). Model 3 extends our basic model with our measure of regional innovativeness. As expected, fast growing regions are also characterized by high innovation rates. Although we cannot judge the causality between innovation and growth, closer analysis (not shown) indicates that average innovation rates measured for 1980–1990 (Paci and Usai's measure) are significantly and positively related to growth in the period 1990–1998. Moreover, the effect size of regional innovation 1980–1990 is 0.62 over the period 1990–1998, 0.42 over the period 1984–1998, and only 0.09 over the period 1950–1998 (ceteris paribus). Although this is merely circumstantial evidence, the apparent increase in effect size when estimating innovation on subsequent growth suggests that innovation triggers growth. To test formally the potential endogeneity of innovation, we performed a Hausman test. Results of this test suggest that endogeneity does not bias our results significantly, which is in line with the remark on the effect size of the estimated innovation coefficient.

[7]However, if we take shorter periods of time (e.g. 1984–1998), we cannot find proof for the convergence hypothesis. This is in line with previous studies on country (Levine and Renelt 1992) and regional level (Fagerberg and Verspagen 1995). The period in the eighties can be roughly characterized by divergence instead of the observed convergence in the period before (Maurseth 2001).

Table 4 Main results

Model	1 OLS	2 OLS	3 OLS	4 OLS	5 2SLS
Dependent variable:		Growth	1950–1998		
Initial GRP per capita	−0.97 (0.06)***	−0.94 (0.07)***	−1.07 (0.12)***	−1.04 (0.11)***	−1.10 (0.14)***
Log investment	0.48 (0.27)	0.15 (0.10)	0.30 (0.09)**	0.22 (0.10)*	0.25 (0.12)*
Log schooling	0.53 (0.27)*	0.66 (0.23)**	0.65 (0.14)***	0.67 (0.15)***	0.68 (0.12)***
Agglomeration	0.53 (0.16)**	0.45 (0.16)**	0.42 (0.16)**	0.41 (0.14)**	0.39 (0.17)*
Spatial spillover	0.31 (0.09)**	0.18 (0.10)	0.17 (0.09)	0.15 (0.09)	0.13 (0.10)
Regional innovativeness (1980–2003)	–	–	0.16 (0.02)***	0.15 (0.03)***	0.22 (0.03)***
Entrepreneurial culture (Instrument for regional innovativeness in model 5)	–	0.49 (0.16)**	–	0.17 (0.12)	2.28 (0.46)***
R-squared	0.41	0.53	0.63	0.64	0.60
N	54	54	54	54	54

Country based cluster adjusted standard errors between parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The 2SLS procedure in model 5 uses entrepreneurial culture as an instrument for regional innovativeness

Interestingly, when we include both the culture and the innovation variable, the results in model 4 clearly show that innovativeness is positively and significantly related with growth ($p < 0.01$), but entrepreneurial culture is insignificant. This is an indication of the relatively strong explanatory power of innovation vis-à-vis entrepreneurial culture, and it holds for all model specifications as performed in our robustness analysis. Once we control for innovation, the culture variable is insignificant. The results of model 2, 3 and 4 together suggest that entrepreneurial culture is related to growth, but once we control for one of the potential mechanisms (innovation) through which culture may translate into growth, culture becomes insignificant. Hence, part of the unexplained variance in growth that can be related to culture is fully absorbed by the innovation variable. Theoretically, this is not very surprising, as it can be argued that culture only affects growth through intermediating mechanisms, and once we control for these, they pick up the otherwise unexplained variance.

Acknowledging that it is not statistically required (given the earlier mentioned Hausman test), we have also performed a 2SLS regression (model 5) in which we relate economic growth to regional innovativeness, which is subsequently related to entrepreneurial culture. This 2SLS approach implies that we estimate two regressions: in the first, we regress entrepreneurial culture on regional innovativeness. In the second regression, we use the estimated value of regional innovativeness as an independent variable explaining regional economic growth. More formally, we use entrepreneurial culture as an instrument for regional innovativeness in explaining growth differentials between European regions. As the results show, explaining regional innovativeness by entrepreneurial culture does not affect the significant relationship of innovation with growth. More important is the fact that entrepreneurial culture is significantly and positively related to regional innovativeness ($p < 0.01$) Hence, we find that differences in growth are partly due to differences in regional innovativeness, which can be explained by differences in entrepreneurial culture. The question is whether these finding are robust.

4.4 Tests of Robustness

We explore the robustness of our results along several dimensions. First, we test for an alternative method to control for country specific effects. In Table 4, we show the estimates with cluster adjusted standard errors. The use of country-based adjusted standard errors may yield inconsistent estimates, if the unobserved variables effecting growth are correlated with observed characteristics (Greene 2003). Therefore, as an additional test, we also use a (more conventional) fixed effects method by directly including country dummies. As shown in Table 5, the result on entrepreneurial culture as shown in Table 4 is robust for the inclusion of country dummies ($p < 0.10$) both in the OLS and the 2SLS regression. The country dummies are insignificant (United Kingdom is the country of reference). Logically, the investment variable (measured at the national level) is dropped when including these country dummies.

Table 5 Robustness analysis of entrepreneurial culture, innovation and growth

Model: Type of change	Model 2: OLS Dependent: growth Coefficient of entrepreneurial culture	Model 4: OLS Dependent: growth Coefficient of entrepreneurial culture[a]	Model 5a: 2SLS Dependent: innovation Coefficient of entrepreneurial culture	Model 5b: 2SLS Dependent: growth Coefficient of regional innovativeness	N
Default model (see Table 4)	0.49 (0.16)**	0.17 (0.12)	2.28 (0.46)***	0.22 (0.03)***	54
Country specific effects					
1. country dummies	0.38 (0.20)*	0.15 (0.20)	1.39 (0.56)**	0.27 (0.13)**	54
Change of growth period					
2a 1984–1998	1.52 (0.46)**	0.72 (0.44)	2.26 (0.45)***	0.67 (0.11)***	54
2b 1990–1998	2.35 (0.66)**	1.05 (0.72)	2.22 (0.45)***	1.05 (0.17)***	54
Observations/outliers					
3a excl. 4 fastest growing regions	0.39 (0.13)**	0.15 (0.13)	1.99 (0.44)***	0.19 (0.03)***	50
3b excl. 4 slowest growing regions	0.51 (0.11)***	0.24 (0.09)**	2.23 (0.50)***	0.23 (0.04)***	50
3c excl. 4 highest scores on regional innovativeness	0.39 (0.12)**	0.23 (0.14)	1.81 (0.38)***	0.22 (0.04)***	50
3d excl. 4 lowest scores on regional innovativeness	0.48 (0.18)**	0.17 (0.15)	2.31 (0.52)***	0.21 (0.03)***	50
3e excl. 4 highest scores on entrepreneurial culture	0.49 (0.21)**	0.12 (0.18)	2.46 (0.52)***	0.20 (0.05)***	50
3f excl. 4 lowest scores on entrepreneurial culture	0.56 (0.21)**	0.20 (0.16)	2.61 (0.57)***	0.22 (0.03)***	50

Country based cluster adjusted standard errors between parentheses except in specification 1

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

[a]This model includes the regional innovation variable. The results for the innovation variable are not shown, but all model specifications yield significant and positive coefficients, which is in line with the results of Table 4

Second, we test for alternative growth periods. Given that entrepreneurial culture is measured in 1990, we tested two alternative growth periods; 1984–1998 and 1990–1998. Apart from data driven logic, it may also be theorized that entrepreneurial culture can be both the cause and the result of economic growth. High growth regions may attract entrepreneurs, and in the long run one may expect this to influence positively the general attitude towards entrepreneurial activity. Hence, the causality may run the other way around. Although a more careful analysis is required, the positive and significant finding when estimating growth between 1990 and 1998 supports the theoretical (causal) argument that entrepreneurial culture affects economic growth. As Table 5 shows, the findings of Table 4 are robust to changes in the growth period.

Finally, we tested for potential outliers by applying the recursive method. As Fig. 1 shows, there are a number of observations scoring high on regional innovativeness. In the robustness analysis, we tested for the influence of these outliers by excluding these observations. The recursive method implies that, based on the order in which the observations are represented, observations are deleted and the estimated coefficients are based on this smaller sample. We chose to order the 54 regions according to growth and the variables proxying regional innovativeness and entrepreneurial culture. When applying the recursive method with respect to growth, we estimate the effect of the latter two variables when the four slowest and four fastest growing regions are excluded. In a similar way, we perform the regression analysis and exclude the four regions with the highest, respectively lowest, scores on the variables for regional innovativeness and entrepreneurial culture.[8] As Table 5 shows, the main results presented in Table 4 are robust to the exclusion of observations.

5 Conclusions and Discussion

The literature has stressed the role of an entrepreneurial culture in explaining the economic success of countries and regions. Empirical evidence for this thesis is, however, scarce. In this paper, we developed a measure of entrepreneurial culture and empirically tested the above hypothesis. Instead of using proxies for general societal characteristics, we developed a measure of entrepreneurial culture based on the individual comparison of entrepreneurs and non-entrepreneurs. Following insights from social psychology on personality trait research, we find five distinguishing characteristics of entrepreneurs. Results show that entrepreneurs distinguish themselves by an internal locus of control reflected in a preference for own responsibility and private (versus state) initiative. By using principal components analysis, we developed a single index and subsequently calculated the average

[8]In principle, the recursive method allows a graphical representation of the estimated coefficients when all 54 observations are subsequently deleted. For reasons of clarity and comprehensiveness, we have chosen to show only the results when the four highest/lowest observations are deleted.

score of a regional population on this new variable. The literature suggests that entrepreneurial culture may both directly and indirectly affect economic success. To test the hypothesis on the economic effects of an entrepreneurial culture, we regressed our regional measure of entrepreneurial culture on regional innovation intensity, measured by average patents per capita, and regional economic growth. Acknowledging a sample of only 54 European regions, the extensive robustness analysis largely supports the claim that regions that have experienced higher economic growth rates have a culture that can be characterized as entrepreneurial. However, more research is needed regarding the channel through which an entrepreneurial culture translates into economic development.

The result of this paper should by no means be interpreted in a way to suggest that economic growth depends on an entrepreneurial spirit, which waxes and wanes for unexplained reasons (cf. Baumol 1993), and that 'underdevelopment is just a state of mind' (Harrison 2000). Cultural features *together* with the institutional setting jointly determine the allocation of entrepreneurial activity (Desai et al. 2003). For reasons of comprehensiveness and for the sake of our argument (and also data availability), we refrained from the formal rules of the game in this paper, but future research might consider a more explicit role of institutions. It is the interplay of the formal *and* informal rules of the game that determines the degree of entrepreneurial activity in an economy. The fact that the United States and the United Kingdom have higher turbulence rates (= total of entry and exit) than, for example, the Netherlands and Germany, cannot only be accounted for by a stronger entrepreneurial spirit in these Anglo-Saxon countries, but is also caused by the type and degree of regulation in the European countries (Parker and Robson 2004).

Based on the results presented in this paper, we think that entrepreneurial climate is beneficial for economic growth, but as Baumol wrote in 1968, 'the view that this [economic growth] must await the slow and undependable process of change in social and psychological climate is a counsel of despair for which there is little justification. Such a conclusion is analogous to an argument that all we can do to reduce spending in an inflationary period is to hope for a revival of the Protestant ethic and the attendant acceptance by the general public of the virtues of thrift' (Baumol 1968, p. 71). In other words, whereas the results of this paper suggest that policy makers should try to change the general atmosphere towards entrepreneurship, this should be complemented by changing the formal rules and regulations regarding entrepreneurial behavior (cf. Venkataraman 2004). Sectoral structure, industry life cycle, firm level factors and national institutions are all related to the extent to which a region can be called entrepreneurial. In this paper, we focused only on one element, i.e. the role of entrepreneurial culture.

Clearly, the key ingredients of a theory of entrepreneurial culture and regional economic success need to be integrated in a more thorough manner than has been achieved in this paper. Obviously, it is not only a society's culture that matters, but more general factors conducive to entrepreneurial activity. Audretsch and Keilbach (2004b) use the term entrepreneurship capital to denote this complex constellation of factors (they mention innovative milieu, venture capital availability, social acceptance of entrepreneurs, and existence of formal and informal networks).

Moreover, there are a number of empirical issues as well. First of all, the measurement of (regional) innovativeness by patents per capita entails a number of weaknesses (Griliches 1990; Jaffe et al. 1993). Though lack of data has forced us and many other scholars studying the empirics of innovation at the (European) regional level (Paci and Usai 2000; Piergiovanni and Santarelli 2001; Bottazzi and Peri 2002; Porter 2003) to use an incomplete measure based on patents, it is widely acknowledged that there are a number of problems with patents (Porter 2003).

Second, though empirically validated at the individual level of the entrepreneur, we only used one single measure of entrepreneurial culture. It should be noted, however, that the characteristics and items used in this measure may not be *universal* drivers of entrepreneurship and innovativeness (Begley and Tan 2001).

Finally, the data on entrepreneurial values constrained the analysis to a European regional setting. Despite the added value of this approach, the problematic character of regional data availability has limited the inclusion of control variables. We would prefer to have included a range of alternative variables relating to structural characteristics of regions, such as, e.g., small firm density, regional start-up (and exit) rates, detailed information on regional industry structure and also regional differences in institutional support of entrepreneurship (Davidsson 2004). As these data are more easily available at the country level, it would be interesting to explore the opportunities for a similar analysis at country level.

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Part III
Transnational Cultural Differences

Chapter 8
Entrepreneurship and its Determinants in a Cross-Country Setting

Andreas Freytag and Roy Thurik

Entrepreneurship and its determinants in a cross country setting (first published in: Journal of Evolutionary Economics, Vol. 17, No. 2, 2007)

1 Introduction

The phenomenon of entrepreneurship is present at various levels of observation, such as the person or the firm, region or industry, and even nation (Davidsson 2004; Wennekers and Thurik 1999). Moreover, the approaches to explaining the phenomenon have built on a variety of disciplines such as economics, sociology and psychology (Wennekers et al. 2002). In the twentieth century, three scholars, Schumpeter, Kirzner and Knight, shaped the economics literature on entrepreneurship.[1]

It is well-known that the level of entrepreneurship, for instance as expressed as the percentage of owner/managers of incorporated and unincorporated businesses relative to the labor force, differs strongly across countries (Stel van 2005). This variation is related to differences in levels of economic development, and also to diverging demographic, cultural and institutional characteristics (Blanchflower 2000; Wennekers 2006). There is evidence of a U-shaped relationship between the level of business ownership (self-employment) and per capita income.[2] Recent research in the framework of the Global Entrepreneurship Monitor (GEM) using the rate of nascent entrepreneurship or the prevalence of young enterprises shows the same phenomenon.[3] The meaning of this U-shape is much disputed since it is just a stylized fact waiting for an explanation using the double causal relationship between entrepreneurship (indicated by business ownership rates, self-employment rates or nascent entrepreneurship rates) and the level of economic development.

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[1] See Swedberg (2000) for views from other parts of the social sciences.

[2] See Blau (1987), Acs et al. (1994), Carree et al. (2002).

[3] See Wennekers et al. (2005), Van Stel et al. (2005).

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Nascent entrepreneurship also reveals a wide-ranging diversity across nations and even regions.[4] An explanation for this variation is much needed, as many governments attach high hopes to a positive effect of entrepreneurship on economic growth and, as a consequence, try to promote new business start-ups.

Whereas a number of individually relevant determinants of entrepreneurship have been widely explored (Parker 2004; Grilo and Irigoyen 2006), differences across countries remain unexplored. There is a general feeling that, while intertemporal differences can be attributed to economic effects such as per capita income and to technological developments, contemporaneous differences are of a mainly institutional or cultural nature. In other words: the relative stability of differences in entrepreneurial activity across countries suggests that factors other than economic ones are at play (Grilo and Thurik 2005a). In order to learn more about the relationship between culture and entrepreneurship, the editors of the present book organized a workshop with outstanding scholars in both fields – culture and entrepreneurship – to see how these two phenomena are linked.

The present chapter is meant to raise questions rather than to answer them. It is organized as follows. Section "Economic Theory and the Level of the Individual Entrepreneur" presents three strands of the theoretical literature on the entrepreneur. In section "Country Differences and the Eclectic Approach" we discuss the literature concerning country differences in entrepreneurial activities. The subsequent section "An Example of the Influence of Culture" offers some new thoughts regarding the determinants of entrepreneurial attitudes and activities by testing empirically the relationship between institutional variables and the cross-country differences in the preferences for self-employment as well as in actual self-employment. The last section concludes. Data of the 25 member states of the European Union as well as the US are used. The results of this exercise are intriguing. In this particular sample, the considered country specific cultural and institutional variables seem to explain the preference for entrepreneurship, but not actual entrepreneurship.

2 Economic Theory and the Level of the Individual Entrepreneur

The economics literature on the role of entrepreneurship is dominated by the influence of three scholars – Schumpeter, Kirzner and Knight. The Schumpeterian tradition stresses the inherent disequilibrium nature of market dynamics. It breaks with the neo-classical approach, which tended to analyze market functioning and agents' decisions as an equilibrium phenomenon, and it sees entrepreneurial activity as almost identical to innovative activity. The entrepreneur is the 'persona causa', pushing the economy out of equilibrium. In the Kirznerian tradition, entrepreneurs

[4]See Masuda (2006) for an analysis of Japanese regions.

demonstrate alertness to exploit (profit) opportunities. They are involved in a process of learning and discovery with the result being that the economy is pushed back towards equilibrium. Kirznerian entrepreneurs operate in a different phase of the product life cycle than do Schumpeterian ones. The Knightian tradition emphasizes the importance of two functions of entrepreneurs: (1) providers of entrepreneurial inputs who (2) receive a return for bearing (non-calculable) risk. Hébert and Link (1989) show that these three intellectual traditions can be traced back to Cantillon's *Essai sur la Nature du Commerce en Général*.[5] Casson (1982), Wennekers and Thurik (1999) attempt to make a synthesis again.

The three traditions started by studying the role of entrepreneurship in the economy, but contributed to a field concerned with self-employment decisions known as the theory of income choice. This field has proved useful in describing some of the factors influencing the occupational decision. In this neo-classical approach, agents act as (expected)-utility maximizers taking an occupational choice decision – to become employees or entrepreneurs (self-employed) – given the utility associated with the returns accruing from the two types of activity (de Wit 1993; Grilo and Irigoyen 2006). This constrained optimization approach is inspired primarily by the role of an entrepreneur as found in the work of Knight (1971) although the specification and the working assumptions vary according to the factor playing the key role in explaining self-employment decisions.

Knight views the entrepreneur as playing a twofold function: "(a) exercising responsible control and (b) securing the owners of productive services against uncertainty and fluctuations in their incomes".[6] The *first* 'provider' function plays a role answering the question why different individuals make different occupational choices by emphasizing the role of entrepreneurial ability. Several authors follow this route by postulating differences across potential entrepreneurs (or firms) in terms of some form of entrepreneurial efficiency (Jovanovic 1982, 1994; Lucas 1978; Murphy et al. 1991; Holmes and Schmitz 1990; Lazear 2004, 2005). The *second* 'risk bearer' function gives a particular role to the presence of risk or that of risk attitudes in the occupational choice decision. Kihlstrom and Laffont (1979), Parker (1996, 1997) show that the degree of risk aversion and the differences in risk of the two occupational alternatives determine the occupational choice. A *third* aspect that has been emphasized in explaining different occupational choices is the existence of liquidity constraints. Evans and Jovanovic (1989), building upon Lucas (1978), Jovanovic (1982), show that, under certain conditions due to capital constraints, there is a positive relationship between the probability of becoming self-employed and the assets of the entrepreneur. This influential study led to many follow up investigations of both conceptual and empirical nature (Hurst and Lusardi 2004).

[5]They refer to the edition of *Essai sur la Nature du Commerce en Général* translated by H. Higgs, 1931, London: McMillan.

[6]As quoted by Grilo and Irigoyen (2006).

A large empirical literature has been built on the insights of the occupational choice models and has sought to test the role of factors influencing self-employment decisions at the micro level. These studies attempt to explain the probability of someone being or becoming self-employed. See Parker (2004), Blanchflower (2004), Grilo and Thurik (2005b, 2008) for references. Typical explanatory variables include age, gender, race, education, earnings, capital assets, previous professional experience, marital status, professional status of the parents, and scores from psychological tests. There are many other determinants of being or becoming self-employed which are dealt with in the literature, such as employment status (wage, part-time, unemployment, characteristics of the workplace), minority behavior, immigrant behavior, family firm effects and attitudinal effects (past failures, relatives with experience, confidence, knowing other entrepreneurs, opportunity perception).

3 Country Differences and the Eclectic Approach

The level of entrepreneurship, expressed as the percentage of owners/managers of incorporated and unincorporated businesses relative to the labor force i.e., the rate of entrepreneurship, differs strongly across countries.[7] Moreover, the percentage of nascent or young entrepreneurs differs strongly across countries,[8] as does latent entrepreneurship, i.e., declared preference. Grilo and Thurik (2006) provide a survey of European countries and the US. These differences are assumed to be associated with levels of economic development, in addition to demographic, cultural and institutional characteristics (Blanchflower 2000). Differences over time seem to be dominated by economic influences, whereas cross-country variations seem to be affected by cultural and institutional components (Wennekers et al. 2002). In particular, there is some intriguing evidence that the level of business ownership displays a U-shaped relationship when associated with economic development (Blau 1987; Acs et al. 1994; Carree et al. 2002). This U-shape appears also in the case of nascent entrepreneurship (Wennekers et al. 2005). The implication of such a U-shape is much disputed since it is just a stylized fact waiting for an explanation in the context of a model that takes into account the many relationships between entrepreneurship in its many manifestations and the level of economic development. One phenomenon seems clear: as economies develop, the association between the rate of new business startups or that of nascent entrepreneurship and the level of economic development changes. There seems to be a difference between moderately and highly developed economies. Audretsch and Thurik

[7]For instance, see Van Stel (2005) for data of 23 OECD countries over a recent period of some 30 years.

[8]See Reynolds et al. (2005) for a survey of the Global Entrepreneurship Monitor data set.

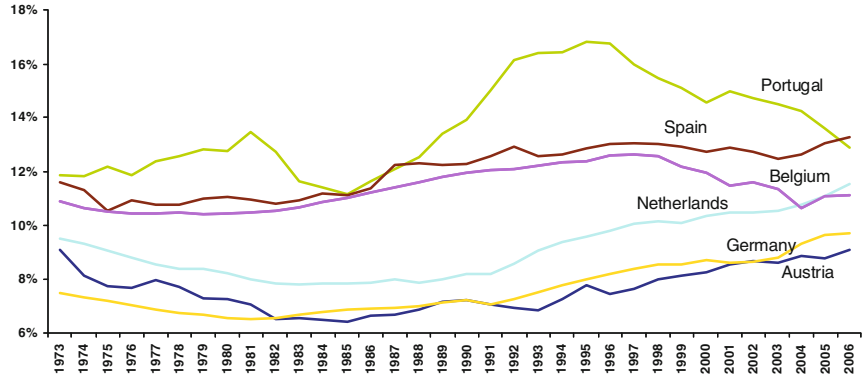

Fig. 1 Rate of entrepreneurship in six OECD countries
Source: Compendia 2006.1. See Stel van (2005)

(2001, 2004) interpret the U-shape as a regime switch between the managed and the entrepreneurial economy.

In Fig. 1, the development of the rate of entrepreneurship is given for six countries of the 23 of the Compendia data set (Stel van 2005). The rate of entrepreneurship is defined as the percentage of the number of non-agricultural business owners (including unincorporated and incorporated self-employed but excluding unpaid family workers) in the total labor force. We observe not only the U-shaped development over time, but also persistent differences between countries.[9] Moreover, we observe a leveling off in the current century. Whereas economic development is often associated with the U-shape, the persistent differences between countries point to non-economic causes such as cultural factors, which have a tendency to remain relatively stable over time.

Whereas the explanation for the individual proclivity towards entrepreneurship is dominated by income choice models, the explanation for the rate of entrepreneurship clearly belongs to the realm of multidisciplinary investigations. See Verheul et al. (2002) for such an 'eclectic' framework and Wennekers et al. (2002) as well as Audretsch et al. (2007b) for updates. Other investigations also use the 'eclectic' approach.[10] Typically, these eclectic investigations attempt to bring together elements from different fields and levels of analysis.

The multidimensionality of entrepreneurship is reflected both in the way it is defined and the way it is measured. Reference is often made to definitions of entrepreneurship from economics (based on both the functions of the entrepreneur

[9]Another phenomenon which is under researched is the rise in variance of the rate of entrepreneurship until 1992 – it more than doubled in the period 1972–1992 for the 23 OECD countries of the Compendia set – and its stabilization afterwards.

[10]See the contributions by Busenitze et al. (2000), Stevenson and Lundström (2001) and by the Global Entrepreneurship Monitor teams (Reynolds et al. 1999; Reynolds et al. 2002; Acs et al. 2005).

and the perception of economic opportunities and innovation) and to those from the managerial world, where entrepreneurship is referred to as a way of managing. This discrimination is also referred to as that between occupational and behavioral entrepreneurship (Sternberg and Wennekers 2005, p 193). As regards measurement, two approaches are suggested. Business ownership and self-employment are considered as equivalent to entrepreneurship and can be the basis for *static* indicators (Wennekers et al. 2002). From a *dynamic* perspective, the proposed measures of entrepreneurship are based on latent (preference), nascent and start-up activity (Grilo and Irigoyen 2006). In Verheul et al. (2002), for instance, the framework distinguishes various disciplines and several levels of analysis (micro, meso and macro), and classifies the explanatory factors into two categories – supply and demand side. From the demand side, the framework focuses on factors that influence the industrial structure and the diversity of consumers' tastes, such as technological development, globalization and standard of living developments. The supply side looks into various structural characteristics of the population and the way these affect the likelihood of someone becoming an entrepreneur. Population growth, urbanization rate, age structure, participation of women in the labor market, income levels and unemployment are examples of such factors. While the supply and demand sides refer to the macro level, the eclectic framework also integrates the decision-making process explaining how and why individuals make the choice to become self-employed as opposed to other job opportunities in terms of risks and rewards of different occupational alternatives – along the lines discussed above.

Other than personal characteristics, the environment in which business is conducted plays a crucial role in fostering or weakening entrepreneurial activities both in terms of firm creation, of firm expansion and of implementation of process, product and management innovation within a firm. From a policy point of view, these "framework conditions" are the aspects that offer the widest scope for action. Issues such as the fiscal environment, labor market regulations, administrative complexities, intellectual property rights, bankruptcy law, education and skill upgrading, etc. are understandably crucial in determining the entrepreneurial dynamism of an economy.[11]

Cultural aspects are assumed to shape the environment in which business is conducted. From a research point of view, there is a paucity of contributions dealing with cultural influences. Hofstede (2001, p 9) refers to culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another." This programming typically happens early in life (Hofstede 1980; Barnouw 1979) and leads to behavioral patterns which continue over time and hence set the cultural context (Hofstede 1980; Mueller and Thomas 2001). Psychological research shows links between values, beliefs and behavior. Hence, it is plausible that differences in culture, in which individual values and beliefs are imbedded, influence a wide range of behaviors, including the decision to

[11]See Stevenson and Lundström (2001), Audretsch et al. (2007a) for surveys of entrepreneurship policies.

become self-employed rather than to work for others (Mueller and Thomas 2001). Using this logic, several studies explore the relationship between various aspects of culture and entrepreneurial behavior across cultures (Busenitz et al. 2000; Davidsson 1995; Huisman 1985; Lee and Peterson, 2000; McGrath and MacMillan 1992; Mueller and Thomas 2001; Tiessen 1997; Noorderhaven et al. 2004). Basically, there are three views (Wennekers 2006).

The *first* view is the 'aggregate psychological trait' explanation of entrepreneurship. The idea is that if a society contains more people with 'entrepreneurial values', more people will become entrepreneurs (Davidsson 1995; Uhlaner and Thurik 2007). Davidsson refers to McClelland (1961) and other proponents of the individualistic view of culture. A *second* view refers to the degree of 'legitimation' or 'moral approval' of entrepreneurship within a culture (Etzioni 1987). This view claims that a higher overall level of 'legitimation' of entrepreneurship implies wide ranging manifestations, including more attention to entrepreneurship within the educational system, a higher social status of entrepreneurs, and more tax incentives to encourage business start-ups. Obviously, this results in higher demand for and supply of entrepreneurship (Etzioni 1987). The *third* view is the 'push' explanation of entrepreneurship. This view starts from the assumption that variation in entrepreneurship is based upon differences in values and beliefs between the population as whole and potential entrepreneurs. It argues that, in a predominantly non-entrepreneurial culture, a clash of values between these groups may drive the latter away from the average (non-entrepreneurial) organization and into self-employment (Baum et al. 1993; Noorderhaven et al. 2004). The second 'legitimation' view is the reverse of the third 'push' view.

Aspects of culture are difficult to model. None of the three views is easy to capture in terms of variables. Therefore, in the following section, we decide to use proxies for culture which can be expressed by more directly observable variables, such as social spending, regulation, political organization, etc. Thereby, we assume that individuals are trying to meet social norms rather than generally to distinguish themselves from their countrymen. In doing so, we concentrate on the first two views. Cross-country differences are assumed to be based on differences in cultural and/or related institutional aspects. Koenig et al. (2007) refer to these aspects as cultural orientations, i.e., manifestations of culture at the individual as opposed to manifestations at the aggregate level. They introduce a new scale measuring cultural orientations of business owners, since they feel that existing cultural orientation scales are not suitable for business owners. The scenario based approach as opposed to the usual Likert based approach is certainly new in the world of economic analyses.

4 An Example of the Influence of Culture

As we have seen from the literature on the determinants of entrepreneurship, regularities exist which hold for many individuals across countries. In a recent analysis, Grilo and Thurik start from this assumption and use individual variables

such as gender, age, education level and whether parents are self-employed, measures of risk tolerance, internal and external locus of control and four perceptions of 'obstacles' to examine what they call entrepreneurial energy (Grilo and Thurik 2006). This energy is captured in two dimensions: latent and actual entrepreneurship. In other words: to *want to be* an entrepreneur and to *be* an entrepreneur. Latent entrepreneurship is measured using the declared preference for self-employment over employment. They use Eurobarometer survey data (some 8,000 respondents) from the 25 member states of the EU as well as the US for the year 2004.[12] The set of explanatory variables used does not include country-specific macro-economic or cultural phenomena. Country differences are controlled for using country dummies. Observing the coefficients of the country dummies, Grilo and Thurik conclude that, in comparison with the US, European citizens have a lower preference for self-employment.[13] This lower preference level has not been explained so far, nor are differences between the coefficients explored. Observing the coefficients of the country dummies of the equation explaining actual entrepreneurship, Grilo and Thurik found no clear regularities.[14]

In the present study, we will use the coefficients of these 26 country dummies in a confrontation with some country-specific cultural and macro-economic aspects since, in addition to personal variables, these country-specific effects may play an important role in the decision to (want to) be an entrepreneur. By culture we understand a broad idea of cultural as well as institutional constraints of human behavior.[15] As these constraints differ from country to country, they may contribute to the explanation of different degrees of entrepreneurial energy across countries.

The variables to be explained in our analysis are the coefficients of the country dummies for both the preference for entrepreneurship (PREFER) and actual entrepreneurship (ACTUAL), computed with the US as benchmark. A negative value shows a lower inclination relative to the US to (want to) be an entrepreneur. The coefficients[16] can be seen as measures of nation-wide entrepreneurship energy

[12]Grilo and Thurik (2006) follow the setup of Grilo and Irigoyen (2006) while specific attention is given to differences between the eight former communist member states and the 17 other EU member states. The most striking result is the higher influence of risk tolerance in shaping both latent and actual entrepreneurship in transition economies relative to market economies.

[13]The dummy coefficients in the 'preference' equation are negative for all 25 European countries and almost always significant (with the exception of four countries: Cyprus, Ireland, Lithuania and Portugal).

[14]The dummy coefficients in the 'actual' equation are negative for six European countries (France, Luxembourg, Portugal Malta, Latvia and Slovenia) but significantly only for France and Luxembourg. They are positive for all remaining 19 countries but significantly only for Belgium, Greece, Finland, Cyprus, Czech Republic, Hungary, Poland and Slovakia.

[15]Here we depart from the North (1994) approach where institutions are defined to include culture but where a distinction between the two is also made (formal constraints such as rules, laws and constitutions versus informal constraints such as norms of behavior, conventions, etc).

[16]The coefficients are taken from Table 3, columns 2 and 5, respectively, in Grilo and Thurik (2006, pp 90–91). For the US we take a value of zero since it is the benchmark country.

corrected for individual effects. Below we refer to these variables as 'corrected' actual and preference for entrepreneurship.

As exogenous variables, we use the following four variables. First, we use the regulatory dimension (OREF) from the 'Frazer' index of economic freedom, as defined by Gwartney et al. (2005).[17] Only regulatory aspects are used here because they affect individual decisions concerning self-employment; reflect cultural aspects well and are sufficiently different across countries. In addition, we employ a post communism dummy (PCD) to incorporate historical influences on role models and institutions, the life expectancy index (LEI) taken from the *Human Development Report* (UNDP 2005), as well as public and private spending for health care as a share of GDP (HEALTH), also taken from the *Human Development Report*. HEALTH can be used as proxy for social spending.

Given that our two variables to be explained (PREFER and ACTUAL) represent the for individual variables 'corrected' country differences in entrepreneurial energy, our hypotheses are the following. PREFER and ACTUAL are negatively influenced by OREF. In other words: the higher the degree of regulation, the lower the for individual variables 'corrected' entrepreneurial energy. We expect the for individual variables 'corrected' entrepreneurial energy to be lower in post communist countries, the reason being that individuals are simply less used to entrepreneurial activities when raised in communist countries.[18] Life expectancy (LEI) is also expected to have a negative impact on the for individual variables 'corrected' entrepreneurial energy. A high life expectancy can be interpreted as a proxy for security (Freytag and Vietze 2009). High security is negatively correlated with the incentive to become an entrepreneur. Finally, HEALTH can take two directions of influence: first, high social spending discourages entrepreneurs because of their high costs (negative sign), and second, high social spending can be seen as a sign of high solidarity within a country, which may then encourage individuals to take risks (positive sign). We expect the first interpretation to be more likely in European welfare states. We will not make a priori assumptions on the difference of the influence on PREFER and ACTUAL.[19]

Table 1 presents the correlations between all dependent and independent variables. We see that life expectancy as well as percentage of public and private spending for health care are lower in post communist countries and that, indeed, these two variables are positively correlated. The 'corrected' preference for entrepreneurship and the 'corrected' actual entrepreneurship show a low negative correlation. The former variable is lower in post communist countries, whereas the second is higher.

[17]The other dimensions of the 'Frazer' index are: size of government (expenditures, taxes and enterprises); legal structure and security of property rights; access to sound money; and freedom to trade internationally. They are not used in the present analysis.

[18]Consequently, this effect is expected to vanish slowly over time.

[19]From Grilo and Irigoyen (2006), Grilo and Thurik (2005a, 2006) we know that differences in the effects on the preference for entrepreneurship and actual entrepreneurship can be sizable.

Table 1 Correlation matrix

	PREFER	ACTUAL	OREF	PCD	LEI	HEALTH
PREFER	1					
ACTUAL	−0.25	1				
OREF	−0.07	−0.30	1			
PCD	−0.33	0.20	−0.22	1		
LEI	0.09	−0.14	0.01	−0.89[a]	1	
HEALTH	−0.03	−0.08	−0.17	−0.64[a]	0.71[a]	1

[a]significant at the 1% level

Table 2 The influence of some cultural variables on the preference for entrepreneurship and actual entrepreneurship in the 25 EU member states and the US

Dependent variables	PREFER (latent entrepreneurship)		ACTUAL (actual entrepreneurship)	
Exogenous variables	Coefficient	t-statistic	Coefficient	t-statistic
Constant	7.31	4.13	1.32	0.38
OREF	−0.22	−3.94	−0.12	−0.99
PCD	−0.91	−6.26	0.03	0.09
LEI	−6.54	−3.45	−0.48	−0.15
HEALTH	−0.06	−1.77	−0.00	−0.03
R-squared	0.53		0.12	
Observations	26		26	

Note: White heteroskedasticity-consistent standard errors are used

The simple linear regression results are given in Table 2 and show that while ACTUAL cannot be adequately explained by the four variables, PREFER can. All coefficients explaining the 'corrected preference' for entrepreneurship are significant at the 1% level, except for HEALTH, which is significant at the 10% level. Their signs are in line with what we expected: regulation has a negative effect on the 'corrected' preference for entrepreneurship and so has the fact that a country has a communist history. Life expectancy and percentage public and private spending for health also have a significantly negative impact on latent entrepreneurship.

We report further about four tests we performed. *First*, we leave out PCD since it correlates with LEI and HEALTH. The results show that the post-communist dummy is highly relevant; all other variables become insignificant. *Second*, we used ACTUAL in the PREFER regression and vice versa. As could be inferred from the low negative correlation between the variables they both have negative coefficients in the respective specifications with a significance below the 5% level, but their presence did not affect the (significance of the) coefficients of the other variables. *Third*, we used the general index of economic freedom instead of OREF. The results generally remain unaffected, only HEALTH becomes insignificant in the PREFER relation and obviously the R-squared drops to = 0.36. *Lastly*, we replaced PREFER and ACTUAL by the uncorrected percentages of the preference for entrepreneurship (PRE) and the actual entrepreneurship (ACT), which can be computed from Table 1 of Grilo and Thurik (2006, p. 87). The results show that

the explanation of the preference specification drops heavily from R-squared = 0.53 to = 0.30, while the coefficients of the actual specification remain insignificant.[20]

5 Conclusion

The most intriguing result of our empirical exercises is that country specific (cultural and macro-economic) variables seem to explain the preference for entrepreneurship but not actual entrepreneurship. It is tempting to assume that the actual decision is determined rather by hard economic factors such as tax rates, direct regulatory burden and the level of unemployment (Stel van et al. 2007). By contrast, the preference for self-employment can be traced back to some cultural variables.

Our analysis is confined to European countries and the US. Broadening the scope to developing and emerging economies would provide room for wider set of conclusions.

Obviously, we cannot rule out reverse causality. We have assumed and could show that cultural aspects constrain the behavior and preferences of would-be entrepreneurs. However, the question is whether or not our direction of causality is correct. It may be that the preference for self-employment has (also) an impact on the cultural setting in a country. As we cannot settle this interesting matter, we do see future research potential. Part of it is addressed in the current volume.

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[20]The correlation coefficient between PRE and ACT is positive but low (0.24) while that between PREFER and PRE is 0.91 and that between ACTUAL and ACT is 0.82.

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Chapter 9
Scenario-Based Scales Measuring Cultural Orientations of Business Owners

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Scenario-based scales measuring cultural orientations of business owners (first published in: Journal of Evolutionary Economics, Vol. 17, No. 2, 2007)

1 Introduction

Culture is manifested in practices and values of societies and organizations (Erez and Gati 2004; Hofstede 2001; House and Javidan 2004). Evolutionary economics has been concerned with the application of Darwinian thinking to economics (Aldrich 1999). Businesses need to develop dynamic capabilities to deal with their environments (Busenitz and Arthurs 2006). The development of dynamic capabilities is both enhanced and restricted by societal and organizational cultures. Freytag and Thurik (2007) have argued persuasively that culture constitutes an important construct in entrepreneurship research. Indeed, there has been a recent increase in cross-cultural studies on entrepreneurship (Hayton et al. 2002). Several good scales have been developed to measure societal culture, such as the ones by Hanges and Dickson (2004), Schwartz (1994). However, these scales should only be used if research is oriented towards the societal level of analysis. For example, these scales should be used when relating the cultural dimension of uncertainty avoidance to societal rates of business ownership (e.g., Wennekers et al. 2007). In contrast, if research is oriented towards the individual level of analysis, scales developed to measure individual cultural orientations should be used. For example, these scales should be used when studying interactions between individual business owners' cultural orientations and societal culture, such as whether business owners with high cultural orientations of fostering collectivism in their businesses have to extend more effort to develop collectivistic organizational cultures if their businesses operate in individualistic rather than in collectivistic cultures. Cultural orientations are manifested in practices and values of individuals (Chirkov et al. 2003; Erez and Gati 2004; Maznevski et al. 2002).

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We developed and validated scenario-based scales that measure cultural orientations of business owners.[1] Given their conceptual and methodological features, the scales differ from other scales commonly used in cross-cultural research: Instead of measuring culture at the aggregate level, they measure cultural orientations at the individual level, and instead of being based on Likert items, they are based on scenarios.

2 The Need for Individual-Level Measurement of Owners' Cultural Orientations

Many cross-cultural studies in entrepreneurship research have focused on individual owners (cf. the review by Hayton et al. 2002). However, instead of measuring the individual owners' cultural orientations, these studies imputed national culture scores found in other cross-cultural studies to each individual owner ("culture inferred from nationality" as Hayton et al. 2002, p.38, called it). The study by Steensma et al. (2000), which imputed Hofstede's national culture scores as individual scores, may serve as an example. Hofstede (2001) has repeatedly warned against such imputations because they involve committing ecological fallacies. They are based on the wrong assumption that all people within a nation show the same level of cultural constructs. Moreover, imputing national culture scores found in studies based on non-owners (such as the study by Hofstede which was based on managers) to owners is problematic because owners are systematically different from non-owners across cultures (McGrath and MacMillan 1992). Finally, the relationships between cultural constructs and outcome variables often differ depending on the level at which the constructs are measured (Klein et al. 1994; Hofstede 2002).

There are two approaches to dealing with these problems. The first approach is to measure cultural orientations of owners using scales developed to measure societal culture. However, this leads to problems of analysis and interpretation (Chan 1998; Klein et al. 1994). The use of aggregate-level scales at the individual level often involves losses of reliability and validity (Spector et al. 2001; Hofstede 2002). The second approach is to measure cultural orientations of owners using scales developed to measure individual cultural orientations. However, among the cultural orientation scales, we are not aware of any that are suitable for owners. Therefore, we developed cultural orientation scales that measure the practices owners apply in their businesses. We considered practices to be more relevant for studying owners than values because practices are related to behaviors (Frese 2006). Owners are commonly defined as individuals who found, own, and manage businesses (Carland et al. 1984). How owners go about managing their businesses becomes apparent in their practices (Schein 1987). The practices owners apply in their businesses provide starting points for the development of organizational cultures. Starting

[1]For simplification, 'business owners' are referred to as 'owners' in the following.

from owners' practices, organizational cultures develop as a result of the interactions between owners and their employees (Schein 1987). Thus, although owners cannot entirely determine their businesses' organizational cultures, they can substantially influence them through their practices. Owners support organizational cultures they consider conducive to business performance (Ogbonna and Harris 2000; Schein 1987). As starting points for their development, owners apply practices that may or may not be in accordance with their personality traits (Schein 1987). For example, owners who are personally low on humane orientation may nevertheless apply humane-oriented practices if they expect humane-oriented organizational cultures to foster their employees' motivation. Whereas personality traits are genetic and unalterable (Jang et al. 1996), cultural orientations are acquired and can be altered. Thus, cultural orientations can be distinguished from personality traits.

The scales measure seven cultural orientations that refer to cultural dimensions introduced by the Global Leadership and Organizational Behavior Effectiveness (GLOBE) Study (House and Javidan 2004). The cultural dimensions represent a theoretical and empirical advancement over other cultural dimensions introduced earlier in cross-cultural research. We based the scales on definitions given by Javidan et al. (2004, p. 30), but adapted the definitions to the practices owners apply in their businesses: *Uncertainty avoidance* implies that owners support reliance on "social norms, rules, and procedures" to prevent incertitude. *Power distance* means that owners promote acceptance of power being distributed unequally. *Collectivism* signifies that owners foster "collective distribution of resources and collective action" (*institutional collectivism*) as well as family "loyalty and cohesiveness" (*in-group collectivism*). *Assertiveness* implies that owners support confrontation and aggressiveness. *Future orientation* signifies that owners foster "delaying gratification, planning, and investing in the future." *Humane orientation* means that owners promote fairness, altruism, generosity, care, and kindness. *Performance orientation* implies that owners support striving for "performance improvement and excellence".[2]

Cultural orientations have an important function for how businesses are managed. The function of cultural orientations is similar to the importance of organizational cultures for business performance (O'Reilly and Chatman 1966). For example, if owners support uncertainty avoidance, there is little support for risk taking. Provided that risk taking is crucial for business performance, owners' support for uncertainty avoidance may reduce business performance. We do not assume that there are one-to-one relationships between owners' cultural orientations and business performance. Rather, we assume with Tung et al. (2006) that there are interactions. For example, owners' support for uncertainty avoidance may

[2]*Gender egalitarianism*, another cultural dimension introduced by the GLOBE Study (House and Javidan 2004), means that owners promote gender equality (Javidan et al. 2004, p. 30). We disregarded this cultural dimension because we were not concerned with gender issues. However, to provide complete scales, we are currently developing and validating a scale measuring gender egalitarianism. The scale can be received upon request.

reduce business performance if their businesses operate in high-tech environments with many competitors and therefore need to take risks to achieve their goals.

The development and the validation of the scales were embedded in a study on Chinese and German owners. This enabled us to ascertain whether the scales are suitable for both Chinese and German owners and whether they allow for meaningful comparisons across China and Germany. The two cultures are quite different (Hofstede 2001; Javidan et al. 2004). If we succeeded in demonstrating the scales' suitability for Chinese and German owners, we could be optimistic that the scales would also be suitable for owners from other cultures and would allow for meaningful comparisons across cultures beyond China and Germany.

3 Scenario-Based Measurement

Cross-cultural scholars have recently suggested that culture and cultural orientations should be measured using scales based on scenarios rather than using scales based on Likert items (Heine et al. 2001; Heine et al. 2002; Kitayama 2002; Peng et al. 1997). Likert items and scenarios differ in the measurement of culture and cultural orientations (Peng et al. 1997): Likert items consist of general abstract statements, such as *I care for my family members*, and standardized scale responses, such as *strongly agree* or *strongly disagree*. Hence, Likert items measure culture and cultural orientations via people's self-evaluations on general abstract statements. In contrast, scenarios consist of concrete social situations, such as *Your poorly qualified nephew asks you to employ him in your business*, and behavioral options, such as *You employ your poorly qualified nephew* or *You don't employ your poorly qualified nephew*. Hence, scenarios measure culture and cultural orientations via people's behavioral preferences in concrete social situations.

Scales based on Likert items tend to hold lower cross-cultural validity than scales based on scenarios, which means that they tend to allow for less meaningful cross-cultural comparisons (Peng et al. 1997). The cross-cultural validity of scales based on Likert items has been challenged for two main reasons. First, Likert items are more likely to be interpreted differently by people from different cultures than scenarios because general abstract statements and standardized scale responses offer a wider scope of interpretation than concrete social situations and behavioral options (Kitayama 2002; Peng et al. 1997). For example, Chinese and German owners are more likely to differ in their interpretations of what it means to care for one's family members than in their interpretations of what it signifies to be asked by one's poorly qualified nephew to employ him in one's business. Also, Chinese and German owners are more likely to differ in their interpretations of what it means to 'strongly agree' or to 'strongly disagree' than of what it signifies to employ or not employ one's poorly qualified nephew. Different interpretations threaten the validity of cross-cultural comparisons (Kitayama 2002; Peng et al. 1997).

Second, Likert items are more affected by the reference group effect than scenarios (Heine et al. 2001; Peng et al. 1997). The reference group effect occurs

when people have to refer to the standards of their reference groups (Heine et al. 2002). Likert items are affected by the reference group effect because people have to refer to the standards of their reference groups to give their self-evaluations on general abstract statements (Biernat et al. 1991). For example, to tell how much they care for their family members, owners have to consider how much other owners care for their family members. Scenarios are less affected by the reference group effect because people do not have to refer to the standards of their reference groups to give their behavioral preferences in concrete social situations (Peng et al. 1997). For example, to tell whether or not they prefer to employ their poorly qualified nephews, owners do not have to consider whether or not other owners prefer to employ their poorly qualified nephews. The reference group effect occurs because people from different cultures have different reference groups that may differ in their standards (Heine et al. 2002). For example, Chinese owners refer to other Chinese owners, whereas German owners refer to other German owners. If Chinese owners generally care more for their family members than German owners, Chinese owners evaluate themselves with higher standards than German owners. Different standards threaten the validity of cross-cultural comparisons (Heine et al. 2002; Peng et al. 1997).

In addition to these cross-cultural issues, scales based on Likert items tend to hold lower construct validity than scales based on scenarios, which means that they tend to allow for less accurate descriptions and predictions of behaviors (Peng et al. 1997). The construct validity of scales based on Likert items has been challenged because people's self-evaluations on general abstract statements less accurately describe and predict their behaviors than people's behavioral preferences in concrete social situations (Chan and Schmitt 1997; Motowidlo et al. 1990). For example, owners' self-evaluations on how much they care for their family members less accurately describe and predict the active support they provide to them than owners' preferences on whether or not to employ their poorly qualified nephews.

As we wanted the cultural orientation scales to hold cross-cultural validity and construct validity, we based them on scenarios rather than on Likert items. However, this involved potential loss of reliability in terms of coefficient alpha (Cronbach 1951) and composite reliability, a reliability estimate used in structural equation modeling (Fornell and Larcker 1981). Coefficient alpha and composite reliability estimate internal consistency. Scales based on scenarios tend to show lower internal consistencies than scales based on Likert items (Chan and Schmitt 1997; Motowidlo et al. 1990). Consisting of concrete social situations and behavioral options, scenarios capture more situational and behavioral aspects than Likert items that consist of general abstract statements and standardized scale responses. Therefore, scenarios have higher specific variances that result in lower intercorrelations. We accepted potential loss of reliability in terms of coefficient alpha and composite reliability because we considered it outweighed by the superior cross-cultural validity and construct validity held by scales based on scenarios. Moreover, there is an alternative to coefficient alpha and composite reliability, and that is test-retest reliability. Test-retest reliability is assumed to be a more appropriate reliability estimate for scales based on scenarios because it does not estimate internal consistency (Chan and Schmitt 1997; Motowidlo et al. 1990).

4 Cross-Cultural Validity

The cultural orientation scales are useful for scholars in cross-cultural research if they hold cross-cultural validity and thus allow for meaningful comparisons across cultures. In particular, the scales must enable scholars to meaningfully compare the means of the seven cultural orientations as well as the relationships between them. Five forms of invariance should be supported for the scales (Steenkamp and Baumgartner 1998; Vandenberg and Lance 2000):

Configural invariance implies that a measure holds an equal configuration of factors and indicators across cultures. The same indicators load on the same factors. Given configural invariance, scholars can compare constructs across cultures because the constructs have the same meaning. Configural invariance provides the basis for all other forms of invariance (Horn and McArdle 1992). *Metric invariance* means that the indicators have equal factor loadings across cultures. *Scalar invariance* signifies that the indicators do not only have equal factor loadings but also equal intercepts across cultures. Given metric and scalar invariance, scholars can conduct meaningful cross-cultural comparisons of observed and latent construct means (Horn and McArdle 1992; Meredith 1993). *Factor variance invariance* implies that the factors have equal variances across cultures. Given metric and factor variance invariance, scholars can conduct meaningful cross-cultural comparisons of relationships between constructs (Schmitt 1982; Steenkamp and Baumgartner 1998). *Error variance invariance* means that the indicators hold equal error variances across cultures. Given metric, factor variance, and error variance invariance, a measure is equally reliable across cultures (Steenkamp and Baumgartner 1998).

Configural, metric, scalar, and error variance invariance are forms of measurement invariance, which concerns the relationships between the factors and the indicators. Factor variance invariance is a form of structural invariance, which concerns the factors themselves (Byrne et al. 1989).

In contrast to full invariance, partial invariance signifies that some, but not all, parameters are equal across cultures (Reise et al. 1993). Partial invariance is more likely to be supported in cross-cultural research than full invariance (Steenkamp and Baumgartner 1998). Fortunately, partial invariance hardly affects the meaningfulness of cross-cultural comparisons. Provided that metric and scalar invariance are partially given, construct means can still be meaningfully compared across cultures (Byrne et al. 1989). Provided that metric and factor variance invariance are partially given, relationships between constructs with equal variances can still be meaningfully compared across cultures (Byrne et al. 1989).

5 Construct Validity

We established a nomological net (Cronbach and Meehl 1955) in which we related the seven cultural orientations to other constructs that are theoretically associated with them. Among the constructs covered in the study, we considered nine constructs to be appropriate validation constructs for the seven cultural orientations:

1. *Achievement striving* implies that owners work hard to achieve their goals (McClelland 1961).
2. *Deliberation* means that owners carefully consider their decisions (Costa and McCrae 1992).
3. *Error communication* signifies that owners turn to their employees if they have made errors (Rybowiak et al. 1999).
4. *Meta-cognitive activity* implies that owners plan, monitor, and revise their performance (Rybowiak et al. 1999; Schmidt and Ford 2003).
5. *Task-oriented personal initiative* means that owners take proactive and self-starting approaches to seizing opportunities and preparing for challenges (Frese et al. 1996).
6. *Relationship-oriented personal initiative* signifies that owners take proactive and self-starting approaches to improving and expanding their business relationships (Zhao et al. 2005).
7. *Social satisfaction* implies that owners are satisfied with the social relationships they have with their employees.
8. Number of co-owners who are actively involved in the management of the business.
9. Number of family members who work in the business.

We made the hypotheses that uncertainty avoidance is negatively related to task-oriented and to relationship-oriented personal initiative. Taking proactive and self-starting approaches to seizing opportunities and preparing for challenges or to improving and extending business relationships brings about changes and therefore increases uncertainty. Thus, task-oriented and relationship-oriented personal initiative require willingness to take risks (Fay and Frese 2001; Frese et al. 1997). Owners who consider it beneficial to rely on social norms, rules, and procedures to prevent incertitude should be unwilling to take risks. This renders them unlikely to show task-oriented and relationship-oriented personal initiative.

We hypothesized a negative relationship between power distance and error communication. To turn to their employees if they have made errors, owners must be ready to acknowledge fallibility (Rybowiak et al. 1999; Hofstede 1984). Owners who deem it advantageous that their employees accept power being distributed unequally should be interested in demonstrating infallibility to assert their superior positions. Therefore, they are unlikely to communicate their errors.

We made the hypotheses that institutional collectivism is positively related to the number of co-owners who are actively involved in the management of the business, and that in-group collectivism is positively related to the number of family members who work in the business. Owners who consider it beneficial to act collectively are likely to join with others in managing their businesses, whereas owners who deem it advantageous to be loyal and cohesive within families are likely to employ their family members (Van Steekelenburg et al. 2000; Hofstede 1984).

We hypothesized negative relationships between assertiveness and deliberation as well as between assertiveness and meta-cognitive activity. Carefully considering decisions and planning, monitoring, and revising performance imply cautiousness and forethought (Costa and McCrae 1992; Schmidt and Ford 2003). Owners who

deem it advantageous to be confrontative and aggressive should be rather impulsive. Therefore, they are unlikely to show deliberation and meta-cognitive activity.

We made the hypothesis that future orientation is positively related to achievement striving. Owners who consider it beneficial to delay gratification and to invest in the future are likely to work hard to achieve their goals (McClelland 1961). Moreover, we made the hypotheses that future orientation is positively related to deliberation and to meta-cognitive activity. Carefully considering decisions and planning, monitoring, and revising performance reflect planful action (Costa and McCrae 1992; Schmidt and Ford 2003). Owners who deem it advantageous to plan should act planfully. This renders them likely to show deliberation and meta-cognitive activity.

We hypothesized positive relationships between humane orientation and error communication as well as between humane orientation and social satisfaction. To turn to their employees if they have made errors and to be satisfied with the social relationships they have with their employees, owners must perceive these relationships as trusting and compassionate (Rybowiak et al. 1999; Hofstede 1984). Given that fairness, altruism, generosity, care, and kindness enhance mutual trust and compassion, owners who promote these qualities should perceive their relationships with their employees as trusting and compassionate. Therefore, they are likely to communicate their errors and to be socially satisfied.

We made the hypothesis that performance orientation is positively related to achievement striving. Owners who consider it beneficial to strive for excellence are likely to work hard to achieve their goals (McClelland 1961). Moreover, we hypothesized a positive relationship between performance orientation and meta-cognitive activity. Owners who deem it advantageous to strive for performance improvement are likely to plan, monitor, and revise their performance (Schmidt and Ford 2003). Finally, we made the hypotheses that performance orientation is positively related to task-oriented and to relationship-oriented personal initiative. Taking proactive and self-starting approaches to seizing opportunities and preparing for challenges or to improving and extending business relationships enhances business performance (Frese et al. 2000; Koop et al. 2000). Owners who support striving for performance improvement and excellence should be interested in enhancing business success. This renders them likely to show task-oriented and relationship-oriented personal initiative.

6 Method

6.1 Development

Following a parallel approach (Harkness et al. 2003), we developed the cultural orientation scales in a team of Chinese and German scholars. We combined our expertise to make sure that the scales were suitable for both Chinese and German owners. We developed the scales in English. The translations into Chinese and German were produced and checked by competent bilinguals.

We created scenarios that consist of social situations and behavioral options. The social situations describe problems owners may encounter in their businesses. They all begin with *Imagine that . . .* and end with *What do you do?* Each social situation represents one of the seven cultural orientations. For example, the problem whether or not to employ one's poorly qualified nephew represents in-group collectivism. The behavioral options describe behaviors owners may show to solve the problems. They all begin with *You . . .*. Two behavioral options follow each social situation. The first option represents a low score on the cultural orientation, whereas the second option represents a high score. For example, not employing one's poorly qualified nephew represents low in-group collectivism, whereas employing him represents high in-group collectivism. Between the two behavioral options, there are two mirror-inverted three-point scales that are directed towards the first and the second option, respectively. The two scales range from *somewhat true of me* (3/4) over *very true of me* (2/5) to *extremely true of me* (1/6). The scenario from which the examples are taken is presented in the Appendix (scenario 'C 7').

To complete the scales, owners have to make themselves aware of how they generally behave in their businesses. Going through the scenarios, they have to make mental simulations of their behaviors in the social situations. For each social situation, they have to decide which of the two behavioral options applies more to them. They can indicate their decision by ticking a point on the respective three-point scale.

In a pilot study, we tested the scenarios on 100 Chinese and German business students. Based on the data obtained from the business students, we conducted exploratory factor analyses to judge whether the scenarios appropriately measured the seven cultural orientations. Judging them as appropriate, we included all those scenarios in the scales that had high factor loadings on the seven cultural orientations. At the end of their development, the scales comprised 40 scenarios. Institutional collectivism and in-group collectivism were each assessed by three scenarios. Uncertainty avoidance and power distance were each measured by five scenarios, whereas assertiveness, future orientation, humane orientation, and performance orientation were each assessed by six scenarios.

6.2 Participants and Procedure

We used a random sample of Chinese and German businesses. To participate in the study, Chinese and German owners had to meet two criteria. First, the owners had to own (with shares of at least 10%) and manage their businesses. However, they did not necessarily have to have founded them. We established this criterion because we defined owners as individuals who own and manage businesses that they may or may not have founded. Compared to common definitions that equally emphasize founding, ownership, and management (Carland et al. 1984), our definition places less emphasis on founding. Owners shape their businesses not only through founding but also through owning and managing them (Schein 1987). Owners who have not founded but purchased or inherited their businesses may still substantially

influence their businesses' organizational cultures. Second, the owners had to have at least one employee. We established this criterion because there is a qualitative difference between owners who work alone and owners who have employees. The step towards having employees implies a change in self-perception, responsibility, and managerial demands (Frese and de Kruif 2000). To be able to control for industry effects, we restricted participation to owners whose businesses belonged to one of four industries, namely information technology, hotel and catering, automobile, and construction.

We searched for participants in Zhejiang, a region in eastern China, and Hesse, a region in western Germany. As a first strategy, we used yellow pages as well as lists provided by the Chinese local government and the German chamber of commerce. As a second strategy, we relied on personal contacts and recommendations. The first strategy was more effective in Germany, whereas the second strategy was more effective in China.

Of the 464 owners who met the two criteria in China, 269 (58%) participated in the study. Of the 709 owners who met the two criteria in Germany, 302 (43%) participated in the study. After having interviewed the owners, we asked them to complete a questionnaire that included the cultural orientation scales. Of the 571 owners who participated in the study, 461 (81%) completed the questionnaire. They served as participants for the validation of the scales. Among them were 260 Chinese (56%) and 201 Germans (44%). Most of the Chinese and the German owners did not only own and manage their businesses but had also founded them (82%, $n = 213$, and 68%, $n = 137$, respectively). The Chinese owners had 198 employees on average. Their businesses belonged mostly to the automobile industry (33%, $n = 85$), followed by the hotel and catering industry (26%, $n = 68$), the information technology industry (21%, $n = 56$), and the construction industry (20%, $n = 51$). The German owners had 12 employees on average. Their businesses belonged mostly to the construction industry (41%, $n = 82$), followed by the information technology industry (23%, $n = 47$), the hotel and catering industry (21%, $n = 43$), and the automobile industry (15%, $n = 30$).

Six months after they had completed the scales for the first time, we asked 25 German owners to complete them a second time. The 22 German owners (88%) who agreed to do so served as participants for the assessment of the scales' test-retest reliabilities. The sub-sample was representative of the German sample.

6.3 Measures

Apart from the cultural orientation scales, the questionnaire included scales and single items that measured the validation constructs:[3] Achievement striving and

[3]The composite reliabilities of the scales measuring the validation constructs could only be assessed through specifying and estimating models. Therefore, they are presented in the result section.

deliberation were each assessed by two items developed by Costa and McCrae (1992). Sample items were *I work hard to accomplish my goals* and *I think things through before coming to a decision*, respectively. The items were rated on five-point scales ranging from *strongly disagree* (1) to *strongly agree* (5). Error communication was measured by four items adapted from Rybowiak et al. (1999). A sample item was *If I cannot rectify an error by myself, I turn to my employees*. The items were rated on five-point scales ranging from *does not apply at all* (1) to *applies completely* (5). Meta-cognitive activity was assessed by ten items adapted from Schmidt and Ford (2003). A sample item was *I think about what skills need the most practice*. The items were rated on five-point scales ranging from *strongly disagree* (1) to *strongly agree* (5). Task-oriented personal initiative was measured by seven items developed by Frese et al. (1997), whereas relationship-oriented personal initiative was assessed by seven items developed by Frese et al. (2005). Sample items were *I actively attack problems* and *I actively seek to improve my business relationships*, respectively. The items were rated on five-point scales ranging from *does not apply at all* (1) to *applies completely* (5). Social satisfaction was measured by a single item (*How satisfied are you with your social relationships with your employees?*). The item was rated on a seven-point scale ranging from *very unsatisfied* (1) to *very satisfied* (7). The number of co-owners who are actively involved in the management of the business and the number of family members who work in the business were each assessed by a single item.

6.4 Cross-Cultural Validation

To ascertain whether the cultural orientation scales hold cross-cultural validity, we tested configural, metric, scalar, factor variance, and error variance invariance. We specified a model of configural invariance in which we restricted the configuration of the seven cultural orientations and their scenarios to be equal across the Chinese and the German samples. The model of configural invariance comprised the scenarios that appropriately measured the seven cultural orientations. We included all those scenarios in the model that had high factor loadings and low modification indices. We assigned scales and origins to the seven cultural orientations by setting the factor loading of one scenario per cultural orientation to one and fixing its intercept to zero.

Starting from the model of configural invariance, we specified nested models of metric, scalar, factor variance, and error variance invariance. In the nested models, we successively constrained the factor loadings and intercepts of the scenarios, the variances of the seven cultural orientations, as well as the error variances of the scenarios, to be equal across the Chinese and the German samples. We estimated the models by conducting multi-group confirmatory factor analyses. We used LISREL 8 (Jöreskog and Sörbom 1993) and maximum likelihood estimation method on the basis of variance-covariance matrices and mean vectors. To evaluate model fit, we relied on the chi-square test (Jöreskog 1971) along with the root mean

square error of approximation (RMSEA; Browne and Cudeck 1993) and the comparative fit index (CFI; Bentler 1990). We interpreted RMSEA values below 0.060 and CFI values close to 0.95 as good model fit (Hu and Bentler 1999). To compare two nested models, we relied on the chi-square difference test (Bollen 1989). Given a non-significant increase in chi-square between the less and the more constrained model, full invariance was supported. Given a significant increase in chi-square between the less and the more constrained model, we investigated whether partial invariance was supported. We examined modification indices and relaxed the equality constraint for those parameters that were unequal across the Chinese and the German samples.

We assessed the scales' composite reliabilities in the Chinese and the German samples. Moreover, we assessed their test-retest reliabilities in the German subsample.

6.5 Construct Validation

To ascertain whether the cultural orientation scales hold construct validity, we assessed the relationships between the seven cultural orientations and their validation constructs. We specified a model of configural invariance in which we restricted the configuration of the seven cultural orientations and their scenarios as well as the configuration of the nine validation constructs and their items to be equal across the Chinese and the German samples. Apart from the scenarios that appropriately measured the seven cultural orientations, the model of configural invariance comprised the items that appropriately measured the nine validation constructs. We included all those items in the model that had high factor loadings and low modification indices. We assigned scales and origins to the nine validation constructs by setting the factor loading of one item per validation construct to one and fixing its intercept to zero.

The model of configural invariance provided the relationships between the seven cultural orientations and their validation constructs. To ascertain whether the relationships could be meaningfully compared across the Chinese and the German samples, we tested not only configural invariance but also metric and factor variance invariance. Starting from the model of configural invariance, we specified nested models of metric and factor variance invariance. In the nested models, we successively constrained the factor loadings of the scenarios and the items, as well as the variances of the seven cultural orientations and the nine validation constructs, to be equal across the Chinese and the German samples. We estimated the models by conducting multi-group confirmatory factor analyses. To determine the significance of the difference between two correlation coefficients, we used the Fisher r-to-z transformation.

We assessed the composite reliabilities of the scales measuring the validation constructs. The assessment was made in the Chinese and the German samples.

7 Results

7.1 Cross-Cultural Validity

The results obtained in the tests of configural, metric, scalar, factor variance, and error variance invariance are presented in Table 1.

The model of configural invariance (Model A) comprised 23 scenarios that appropriately measured the seven cultural orientations. In-group collectivism was assessed by two scenarios.[4] Uncertainty avoidance, assertiveness, future orientation, and performance orientation were each measured by three scenarios. Humane orientation and power distance were assessed by four and five scenarios, respectively. The model of configural invariance provided adequate fit ($\chi^2(418) = 603.45$; RMSEA = 0.044; CFI = 0.94). Hence, configural invariance was supported. Given configural invariance, the seven cultural orientations can be meaningfully compared across the Chinese and the German samples.

In the model of full metric invariance (Model B), the factor loadings of the scenarios were constrained to be equal across the Chinese and the German samples; they are presented in Table 2. The increase in chi-square between the model of configural invariance (Model A) and the model of full metric invariance (Model B) was not significant ($\Delta\chi^2(16) = 24.82$, $p > 0.05$), and the latter model achieved adequate fit ($\chi^2(434) = 628.26$; RMSEA = 0.044; CFI = 0.93). Hence, full metric invariance was supported for each of the seven cultural orientations.

In the model of full scalar invariance (Model C), the intercepts of the scenarios were restricted to be equal across the Chinese and the German samples; they are presented in Table 2. The increase in chi-square between the model of full metric

Table 1 Tests of configural, metric, scalar, factor variance, and error variance invariance

	Models	Comparisons	χ^2 (df)	$\Delta\chi^2$ (Δdf)	RMSEA	CFI
A	Configural invariance	–	603.45 (418)**	–	0.044	0.94
B	Full metric invariance	A vs. B	628.26 (434)**	24.82 (16) $^{n.s.}$	0.044	0.93
C	Full scalar invariance	B vs. C	702.87 (450)**	74.61 (16)**	0.050	0.91
D	Partial scalar invariance	B vs. D	641.92 (446)**	13.66 (12)$^{n.s.}$	0.044	0.93
E	Full factor variance invariance	D vs. E	668.22 (453)**	26.30 (7)**	0.046	0.93
F	Partial factor variance invariance	D vs. F	646.71 (451)**	4.79 (6)$^{n.s.}$	0.044	0.93
G	Full error variance invariance	F vs. G	889.87 (474)**	263.16 (23)**	0.062	0.86
H	Partial error variance invariance	F vs. H	664.85 (463)**	18.14 (12)$^{n.s.}$	0.044	0.93

Note: * = $p < 0.05$, ** = $p < 0.01$

[4]Due to low factor loadings and high modification indices, the scenarios created to assess institutional collectivism turned out to be inappropriate. Therefore, they were not comprised in the model of configural invariance.

Table 2 Variances of the cultural orientations as well as factor loadings, intercepts, and error variances of the scenarios

Cultural orientations (variances)	Scenarios	Factor loadings (unstandardized)	Factor loadings (standardized)	Intercepts	Error variances
Uncertainty avoidance (0.40/0.19)	UA1	1.00	0.50	0.00	1.29/0.44
	UA2	1.22	0.54	−0.23	1.10
	UA6	1.20	0.60	0.38	0.80
Power distance (0.62)	PD1	0.87	0.50	1.05/0.64	1.71/1.09
	PD2	0.91	0.58	0.75/0.22	1.28/0.70
	PD3	1.00	0.77	0.00	0.42
	PD4	0.95	0.65	0.37	0.80
	PD6	0.85	0.52	0.69	1.23
In-group collectivism (0.42)	C5	1.00	0.52	0.00	1.16
	C7	0.87	0.53	−0.22	0.82
Assertiveness (0.38/0.21)	A3	1.09	0.75	−0.71/ −0.39	0.28
	A5	1.00	0.54	0.00	0.93/0.46
	A6	1.35	0.70	−0.91	0.86/0.16
Future orientation (0.28)	FO2	1.00	0.47	0.00	1.02
	FO4	1.15	0.52	−0.81	1.29/0.69
	FO6	1.30	0.69	−1.26	0.56
Humane orientation (0.43)	HO1	1.00	0.62	0.00	0.68
	HO3	0.74	0.56	1.40	0.59/0.39
	HO4	0.88	0.59	0.66/0.34	0.62
	HO6	0.96	0.59	0.24	0.90/0.54
Performance orientation (0.37)	PO2	1.00	0.45	0.00	2.09/0.72
	PO3	0.82	0.54	1.52	0.75/0.45
	PO5	0.77	0.32	0.09	2.54/1.33

Note: In cases of unequal variances, factor loadings, intercepts, and error variances across the Chinese and the German samples, two values are given. The first value refers to the Chinese sample, whereas the second value refers to the German sample

invariance (Model B) and the model of full scalar invariance (Model C) was highly significant ($\Delta\chi^2(16) = 74.61$, $p < 0.01$). Full scalar invariance was thus not supported for each of the seven cultural orientations. Examination of the modification indices revealed that the significant increase in chi-square was due to unequal intercepts of two scenarios measuring power distance, one scenario measuring assertiveness, and one scenario measuring humane orientation. The intercepts of the three scenarios measuring power distance and humane orientation were higher in the Chinese sample, which means that, regarding these three scenarios, the Chinese owners ticked higher scale points. The intercept of the scenario measuring assertiveness was higher in the German sample, which means that, regarding this scenario, the German owners ticked higher scale points. In the model of partial scalar invariance (Model D), we relaxed the equality restriction for the unequal intercepts. The increase in chi-square between the model of full metric invariance (Model B) and the model of partial scalar invariance (Model D) was not significant ($\Delta\chi^2(12) = 13.66$, $p > 0.05$), and the latter model achieved adequate fit ($\chi^2(446) = 641.92$; RMSEA = 0.044; CFI = 0.93). Hence, full scalar invariance

was supported for uncertainty avoidance, in-group collectivism, future orientation, performance orientation, whereas partial scalar invariance was supported for power distance, assertiveness, and humane orientation. Given full metric and partial scalar invariance, the observed and latent means of the seven cultural orientations can be meaningfully compared across the Chinese and the German samples.

In the model of full factor variance invariance (Model E), the variances of the seven cultural orientations were constrained to be equal across the Chinese and the German samples; they are presented in Table 2. The increase in chi-square between the model of partial scalar invariance (Model D) and the model of full factor variance invariance (Model E) was highly significant ($\Delta\chi^2(7) = 26.30$, $p < 0.01$). Full factor variance invariance was thus not supported. Examination of the modification indices revealed that the significant increase in chi-square was due to unequal variances of uncertainty avoidance and assertiveness. They were higher in the Chinese than in the German sample, which means that, regarding these two cultural orientations, the Chinese owners were more heterogeneous than the German owners. In the model of partial factor variance invariance (Model F), we relaxed the equality constraint for the unequal variances. The increase in chi-square between the model of partial scalar invariance (Model D) and the model of partial factor variance invariance (Model F) was not significant ($\Delta\chi^2(6) = 4.79$, $p > 0.05$), and the latter model provided adequate fit ($\chi^2(451) = 646.71$; RMSEA $= 0.044$; CFI $= 0.93$). Because most, but not all, variances were equal across the Chinese and the German samples, partial factor variance invariance was supported. Given full metric and partial factor variance invariance, the relationships between power distance, in-group collectivism, future orientation, humane orientation, and performance orientation can be meaningfully compared across the Chinese and the German samples. The relationships involving uncertainty avoidance and assertiveness should be compared with caution.

In the model of full error variance invariance (Model G), the error variances of the scenarios were restricted to be equal across the Chinese and the German samples; they are presented in Table 2. The increase in chi-square between the model of partial factor variance invariance (Model F) and the model of full error variance invariance (Model G) was highly significant ($\Delta\chi^2(23) = 263.16$, $p < 0.01$). Full error variance invariance was thus not supported for each of the seven cultural orientations. Examination of the modification indices revealed that the significant increase in chi-square was due to unequal error variances of eleven scenarios measuring uncertainty avoidance, power distance, assertiveness, future orientation, humane orientation, and performance orientation. They were higher in the Chinese than in the German sample, which means that, regarding these eleven scenarios, the Chinese owners produced lager variances due to measurement error than the German owners. In the model of partial error variance invariance (Model H), we relaxed the equality restriction for the unequal error variances. The increase in chi-square between the model of partial factor variance invariance (Model F) and the model of partial error variance invariance (Model H) was not significant ($\Delta\chi^2(12) = 18.14, p > 0.05$), and the latter model achieved adequate fit ($\chi^2(463) = 664.85$; RMSEA $= 0.044$; CFI $= 0.93$). Hence, full error variance

Table 3 Reliabilities of the scales measuring the cultural orientations and the validation constructs

Cultural orientations/validation constructs	Composite reliabilities		Test-retest reliabilities
	China	Germany	Germany
Uncertainty avoidance	0.60	0.46	0.74
Power distance	0.73	0.77	0.78
In-group collectivism	0.43	0.43	0.78
Assertiveness	0.70	0.74	0.76
Future orientation	0.56	0.61	0.74
Humane orientation	0.66	0.71	0.73
Performance orientation	0.35	0.53	0.75
Achievement striving	0.70	0.66	–
Deliberation	0.55	0.56	–
Error communication	0.69	0.75	–
Meta-cognitive activity	0.75	0.75	–
Task-oriented personal initiative	0.75	0.69	–
Relationship-oriented personal initiative	0.81	0.77	–

Note: Composite reliability is defined as the quotient between the added squared standardized factor loadings and the sum of the added squared standardized factor loadings and the added error variances Fornell and Larcker (1981)

invariance was supported for in-group collectivism, whereas partial error variance was supported for uncertainty avoidance, power distance, assertiveness, future orientation, humane orientation, and performance orientation.

The cultural orientation scales are presented in the Appendix. The scales' composite reliabilities in the Chinese and the German samples are presented in Table 3. The scale measuring uncertainty avoidance showed higher composite reliability in the Chinese sample, whereas the scales measuring power distance, assertiveness, future orientation, humane orientation, and performance orientation displayed higher composite reliabilities in the German sample. Only the scale measuring in-group collectivism showed equal composite reliability across the Chinese and the German samples. This is due to the fact that in-group collectivism is the only cultural orientation for which both full metric and full error variance invariance are given and that, at the same time, has equal factor variances across the Chinese and the German samples. The scales' test-retest reliabilities in the German sub-sample are also presented in Table 3. Each of the scales displayed higher test-retest reliability than composite reliability. This supports the assumption that test-retest reliability is a more appropriate reliability estimate for scales based on scenarios than composite reliability (Chan and Schmitt 1997; Motowidlo et al. 1990).

7.2 Construct Validity

The relationships between the seven cultural orientations and their validation constructs are presented in Table 4. The relationships were provided by the model of configural invariance.

Table 4 Relationships between the latent cultural orientations and the latent validation constructs

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
01	Uncertainty avoidance		0.34**	−0.04	0.32*	−0.20	−0.33**	−0.01	−0.28*	−0.02	0.06	−0.09	−0.22*	−0.45**	−0.09	0.11	−0.13
02	Power distance	0.54**		0.64**	0.62**	−0.50**	−0.53**	−0.39**	−0.23**	−0.36**	−0.19**	−0.10	−0.07	−0.11	−0.16*	0.01	0.02
03	In-group collectivism	0.24*	0.13		0.70**	−0.50**	−0.63**	−0.60**	−0.32**	−0.30*	−0.29**	−0.31**	−0.17	−0.07	−0.14	−0.02	0.19*
04	Assertiveness	0.18*	0.11	0.21*		−0.28*	−0.27**	−0.31*	−0.24*	−0.30**	−0.01	−26**	−0.17	−0.14	0.02	0.02	0.02
05	Future orientation	−0.48**	−0.41**	−0.40**	−0.23**		0.72**	0.58**	0.31**	0.40**	0.14	0.25**	0.15	0.24*	0.18*	0.02	0.11
06	Humane orientation	−0.38**	−0.53**	0.06	−0.40**	0.39**		0.62**	0.36**	0.40**	0.22**	0.39**	0.28**	0.15	0.19**	−0.10	−0.02
07	Performance orientation	−0.26*	0.09	−0.57**	−0.21*	0.33**	0.07		0.42**	0.42**	0.14	0.35**	0.39**	0.28*	0.26*	0.23	0.08
08	Achievement striving	−0.17	−0.06	−0.21	−0.07	0.13	0.13	0.52**		0.74**	0.27**	0.72**	0.66**	0.51**	0.23**	0.21*	0.00
09	Deliberation	−0.08	−0.09	−0.01	−0.18*	0.12	0.16	0.04	0.36**		0.14	0.60**	0.67**	0.45**	0.26**	0.14	−0.02
10	Error communication	−0.17*	−0.50**	−0.05	−0.11	0.08	0.25**	−0.25**	0.07	0.06		0.24**	0.18*	0.31**	0.23**	0.01	0.02
11	Meta-cognitive activity	−0.05	0.04	−0.20	−0.16*	0.16*	0.11	0.19*	0.33**	0.31**	−0.02		0.77**	0.51**	0.15*	0.14	−0.08
12	Task-oriented PI	−0.22**	−0.13	−0.21	−0.10	0.10	0.09	0.21*	0.59**	0.20	0.13	0.32**		0.66**	0.17*	0.21*	0.03
13	Relationship-oriented PI	−0.14	−0.06	−0.31*	−0.10	0.14	0.07	0.35**	0.49**	0.16	0.08	0.33**	0.50**		0.20**	0.21*	0.06
14	Social satisfaction	−0.10	−0.12	−0.03	−0.05	−0.07	0.14	−0.11	0.07	0.04	0.18**	0.07	0.04	−0.02		0.05	0.05
15	Number of co-owners	0.01	0.01	0.00	0.09	−0.12	−0.10	−0.02	−0.02	−0.00	−0.01	−0.02	0.05	0.04	0.05		−0.10
16	Number of family members	−0.01	−0.00	0.00	−0.00	0.01	0.00	−0.00	0.01	−0.00	0.00	0.01*	0.01	0.01	0.00	−0.00	

Note: * = $p < 0.05$, ** = $p < 0.01$. The values above the diagonal refer to the Chinese sample, whereas the values below the diagonal refer to the German sample

Apart from the 23 scenarios that appropriately measured the seven cultural orientations, the model of configural invariance comprised 19 items that appropriately measured the nine validation constructs. Social satisfaction, the number of co-owners who are actively involved in the management of the business, and the number of family members who work in the business were each assessed by one item. Achievement striving, deliberation, and error communication were each measured by two items. Meta-cognitive activity and task-oriented personal initiative were each assessed by three items. Relationship-oriented personal initiative was measured by four items.

The models of configural, full metric, and partial factor variance invariance achieved adequate fits.[5] Hence, configural, full metric, and partial factor variance invariance were supported. Given configural invariance, the seven cultural orientations and the nine validation constructs can be meaningfully compared across the Chinese and the German samples. Given full metric and partial factor variance invariance, the relationships between five of the seven cultural orientations and seven of the nine validation constructs can be meaningfully compared across the Chinese and the German samples. The relationships involving uncertainty avoidance and assertiveness as well as the number of co-owners who are actively involved in the management of the business and the number of family members who work in the business should be compared with caution. The composite reliabilities of the scales measuring the validation constructs are presented in Table 3.

The correlations between uncertainty avoidance and its two validation constructs were consistent with our hypotheses. Uncertainty avoidance was negatively correlated to task-oriented personal initiative (r=−0.22, $p < 0.05$/r=−0.22, $p < 0.01$)[6] and to relationship-oriented personal initiative ($r = -0.45$, $p < 0.01$/$r = -0.14$, $p > 0.05$). The more Chinese and German owners support uncertainty avoidance, the less they show task-oriented and relationship-oriented personal initiative. The negative correlation between uncertainty avoidance and relationship-oriented personal initiative was significantly higher in the Chinese sample ($z = -3.64$, $p < 0.01$). In China, business relationships may be more delicate to handle and therefore may require more willingness to take risks than in Germany. This could explain why Chinese owners who support uncertainty avoidance show even less relationship-oriented personal initiative than their German counterparts. There was one non-hypothesized correlation that was as high as the hypothesized correlations. Uncertainty avoidance was negatively correlated to achievement striving ($r = -0.28, p < 0.05$/$r = -0.17, p > 0.05$). The more Chinese and German owners support reliance on social norms, rules, and procedures to prevent incertitude, the less they work hard to achieve their goals. Post hoc, the negative correlation

[5]A table presenting the results obtained in the tests of configural, metric, and factor variance invariance can be received upon request.

[6]Whenever two correlation coefficients are given, the first correlation coefficient refers to the Chinese sample, whereas the second correlation coefficient refers to the German sample.

could be explained as follows: Achievement striving may require willingness to take risks. Owners who support uncertainty avoidance should be unwilling to take risks. This renders them unlikely to show achievement striving.

In accordance with our hypothesis, power distance was negatively correlated to error communication ($r = -0.19$, $p < 0.01$; $r = -0.50$, $p < 0.01$). The more Chinese and German owners promote power distance, the less they communicate their errors. The negative correlation was significantly higher in the German sample ($z = 3.78, p < 0.01$). In Germany, acknowledgement of fallibility may be regarded as less compatible with leadership than in China. This could explain why German owners who promote power distance communicate their errors even less than their Chinese counterparts.

The correlation between in-group collectivism and its validation construct was only partially in line with our hypothesis.[7] In the Chinese sample, in-group collectivism was positively correlated to the number of family members who work in the business ($r = 0.19, p < 0.05$). The more Chinese owners foster in-group collectivism, the more they employ their family members. In the German sample, however, in-group collectivism was not correlated to the number of family members who work in the business ($r = 0.00, p > 0.05$). Employing one's family members may be regarded as collectivism in China but disregarded as nepotism in Germany. This could explain why the hypothesized correlation existed in the Chinese but not in the German sample ($z = 2.03, p < 0.05$). There were several non-hypothesized correlations that were higher than the hypothesized correlation. No post hoc explanations could be provided for them.

Consistent with our hypotheses, assertiveness was negatively correlated to deliberation ($r = -0.30$, $p < 0.01$/$r = -0.18$, $p < 0.05$) and to meta-cognitive activity ($r = -0.26, p < 0.01$/$r = -0.16, p < 0.05$). The more Chinese and German owners support assertiveness, the less they show deliberation and meta-cognitive activity.

The correlations between future orientation and its three validation constructs were in line with our hypotheses. Future orientation was positively correlated to achievement striving ($r = 0.31$, $p < 0.01$/$r = 0.13$, $p > 0.05$), to deliberation ($r = 0.40, p < 0.01$/$r = 0.12, p > 0.05$), and to meta-cognitive activity ($r = 0.25$, $p < 0.01$/$r = 0.16, p < 0.05$). The more Chinese and German owners foster future orientation, the more they show achievement striving, deliberation, and meta-cognitive activity. The correlation between future orientation and achievement striving ($z = 2.01$, $p < 0.05$) and the correlation between future orientation and deliberation ($z = 3.21, p < 0.01$) were significantly higher in the Chinese sample. In China, hard work and careful consideration may be regarded as more essential

[7]As the model of configural invariance comprised no scenarios that appropriately assessed institutional collectivism, we could not test our hypothesis on the positive correlation between institutional collectivism and the number of co-owners who are actively involved in the management of the business.

to implementing long-term projects than in Germany. This could explain why Chinese owners who foster future orientation show even more achievement striving and deliberation than their German counterparts.

In accordance with our hypotheses, humane orientation was positively correlated to error communication ($r = 0.22$, $p < 0.01$/$r = 0.25$, $p < 0.01$) and to social satisfaction ($r = 0.19$, $p < 0.01$/$r = 0.14$, $p > 0.05$). The more Chinese and German owners promote humane orientation, the more they communicate their errors and the more they are socially satisfied. There were two non-hypothesized correlations that were as high as the hypothesized correlations. First, humane orientation was positively correlated to achievement striving ($r = 0.36$, $p < 0.01$/ $r = 0.14$, $p > 0.05$). The more Chinese and German owners promote fairness, altruism, generosity, care, and kindness, the more they work hard to achieve their goals. Post hoc, the correlation could be explained as follows: Achievement striving may require motivating others to help achieve one's goals. Owners may promote humane orientation because their employees may be more motivated to help achieve their goals if they are treated in a humane-oriented way. The correlation was significantly higher in the Chinese sample ($z = 2.50$, $p < 0.05$). In China, employees' motivation to help achieve owners' goals may be lower than in Germany. This could explain why Chinese owners who show achievement striving promote even more humane orientation than their German counterparts. Second, humane orientation was positively correlated to deliberation ($r = 0.40$, $p < 0.01$/ $r = 0.16$, $p > 0.05$). The more Chinese and German owners promote fairness, altruism, generosity, care, and kindness, the more they carefully consider their decisions. Post hoc, the correlation could be explained as follows: Deliberation may reflect responsibility towards others who are affected by one's decisions. Owners who promote humane orientation should act responsibly towards their employees. This renders them likely to show deliberation. The correlation was significantly higher in the Chinese sample ($z = 2.77$, $p < 0.01$). In China, responsibility towards employees may be more pronounced than in Germany. This could explain why Chinese owners who promote humane orientation show even more deliberation than their German counterparts.

The correlations between performance orientation and its four validation constructs were consistent with our hypotheses. Performance orientation was positively correlated to achievement striving ($r = 0.42$, $p < 0.01$/$r = 0.52$, $p < 0.01$), to meta-cognitive activity ($r = 0.35$, $p < 0.01$/$r = 0.19$, $p < 0.05$), to task-oriented personal initiative ($r = 0.39$, $p < 0.01$/$r = 0.21$, $p < 0.05$), and to relationship-oriented personal initiative ($r = 0.28$, $p < 0.01$/$r = 0.34$, $p < 0.01$). The more Chinese and German owners support performance orientation, the more they show achievement striving, meta-cognitive activity, and task-oriented and relationship-oriented personal initiative. The correlation between performance orientation and task-oriented personal initiative was significantly higher in the Chinese sample ($z = 2.10$, $p < 0.05$). In China, seizing opportunities and preparing for challenges may be regarded as more essential to reaching excellence than in Germany. This could explain why Chinese owners who support performance orientation show even more task-oriented personal initiative than their German counterparts.

8 Discussion

We developed and validated scenario-based scales measuring seven cultural orientations of owners, namely uncertainty avoidance, power distance, in-group collectivism, assertiveness, future orientation, humane orientation, and performance orientation. The cultural orientations are manifested in the practices owners apply in their businesses. These practices provide starting points for the development of organizational cultures.

The assessment of the scales' invariance across China and Germany suggests that they hold cross-cultural validity. Full configural, full metric, and partial scalar invariance were supported, as were partial factor variance and partial error variance invariance. Hence, the scales enable scholars to meaningfully compare the means of the seven cultural orientations across cultures. Moreover, they enable scholars to conduct meaningful cross-cultural comparisons of the relationships involving power distance, in-group collectivism, future orientation, humane orientation, and performance orientation. The relationships involving uncertainty avoidance and assertiveness should be compared with caution.

Cultural response bias occurs if people from different cultures differ in their response sets (Triandis 1994). The scales measuring uncertainty avoidance, in-group collectivism, future orientation, and performance orientation were not affected by cultural response bias because the Chinese and the German owners did not differ in their response sets on the scenarios assessing these cultural orientations. The scales measuring power distance, assertiveness, and humane orientation were marginally affected by cultural response bias because the Chinese and the German owners differed in their response sets on one or two scenarios assessing these cultural orientations.

The assessment of the relationships between the seven cultural orientations and their validation constructs suggests that most scales hold construct validity. According to tests of invariance, the relationships between five of the seven cultural orientations and seven of the nine validation constructs can be meaningfully compared across China and Germany. The relationships involving uncertainty avoidance and assertiveness as well the number of co-owners who are actively involved in the management of the business and the number of family members who work in the business should be compared with caution. Both in China and in Germany, uncertainty avoidance, power distance, assertiveness, future orientation, humane orientation, and performance orientation demonstrated the hypothesized relationships with their validation constructs. Hence, it can be assumed that the scales measuring these cultural orientations hold construct validity. As for uncertainty avoidance and humane orientation, there were three non-hypothesized relationships that were as high as the hypothesized relationships. However, as post hoc explanations could be provided for these relationships, they do not challenge the construct validity of the scales measuring uncertainty avoidance and humane orientation.

We intended to develop two scales measuring the two forms of collectivism, namely institutional collectivism and in-group collectivism. However, we could

only partially implement our intention. We did not succeed in developing a scale measuring institutional collectivism because the three scenarios created to assess this form of collectivism turned out to be inappropriate. Therefore, we are currently developing and validating a new scale measuring institutional collectivism. The scale can be received upon request. We succeeded in developing a scale measuring in-group collectivism because two of the three scenarios created to assess this form of collectivism turned out to be appropriate. In-group collectivism demonstrated the hypothesized relationship with its validation construct in China but not in Germany. Hence, it can be assumed that the scale measuring in-group collectivism holds construct validity in China. The validation construct may not have been appropriate for in-group collectivism in Germany. There were several non-hypothesized relationships that were higher than the hypothesized relationship. As no post hoc explanations could be provided for these relationships, they challenge the construct validity of the scale measuring in-group collectivism. Therefore, we are currently revising the scale. It can be received upon request.

8.1 Limitations

Some scales do not cover all facets of the cultural orientations specified in the definitions. The 40 scenarios created to assess the cultural dimensions captured all of their facets. However, in the cross-cultural validation of the scales, only 23 scenarios turned out to be appropriate and were included in the scales.

Readers may be concerned about the low internal consistencies of some scales. The scales measuring in-group collectivism and performance orientation show low composite reliabilities both in China and in Germany, whereas the scale measuring future orientation and the scale measuring uncertainty avoidance display low composite reliabilities in China and Germany, respectively. These scales have few scenarios, and short scales usually suffer from low internal consistencies. However, we assume with Chan and Schmitt (1997) and Motowidlo et al. (1990) that test-retest reliability is a more appropriate reliability estimate for scales based on scenarios than composite reliability. All scales show high test-retest reliabilities.

Given that owners are commonly defined as individuals who found, own, and manage businesses (Carland et al. 1984), readers may also be concerned about the fact that the Chinese and the German samples comprised both owners who had and owners who had not founded their businesses. To invalidate this concern, we compared the correlation matrices obtained in the Chinese and the German samples to the correlation matrices obtained in samples that included only founders. Both in China and in Germany, the compared correlation matrices turned out to be quite similar. The correlations between them were $r = 0.99$ ($p < 0.01$) in both cultures. Thus, we could rule out that our results were distorted by the fact that the Chinese and the German samples comprised both founders and non-founders.

Given that we developed and validated the scales for Chinese and German owners, their use may be limited in two respects. First, the scales are suitable for

owners but may not be suitable for managers. As long as it has not been ascertained whether the scales allow for meaningful comparisons of managers, they should only be used to compare owners. Owners and managers have quite a lot in common. Therefore, we are optimistic that future studies will demonstrate the scales' suitability for managers. Second, the scales are suitable for Chinese and German owners but may not be suitable for owners from other cultures. As long as it has not been ascertained whether the scales can be used to meaningfully compare owners from other cultures, comparisons should be conducted with caution. China and Germany are two quite different cultures. Therefore, we are optimistic that future studies will demonstrate the scales' suitability for owners from other cultures.

9 Conclusion

The scales are useful for cross-cultural and organizational scholars. Cross-cultural scholars can use the scales to investigate how owners from different cultures differ in their cultural orientations. Moreover, they can use the scales to investigate cross-cultural differences in the effects of cultural orientations. Organizational scholars can use the scales to assess the practices owners apply in their businesses. Thereby, they can assess how owners go about managing their businesses and how they support the development of organizational cultures. The scales may also be useful for owners and managers. The scales may be used in training to make owners and managers aware of the practices they apply in their businesses. The awareness of how they go about managing their businesses and how they support the development of organizational cultures may lead owners and managers to challenge and improve their practices.

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Appendix

Scales Measuring Cultural Orientations of Business Owners

Uncertainty Avoidance (UA 1, UA 2, UA 6)

Imagine that one of your employees comes up with a new idea. His idea sounds promising but its implementation would necessitate considerable changes in your business routines. What do you do?

You encourage your employee to try out his idea.	You refuse to implement your employee's idea. Changing your business routines is too risky to you.

Imagine that one of your clients asks you to work on a project. Since neither you nor your employees have any experience in this field, working on the project would be a big challenge for your business. What do you do?

You accept the project. Exploring new fields will help to improve your business.	You reject the project. Sticking to fields in which you are experienced is much more sensible to you.

Imagine that one of your employees suggests extending your business to new areas in which you are not experienced yet. What do you do?

You implement your employee's suggestion. Extending your business to new areas will help to increase your competitiveness.	You reject your employee's suggestion. Extending your business to new areas is too risky to you.

Power Distance (PD 1, PD 2, PD 3, PD 4, PD 6)

Imagine that one of your employees challenges a rule you established in your business. What do you do?

You ask your employee to make suggestions about how to change the rule.	You tell your employee to accept the rule.

Imagine that you are faced with a difficult problem in your business. You are not sure how to solve it. What do you do?

You tell your employees about the problem and ask them for their help.	You don't tell your employees about the problem and try to solve it by yourself.

Imagine that one of your employees criticizes the way you run your business. What do you do?

You ask your employee to make suggestions for improvement.	You tell your employee to stop his criticism.

Imagine that you have to make a decision that has important consequences for your business. What do you do?

You make the decision after having consulted your employees.	You make the decision without consulting your employees before.

Imagine that one of your employees refuses to follow an instruction you gave him. What do you do?

You ask your employee for the reasons for his refusal.	You reprimand your employee for his refusal.

In-Group Collectivism (C 5, C 7)

Imagine that you want to employ a new secretary who has at least three years of work experience. Now your best friend's wife applies for the job. She is well qualified but has only been working for one year. What do you do?

You stick to your requirements and don't employ your best friend's wife.	You make an exception to your requirements and employ your best friend's wife.

Imagine that your nephew asks you to employ him in your business. You don't consider him to be sufficiently qualified. What do you do?

You don't employ your nephew due to his poor qualification.	You employ your nephew regardless of his poor qualification.

Assertiveness (A 3, A 5, A 6)

Imagine that one of your employees is very aggressive. He verbally attacks his co-workers whenever they don't agree with him. What do you do?

You tell your employee to change his behavior.	You tolerate your employee's behavior.

Imagine that one of your employees is very dominant. He gives orders to his co-workers although he is not authorized to do so. What do you do?

You tell your employee to change his behavior.	You tolerate your employee's behavior.

Imagine that one of your employees is very aggressive. Whenever he wants to achieve something, he bullies his co-workers. What do you do?

You tell your employee to change his behavior.	You tolerate your employee's behavior.

Future Orientation (FO 2, FO 4, FO 6)

Imagine that one of your employees asks you to give him general advice about how to work on a challenging project. What do you do?

You advise your employee to think about things as he goes along.	You advise your employee to plan ahead.

Imagine that one of your employees suggests having regular meetings to plan for the future of your business. What do you do?

You tell your employee that too much planning for the future just distracts from current business.	You are pleased with your employee's suggestion and implement it.

Imagine that one of your employees asks you what to consider prior to starting a project. What do you do?

You advise your employee to start the project right away without considering its long term implications.	You advise your employee to consider the long term implications of the project.

Humane Orientation (HO 1, HO 3, HO 4, HO 6)

Imagine that one of your employees who always used to do his work properly suddenly makes a lot of mistakes. You find out that things are not going well for him in his private life. What do you do?

You are not willing to show any consideration for your employee's personal problems. You just tell him to get on top of them.	You feel sorry for your employee and offer him your help.

Imagine that one of your employees asks you for special leave due to unexpected strains in his private life. What do you do?

You refuse to grant your employee special leave.	You grant your employee special leave.

Imagine that one of your employees seems to be in a bad mood. What do you do?

You don't care about your employee's bad mood.	You try to find out the reasons for your employee's bad mood.

Imagine that one of your employees is a single father. He has problems balancing the education of his children and his work. Therefore, he asks you to exempt him from working overtime. What do you do?

You refuse to exempt your employee from working overtime.	You exempt your employee from working overtime.

Performance Orientation (PO 2, PO 3, PO 5)

Imagine that you plan to do a new project. Now you have to decide who among your employees will be part of the project team. What do you do?

You base your decision mainly on your employees' social skills.	You base your decision mainly on your employees' performance.

Imagine that you want to fill several high positions in your business. Now you have to decide who among your employees will be promoted. What do you do?

You promote your employees based on their seniority.	You promote your employees based on their performance.

Imagine that several people have applied for a job in your business. Now you have to choose between the applicants. What do you do?

You choose the applicant who socially fits best into your workgroup.	You choose the applicant who shows the highest performance orientation.

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Chapter 10
Economic Freedom and Entrepreneurial Activity: Some Cross-Country Evidence

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Economic Freedom and Entrepreneurial Activity: some Cross-Country Evidence (first published in: Public Choice, Vol. 134, No. 3–4, 2008)

1 Introduction

Societies do not grow and prosper without entrepreneurs. Entrepreneurs are here defined as those individuals who exercise their ability and willingness to perceive new economic opportunities and to introduce their specific ways of seizing these opportunities into the market in the face of uncertainty (Knight 1921; Wennekers and Thurik 1999, pp. 46–47). They may do so by starting up firms or by instituting changes within established firms. As Baumol (1990) argues, entrepreneurial creativity need not necessarily be socially beneficial;[1] still, new products, processes, ways of organizing, etc., all essential aspects of the growth process, are outcomes of entrepreneurship (Schumpeter 1911; Rosenberg 1992; Wennekers and Thurik 1999). Not surprisingly, the history of all rich societies is ripe with entrepreneurs: Julius Caesar's friend Balbus went to Rome from a far-away province (Spain) and worked his way up through the ranks to become one of the richest people in the Empire, and on his way built both theatres and public baths; Thomas Edison's inventions both made him one of the most famous people of his age and brought electric light and many other modern appliances to ordinary people; and in more recent years, Bill Gates founded one of the world's largest personal fortunes by bringing the computer age into people's homes. Common to these three individuals and countless other less known is entrepreneurial ability and will. Indeed, while culture may vary, it is arguable that the particular characteristics of entrepreneurship are anthropological constants (von Mises 1949; Kirzner 1997; Russell and Rath 2002).

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[1]Entrepreneurship may well be unproductive and even destructive. For example, entrepreneurship may be exercised in criminal or rent-seeking activities.

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Yet, we observe rather large differences in the supply and allocation of entrepreneurial activity across countries and time, particularly if entrepreneurship is proxied by such measures as self-employment, new firm formation, and the like (Blau 1987; Blanchflower 2000). Some countries are ripe with entrepreneurs who found firms in many different industries (e.g., United States), while in other countries new firm formation is more of an exception (e.g., Sweden). In this paper, we try to explain such cross-country differences by differences in economic policy and institutions. We take "economic policy" to mean government actions intended to improve overall (intertemporal) resource allocation. While institutions may be outcomes of such actions, institutions typically have a longer term existence, and in general may be understood as the designed or undersigned "rules of the game" as defined by property rights regimes, norms and mores, etc. (cf. North 1990).[2] Specifically, we use the well-known economic freedom indices (Gwartney and Lawson 2005) to ask which elements of economic policy making and the institutional framework that affect the supply of entrepreneurship in societies. Our data on entrepreneurship are derived from the Global Entrepreneurship Monitor (http://www.gemconsortium.org), a research consortium that collects cross-national data on numerous aspects of entrepreneurship. The combination of these two datasets is unique in the literature.

Part of the background of this paper is that the interest in institutions (North 1990; Dixit 1996), growth (Romer 1990; Temple 1999) and entrepreneurship (Segerstrom et al. 1990; Baumol 1993) has strongly increased in economics in the last two to three decades.[3] In particular, the intersections between these three areas have been fertile areas of research. Thus, much of recent growth theory has been concerned with exploring cross-country links betweens institutions, economic policies and growth (e.g., Olson 1982; Barro 1991; Sachs and Warner 1997; Temple 1999; Glaeser et al. 2004), and there has also been some interest in linking entrepreneurship and growth (Aghion and Howitt 1992; Baumol 1993; Wennekers and Thurik 1999; Audretsch and Thurik 2001; Carree et al. 2002), although it seems fair to say theory in this area is ahead of empirical work.

Less interest has been devoted to the issue of how institutions and economic policy impact the supply and allocation of entrepreneurship (e.g., within-firm entrepreneurship or upstart firms, or between Baumol's three categories of entrepreneurship).[4] This lacuna may be caused by the well known difficulties of modelling the entrepreneurial function and measuring the incidence and effects of entrepreneurship (cf. Bianchi and Henrekson 2005). This is a gap in the literature,

[2]It should be stressed the distinction between "pure" economic policy and institutional design is not always easy to make. In the following, we think of economic policy as a set of factors that can be changed within a shorter time-span, and institutions as a set of factors that are stable in the medium run and only change over longer periods of time. What separates the two concepts is thus their degree of persistence over time.

[3]Although roughly speaking, interest in institutions and growth is still much larger than interest in entrepreneurship; cf. Bianchi and Henrekson 2005.

[4]However, see Audretsch et al. (2002) for some cross-country comparisons and Kreft and Sobel (2005) for cross-state comparisons in a US context.

because the link from the institutional framework and economic policies to economic growth may well be mediated by entrepreneurial activity (i.e., the supply and allocation of entrepreneurship). In Kirzner's (1980) terms, the entrepreneur is the "prime mover of progress," and neglecting the entrepreneur may mean neglecting an important mechanism in the growth process (Wennekers and Thurik 1999).

The design of the paper is the following. First, we outline some existing theories of entrepreneurial activity. Most economic theories of entrepreneurship are extremely abstract and do not enter into specific discussions of the institutional and economic policy determinants of entrepreneurship. Accordingly, we provide such a discussion. Secondly, we report a set of cross-country regressions that explain various measures of entrepreneurship in terms of variables drawn from the economic freedom indices. Finally, we discuss the findings and conclude with a set of policy recommendations for countries wanting to increase their entrepreneurial dynamism.

Two limitations of our analysis may be stated at the outset. First, the country sample, encompassing 29 developed, developing, and transition countries, is admittedly small. This smallness is not due to a choice on our part *per se*, but stems from the Global Entrepreneurship Monitor data only including 29 countries with full data. Second, while it is theoretically, and perhaps also empirically, important to distinguish between the supply and the allocation of entrepreneurship (cf. Baumol 1990), we essentially sidestep this distinction by taking start-up firms as the relevant measure of entrepreneurship. Start-ups *may* well capture the supply as well as the allocation of entrepreneurship, but to the extent that, for example, much entrepreneurship takes place inside firms, it is also conceivable that it only captures an aspect of the allocation of entrepreneurship. Unfortunately, the data do not allow us to introduce the distinction in the empirical analysis.

2 Theories of Entrepreneurship and its Determinants

2.1 The Phenomenon of Entrepreneurship

Because entrepreneurs in many ways personify market forces, one might expect entrepreneurs to be *the* central figures in economics, that is, to be recognized as "the single most important player in a modern economy" (Lazear 2002: 1). As numerous writers – from Hayek (1946) over Baumol (1968) to Bianchi and Henrekson (2005) – have lamented, the real world importance of entrepreneurs is not reflected in economic theorizing. Yet, what is usually seen as the founding contribution to the economics of entrepreneurship, namely Cantillon (1755), actually precedes the *Wealth of Nations* by more than two decades, and many different conceptions of entrepreneurship have been developed in the economics literature, although usually at the fringes of economics, such as in non-mainstream traditions. In the following, we briefly survey the main conceptions.

Entrepreneurship as innovation. The most cited conception of entrepreneurship in economics is Schumpeter's idea of the entrepreneur as innovator (e.g., Segerstrom et al. 1990; Aghion and Howitt 1992; Baumol 1993). Schumpeter's entrepreneur introduces "new combinations" (Schumpeter 1911) – new products, production methods, markets, sources of supply, or industrial combinations – shaking the economy out of its previous equilibrium through a process Schumpeter termed "creative destruction" (Schumpeter 1942). Realizing that the entrepreneur has no place in the general equilibrium system of Walras, Schumpeter gave the entrepreneur a role as the source of economic change.[5] Schumpeter distinguished the entrepreneur from the capitalist, thus, the Schumpeterian entrepreneur need not own capital, or even work within the confines of a business firm at all. In Schumpeter's conception, "people act as entrepreneurs only when they actually carry out new combinations, and lose the character of entrepreneurs as soon as they have built up their business, after which they settle down to running it as other people run their businesses" (Ekelund and Hébert 1990, p. 569).[6]

Entrepreneurship as alertness and discovery. A rather different notion of entrepreneurship is the notion of "alertness" to profit opportunities. While already present in Cantillon's (1755) notion of entrepreneurship, this concept has been elaborated most fully by Kirzner (e.g., 1997). Kirzner follows Hayek (1968) in describing competition as a discovery process. The starting point of the analysis is thus disequilibrium, not equilibrium as in Schumpeter (1911). The source of entrepreneurial profit is alertness – the discovery of something (new products, cost-saving technology) unknown to other market participants. The simplest case is that of the arbitrageur, who discovers a discrepancy in present prices that can be exploited for financial gain. In a more typical case, the entrepreneur is alert to a new product or a superior production process and therefore steps in to fill this market gap before others. Profit comes not from following a well-specified maximization problem, but from having some knowledge or insight that no one else has – that is, from something beyond the given optimization framework. Kirzner's view of superior foresight thus differs from search theory in which the value of new knowledge is known in advance and available to anyone willing to pay the relevant search costs. In Ricketts's (1987, p. 58) words, the difference consists in that the searcher of search theory "... decides how much time it is worth spending rummaging through dusty attics and untidy drawers looking for a sketch which (the family recalls) Aunt Enid thought might be by Lautrec. Kirzner's entrepreneur enters a house and glances lazily at the pictures which have been hanging in the same place for years. 'Isn't that a Lautrec on the wall?'"

Entrepreneurship as judgment. A third conception is that entrepreneurship consists of judgmental decision-making under conditions of uncertainty. In the

[5]This includes, but is not limited to, the formation of new business ventures.

[6]Thus, even if by innovating the entrepreneur succeeds in establishing a monopoly that gives rise to indefinite returns, "... the flow of gains to the entrepreneur in *her entrepreneurial role* must be very temporary" (Baumol 1993: 7).

treatment of Knight (1921), the best known advocate of this view, judgment refers primarily to business decision-making when the range of possible future outcomes, let alone the likelihood of individual outcomes, is generally unknown, i.e., he faces uncertainty rather than probabilistic risk. While alertness tends to be passive, judgment is active. Entrepreneurs "are those who seek to profit by actively promoting adjustment to change. They are not content to passively adjust their [...] activities to readily foreseeable changes or changes that have already occurred in their circumstances; rather, they regard change itself as an opportunity to meliorate their own conditions and aggressively attempt to anticipate and exploit it" (Salerno 1993, p. 123). Because judgment in this view is something that is entirely idiosyncratic to the entrepreneur, the transaction costs of trading judgment are prohibitive (Foss and Klein 2005). Knight therefore argues that entrepreneurship and new firm formation are two sides of the same coin because the exploitation of entrepreneurial opportunity requires the start up of a new venture.

Defining entrepreneurship. The above conceptions of entrepreneurship all arguably capture relevant aspects of the phenomenon. Drawing on the above contributions to the economics of entrepreneurship, and echoing Wennekers and Thurik (1999, pp. 46–47), we therefore define "entrepreneurship as the manifest ability and willingness of individuals" to perceive new economic opportunities and to introduce their ways of seizing these opportunities into the market in the face of uncertainty. These opportunities may consist in new products, new processes, new modes of organization, and new product-market combinations, but they may also consist in spotting new opportunities for inter- and intra-market arbitrage. Individuals may exercise this ability and willingness on their own, as manager/owners of firms, as 'intrapreneurs' within firms, and as part of teams inside firms – although this is an aspect that we cannot capture in the empirical analysis that follows.

2.2 Determinants of Entrepreneurship

The above summaries of classical contributions to the economics of entrepreneurship suggest several immediate determinants of entrepreneurship. Thus, Schumpeter and Knight both focus on determinants that are inherent to potential entrepreneurs such as the degree to which a person is "venturesome" (Knight 1921) or has the "ambition" and "intelligence" to exercise "leadership" (Schumpeter 1911). In contrast, there is rather little specificity in the classical contributions on the institutional and economic policy prerequisites for (successful) entrepreneurship, although both Knight and Schumpeter stress the availability of credit. Schumpeter also links the exercise of entrepreneurship to the supply of other opportunities for social distinction.

However, one seeks in vain in the classical statements for more precise discussions of the institutional and economic policy antecedents to entrepreneurial activity, perhaps because the notion – now entirely commonplace – that institutions

imply systems of incentives (e.g., North 1990) was not widespread at the time when Schumpeter and Knight wrote. Moreover, state apparatuses did not have anything like the size they do in contemporary welfare states, so it is perhaps understandable that the classical contributions missed out on this and in general emphasized individual-level determinants.

A partial exception is constituted by the (admittedly much more recent) work of Kirzner (1985). Kirzner (1985 p. 11) argues that the opportunity of profit switches on entrepreneurial alertness. Price discrepancies, representing profit opportunities, are "flashing red lights" that alert entrepreneurs to pockets of ignorance in the market. By closing these pockets, that is, exploiting gains from trade, entrepreneurs equilibrate the market. However, the signaling system of the market can be hampered in various ways. Thus, Kirzner argues that government intervention, such as minimum prices, price ceilings, and outright nationalization, destroys the informational signaling process of the market. Government intervention which aims to improve market outcomes is based on the presumption that government bureaucrats know in advance what the market will reveal. In addition to this fundamental knowledge problem comes the motivational problem that government bureaucrats, unlike entrepreneurs, do not have sufficient incentives to discover the correct prices.

2.3 Institutional Determinants of Entrepreneurship

How institutions affect the supply, quality and allocation (e.g., across Baumol (1990) categories of productive, unproductive and destructive entrepreneurship) of entrepreneurial efforts, as well as how it affects whether entrepreneurship is associated with commercial success, has been a relatively under-researched area in mainstream economics.[7] The set of possible determinants of entrepreneurship is very large indeed, including the size of the government, the degree of administrative complexity/bureaucracy, the tax environment, the intellectual property rights regime, the enforcement of property rights in general, the level of trust, competition law, political freedom, labour laws, social security regime, bankruptcy law, corruption, crime, the ethnic composition of the population, availability of finance capital, etc. Some of these have been examined in previous work. For example, Brunetti et al. (1997) in a survey of private sector obstacles show that the most frequently mentioned obstacles to entrepreneurs are taxes, labour and safety regulations, and access to finance. In a series of papers, Grilo and Thurik (e.g., 2004) build what they term an "eclectic framework" of determinants of entrepreneurship, highlighting demography, various kinds of government intervention, unemployment levels,

[7]However, much applied research in small business economics, economic geography, innovation studies, etc. has dealt with how institutions and economic policy influence small-firm formation and the rate of innovation.

the risk-reward profiles of self-employment versus other types of employment, etc. While elements of their framework relate to economic freedom, and it may be possible to build indices of economic freedom from this framework, they do not directly build theory concerning how such freedom impacts entrepreneurship, a generally neglected focus in the academic literature.

2.4 Economic Freedom and Entrepreneurship

In order to relate economic freedom to entrepreneurship, operational definitions of economic freedom are needed. Economists have typically treated economic freedom as a composite construct that includes such components that all ultimately boil down to the security and extent of property rights, but include, for example, the freedom to save, to change jobs, to devise contracts, to keep income, etc. In the following we discuss these components and relate them to the supply of entrepreneurship.

Many scholars, and certainly those with a leaning towards classical liberalism (e.g., Friedman 1962), have used the *size of government* in a broad sense – that is, the extent to which the government intervenes in the economy through government consumption, redistribution through transfer schemes, public investments, and marginal taxation – as a good measure of economic freedom (e.g., Gwartney et al. 1999; Carlsson and Lundström 2002). There are many reasons why the size of government may be expected on *a priori* grounds to influence entrepreneurship.

Most directly, if economic activities in certain industries or sectors have essentially been nationalized, the scope for entrepreneurship is reduced, as nationalization often (but of course not necessarily) implies a public monopoly. In most parts of the Western industrialized world this is clearly the case of child care, health care, and care of the elderly. More indirect governmental control, such as requirements that certain trades be certified, may also reduce entrepreneurial activity for example, because certification amounts to barriers to entry (Demsetz 1982).

To the extent that a large government is associated with high levels of publicly financed provision of various services (e.g., care of the elderly, education, etc.) and with generous social security systems, the incentives to engage in entrepreneurial acts in order to make a living (what may be called "necessity entrepreneurship") are reduced because a relatively high reservation wage is practically guaranteed.[8] However, such schemes also reduce incentives for individual wealth formation which may be expected to negatively influence the level of entrepreneurial activity (Henrekson 2005, p. 11). One reason has to do with entrepreneurial judgment being

[8]It may be argued, however, that welfare systems, by providing a safety system, may make people more prone to take entrepreneurial actions, because they know that if they fail, they need not starve. Thus, what may be called "opportunity entrepreneurship" could conceivable be positively influenced through this mechanism (see Sinn 1995, 1997). Thanks to Niclas Berggren for pointing this out.

idiosyncratic and often hard to clearly communicate to potential investors (Knight 1921). The entrepreneur may have to finance his venture himself, at least in the start-up phase. If individual wealth formation is reduced because of generous public transfer schemes, etc., this makes such financing difficult. Moreover, if entrepreneurs are only able to commit little personal capital to their entrepreneurial venture, their signal to potential outside investors concerning their commitment to the venture is correspondingly weaker.

A large government also needs to be financed, ultimately by taxation. As Henrekson (2005, p. 9) rightly points out,

[i]n order to analyze how the tax system impacts on entrepreneurial behaviour, it is not sufficient to focus on the taxation of owners of firms. To a large extent, the return on entrepreneurial effort is taxed as wage income.

One reason is that parts of the income that accrue from closely held companies may be paid out as wage income (depending on the specific tax regime), and that entrepreneurial activity may be carried out by employees. Rewards for entrepreneurial behaviour in firms (e.g., stock options, bonuses for suggesting improvements, etc.) are taxed as wage income. Henrekson (2005, p. 14) also points out that a high level of taxation moves many household-related services out of the reach for entrepreneurial exploitation.:"... higher rates of personal taxation discourage the market provision of goods and services that substitute closely for home-produced services" (p.15).

A related, yet distinct, item in an overall measure of economic freedom relates to the enforcement of property rights, that is, the extent to which property rights are secure over time (North 1990; Barzel 2005). Huge literatures in economic history, on intellectual property rights, and on innovation stress the importance for entrepreneurial activity at the micro level and economic development at the macro level of property rights being well-defined and enforced (e.g., Rosenberg and Birdzell 1986; North et al. 2000; Falvey 2004; Glaeser et al. 2004). Well defined and enforced property rights reduce the transaction costs of carrying out the commercial experimentation that we associate with entrepreneurship (Rosenberg 1992), because well defined property rights usually imply that contracting costs are relatively low, and it is thus less costly to search for, negotiate with and conclude bargains with owners of those inputs that enter into entrepreneurial ventures. Well defined and enforced income rights imply that the risk of undertaking entrepreneurial activities is reduced which may also stimulate the supply of entrepreneurship. If so, it should be expected that institutional features, such as the quality of regulations and the judicial system, affect overall level of entrepreneurial activity.

A third important item in an economic freedom measure arguably is sound money (Friedman 1962), in particular the rate and variability of inflation. While anticipations of future relative prices are important in general for economic decision makers, it is arguable that they matter particularly much for entrepreneurs because entrepreneurs are essentially speculators who receive a residual income (Knight 1921; Kirzner 1997). Inflation, and particularly erratic inflation, "jams" the signalling effects of relative prices (Friedman 1977). While this may be less of a problem for risk-loving entrepreneurs, many entrepreneurs may well be risk-averse,

particularly those who engage in necessity entrepreneurship or activity within well-developed sectors. In addition, the concept and measurement of sound money is associated with the level of financial development and financial depth, and as such a proxy for the access to capital, which classical theories stress as a crucial condition of entrepreneurship.

The fourth area of economic freedom is the degree of openness to international trade and investment. Larger trade flows through a country may arguably imply more access to international price signals, thus allowing potential entrepreneurs to take advantage of not only national but also international opportunities. In addition, freedom to invest could, as is often found in empirical studies, increase the rate of technology adoption (cf. Wacziarg 2001), providing further impetus for entrepreneurial discovery although also further competition from foreign entrepreneurs. In addition, the absence of capital restrictions also implies that entrepreneurs gain easier access to international capital markets, thereby potentially increasing the supply of venture capital.

Finally, following Kirzner (1985) public regulation is an important item in an economic freedom measure that is relevant to explaining the prevalence of entrepreneurial activity. Arguably, regulations can both help and hinder entrepreneurs who need clear rules and predictable enforcement of those rules. On the other hand, excessive regulations impose burdens on all firms, not the least start-ups, that may imply prohibitive start-up costs. In addition, Baumol (1990) made the point that individuals operating in heavily regulated economic environment may have larger gains from engaging in rent-seeking activities within the public sector – what he termed "destructive entrepreneurship" – than in real economic activities.

3 Empirical Evidence

3.1 Data Sources, Variables, and Models

The data used in this study are drawn from three different sources and are summarized in Table 1.

First, the dependent variables in the following are from the Global Entrepreneurship Monitor Consortium (GEM) 2001 dataset, a rich large-scale questionnaire survey conducted in 29 countries in representative samples of individuals between 18 and 64 years; in total, approximately 77,000 respondents are included. The data contain answers to a large array of questions on both entrepreneurial activity, the reasons for the activities, how they were financed as well as a battery of background questions. We use three variables constructed from the data. The variables, aggregated at the country level, are:[9]

[9]For readers who may want to use the GEM database themselves, we use the variables denoted "tea01", "tea01opp" and "tea01nec" to form our aggregate data.

Table 1 Descriptive statistics

Variable	Mean	Minimum	Maximum	Std. deviation	Observations
TEA	8.0874	2.900	20.209	3.911	29
TEAOPP	5.519	1.250	13.307	2.807	29
TEANEC	2.095	0.209	6.753	1.836	29
Log GDP	9.731	7.816	10.414	0.584	29
Postcommunist	0.103	0	1	0.309	29
Number of MSME	51.126	20.0	99.6	21.251	27
Education	105.708	48.70	160.76	24.039	
Income inequality	35.458	25.60	62.30	9.197	29
Investment price level	1.050	0.792	2.022	0.299	29
Employment, ag.	3.679	0	18.6	3.603	29
Employment, man.	30.100	20.4	46.0	6.196	29
Market capitalization	96.528	17.611	271.116	68.972	28
Exchange rate volatility	0.291	0	1.177	0.255	29
Government size	5.449	2.540	8.080	1.548	29
Consumption, % of GDP	23.031	4.200	36.800	8.849	29
Transfers, % of GDP	15.961	4.900	29.800	6.908	28
Investment	11.844	4.000	31.000	6.515	18
Lack of taxation	4.586	1.00	10.00	2.151	29
Legal quality	7.348	3.300	9.500	1.763	29
Sound money	8.879	3.800	9.800	1.394	29
International trade	7.821	6.400	9.500	0.774	29
Regulatory quality	6.241	4.800	7.600	0.847	29

- *TEA* denotes the level of total entrepreneurial activity, measured by the proportion of respondents in each country who answer that they engaged in the upstart of an economic activity – starting a firm – within the sampling period. As such, the variable measures *all* firm upstarts regardless of the type of firm and the reason for the activity.

Since the GEM database also includes questions on the reason why respondents may have started a firm of their own, we can distinguish between two broad types of entrepreneurial activity, "opportunity entrepreneurship" and "necessity entrepreneurship." These variables logically sum to the overall TEA index.

- *TEAOPP* is the proportion of the same sample who state that they have engaged in an activity for the reason that they perceive that it represents an economic opportunity to them ("opportunity entrepreneurship")
- *TEANEC* is the proportion of the same sample who state that they engaged in an activity for the reason that they perceived it as "necessary," probably in order to uphold a decent standard of living or, in developing countries, to be able to support their family ("necessity entrepreneurship").

It should be stressed again that we thus only measure the actual economic entrepreneurial activity *through firm upstarts*. Hence, it must be emphasized that we neither capture whatever entrepreneurial activity occurs within existing firms, nor do we in any way measure the potential activity that there may have been in

Table 2 Countries Included in this study

Country	TEA	TEAOPP	TEANEC	Country	TEA	TEAOPP	TEANEC
Argentina	9.6	5.3	4.1	Mexico	20.2	13.3	6.8
Australia	12.1	9.9	1.9	Netherlands	4.8	4.0	0.3
Belgium	3.4	2.6	0.6	New Zealand	15.2	12.4	2.5
Brazil	12.9	7.8	5.3	Norway	7.0	5.9	0.2
Canada	9.1	6.2	2.6	Poland	7.1	3.4	3.5
Denmark	5.6	4.6	0.3	Portugal	6.6	5.1	1.4
Finland	5.1	3.9	0.5	Russia	6.0	4.3	1.0
France	4.3	2.1	0.9	Singapore	5.9	4.6	1.1
Germany	5.8	4.1	1.4	South Africa	8.2	5.5	2.3
Hungary	10.9	7.6	3.2	South Korea	13.4	7.2	5.2
India	11.7	5.0	6.6	Spain	6.0	4.0	1.4
Ireland	9.7	7.2	1.8	Sweden	4.9	4.0	0.6
Israel	3.8	1.4	0.5	United Kingdom	5.2	3.5	0.9
Italy	8.2	6.3	1.7	USA	9.1	7.8	1.2
Japan	2.9	1.3	1.2				

a country, had barriers to such activity not been in place. It is nevertheless clear that there is a substantial amount of cross-country variation, even in a small sample consisting of only 29 countries. The TEA data are distributed between a minimum of 2.9% of the sample population (Japan) and a maximum of 20.2% (Mexico); the opportunity index is distributed between 1.3% (Japan) and 13.3% (Mexico), while the necessity index is distributed between 0.2% (Denmark) and 6.8% (Mexico). The country-level data on entrepreneurship are summarized in Table 2.

While we prefer to keep the specification as parsimonious as possible, we add a few control variables. In the following, we control for the potentially important effects of overall economic development, which could influence both the ease with which new firms are set up as well as the economic incentives for individuals to do so, by including the logarithm to GDP *per capita*, measured in purchasing power parity-adjusted 1995 US dollars and taken from the Penn World Tables, Mark 6.1 (Heston et al. 2002). We also control for regional variations by including dummies for Sub-Saharan Africa, North Africa and the Middle East, Latin America, and the post-communist countries in Eastern Europe and Central Asia. Regarding the regional differences, Latin America and the postcommunist countries in particular might have different entrepreneurial traditions and underlying institutions due to the detrimental effects of decades of import substituting industrialization policies and communism, respectively. As such, we hold the baseline specification as simple as possible, given the small number of observations while controlling for the most obvious potential factors.

To test the robustness of our results further, we employ a set of additional variables. These variables, that may all be argued to influence or proxy for influences on entrepreneurial activity, include the rate of market capitalization as percent of GDP, enrolment rates in secondary education, and the share of micro, small and medium companies in the economy, all from World Bank (2006); income inequality as measured by Gini coefficients from UNU (2006); the relative price of

investments (as ratio of the overall price level) and the 10 year average coefficient of variation of the real exchange rate from Heston et al. (2002); and the shares of the workforce employed in agriculture and manufacturing as a proxy for industry structure, derived from CIA (2006).[10]

Our policy variables are from the freedom data, assembled by the Canadian Fraser Institute and published annually in Gwartney and Lawson (2005). The economic freedom indices have been used in a large number of studies documenting, among other things, their substantial effects on economic growth rates (e.g. Berggren 2003). In the use of this type of data in this context, we follow Kreft and Sobel (2005). We use all five sub-indices of economic freedom. These are:

- *Government size* – which measures the extent to which the government intervenes in the economy through consumption, redistribution through transfer schemes, public investments, and marginal taxation. For this particular index, we alternatively split it into its four sub-components.
- *Legal quality* – which measures the protection and respect for the rights of people to their own lives and rightfully acquired property. The legal quality index is composed of indicators of judicial independence, impartiality of the courts, protection of intellectual property rights, military interference in law and politics, and integrity of the legal system.
- *Sound money* – which consists of the rate and variability of inflation and monetary controls, which is a measure of the consistency of monetary policy. As such, this index also captures broader notions of financial sector development and financial depth.
- *International trade* – which measures the extent of trade and barriers to trade and capital flows, both through actual trade and investment flows and through indicators of tariff and non-tariff barriers to trade and capital.
- *Regulatory quality* – which is composed of three sub-indices measuring the freedom from government regulations and controls in the labour market, financial markets, and the price controls in the markets for goods and services. These three areas are again composed of: (1) the impact of minimum wages, hiring and firing practices, the share of the labour force with wages set in centralized bargaining, the generosity of unemployment benefits, and the use of conscript military personnel; (2) the percentage of deposits held in privately owned banks, bank competition, percentage of credit extended to the private sector, and the extent of interest rate controls; and (3) price controls, administrative procedures that are obstacles to business, time spent with the bureaucracy, the ease of starting new businesses, and the necessity of irregular payments.

[10]The inclusion of exchange rate volatility and market capitalization is evidently important, as sound money may simply proxy for the effects of import and export price volatility, and may be a poor proxy for financial depth. However, in the present sample it is only significantly associated with the alternative measure of real exchange rate volatility from World Bank (2006), which only is available 23 observations here. Evidently, sound money picks up a somewhat different aspect of economic policy.

As such, we employ a rather simple baseline for a number of reasons. First, as this in essence is an exploratory study we aim at capturing parsimonious effects of economic freedom. Second, as part of our small sample consists of developing or transition countries, a subset of the ideal data to be included is either unavailable or highly questionable. All results in the following therefore need to be interpreted with this qualification in mind.

3.2 Some Cross-Country Tests

We include these variables in a set of OLS regressions explaining either the full TEA scores or the TEAOPP or TEANEC variables; Table 3 shows the results of the regressions including all five areas of economic freedom. It also reports the results of using the robust regression technique, which iteratively downweighs potential outlier observations based on the size of their residuals (Huber 1964). This alternative procedure solves the well-known problem of OLS regressions having a breakdown point of zero – i.e., a single outlier observation can in principle induce an infinite bias – and thus tests whether results obtained by OLS can be generalized to the full 29-country sample or are driven by single countries, which is an especially important potential problem given our small sample size. When reading this and the following tables, it should be kept in mind that due to severe limitations of the GEM dataset, the sample is rather small; i.e., the size and significance of the results should be interpreted accordingly.

The table shows that even with such a small sample, the specification does a fairly good job at explaining the variation. The explanatory power (R squared) varies between 40 and 83%, and all F-tests for joint inclusion of the specification are significant, although the one for TEAOPP fails the 1% level. The inclusion of all five indices of economic freedom neither proves to be a problem as indicated by the low variance inflation factor (See footnote of Table 3). We are therefore able to include the five indices separately instead of the summary index, which allows us to gain a more precise impression of the importance of distinct dimensions of economic freedom.[11]

It is immediately apparent from the table that economic development is strongly and negatively associated with entrepreneurial activity. Hence, even though such activity forms an important determinant of the growth of income, it tends to decrease with the level of incomes. However, this relation is not significant for opportunity activity (TEAOPP) while being strongly so for necessity activity

[11]Even though all regressions include the regional dummies, they are generally not individually significant, but only jointly. In other words, these dummies tend to pick up variation that is difficult to interpret. We therefore opt for not presenting them in the tables.

Table 3 Macro determinants of entrepreneurial activity

	TEA	TEA	TEAOPP	TEAOPP	TEANEC	TEANEC
	OLS	RR	OLS	RR	OLS	RR
Log GDP	−3.909 (1.325)***	−3.989 (2.144)*	−1.725 (1.038)	−1.706 (1.495)	−2.413 (0.338)***	−2.547 (0.505)***
Postcommunist	0.863 (1.318)	0.469 (2.807)	0.886 (1.136)	0.842 (1.958)	0.378 (.456)	0.308 (0.804)
Government size	2.124 (0.692)***	2.321 (0.721)***	1.740 (0.404)***	1.712 (0.503)***	0.558 (0.243)**	0.600 (0.210)***
Legal quality	0.434 (0.644)	0.797 (0.883)	0.491 (0.494)	0.741 (0.616)	0.062 (0.197)	0.111 (0.259)
Sound money	2.077 (0.714)***	2.582 (1.728)	1.304 (0.493)***	1.729 (1.205)	0.899 (0.213)***	0.937 (0.247)***
International trade	−1.255 (0.793)	−1.840 (1.144)	−0.787 (0.566)	−1.131 (0.798)	−0.545** (0.250)	−0.529* (0.312)
Regulatory quality	−0.785 (1.670)	−1.442 (1.757)	−0.449 (1.047)	−0.872 (1.225)	−0.420 (0.565)	−0.596 (0.508)
Observations	29	29	29	29	29	29
Adjusted R^2	0.526	–	0.409	–	0.832	–
F statistic	4.11	2.52	2.94	2.22	14.86	11.24
RMSE	2.740	–	2.196	–	0.766	–

Note: all regressions include dummies for Asia, Sub-Saharan African, Latin America and the Caribbean, and the Middle East and North Africa region; *** (**) [*] denotes significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]. The variance inflation factor is 3.76 in all OLS regressions

(TEANEC). As such, development seems to reduce the amount of entrepreneurial activity which is caused by the *need* to engage in such activity, which is the main reason for the latter type while not necessarily reducing the perceived opportunities. The table also shows that, as of 2001, the post-communist countries do not deviate systematically from other comparable countries. Even though one might fear so, we do not find any sign of path dependency of a system that strongly discouraged private activity.

Turning to the policy variables, we first of all find that the size of government is strongly positively related to both total activity as well as the shares arising from opportunity or necessity. Remembering that a *larger* score on this index means *less* government intervention, this is quite clear evidence of a depressing effect of government activity, which we explore further in Table 4 below. The estimate suggests a substantial effect, as a positive one standard deviation change results in a rise in entrepreneurial opportunity activity of roughly 85% of a standard deviation. Second, we fail to find any effects of legal quality, the freedom to trade internationally, or the extent of the regulatory framework.[12] We do, however, also find evidence of a strong effect of having access to sound money on both the level of total activity as well as on opportunity and necessity entrepreneurship. Here, a positive one standard deviation change of sound money is associated with an increase of 53% of a standard deviation of TEAOPP and a 49% increase of TEANEC. The effect is evidently somewhat stronger at the margin for entrepreneurial activity based on the presumption of opportunity, yet it is not robust to being estimated by robust regressions. Further tests show that the insignificance of sound money using either TEA or TEAOPP is due to the influence of the three richest countries in the sample that also score highest on this index. As such, there seem to be decreasing returns to sound money as indicated in Table 4 further down where we instead use the logarithm to the sound money index. This has the specific effect of allowing for larger effects of having very poor monetary consistency, the reason being that once a country passes a certain threshold of economic development, it is likely to have set up independent monetary authorities to ensure that citizens have access to stable and predictable money. As such, there is very little variation at the top of the sound money index, which prevents identification of an average linear effect in the presence of decreasing returns. The further results in Table 4, that allow for a logarithmic association between economic freedom and entrepreneurial activity rather clearly support this notion, as the logarithm to sound money is strongly significant throughout.

[12]It should be noted that if we instead use actual trade volumes, which can also be obtained from the Penn World Tables, we obtain the same non-result as with the trade index from the Fraser Institute.

Table 4 Macro determinants of entrepreneurial activity: logged independent variables

	TEA	TEA	TEAOPP	TEAOPP	TEANEC	TEANEC
	OLS	RR	OLS	RR	OLS	RR
Log GDP	−3.293 (1.402)**	−5.019 (2.224)**	−1.283 (1.046)	−2.715 (1.676)	−2.179 (0.364)***	−2.499 (0.447)***
Postcommunist	0.285 (1.507)	−0.869 (3.065)	0.423 (1.236)	−0.483 (2.309)	0.226 (0.437)	0.049 (0.728)
Log government size	8.763 (3.139)***	7.933 (3.332)**	7.344 (1.972)***	6.731 (2.511)**	2.283 (1.066)**	1.494 (0.814)*
Log legal quality	0.282 (4.789)	−0.996 (6.253)	1.413 (3.774)	0.334 (4.712)	−0.456 (1.284)	−0.893 (1.523)
Log sound money	10.509 (4.029)***	29.309 (14.408)**	6.084 (2.862)**	21.588 (10.856)**	5.123 (1.132)***	4.022 (1.326)***
Log international trade	−5.763 (6.479)	−11.849 (9.699)	−3.222 (4.717)	−7.590 (7.308)	−3.066 (1.964)	−2.029 (2.198)
Log regulatory quality	−0.332 (10.403)	3.679 (10.865)	0.707 (6.979)	3.669 (8.186)	−1.397 (3.242)	1.330 (2.586)
Observations	29	29	29	29	29	29
Adjusted R^2	0.476	–	0.365	–	0.821	–
F statistic	3.55	2.86	2.61	2.39	13.80	12.41
RMSE	2.880	–	2.277	–	0.791	–

Note: all regressions include dummies for Asia, Sub-Saharan African, Latin America and the Caribbean, and the Middle East and North Africa region; *** (**) [*] denotes significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]. The variance inflation factor is 3.41 in all OLS regressions

In sum, Tables 3 and 4 show substantial evidence for the effects of one type of economic freedom on the level of entrepreneurial activity and some support for another type.[13] However, the government size index covers a fairly disparate set of sub-indices (cf. Sturm et al. 2002). We therefore split this index into its component parts in Table 5, in which we keep the logarithm to GDP, the post-communist dummy and the sound money index in the specification while excluding the three insignificant freedom indices. It should also be noted that for three of the four sub-indices, we use the underlying real data. Hence, "government consumption" is measured as the share of government consumption in total consumption; transfers and subsidies as a percentage of total GDP; and public investment as a share of total investments. The exception is the (lack of marginal) taxation index, which we keep as an index since it includes both the size of marginal taxes as well as the share of the labour force that face the highest marginal tax rate. Again, the regressions do a fairly decent job in explaining the cross-country variation although the R squared is much larger when TEANEC is the dependent variable, which is due to the strong and significant impact of economic development.[14]

This point is clear as (the logarithm to) GDP per capita is consistently significant with a very large coefficient in the first four columns while it only becomes statistically significant in one of the four right-hand side columns. Again, the post-communist dummy is never significant, indicating that the Eastern European countries have rapidly come to resemble the rest of the Free World on this count. Likewise, sound money is significant in both statistical and economic terms throughout the table with both TEANEC and TEAOPP as the dependent variable.

Turning to the government size variables and starting in the four left-hand columns of Table 5, in which the necessity component of total entrepreneurial activity is the dependent variable, only one of the four underlying variables is

[13]It should be noted that our results are robust to including a number of variables that may arguably proxy for similar underlying economic and institutional features mentioned in the literature. These variables include (but are not restricted to) measures of trade volume, discrepancies of domestic price levels from international levels, both absolute price levels and relative prices of capital goods, and alternative institutional measures such as the Freedom House democracy index and the World Bank index on the rigidity of employment rules. We do not report these additional results here but they are available on request from the authors.

[14]The indices on all five areas are composed of sub-indices, but we opt for including only the index that is significant. Moreover, the government size index has been criticized for being composed of particularly disparate elements, which warrants further specific testing (cf. de Haan and Sturm 2000; Sturm et al. 2002). We have also performed tests with, for example, the three constituent sub-indices – labour, credit and business regulations – forming the overall regulation variable. These results are not reported here as they show no association. Hence, the extent of regulations and controls in the labour market seem unassociated with entrepreneurship in this sample even though other studies have argued for a strong correlation (e.g. Kreft and Sobel 2005). In addition, all results in Table 4 also survive being estimated with the robust regression technique although we do not report them due to space constraints.

Table 5 Effects of specific factors of government size

	TEA	TEA	TEA	TEA	TEANEC	TEANEC	TEANEC	TEANEC	TEAOPP	TEAOPP	TEAOPP	TEAOPP
	1	2	3	4	5	6	7	8	9	10	11	12
Log GDP	−2.087	−2.990	−6.282	−3.808	−2.159	−2.332	−2.598	−2.588	0.008	−0.746	−4.021	−1.345
	(0.841)**	(1.742)*	(2.799)**	(1.436)**	(0.279)***	(0.596)***	(0.488)***	(0.394)***	(0.782)	(1.324)	(2.335) *	(1.176)
Postcommunist	−2.477	0.934	12.323	0.811	−0.417	0.566	2.334	0.476	−1.895	0.619	9.514	0.591
	(1.357)*	(1.813)	(0.327)	(1.707)	(0.775)	(0.654)	(1.602)	(0.491)	(1.207)	(1.687)	(6.458)	(1.705)
Sound money	1.649	1.738	3.994	1.579	0.706	0.659	1.113	0.652	1.015	1.132	2.862	1.007
	(0.351)***	(0.545)***	(1.969)**	(0.593)***	(0.146)***	(0.129)***	(0.378)***	(0.122)***	(0.306)***	(0.513)***	(1.534)*	(.537)*
Government:												
Consumption, % of GDP	−0.376				−0.104				−0.282			
	(0.070)***				(0.021)***				(0.062)***			
Transfers, % of GDP		−0.338				−0.060				−0.277		
		(0.143)**				(0.038)				(0.131)**		
Investment			−0.149				−0.106				−0.019	
			(0.297)				(0.069)				(0.227)	
Lack of taxation				0.658				0.139				0.549
				(0.341)*				(0.093)				(0.272)**
Observations	29	28	18	29	29	28	18	29	29	28	29	29
Adjusted R Square	0.583	0.442	0.134	0.283	0.874	0.792	0.786	0.785	0.353	0.211	0.109	0.286
F statistic	6.59	4.06	1.38	2.58	28.84	15.70	9.89	13.53	3.18	2.03	–	
RMSE	2.571	2.931	4.158	3.370	0.662	0.863	1.001	0.919	2.298	2.475	3.315	2.788

Note: all regressions include dummies for Asia, Sub-Saharan African, Latin America and the Caribbean, and the Middle East and North Africa region

statistically significant.[15] This variable, government consumption, may proxy for unemployment benefits and other welfare arrangements that lower the chances of having to set up a business out of necessity.

The results are different when we turn to the determinants of opportunity entrepreneurship. First of all, the share of total consumption pertaining to the government sector has a strong negative influence on TEAOPP. The coefficient, which is almost three times larger than with TEANEC, indicates that a one standard deviation to government consumption in this sample would induce a loss of opportunity entrepreneurship of about 90% of a standard deviation. Second, the share of transfers and subsidies in total GDP also exerts a negative influence on TEAOPP. Here, the estimate suggests that a one standard deviation increase in transfers would induce a loss of about 70% of a standard deviation.

Finally, the lack of taxation index also has a positive influence, that is, raising the marginal income tax rate or expanding the share of the labour force paying this rate affects the level of opportunity entrepreneurship negatively. The estimate here suggests that a one standard deviation deterioration of the index would induce a loss of about 40% of a standard deviation. Overall, we thus find that both the access to sound money and three different components of government size are strongly associated with national levels of opportunity entrepreneurship while sound money and one of the government indices are associated with necessity entrepreneurship.

Naturally, all findings here must be interpreted with some care as they are based on a fairly small sample of countries. However, as a final exercise Table 6 reports the estimates of overall government size and sound money when adding one of the additional control variables; the estimates also include the full baseline specification although we only report the central estimates. As such, Table 6 provides a simple robustness test of the general findings. The table shows that even in such a small sample, the effects of two types of economic freedom remain robust and significant at conventional levels, and none of the coefficients vary significantly from the estimates in Table 3. At first sight, the findings therefore seem to be robust and stable.[16] In addition, the results are fairly robust to adding two extra control variables (not shown) even though the variance inflation factor tends to be

[15]It is worth mentioning that the regressions with public investment contain many missing observations. If we attempt to substitute the missing observations with data from other sources, we get a negative association between necessity entrepreneurship and public investment, but no relation with opportunity activity.

[16]It should be noted that we have performed a set of additional robustness tests although Table 6 only reports those for which the variables cover almost the entire sample. In particular, sound money also remains significant even if we include the volatility of the real exchange rate or actual inflation data in levels or variance from World Bank (2006). Hence, even if sound money may be the theoretically most worrisome of the five indices, as a referee correctly pointed out to us, the results are robust to including a set of other measures of financial development and related concepts.

Table 6 Additional robustness tests

	TEA	TEA	TEAOPP	TEAOPP	TEANEC	TEANEC
	Government size	Sound money	Government size	Sound money	Government size	Sound money
Inclusion of:						
Number of MSME	2.156	2.095	1.780	1.286	611	1.077
	(0.719)***	(0.825)**	(0.420)***	(0.651)**	(0.272)**	(0.217)***
Education	2.085	1.998	1.719	1.319	0.543	0.848
	(0.734)**	(0.727)**	(0.447)***	(0.574)**	(0.249)**	(0.212)***
Income inequality	1.921	1.976	1.408	1.137	0.662	0.951
	(0.802)**	(0.774)**	(0.515)**	(0.537)**	(0.256)**	(0.211)***
Investment price level	1.739	2.010	1.584***	1.277	0.387	0.869
	(0.636)**	(0.647)***	(0.436)	(0.473)**	(0.249)	(0.184)***
Sectoral employment	1.710	1.768	1.501	1.099	0.492	0.853
	(0.684)**	(0.566)***	(0.438)***	(0.415)**	(0.277)*	(0.216)***
Market capitalization, % of GDP	2.053	1.817	1.650	1.080	0.509	0.851
	(0.755)**	(0.784)**	(0.437)***	(0.552)**	(0.245)**	(0.226)***
Exchange rate volatility	2.117	2.148	1.729	1.421	0.561	0.876
	(0.712)***	(0.802)**	(0.420)***	(0.525)**	(0.249)**	(0.239)***

Note: all regressions include the full baseline specification; *** (**) [*] denotes significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]

disturbingly large.[17] In the following, we discuss the potential reasons for these effects and their economic significance.

4 Concluding Discussion

The literature on entrepreneurship mainly focuses on individual-level characteristics of entrepreneurs and tends to ignore the political and institutional environment. The contribution of this work is to discuss the importance of economic policy and institutions as captured by the concept of economic freedom. We report a set of cross-country tests of the relation between entrepreneurship and economic freedom, and interpret our findings within the context of the existing theoretical literature. We thus contribute to the small literature on macroeconomic determinants of entrepreneurship as well as the much larger literature on economic freedom and economic growth.[18]

Fundamentally, we show that the size of government and the quality of the monetary policy and overall financial environment are strong determinants of

[17]We chose not to report these results fully due to space constraints. As noted in the text, the findings are reasonably robust throughout and remain significant in the cases where the variance inflation factor remains below a level of approximately 20. We do, however, note that a full robustness test must await future research with more cross-country information.

[18]The study that is closest to the present work is Kreft and Sobel (2005) who show that across the US states, the level of entrepreneurial activity is significantly associated with economic freedom.

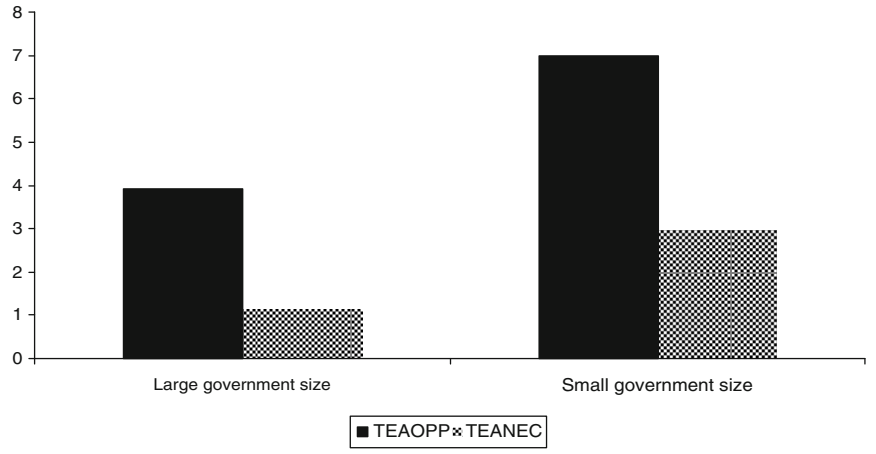

Fig. 1 Enterpreneurship and government size

entrepreneurship across the small sample of 29 countries for which there are comparable data on entrepreneurship. The basic access to sound money appears to be critical to both opportunity and necessity entrepreneurship (although this index shows decreasing returns to scale). On the other hand, only governments' share in total consumption affects *necessity* entrepreneurship, while both government consumption, transfers and subsidies and the extent of taxation are negatively associated with *opportunity* entrepreneurship.

To exemplify the findings, we first summarize those pertaining to government size in Fig. 1, which reports the average level of entrepreneurial activity in the half of the sample with a small government sector and a large government sector, respectively. The figure provides an illustration of the economic significance of government interventions, and thereby also provides a "feeling" for the size of the differences as the height of the columns are percent of the sample average.

According to the results, if, for example, Denmark was to raise its current score on the government size index (3.75) to the average of the remaining four areas – legal quality, sound money, freedom to trade, and regulatory freedom – (8.5), it would raise its TEAOPP by about eight points. While this is quite clearly an overestimate by being more than two standard deviations of the TEAOPP variable – the GEM survey shows that only about 4.5% of the Danish population engage in entrepreneurship – it nevertheless indicates the substantial effect of having a very large-scale government sector. On the other hand, it would move Denmark to a position of about that of New Zealand, another rich country that in most other respects has noticeably similar formal institutions and cultural traits. Differences in individuals' access to sound money are also important but with about half the effect as that of the overall government index and most probable with decreasing returns.

That government consumption has a negative effect on the level of necessity entrepreneurship is hardly surprising as this variable includes, among other expenditures, both unemployment benefit expenditures and various public goods that, if

not provided by the government, might entail a financial burden for the poor. However, the effect on opportunity entrepreneurship is approximately three times larger than that on necessity entrepreneurship. This finding would seem to contradict claims made recently by Scandinavian politicians that the "welfare state" increases the economic dynamism by protecting people from adverse effects of failing.[19] Instead, the empirical findings rather clearly indicate that central traits of the welfare state – strong redistribution by either public goods, reflected in government consumption, regressive transfers or high marginal taxation – are all strongly negatively associated with opportunity entrepreneurship.

As suggested already, this work contributes to the extensive literature on economic freedom. This literature has first and foremost demonstrated that aspects of economic freedom and other institutional measures are strongly associated with economic performance and economic growth (Grubel 1998; Carlsson and Lundström 2002; Berggren 2003; de Haan et al. 2006). Whether this association comes about through the effects of economic freedom on factor accumulation or productivity growth is still uncertain. However, using a set of alternative institutional indices related to economic freedom, Méon and Weill (2006) find evidence suggesting that such factors are strongly related to total factor productivity. Our study suggests that at least part of the association may come about through the effects of economic freedom on the degree of entrepreneurship and thus the degree of dynamism in the economy. Here, both direct and indirect channels may be important. The policy focus is usually on high-tech entrepreneurial activity à la Microsoft. Some firm start-ups may indeed end up as major international players, and increased entrepreneurial activity resulting from increased economic freedom will probably increase the likelihood that such firms arise.

Yet, it should also be stressed that entrepreneurial activity need not be of a sophisticated technological nature to add to economic performance. As stressed by Hayek (1968), competition has important dynamic effects. Part of the effect of economic freedom on growth could therefore arise from more mundane reasons, for example if new firms increase the competition in product markets or in the production of factor inputs and intermediate goods. Given that economic freedom, through its effects on entrepreneurial activity, increases the competition and efficiency in intermediate goods markets, it could also result in improved efficiency in the production of final goods and thereby in improved economic performance.

However, a note of caution is called for when interpreting these results. First, note that our results do not inform us about the *survival* of firms resulting from entrepreneurial activities, only the likelihood of such activity occurring. Second, the results also do not inform us about the degree to which entrepreneurship is productive or not (cf. Baumol 1993). Third, our results cannot capture the within-firm entrepreneurship that also takes place. It is therefore entirely possible that a

[19]Interested readers can, for example, compare the present results to Henrekson's (2005) analysis of how the welfare state (*in casu*: the Swedish welfare state) stifles incentives for entrepreneurship.

casual examination of the cross-country differences in total entrepreneurial activity might overstate the benefits of entrepreneurship potentially available to single countries if there is either: (1) country-level decreasing marginal returns to total activity; (2) that a higher level of activity also reflects a larger proportion of such activities failing; or (3) large variations in the social returns to such activities. We are also likely to understate the degree of entrepreneurship for the third reason above, although the downward bias induced by this problem is unlikely to be systematic. Fourth, a final limitation of our analysis is that it cannot tell us whether government size mainly affects the context in which potential entrepreneurs work and their incentives to unfold their entrepreneurial abilities, or whether systems with large governments instead mainly limit entrepreneurship by transforming norms and privately held beliefs about society.[20]

However, in spite of the obvious limitations on analysis derived from cross-country empirical work consisting of simple entrepreneurial activity in only 29 countries, the findings in this paper fit well within a broader and much more extensive literature on economic freedom. Hence, the cross-country differences should neither be under- nor overestimated, but simply treated with the usual caution. Keeping the limitations of this analysis in mind, we conclude that these findings outline what may be costs of a lack of economic freedom that have seldom been discussed in the literature.

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[20]While this to some might seem a slightly farfetched possibility, it is worth stressing that Lindbeck et al. (1999) argue theoretically for the risk that welfare states can undermine citizens' economic norms. Mokyr (2006) makes a similar argument that cultural beliefs played an important role in the Industrial Revolution, which was above anything else an entrepreneurial event.

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Chapter 11
Entrepreneurial Culture and its Effect on the Rate of Nascent Entrepreneurship

Kashifa Suddle, Sjoerd Beugelsdijk, and Sander Wennekers

Entrepreneurial culture and its effects on the rate of nascent entrepreneurship (not published)

1 Introduction

In recent years a growing awareness of the importance of entrepreneurial activity for economic development has triggered research on the fundamentals of entrepreneurship. Cross-national differences in levels of entrepreneurial activity may be explained by a wide range of economic, technological, demographic, cultural and institutional factors (Verheul et al. 2002; Wennekers 2006). In particular, differences in value systems and cultural orientations towards entrepreneurship have been argued to affect entrepreneurship (Illeris 1986; Thomas and Meller 2000). McClelland's (1961) seminal study on children's stories and the role of Need for Achievement in explaining cross national differences in economic development is perhaps the most well known example of this type of research (Beugelsdijk and Smeets 2008). Other nation level studies like those by Lynn (1991), Shane (1993), and Hofstede (1980) fit this line of reasoning. At the regional level, Davidsson and Wiklund (1997) study the role of values and beliefs in explaining regional variations in new firm formation rates. Wennekers et al. (2005) have studied the relationship between a country's rate of entrepreneurial dynamics (as measured by nascent entrepreneurship) and its level of economic development, while using population growth, social security expenditures and two proxies for cultural influences as control variables. They find robust statistical evidence for a U-shaped relationship between a country's nascent entrepreneurship rate and its level of economic development.[1] They also report a positive influence of both cultural proxies on nascent entrepreneurship. First, the authors use incumbent business ownership as a proxy for the influence of entrepreneurial role models on nascent

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[1]Cf. Carree et al. (2002, 2007) for a related investigation of the relationship between the level of economic development and the rate of business ownership in 23 OECD countries.

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entrepreneurship. Secondly, they include a '(former) centralized command economy' dummy, arguing that over many decades of the twentieth century, culture and institutions in the (formerly) communist countries have become unfavourable for self-employment.

Obviously, the measures of culture used by Wennekers et al. (2005) are rather indirect and incomplete. In this paper we use a more direct and more complete indicator for entrepreneurial culture. Based on the Word Values Survey (WVS) we develop a composite measure embedded in trait research. We relate this newly developed measure to levels of nascent entrepreneurship across 28 countries.[2] Moreover, to test the robustness of our results and to corroborate the validity of our measure, we use a variety of existing measures that have been developed in earlier literature and can plausibly be related to differences in levels of entrepreneurship. More specifically we use McClelland's (1961) Need for Achievement, Lynn's (1991) competitiveness index, Granato et al.'s (1996) achievement motivation index, and GLOBE's (2004) performance orientation index.[3] Building on the analyses of Wennekers et al. (2005), we use the Global Entrepreneurship Monitor 2002 data for nascent entrepreneurship. Controlling for economic, institutional and demographic factors our newly developed measure of entrepreneurial culture is found to be significantly and positively related to nascent entrepreneurship. This is in sharp contrast with the four other existing measures proxying entrepreneurial culture for which we find insignificant or counterintuitive results. We discuss the strengths and weaknesses of each of these indicators and provide suggestions for future research in this area.

The structure of this paper is as follows. First, we briefly discuss the relevant literature on the hypothesized relationship between entrepreneurial culture and (nascent) entrepreneurship. Next, we describe our empirical research method and the data we use. We then present the regression results and discuss the outcomes. Finally, we present our conclusions, discuss the limitations of our study and make suggestions for future research.

2 Literature Review

Rates of entrepreneurship differ widely across nations and over time (Wennekers 2006). Whereas some countries score consistently high on various indicators of entrepreneurial activity (such as several Anglo-Saxon countries), other countries (such as Belgium) remain in a backward position (cf. Reynolds et al. 2002). Entrepreneurship theorists (e.g. Schumpeter 1934; McClelland 1961; Illeris 1986; Thomas and Meller 2000) as well as empirical work (Lynn 1991; Shane 1993;

[2]Our sample numbers 34 countries, but due to data limitations the number of countries in our regressions varies across the models used in our analysis.

[3]See also: http://www.thunderbird.edu/wwwfiles/ms/globe/.

Davidsson 2004; Wennekers et al. 2005) suggest a role for culture next to structural factors in explaining these cross-country differences. Certain societal values may be conducive to new firm formation and/or economic dynamism in general.

The first author who systematically discussed this relationship was McClelland. He argued his concept of achievement motivation to be crucial for economic development (McClelland 1961). Though his analysis of 22 countries has been criticized for lack of robust results and questionable proxy measures, such as the use of changes in electricity generation to measure economic development (O'Farrell 1986; Schatz 1965; Frey 1984; Gilleard 1989; Beugelsdijk and Smeets 2008), McClelland made the first attempt to actually measure an aspect of entrepreneurial culture and relate it to economic development.

Thirty years later Lynn (1991) made a similar attempt by measuring cultural values of students in 41 countries and combining the results into a national indicator of entrepreneurial attitude. Although Lynn, just like McClelland, does not use economic models to test for alternative explanations, his analysis does yield interesting results. In particular, a society's orientation towards competitiveness was found to be related to economic growth rates. More recently, Granato et al. (1996) used the World Value Survey to develop an alternative achievement motivation indicator and relate this to economic growth. Acknowledging that their analysis is embedded in a modern economic growth framework, re-interpretations suggest that their main finding on the positive role of an entrepreneurial culture is based on weak measures and omitted variables (Beugelsdijk and Smeets 2008).

Instead of relating culture to economic growth on the basis of an assumed intermediary role of entrepreneurship, a limited number of other studies have related societal values to indicators of entrepreneurship directly. Shane (1993) for example applied Hofstede's four dimensional culture framework to study national differences in rates of innovation. He found that culture, defined as 'the collective programming of the mind which distinguishes the members of one group from another' (Hofstede 1980, p. 25), affects a country's innovativeness. More specifically, Shane (1993) found that the cultural value of uncertainty acceptance is strongly related to rates of innovation. Morris et al. (1994) relate Hofstede's individualism dimension to corporate entrepreneurship. They focus on individualism as this value has been associated with the willingness of people to violate norms and their level of achievement motivation (Hofstede 1980), both of which are associated with entrepreneurship. Their findings suggest that there may be an optimal level of individualism. While the Hofstede dimensions are conceptually attractive and are available for a large number of countries, they reflect *general* cultural characteristics and have not been developed to rank societies in terms of their specific entrepreneurial culture.

Lee et al. (2004) relate creativity to entrepreneurship, using the 'Bohemian Index' – a measure of the proportion of artistically creative people in the region. Although this index does not really represent entrepreneurial culture, they find that entrepreneurship is overall related to creativity. Davidsson and Wiklund (1997) study the impact of an entrepreneurial culture on regional variations in new firm

formation rates, using cultural values and beliefs data. Although the cultural variation between the Swedish regions they include in the analysis was rather small, their study points to a weak influence of entrepreneurial values on regional new firm formation rates.

Wennekers et al. (2005) have tested a model in which they explain levels of nascent entrepreneurship in a sample of 36 countries. Culture is operationalized by two indirect measures, i.e. incumbent business ownership as a proxy for the prevalence of entrepreneurial role models and a dummy variable for the communist heritage. Acknowledging that Wennekers et al. (2005) are the first to actually relate levels of nascent entrepreneurship to national culture in such a broad empirical framework, their culture measures are indirect and incomplete. We expect that developing more direct measures for entrepreneurial culture based on underlying theory and reflecting entrepreneurial value differences may improve existing analysis and contribute to the literature.

In other words, it is important to develop a measure for entrepreneurial culture by building upon micro insights regarding the value orientation of entrepreneurs. Based on the fundamental belief that entrepreneurs are different, socio-psychologists have tried to find distinguishing personality characteristics. Schumpeter (1934) already associated entrepreneurs with 'the dream and the will to found a private kingdom, usually, though not necessarily, also a dynasty. [..] Then there is the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake, not of the fruits of success, but of success itself. [..] Finally, there is the joy of creating, of getting things done, or simply of exercising one's energy and ingenuity' (Schumpeter 1934, p. 93). Other works by scholars like Rotter (1966), Brockhaus (1982), Sexton and Bowman (1985), Chell et al. (1991) and Thomas and Meller (2000) confirmed the general idea that entrepreneurs have distinguishing personality characteristics. In an attempt to summarize the personality trait literature, Cromie (2000) concludes there are (at least) seven characteristics distinguishing entrepreneurs or business owners from non-entrepreneurs. Without gong into detail, these relate to McClelland's need for achievement (McClelland 1961), Rotter's idea of (internal) locus of control (Rotter 1966), risk attitudes, and creativity (see, e.g. Beugelsdijk 2007).

In this paper we follow the above approach by developing a composite indicator of entrepreneurial culture. Our underlying items relate to core concepts of entrepreneurial trait research. Advantages of this approach over the existing literature are the facts that our measure (a) is not a general cultural indicator but relates specifically to entrepreneurial values and, (b) is embedded in micro insights derived from entrepreneurial trait research. To corroborate our measure and associated findings we also use alternative existing indicators of entrepreneurial culture. The empirical analysis pertains to the sample of 34 countries used in Wennekers et al. (2005). In this framework, a range of variables – among which level of economic development, institutional characteristics like tax level and social security expenditures, and demographic characteristics – explain nascent entrepreneurship. Using nascent entrepreneurship from the Global Entrepreneurship Monitor 2002 as an indicator of entrepreneurial activity, we test the following hypothesis:

H_1: Countries with an entrepreneurial culture will – ceteris paribus – experience higher rates of (nascent) entrepreneurial activity.

3 Method and Data

As mentioned above, we use the data used in Wennekers et al. (2005) for our analysis. This is the Global Entrepreneurship Monitor (GEM) data set 2002, in which 37 countries participated. Additionally, we use data on entrepreneurial culture from a variety of sources. Matching the GEM database with our newly developed culture measure and existing culture measures yields a minimum of 27 observations and a maximum of 34 observations in our regressions. See appendix for an overview of the countries included in these studies.

Using this dataset, we carry out a series of regressions for testing the hypothesized relationship between the rate of nascent entrepreneurial activity at the country level and entrepreneurial culture. After performing a baseline regression analysis including six explanatory variables but excluding culture (our 'standard model'), we test the role of different measures of entrepreneurial culture in five successive regression models. The paragraphs below describe the variables used in our regression analyses.

3.1 Dependent Variable

The GEM data set includes various indicators of entrepreneurship, as well as a wide selection of explanatory variables from standardized national statistics. Our dependent variable is the same as in Wennekers et al. (2005), i.e. the gross inflow into entrepreneurship as represented by the metric nascent entrepreneurship. Data on nascent entrepreneurial activity in 2002 are taken from the GEM 2002 Adult Population Survey. The nascent entrepreneurship rate is defined as the number of people who are actively trying to start a new business, as a percentage of the adult population (18–64 years of age). For each participating country this measure is based on at least 2000 respondents.

3.2 A Composite Measure of Entrepreneurial Culture

To measure entrepreneurial culture, we develop a new, composite measure embedded in ongoing research. We complement this new indicator with four existing indicators that are briefly described in the next section. For the measurement details of these four complementary indicators we refer to the respective original contributions.

Our newly developed composite measure is derived from Beugelsdijk (2007) and was first introduced by Suddle et al. (2006). This measure is based on information

from the World Values Survey (WVS). The WVS data set contains information about basic values, attitudes and preferences of the European, respectively, world population (Halman 2001). These include qualities that children can be encouraged to learn at home, aspects of a job people say are important, some political views and measures for the loci of control. Using the 1999 wave we operationalise entrepreneurial culture by a composite factor consisting of three underlying indicators derived from this WVS database. The three questions used to calculate the composite measure are based on the fraction of respondents giving the following answers on three questions:

1. Question: which aspects of a job do you think are important in a job? Answer: an opportunity to use initiative
2. Question: which aspects of a job do you think are important in a job? Answer: a job in which you can achieve something
3. Question: why are there people in this country who live in need? Answer: because of laziness and lack of willpower.

The national scores reflect the percentage of respondents giving the indicated answers categories on these questions.

As these underlying variables relate to 'initiative', 'achieving behaviour' and 'personal influence on one's own life', which are key constructs in trait research on entrepreneurship, they have a strong theoretical base. 'Initiative' corresponds with one of the key meanings of entrepreneurship, namely 'to take in hand' (Wennekers 2006). 'Achieving behaviour' is another relevant trait for entrepreneurship, as many studies have shown including most notably McClelland (1961). Finally, 'personal influence' represents the internal locus of control, based on Rotter (1966), that is characteristic for entrepreneurs. To develop our new measure we apply principal components analysis and derive a composite scale based on the above three variables. Doing so yields one variable representing entrepreneurial culture, explaining 67% of total variance. Cronbach's alpha of this new scale equals 0.74 suggesting the measure is reliable in the sense of 'internal consistency'. In our subsequent analysis we use this composite variable as a measure of entrepreneurial culture. To complement this measure and also test its robustness we also investigate the role of four alternative indicators of entrepreneurial culture.

3.3 Other Culture Variables

First, we use McClelland's index of need for achievement (N achievement). McClelland found a strong positive correlation between measures of N achievement imagery in school textbooks and the rate of economic growth. He showed that such a relationship exists in a sample of 23, respectively, 41 countries by relating 1925, respectively, 1955 scores on N achievement to subsequent economic growth. The intuitively attractive result that economic growth partly results from the (entrepreneurial) ambition of human beings has gradually become generally

accepted. Most papers on entrepreneurship and economic development refer to McClelland's Achieving Society in the introduction as a common point of departure (see Beugelsdijk and Smeets 2008 for an extensive discussion of this index).

Second, we use the Achievement motivation index as developed by Granato et al. (1996). This measure is based on the World Values Survey. Specifically, it is based on four questions inquiring people's opinion regarding the importance of thrift, determination, obedience and faith as four qualities which children can be taught at home. GIL's achievement motivation index is then calculated as the percentage of respondents emphasizing thrift and determination as important qualities, minus the percentage emphasizing obedience and faith.

Third we use Lynn's measure of competitiveness. Lynn (1991) compares the four psychological theories of economic growth (Weber's work ethic, Schumpeter's competitiveness, McClelland's achievement motivation and Wiener's status of the land owner), and finds in a sample of 41 countries that differences in attitudes towards competitiveness best explain variation in economic growth rates across societies. Competitiveness can be defined as the drive to win against others and obtain some form of dominance over them through winning. This drive was identified by Schumpeter as one of the major motivations of the entrepreneur (Lynn 1991). Therefore, we also include Lynn's competitiveness index as one of our additional proxies for entrepreneurial culture.

Fourth, we use GLOBE's index of performance orientation. This index measures the degree to which a collective encourages and rewards group members for performance improvement and excellence. It is based on the question inquiring people's opinion regarding the importance of encouraging students to strive for continuously improved performance. Originally, the GLOBE performance orientation index is based on McClelland's concept of achieving societies. These societies tend to focus on the future, achievement, taking initiative, and independent competence. In a sample of 62 different societies and cultures, Javidan (2004) finds that societies that score higher on performance orientation tend to value taking initiative, assertiveness and competitiveness. Furthermore, these societies tend to value and reward individual achievement and tend to believe that anyone can succeed if he or she tries hard enough. As these are all characteristics of an entrepreneurial mindset, we also include this measure as an additional proxy for entrepreneurial culture.

In sum, we have five indicators of entrepreneurial culture: our newly developed indicator based on EVS/WVS data, and four existing measures of, respectively, McClelland's N-Achievement, GIL's Achievement motivation, Lynn's competitiveness, and GLOBE's performance orientation.

3.4 Control Variables

When examining the relationship between the rate of nascent entrepreneurship and entrepreneurial culture, other variables that influence nascent entrepreneurship must be taken into account. We use a number of economic, institutional and

demographic variables as controls for testing our hypothesis. Level of economic development is measured as the per capita income. Gross national income per capita 2001 is expressed in purchasing power parities per US $, and these data are taken from the 2002 World Development Indicators database of the World Bank. To test for a U-shaped relationship (Wennekers et al. 2005), we also include its squared term.

To control for the institutional context, we include variables on tax revenues and social security expenditures. The impact of taxes on the level of entrepreneurial activity is complex and even paradoxical (Verheul et al. 2002). On the one hand, high tax rates reduce the return on entrepreneurship (Gentry and Hubbard 2000). On the other hand, self-employment may offer greater opportunities to evade or avoid tax liabilities. For a selection of 12 OECD countries spanning the period 1972–1996, Parker and Robson (2004) find a significantly positive effect of personal income tax rates on self-employment. Other studies, among which Kreft and Sobel (2003), Schuetze and Bruce (2004) and Bruce (2000), find a similar positive effect. Our control variable is tax revenues as % of GDP (1999), taken from Table 2.2.09 of the World Competitiveness Yearbook 2001. Likewise, the effect of social security on entrepreneurial activity may also be two-sided. First, we may expect a negative impact in so far as generous social security for employees increases the opportunity costs of entrepreneurship. In this respect, social security benefits determining the opportunity costs of unemployed persons may also interact with unemployment (Noorderhaven et al. 2004). Second, social security in general may positively affect entrepreneurial activity by creating a safety net in case of business failure. In fact, empirical studies suggest a negative relationship between social security and entrepreneurial activity (Wennekers et al. 2005; Davis and Henrekson 1999; Parker and Robson 2004; Hessels et al. 2007). Social security cost as a percentage of GDP (2000), taken from Table 2.2.01 of the World Competitiveness Yearbook 2001, is used as our control variable.

Population growth and age distribution are relevant in the demographic context. Population growth is expected to have a positive effect on entrepreneurship (Armington and Acs 2002). A growing population provides opportunities for new economic activity as new and bigger consumer markets emerge because of the growing population (demand side of entrepreneurship). Population growth may also be a push factor to engage in new economic activity in order to make a living, particularly when population growth is driven by immigration (supply side of entrepreneurship). The population growth 1996–2002 is taken from the US Census Bureau IDB (International Data Base). As regards age distribution, while start-ups occur in all relevant age groups, the prevalence rate of nascent entrepreneurship is often seen to be highest in the age group between 25 and 34 (Delmar and Davidsson 2000; Verheul et al. 2002). Regarding the age composition of the population in 2002, we have shares in total population of five age groups: 20–24, 25–34; 35–44; 45–54 and 55–64 years. These data are also taken from the International Data Base of the US Bureau of the Census. Because the ‘age group variables’ are highly inter-correlated, only the population share of age group 45–54 years is included in our analysis.

3.5 Data

Table 1 provides the nascent entrepreneurship rates and the various culture indices that we have used in our study. For reasons of presentation we have also rescaled the scores of our newly developed measure of entrepreneurial culture on a 0–100 scale (between brackets). A correlation matrix for all variables used in our study is presented in Table 2. Our newly developed measure of entrepreneurial culture correlates 0.538 with Lynn's competitiveness index. The correlation with the other culture indices is almost zero.

4 Results

We test our hypothesis starting with a 'standard model' in which we include only our control variables (see Table 3). Model 1 shows a significant negative effect of the population share variable and a significant positive effect of population growth (both at $p < 0.10$). The standard model also shows a significant effect of GDP per capita and its squared term ($p < 0.05$). From a certain level of economic development onwards, (nascent) entrepreneurship starts to rise again as per capita income increases still further. Wennekers et al. (2005) explain this U-shaped relationship by the lower levels of independent entrepreneurship in industrializing economies compared with both traditional agriculture-based and modern service-based economies.

In model 2 we include our newly developed measure for entrepreneurial culture. We find a significant positive effect for our new WVS based measure of entrepreneurial culture ($p < 0.05$), and an explained variance of 87%. In the models 3–6 we successively include the four existing measures of entrepreneurial culture. We find an insignificant effect of Lynn's competitiveness index, McClelland's N achievement index and GLOBE's performance orientation, and a significantly negative (counterintuitive) effect of Granato et al's WVS based measure of entrepreneurial culture ($p < 0.05$). These regression models thus do not show consistent evidence of the role of entrepreneurial culture in explaining nascent entrepreneurship across a wide range of cultural indices. The control variables are generally insignificant, except for GDP per capita (barring model 2) and population growth (barring models 3 and 5).

Given the insignificant results of three of the four existing cultural measures, the negative effect of the Granato et al. (1996) index is particularly surprising. In fact, the Pearson-correlation coefficient between McClelland's index and GIL's index is negative and equals −0.18 (based on 28 observations). Since both variables aim to measure achievement motivation (i.e. for both variables, higher values imply 'more' need-for-achievement), this result is particularly disturbing. In addition to the problems related to McClelland's measure (Beugelsdijk and Smeets 2008), the way in which GIL's achievement motivation index is measured also raises serious

Table 1 Total early-stage entrepreneurial activity indices and culture indicators for 34 countries

Country	Nascent entrepreneurship rate 2002	Existing measures of entrepreneurial culture				New measure
		GLOBE's performance orientation	Lynn's competitiveness index	Granato, Inglehart and Leblang's culture index	McClelland's need for achievement	Suddle, Beugelsdijk and Wennekers' entrepreneurial culture[a]
Argentina	8.5	3.65	8.51	−44	3.38	−0.56 (34)
Australia	3.8	4.36	11.42	5	2.38	–
Belgium	2.1	–	10.75	30	0.43	−0.80 (29)
Brazil	5.7	4.04	11.17	−42	1.14	−0.60 (33)
Canada	5.9	4.49	12.03	14	2.29	0.42 (57)
Chile	10.4	–	11.54	−17	1.19	0.16 (51)
China	5.5	4.45	12.37	–	–	−2.03 (0)
Denmark	3.6	4.22	–	20	1.05	−0.57 (34)
Finland	2.7	3.81	–	27	1.52	−0.41 (38)
France	2.4	4.11	10.19	32	2.38	−1.18 (20)
Germany	3.5	4.09	9.1	58	2.14	−0.17 (43)
Hungary	3.5	3.43	–	19	1.81	0.85 (67)
Iceland	5.7	–	12.99	22	–	0.83 (67)
India	10.9	4.25	14.48	5	2.71	1.10 (73)
Ireland	5.7	4.36	10.99	−36	2.29	0.36 (56)
Israel	3.4	4.08	11.59	6	2.33	–
Italy	3.7	3.58	–	10	1.33	–
Japan	0.9	4.22	12.21	106	1.29	0.77 (65)
Korea	5.9	4.55	13.66	–	–	0.37 (56)
Mexico	9.2	4.10	13.82	−41	1.57	2.26 (100)
Netherlands	2.6	4.32	–	22	1.38	−0.21 (42)
New Zealand	9.1	4.72	11.13	26	2.05	−0.62 (33)
Norway	5.2	–	9.6	11	1.71	–

Poland	3.7	3.89	12	−3	0.86	−0.23 (42)
Russia	1.1	3.39	–	49	2.1	0.20 (43)
Singapore	4	4.9	11.83	7	–	−1.54 (11)
Slovenia	3.3	3.66	–	46	–	–
South Africa	4.7	4.11	12.5	46	2.33	2.03 (95)
Spain	2.2	4.01	10.45	−8	2.33	0.17 (51)
Sweden	1.8	3.72	9.05	42	1.62	−1.08 (22)
Switzerland	4.4	4.25	8.99	38	1.71	−0.35 (39)
Thailand	1.3	4.56	13.39	41	–	–
United Kingdom	2.5	4.08	10.64	7	1.67	−0.63 (33)
United States	7.1	4.49	12.76	−16	2.24	1.46 (81)

[a]This measure is based on factor scores, and higher scores reflect higher levels of entrepreneurial culture. The scores between parentheses reflect the re-scaled scores between 0–100 with zero for the country with the lowest score in this sample and 100 for the country with the highest score in the sample

Table 2 Descriptive statistics and cross-correlations

	Mean	St. dev.	1	2	3	4	5	6	7	8	9	10	11	12
1. Nascent entrepreneurship rate	4.59	2.62	1.000											
2. GDP per capita	20.23	8.79	−0.368*	1.000										
3. GDP per capita squared	484.05	328.08	−0.280	0.979**	1.000									
4. Social security costs as % of GDP	16.87	13.32	−0.461**	−0.005	−0.061	1.000								
5. Tax revenue as % of GDP	32.02	11.06	−0.463**	0.622**	0.559**	0.330	1.000							
6. Population growth	4.46	4.79	0.493**	−0.111	−0.094	−0.397*	−0.547**	1.000						
7. Population share 45–54 years	12.97	1.95	−0.636**	0.537**	0.494**	0.305	0.533**	−0.448**	1.000					
8. McClelland's index	1.83	0.63	0.302	−0.131	−0.124	−0.142	−0.344	0.398*	−0.284	1.000				
9. Lynn's competitiveness index	11.45	1.57	0.297	−0.368	−0.310	−0.481*	−0.614**	0.339	−0.336	−0.066	1.000			
10. GIL achievement motivation index	15.06	32.04	−0.595**	0.274	0.231	0.012	0.279	−0.413*	0.484**	−0.180	−0.059	1.000		
11. Entrepreneurial culture (new measure)	0.00	1.00	0.310	0.139	0.138	−0.325	−0.20	0.199	−0.002	0.096	0.538*	0.027	1.000	
12. GLOBE's performance orientation	4.13	0.37	0.288	0.272	0.312	−0.641**	−0.365*	0.651**	−0.159	0.089	0.483*	−0.049	0.120	1.000

*$p < 0.10$, **$p < 0.05$

Table 3 Explaining nascent entrepreneurship in 2002

	Model 1: standard model	Model 2: entrepreneurial culture	Model 3: Lynn's competitiveness index	Model 4: McClelland's index	Model 5: GIL's index	Model 6: GLOBE index
Constant	13.63 (2.90)**	4.08 (2.94)	18.49 (6.28)**	8.14 (3.92)**	12.38 (2.68)**	13.45 (7.79)*
Social security cost as % of GDP	−0.043 (0.03)	−0.006 (0.02)	−0.060 (0.04)	−0.030 (0.03)	−0.066 (0.03)**	−0.029 (0.04)
Tax revenue as % of GDP	0.052 (0.05)	0.022 (0.04)	0.032 (0.07)	−0.001 (0.06)	0.038 (0.05)	0.054 (0.06)
Population growth 1996–2002	0.174 (0.10)*	0.637 (0.13)**	0.176 (0.11)	0.409 (0.16)**	0.096 (0.09)	0.180 (0.11)*
Population share 45–54 years old	−0.459 (0.23)*	0.047 (0.19)	−0.524 (0.30)*	−0.008 (0.27)	−0.199 (0.22)	−0.460 (0.23)*
Per capita income	−0.52 (0.21)**	−0.25 (0.16)	−0.56 (0.24)**	−0.46 (0.24)*	−0.56 (0.21)**	−0.533 (0.22)**
Per capita income, squared	0.012 (0.005)**	0.004 (0.004)	0.013 (0.006)**	0.010 (0.006)	0.013 (0.005)**	0.013 (0.005)**
Entrepreneurial culture (new composite measure)	–	0.502 (0.24)**	–	–	–	–
Lynn's (1991) competitiveness index	–	–	−0.277 (0.34)	–	–	–
McClelland's (1961) index	–	–	–	0.078 (0.60)	–	–
Granato Inglehart and Leblang's (1996) Achievement motivation index	–	–	–	–	−0.030 (0.01)**	–
GLOBE's performance orientation	–	–	–	–	–	−0.106 (1.77)
R squared	0.600	0.871	0.595	0.719	0.711	0.597
Observations	34	28	27	28	32	30

Note: standard errors between parentheses. * indicates 10 % significance, ** indicates 5 % significance

doubts about its validity. Moreover, it has been shown that the positive findings reported by GIL are based on a very specific choice for their regression analysis (Beugelsdijk and Smeets 2008). In other words, the negative significant result of the GIL index could possibly be related to measurement errors, and not be interpreted as a valid test of the role of entrepreneurial culture in explaining nascent entrepreneurship.

5 Discussion

In this paper we have developed a new measure for entrepreneurial culture and tested its relationship with levels of nascent entrepreneurship across a sample of 34 countries. We find a positive and significant effect of our newly developed measure on the rate of nascent entrepreneurial activity. However, we also tested the relationship between nascent entrepreneurship and four other, existing proxy measures of entrepreneurial culture. Three of these four measures are insignificant and one is significant but with a negative (i.e. counterintuitive) sign. While, at first sight, the results of our test of the relationship between entrepreneurial culture and nascent entrepreneurship seem at best mixed, the results of this study are in fact susceptible to three different interpretations:

1. The theory of a positive relation between national cultural entrepreneurial values and nascent entrepreneurship is correct. Our newly developed measure of entrepreneurial culture is theoretically and methodologically sound and has allowed us to test this hypothesis in a proper way, and with a positive outcome. Instead, the insignificant effect of McClelland's variable may be due to its poor internal validity, reflected in the heavy criticism it received (Beugelsdijk and Smeets 2008). Moreover, McClelland's index is based on data from the 1950s, and we are explaining nascent entrepreneurship rates in 2002. In a similar vein, the GIL index suffers from validity problems, making it difficult to interpret its negative effect in our regression model. Lynn's competitiveness index is based on the test scores of students only, and may therefore not properly reflect population level scores on these entrepreneurial values. From a theoretical and methodological perspective, the GLOBE index on performance orientation is also sound, but it has not been constructed to proxy entrepreneurial culture. Thus, our newly developed measure is the only valid, current and explicit proxy for an entrepreneurial culture. The fact that it is found to be positively and significantly related to nascent entrepreneurship supports our hypothesis.
2. The theory is incorrect. Our hypothesis on a positive relationship between entrepreneurial culture and nascent entrepreneurship cannot be supported in a robust way across a range of five indicators of entrepreneurial values, among which a newly developed measure. This would be in line with Pryor's (2005) more general claim that no robust relationship exists between national values in general and economic growth. Pryor actually constructs three factors that each

relate to different sets of national values. The factor that incorporates an achievement value actually relates negatively to growth, but as the author himself states (p. 468): "this factor is so peculiar and explains such a relatively small proportion of the variance of the value sample that it is difficult to make much sense of such a result." Assuming that all measures of entrepreneurial culture used in our paper are to some extent relevant, our empirical results show that there is no robust significant relationship between entrepreneurial culture and nascent entrepreneurship.

3. The third interpretation is a mix of the two above interpretations. The theory may be partly right, in the sense that a value system characterized by a strong emphasis on entrepreneurial behaviour may indeed be reflected in a higher level of *overall* entrepreneurial activity, but this need not necessarily be reflected in higher levels of *nascent* entrepreneurship. The positive effect may for example be offset by countervailing effects like an institutional system that is not conducive to new business start-ups. In such a case, it may be that an entrepreneurial culture primarily affects the way existing firms operate and may have economic effects through intrapreneurship, but not through higher start-up rates.

Which implications do our findings suggest for future research? Although weak, we do find some support for the thesis that entrepreneurial culture matters in explaining entrepreneurship rates. However, in order to test this more fully, we need to take multiple factors at multiple levels into account. Becoming an entrepreneur is an individual decision, and the decision to do so is based on the interplay between individual level factors as has been shown in trait research and environmental factors, of which the overall culture may indeed be an important aspect. Hence, a fruitful way forward might be to apply multilevel approaches in order to increase our understanding of country-specific differences in levels of entrepreneurship.

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Appendix

Overview of the countries included

	GEM 2002	GLOBE	Lynn	GIL	McClelland	WVS 1999
Argentina	×	×	×	×	×	×
Australia	×	×	×	×	×	×
Belgium	×		×	×	×	×
Brazil	×	×	×	×	×	×
Canada	×	×	×	×	×	×
Chile	×		×	×	×	×
China	×	×	×			×
Taiwan	×	×	×	×		×
Denmark	×	×				

(*continued*)

(Continued)

	GEM 2002	GLOBE	Lynn	GIL	McClelland	WVS 1999
Finland	×	×		×	×	×
France	×	×	×	×	×	×
Germany	×	×	×	×	×	×
Hungary	×	×		×	×	×
Iceland	×		×	×		×
India	×	×	×	×	×	×
Ireland	×	×	×	×	×	×
Italy	×	×		×	×	×
Japan	×	×	×	×	×	×
Korea	×	×	×			×
Mexico	×	×	×	×	×	×
Netherlands	×	×		×	×	×
New Zealand	×	×	×	×	×	×
Norway	×		×	×	×	×
Poland	×	×	×	×	×	×
Russia	×	×		×	×	×
Singapore	×	×	×	×		×
Slovenia	×	×		×		×
South Africa	×	×	×	×	×	×
Spain	×	×	×	×	×	×
Sweden	×	×	×	×	×	×
Switzerland	×	×	×	×	×	×
Thailand	×	×	×	×	×	
United Kingdom	×	×	×	×	×	×
United States	×	×	×	×	×	×

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Chapter 12
Explaining Cross-National Variations in Entrepreneurship: The Role of Social Protection and Political Culture

Martin Robson

Explaining cross-national variations in entrepreneurship: the role of social protection and political culture (first published in: Comparative Labor Law & Policy Journal, Vol. 28, No. 4, 2007)

1 Introduction

Among academics and policy-makers, there is increasing recognition of the importance of a successful entrepreneurial sector to the promotion of wealth creation and economic prosperity.[1] However, there remains considerable debate over the question of what kind of economic environment provides the best conditions for entrepreneurial activity. In the literature on entrepreneurship, a long line of work dating back to the seminal contribution of Knight (1921) emphasises the role of entrepreneurs as risk takers, who seek out new opportunities and develop new products and processes in an environment of uncertainty. Under this view, the agents in an economy who are drawn into entrepreneurship are those with the least aversion to risk (see Kihlstrom and Laffont 1979, for example). However, formal theoretical models generate ambiguous predictions concerning the effects of an increase in risk on the rate of entrepreneurship in an economy. A priori, therefore it is unclear whether mechanisms designed to reduce the degree of risk faced by individuals in an economy will tend to promote or discourage the level of entrepreneurship.

In economies throughout the world, governments have developed a variety of social protection mechanisms that aim to protect individuals against the risk of fluctuations in the economic environment. These include the provisions of benefits to individuals out of work, regulations to protect workers against the threat of dismissal and the provision of welfare benefits in times of sickness and ill health. In this paper, we seek to examine whether mechanisms aimed at reducing individuals' exposure to the risk of shocks to the economy help to promote entrepreneurial activity or whether instead they tend to discourage entrepreneurship, perhaps by restricting the rewards for entrepreneurial success.

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[1] See, for example, Audretsch and Keilbach (2004), van Stel et al. (2005) and Acs et al. (2005).

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A number of previous studies have found evidence of a negative relationship between the level of unemployment benefits and the rate of self-employment in an economy (which is often taken as a proxy for the prevalence of entrepreneurship) – e.g. Ilmakunnas and Kanniainen (2001), Parker and Robson (2004) – though work by Torrini (2005) suggests that this relationship may be non-robust. In addition, work has been done on examining the relationship between self-employment and the strictness of employment protection legislation in an economy and here too there is conflicting evidence. While studies by Grubb and Wells (1993) and OECD (1992, 1999) find evidence of a positive relationship between the strictness of employment protection legislation and the rate of self-employment, more recent work by Robson (2003) and Torrini (2005) using pooled cross-section time-series data has cast doubt on the validity of these findings.

In each of these areas, the work that has been done has focused on experiences in the developed market economies of the OECD. In contrast, the current study examines data from a much broader cross-section of countries, including a range of less developed and middle-income economies, the transition economies of Eastern Europe and the former Soviet Union, and China. Drawing on a dataset compiled by Botero et al. (2004), we examine the relationship between the level of social protection in an economy and measures of the incidence of entrepreneurship.

In studying this relationship, we make allowance for the effect that the institutional and political environment within an economy may have in shaping attitudes to entrepreneurship and the incentives that individuals have to engage in entrepreneurial activity. In particular, we examine the effect of regulations that govern the administrative requirements for starting up a business and include an indicator variable for whether a country is a current or former centralised command economy. The latter is included in recognition of the lasting effects that might be experienced in such economies as a legacy of the system of central planning and a communist political culture that tended to take an unfavourable or even hostile stance towards self-employment and entrepreneurship.

The outline of the rest of the paper is as follows. In Section "Model Specification and Data," we discuss the specification of the empirical models to be estimated in the paper and describe the data used in the analysis. The following section reports details of the regression results, while section "Summary and Conclusions" presents the main conclusions of the study.

2 Model Specification and Data

We follow convention and use the rate of self-employment as our main proxy for the level of entrepreneurship in an economy. We use measures both of total self-employment and the percentage of own-account workers, i.e. self-employed individuals without employees. Additionally, in view of the well-known limitations of self-employment as a measure of entrepreneurship, for a smaller sample of countries we use data from the Global Entrepreneurship Monitor (GEM) on the

prevalence of nascent entrepreneurship, where the latter is defined as the number of people actively attempting to start a business as a percentage of the adult population.[2]

We obtain data on the rate of self-employment from the ILO Yearbook of Labour Statistics for a total of 66 countries. In the year 2001, this ranged from a high of 44.8% in Columbia to a low of 6.8% in Norway, with an average across the countries in our sample of 23.1% (see Table 1). In general, rates of self-employment tend to be highest in less developed economies, an observation that has been documented formally in studies by a number of authors, including Schultz (1990), Yamada (1996) and Iyigun and Owen (1998). In contrast, Acs et al. (1994) argue for the existence of a U-shaped relationship between the rate of self-employment and the level of economic development.

GEM data on the rate of nascent entrepreneurship is available for the year 2002 for a smaller sample of 36 countries.[3] Table 2 shows that within this sample the rate of nascent entrepreneurship ranged from a maximum of 11.6% in Thailand to a minimum of 0.9% in Japan. Unsurprisingly, for the 32 countries for which we have data on both the rate of self-employment and the rate of nascent entrepreneurship there is a fairly close correspondence between the two measures (see Fig. 1).[4] Note however, that while the rate of self-employment provides a proxy for the level of entrepreneurship at a particular point in time, the rate of nascent entrepreneurship provides a picture of the dynamics of entrepreneurship.

In examining the empirical relationship between social protection and entrepreneurship it is important to control for other factors, apart from political culture, that might help to influence the rate of self-employment in an economy. As noted above, the level of economic development of the economy is likely to be a significant factor. To control for this, we include in the list of explanatory variables the log of real per capita GNP. In addition, we include the share of employment in agriculture as a percentage of total employment as this sector tends to account for a relatively high proportion of output and employment in less developed economies, and is often characterised by a relatively high incidence of self-employment.

[2]In addition to the conceptual issue of whether self-employment can truly be viewed as synonymous with entrepreneurship – a view that might be considered particularly contentious in the context of self-employment in less developed economies – there are measurement issues as well, relating to differences between countries in the way that self-employment is defined. For instance, in some countries only own account workers are included in the definition of self-employment, while in other countries the definition is extended to include self-employed individuals who employ others. To some extent, the latter problem is addressed in the current study through the estimation of separate equations for the rate of total self-employment and the percentage of own account workers. However, the effects of other national differences in data definitions will remain. In principle, this problem could be addressed through the estimation of fixed effects panel data models. However, constraints on data availability – in particular on the availability of measures of social protection for a sufficiently broad cross-section of economies – preclude such an approach in the current study.

[3]I am grateful to André van Stel and Roy Thurik for providing me with a copy of this data.

[4]The correlation coefficient between the two series is 0.61.

Table 1 Self-employment as a percentage of all persons in employment, 2001

Highest	(%)
Colombia	44.8
Indonesia	44.7
Madagascar	43.7
Dominican Republic	43.5
Peru	43.1
Pakistan	43.0
Kyrgyz Republic	42.5
Zambia	40.6
Kazakhstan	39.9
Vietnam	38.6
Lowest	(%)
Latvia	10.3
Sweden	10.0
Germany	9.9
United Kingdom	9.5
France	8.9
Denmark	8.8
Tanzania	8.3
Uruguay	7.3
Senegal	7.0
Norway	6.8
Average (n = 66)	23.1%
Standard deviation	11.61

Note: the data refer to the rate of total self-employment including own-account workers and self-employed individuals who employ others
Source: ILO yearbook of labour statistics

Table 2 Nascent entrepreneurs as a percentage of the adult population, 2002

Highest	(%)
Thailand	11.6
India	10.9
Chile	10.4
Mexico	9.2
New Zealand	9.1
Argentina	8.5
United States	7.1
Canada	5.9
Korea	5.9
Brazil	5.7
Lowest	(%)
Netherlands	2.6
United Kingdom	2.5
France	2.4
Spain	2.2
Belgium	2.1
Hong Kong	2.0
Sweden	1.8
Taiwan	1.3
Russian Federation	1.1
Japan	0.9
Average (n = 36)	4.6%
Standard deviation	2.81

Source: Data from the Global Entrepreneurship Monitor (GEM)

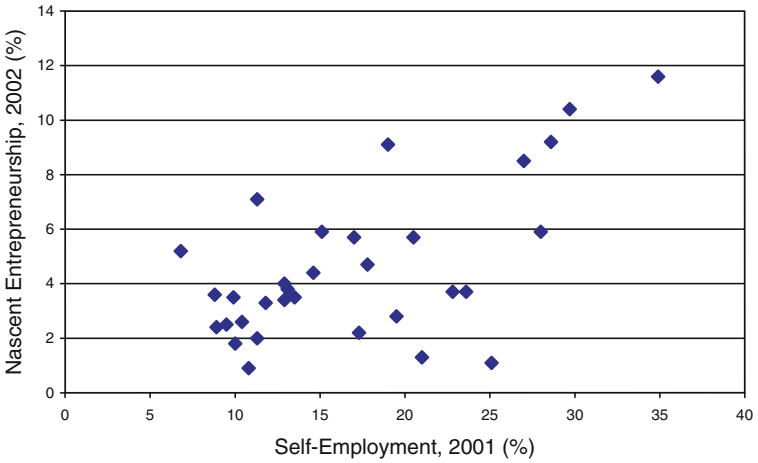

Fig. 1 Scatter plot of the self-employment rate and the rate of nascent entrepreneurship, 32 countries
Note: The data refer to total self-employment as a percentage of all persons in employment and GEM data on the number of nascent entrepreneurs as a percentage of the adult population

As economies develop, resources tend to shift out of the agricultural sector, firstly into manufacturing and then later into services. While much of manufacturing industry tends to be characterised by a relatively high minimum efficient scale relative to total output and thus a relatively low rate of self-employment, in the service sector the prevalence of small-scale operations tends to be much greater. Other things equal, therefore, we might expect to observe a positive relationship between the rate of self-employment in an economy and the size of the service sector and we allow for this by including the share of service sector employment as a percentage of total employment as one of the explanatory variables in our models.

In the literature on self-employment and entrepreneurship, there is considerable debate over the extent to which the propensity for self-employment is influenced by measures of formal education. While there is general agreement that entry and survival in entrepreneurship is likely to be facilitated by the possession of entrepreneurial human capital, there is no clear consensus on how this concept should best be measured. Evidence both from microeconometric analyses and studies using more aggregated data produces mixed findings concerning the influence of measures of formal education on the incidence of self-employment, and a reason for this may be that the skills that are required for a successful career in entrepreneurship are only weakly proxied by such measures.[5] Nonetheless, in the absence of better

[5]Studies that find a positive effect of education on the probability of self-employment include Rees and Shah (1986), Evans and Leighton (1989) and Henley (2004), while studies by Evans (1989), de Wit and van Winden (1989) and Kidd (1993) report that a higher level of education reduces entry into self-employment. Interestingly, Burke et al (2000) find that amongst workers in the

proxy variables, we include a measure of the average number of years of schooling amongst members of the adult population in our regressions to try to capture the effect that differences in levels of entrepreneurial human capital may have on the incidence of entrepreneurship across countries.

2.1 Measures of Social Protection

As our primary indicator of the influence of social protection on the incentives for entrepreneurship, we focus on the role of the unemployment benefit system in an economy. As noted in the Introduction, the influence of the level of unemployment benefits has been examined in a number of previous studies. In general, the underlying hypothesis in these studies is that a high level of unemployment benefits – in particular, a high ratio of benefits to wages – encourages unemployed workers to wait longer for job openings in the paid-employment sector and discourages them from entering self-employment. Alternatively, however, it might be the case that through providing a social safety net in the event of business failure a generous system of unemployment benefits could actually encourage individuals to experiment with a career in entrepreneurship.

In relation to each of the preceding hypotheses, it is important to recognise that the ratio of unemployment benefit to wages – the replacement ratio – is only a partial indicator of the generosity of the unemployment benefit system. Other relevant considerations include the length of time for which benefits can be claimed and the strictness of the criteria that must be satisfied in order for claimants to be eligible to receive payments. In recognition of this, the dataset compiled by Botero et al. (2004) includes a measure of the replacement ratio, which is then combined with indicators of the strictness of the eligibility criteria for entitlement to benefits to form an overall index of the generosity of the unemployment benefit system in an economy. In the empirical analysis below, we experiment with including the replacement ratio and the overall index of benefit generosity as alternative measures of the impact of the unemployment benefit system on the incentives for entrepreneurship.

As further indicators of the generosity of the system of social protection in an economy, we include the measures compiled by Botero et al. of the generosity of sickness and old age benefits. While employers will often provide their employees with insurance against the effects of ill-health – at least for short periods of illness – by continuing to pay them during periods of sickness absence, for self-employed workers losses of income during periods of sickness can be a major source of risk.

United Kingdom while possession of formal educational qualifications tends to reduce the probability of self-employment, individuals who have participated in apprenticeship training are more likely to be self-employed. This suggests that the practical skills developed during the course of an apprenticeship may be more relevant to a career in entrepreneurship than formal academic qualifications.

While private sector sources of ill-health insurance may be available, problems of moral hazard and adverse selection may mean that this is prohibitively expensive. In such circumstances, access to a generous system of publicly provided sickness benefits may be important in helping to address this particular element of the risks associated with entrepreneurship.

The provision of welfare benefits for the elderly is a means through which society insures individuals against the risk of low income in old age. It is argued by Sinn (1996) that by affording individuals with a degree of protection against the risk of variations in their lifetime incomes the provision of this type of social insurance mechanism might increase the willingness of individuals to engage in risk taking activities. The intuition for this argument is that individuals will seek to translate some of the benefit from a reduction in risk into a higher expected lifetime income by taking additional risks. In view of this argument it is hypothesised that we might expect to observe a positive relationship between the generosity of the system of welfare benefits for the elderly and the rate of self-employment and nascent entrepreneurship in an economy.

In the case of both sickness and old age benefits, a key component in the generosity of the benefit system is the extent to which the level of benefit payments is conditional on contributions made by the individual. In each case, the indices compiled by Botero et al. take account both of the months of contributions or employment required to qualify for the relevant benefit in each of the countries covered and the percentage of the worker's monthly salary deducted by law for benefit contributions. In addition, in the case of sickness benefit, the measure takes account of the waiting period before benefits are paid and the percentage of net salary covered by net sickness cash benefit for a two-month spell of illness. For old age benefits, the measure takes account of the difference between the official retirement age and life expectancy at birth and the percentage of the worker's net pre-retirement salary covered by the net old age pension benefit.[6]

As noted in the Introduction, the other main mechanism through which governments frequently seek to protect workers against the risk of fluctuations in income due to exogenous shocks is through regulations designed to restrict the ability of firms to dismiss their employees. For measures of the strictness of employment protection legislation, we again draw on data compiled by Botero et al. From their

[6]The measures of welfare benefits compiled by Botero et al do not take into account the possibility that the eligibility criteria and level of assistance provided to self-employed workers may differ from those for individuals in paid employment. In the United Kingdom, for example, self-employed workers typically pay a lower rate of contributions to the state national insurance system and in exchange receive a lower entitlement to benefits. Unfortunately, cross-national data on differences in the benefit rules governing self-employed and paid-employed workers is not widely available, which limits attempts to control for this type of effect in empirical analysis. In their analysis of a limited range of countries, Hessels et al. (2007) find that in general differences in the value of social security benefits paid to self-employed and paid-employed workers do not have a significant effect on the level of entrepreneurial activity.

dataset, we take two measures. The first is a measure of firing costs, calculated as the cost of firing 20% of the firm's workers (10% of whom are fired for redundancy, 10% without cause), who have been employed for a minimum of 3 years. The cost is calculated taking account of the statutory period of notice, the level of statutory severance pay, and any mandatory penalties established by law or by mandatory collective agreements. The second measure is an index of the extent of protection granted to workers against the threat of dismissal, either by law or by mandatory collective agreements. Amongst other things, the measure takes account of whether an employer is obliged to give notice to or seek permission from third parties prior to dismissing a worker, either due to redundancy or for other reasons.[7]

The measures of benefits and employment protection legislation compiled by Botero et al. are calculated using data for 1997. To avoid any potential problems of endogeneity and to gauge more accurately the effect of these variables on the incidence of entrepreneurship, we use measures of the rate of self-employment and nascent entrepreneurship for the year 2001 and 2002, respectively. In addition, as a check on the sensitivity of the results to the choice of year in which the dependent variable is measured, we re-run the regressions for the rate of self-employment using data for the year 2000. Due to missing data on one or more of the independent variables (principally, the measures of sectoral employment shares), the sample size for the regressions for the rate of self-employment is limited to 56 observations when using data for 2001 and 54 when using data for the year 2000. For analysing the determinants of the percentage of own-account workers, we have 51 and 46 observations, respectively.[8] The relatively small number of observations in each case means that care needs to be exercised when interpreting the results reported in the next section, though the hope is that by analysing data for a number of different measures of entrepreneurship a reasonably consistent pattern of evidence on the relationships of interest may emerge.

[7]For the 28 member countries of the OECD, the measures of employment protection compiled by Botero et al. (2004) can be compared with the frequently used indices of employment protection legislation (EPL) compiled by the OECD. Unsurprisingly perhaps, comparisons between the Botero et al. measures and values of the OECD indices for 1998 (as reported in OECD, 2004) show a positive correlation. However, this correlation is not as strong as might be expected. For instance, the correlation coefficient between Botero et al.'s measure of firing costs ('Firecost') and the OECD's overall index of the strictness of EPL is 0.43, while the correlation between Botero et al's measure of the protection against dismissal ('Dismiss') and the OECD index of the strictness of EPL is 0.61. The correlation coefficient between Firecost and the comparable OECD index of the strictness of regulations governing collective dismissals for 1998 is 0.22, while the correlation between Dismiss and the OECD index of regulations covering individual dismissals is 0.58.

[8]A list of countries included in each set of observations is given in an appendix.

3 Results

Table 3 presents the regression results for equations with the total rate of self-employment in 2001 as the dependent variable. This measure includes both own account workers and self-employed individuals who employ others. The equations are estimated by OLS, with t-ratios based on White heteroscedasticity-consistent standard errors given in parenthesis. The first column presents the results for a 'baseline' specification, which excludes measures of social protection but

Table 3 Regression results for total self-employment, 2001

	(1)	(2)	(3)	(4)	(5)	(6)
ln GNP per capita	−3.127**	−2.916**	−3.451**	−4.307***	−3.514**	−5.531**
	(2.26)	(2.08)	(2.58)	(3.33)	(2.58)	(2.21)
% Agriculture	0.372**	0.306	0.269	0.201	0.312*	0.200
	(2.02)	(1.61)	(1.42)	(1.03)	(1.80)	(1.22)
% Services	0.429***	0.351*	0.383*	0.336*	0.417**	0.247
	(2.29)	(1.79)	(1.98)	(1.80)	(2.29)	(1.43)
Years of schooling	−1.224**	−1.056*	−0.829	−0.783	−0.659	−0.135
	(2.29)	(1.90)	(1.42)	(1.38)	(1.14)	(0.25)
ln procedures to start a business	4.303**	4.480**	4.673**	5.649**	4.755**	4.726**
	(2.05)	(2.13)	(2.27)	(2.63)	(2.36)	(2.61)
Replacement ratio		−4.591*				
		(1.73)				
Unemployment benefits index			−7.989**	−7.118*	−7.466*	−4.799
			(2.12)	(1.73)	(1.88)	(1.26)
Sickness benefits				−1.684		
				(0.34)		
Old age benefits				18.013*		
				(1.70)		
Firing costs					6.649	
					(1.39)	
Dismissal procedures					−4.811	
					(1.37)	
Former command economy						−7.356***
						(2.93)
Constant	18.611	22.208	26.778	25.161	21.710	46.790**
	(0.79)	(0.93)	(1.16)	(1.13)	(0.99)	(2.21)
Adjusted R^2	0.603	0.605	0.676	0.647	0.639	0.679
SSE	2463.926	2397.968	2206.866	2057.115	2104.726	1909.050
Normality	3.23	3.67	0.64	0.88	1.56	1.40

The dependent variable is the rate of total self-employment as a percentage of all persons in employment

Number of observations = 56

Notes: The coefficients are estimated by Ordinary Least Squares, with absolute t-ratios based on White heteroscedasticity-consistent standard errors shown in parenthesis below. *Asterisks* denote that a coefficient is significant at the 10% (*), 5% (**), or 1% (***) significance level on a two-tail test. SSE denotes the equation sum of squared residuals. Normality is the Jarque–Bera test of normality in the regression disturbances. It has an asymptotic χ^2 distribution with 2 degrees of freedom

See text for variable definitions and data sources

which includes as explanatory variables the log of per capita GNP in 1997; the share of agriculture and services, respectively, in total employment; average years of schooling among members of the population aged over 25; and as a measure of regulations governing business start-ups the natural log of the number of procedures a start-up business has to comply with in order to obtain legal status. The data for the employment shares of agriculture and services relate to 1999 and come from the ILO Key Indicators of the Labour Market, made available on-line through Economic and Social Data Service (ESDS) International. The data on years of schooling and the numbers of procedures required to start a business are taken from Botero et al. (2004), though in the case of the former the original source is Barro and Lee (2000), while for the latter the data come originally from Djankov et al. (2002). The years of schooling data are the average of figures for 1995 and 2000, while the data on the number of procedures required to start a business relate to the position in 1999.

As might be expected, the results show that other things equal the rate of self-employment is higher in countries with a relatively low level of GNP per capita and relatively high shares of employment in agriculture and services.[9] Increases in the average years of schooling among members of the adult population appear to have a negative effect on the rate of self-employment, other things equal, suggesting that the returns to formal education are higher in the waged sector than in self-employment – a result that is consistent with some of the microeconometric evidence on the effect of formal education on the propensity for entrepreneurship. Finally, increases in the number of procedures required to start a business seem to have a positive effect on the rate of self-employment, other things equal. As the measure constructed by Djankov et al. (2002) relates to the number of procedures faced by reasonably large sized businesses, a possible explanation for the latter finding might be that this variable is acting as a proxy for the presence of more general regulatory barriers to the growth of small firms.[10] Thus, while entrepreneurs in economies in which there are a relatively large number of entry regulations for larger firms might find it relatively easy to set up in self-employment there may be barriers that inhibit them from expanding the size of their business.

In the second and third columns, we introduce measures of the generosity of the system of unemployment benefits in an economy. Column (2) includes the replacement ratio as an explanatory variable, which is the benefit measure that has been used in a number of previous studies using OECD data. The coefficient on this variable is negative and statistically significant at the 10% level (on a two-tail test),

[9]We experimented with a quadratic specification for the effect of per capita GNP on the rate of self-employment but this produced a weaker fit to the data than the semi-log specification shown. In addition we experimented with equations in which the dependent variable was specified in logarithmic form but this often resulted in equations with non-normally distributed errors.

[10]Djankov et al. (2002) construct their measures of the regulations governing business start-ups for a standardised firm, which amongst other things has the property that it is a limited liability company, which one month after the commencement of operations has between 5 and 50 employees. Clearly, this is a significantly larger organisation than the typical self-employed business.

indicating that, other things equal, a more generous system of unemployment benefit tends to discourage workers from taking on the risks associated with entrepreneurship. Stronger evidence in support of this hypothesis is provided in column (3), in which the replacement rate is replaced by the overall index of the generosity of the unemployment benefit system compiled by Botero et al. (2004). Like their measures of the generosity of sickness and old age benefits, the latter takes account of additional factors such as the regulations governing the contributions that workers are required to make in order to be entitled to benefits and the waiting period before benefits can be claimed.

In column (4) of the Table, the indices of sickness and old age benefits are added to the list of explanatory variables. The former turns out to be statistically insignificant but the latter has a positive coefficient that is just significant at the 10% level. This finding suggests, therefore, that a more generous system of income support for workers in old age might have the effect of encouraging entry into self-employment for workers earlier in their working lives. This supports the suggestion made earlier – based on the argument of Sinn (1996) – that by providing individuals with a degree of insurance against risks to their lifetime income a generous system of old age benefits might increase the willingness of individuals to engage in entrepreneurial activity.

In contrast to the above, the results in column (5) indicate that measures of the strictness of employment protection legislation have no statistically significant effect on the rate of self-employment in an economy. These results therefore further contradict the initial findings of Grubb and Wells (1993) and OECD (1992, 1999) on this issue.

Column (6) introduces the dummy variable for whether a country is a former command economy. The coefficient of this variable is negative and strongly significant and an effect of its inclusion is to impact severely on the significance of the indicator of the generosity of the unemployment benefit system and the coefficients of a number of the other explanatory variables in the model. The size of the coefficient on the dummy for former command economies indicates that, other things equal, the experience of being or having been governed by a communist regime reduces the rate of self-employment in an economy by an average of over 7 percentage points. For the transition economies of Eastern Europe and elsewhere – which by 2001 had formally abandoned communism for the best part of a decade or more – the size of this effect highlights the long-lasting impact created by a system of central planning and a political culture that was strongly biased against entrepreneurship.

Table 4 repeats the regression analysis reported above but this time using the percentage of own account workers as a share of total employment (in 2001) as the dependent variable. On the whole, the results are similar to those from the previous analysis, as might be expected. However, there are some key differences, which are highlighted below. As in the analysis of total self-employment, there is fairly strong evidence that the percentage of own-account workers as a share of total employment is negatively related to the level of per capita GNP in an economy. There is consistent evidence too that the percentage of own-account workers is

Table 4 Regression results for own-account workers, 2001

	(1)	(2)	(3)	(4)	(5)	(6)
ln GNP per capita	−2.909**	−2.735*	−3.316**	−3.874**	−3.052**	−4.602**
	(2.05)	(1.86)	(2.52)	(2.69)	(2.15)	(2.64)
% Agriculture	0.491**	0.432**	0.377*	0.327	0.416**	0.338*
	(2.37)	(2.07)	(1.83)	(1.45)	(2.23)	(1.74)
% Services	0.580***	0.508**	0.527**	0.484**	0.566***	0.446**
	(2.75)	(2.33)	(2.45)	(2.20)	(2.82)	(2.11)
Years of schooling	−1.346**	−1.188*	−0.859	−0.810	−0.795	−0.351
	(2.02)	(1.71)	(1.19)	(1.11)	(1.07)	(0.52)
ln procedures to start a business	4.988**	5.101**	5.341**	6.217**	5.310**	5.287**
	(2.31)	(2.34)	(2.38)	(2.51)	(2.50)	(2.52)
Replacement ratio		−4.01				
		(1.33)				
Unemployment benefits index			−8.852**	−7.580	−8.800*	−6.709
			(2.18)	(1.68)	(1.97)	(1.42)
Sickness benefits				−3.869		
				(0.78)		
Old age benefits				12.560		
				(0.904)		
Firing costs					8.844	
					(1.68)	
Dismissal procedures					−3.119	
					(0.73)	
Former command economy						−4.927
						(1.43)
Constant	0.833	4.268	10.175	10.220	1.609	22.915
	(0.03)	(0.16)	(0.41)	(0.41)	(0.07)	(0.84)
Adjusted R^2	0.567	0.565	0.610	0.607	0.610	0.623
SSE	2645.460	2600.207	2332.188	2241.088	2224.312	2200.476
Normality	1.75	1.79	0.97	1.55	1.09	0.87

The dependent variable is the number of own-account workers as a percentage of all persons in employment

Number of observations = 51

Notes: The coefficients are estimated by Ordinary Least Squares, with absolute t-ratios based on White heteroscedasticity-consistent standard errors shown in parenthesis below. *Asterisks* denote that a coefficient is significant at the 10% (*), 5% (**), or 1% (***) significance level on a two-tail test. SSE denotes the equation sum of squared residuals. Normality is the Jarque–Bera test of normality in the regression disturbances. It has an asymptotic χ^2 distribution with 2 degrees of freedom

See text for variable definitions and data sources

positively related to the share of employment in services and the number of legal procedures required in order to start a business. In relation to the main issues of interest in the current study, there is evidence once again that the generosity of the system of unemployment benefit has a negative effect on the rate of self-employment, with the effect again being more strongly determined when the overall index of the generosity of the benefit system is included as an explanatory variable rather than the replacement ratio.

Two key differences with the previous set of results are that the index of the generosity of old age benefits and the dummy variable for the former command economies fail to achieve significance in the regression equation for own-account workers. The latter finding suggests that the legacy effect of a communist political culture is stronger for larger self-employment businesses than it is for micro-businesses in which there are no employees. The inclusion of the dummy for the former command economies, however, once again impacts on the significance of the index of unemployment benefits, suggesting that there may be a close correlation between these two variables, with benefit systems being more generous, on average, in the countries that previously were under communist rule.[11]

In view of the relatively small number of observations and to check whether the results from the preceding analysis may be sensitive to the choice of year in which the data on the dependent variable is measured, Table 5 presents selected results from regression equations estimated using data for the year 2000. The first three columns present results for equations with the rate of total self-employment as a percentage of all individuals in employment as the dependent variable, while the remaining three columns show the equivalent specifications with the percentage of own-account workers as the dependent variable. The first and fourth columns repeat the specification from column (3) of Tables 3 and 4. The results are broadly consistent with those estimated previously, though this time the variable, *years of schooling*, is found to have a statistically significant negative effect on the incidence of entrepreneurship. The main finding is that the incidence of entrepreneurship again appears to be negatively related to the index of the generosity of the unemployment benefit system in an economy. Once again, however, this result appears to be sensitive to the inclusion of the dummy variable for former command economies. Indeed, the impact on the significance of the unemployment benefits variable appears to be much more severe in this case than in the regressions estimated using data for 2001. A note of caution with respect to the interpretation of these results, however, is that the introduction of the dummy for former command economies introduces evidence of severe non-normality in the disturbances of the equations for the percentage of own-account workers, meaning that strictly speaking no valid inferences can be drawn from the t-ratios of the coefficients of the affected equations.

A final point of note from the set of equations reported in Table 5 is that the index of the extent of protection given to workers against the threat of dismissal emerges with a negative and strongly significant coefficient – at least in the equation for the rate of total self-employment, for which inference is most valid. This result is in sharp contrast to the estimates obtained earlier using data for 2001.

[11] An inspection of the data provides some support for this view. For the sample of 56 countries used in our analysis of the determinants of the rate of self-employment in 2001 the average value of the index of unemployment benefits is 0.7147 in the former command economies compared with an average of 0.5768 for the other countries in the data sample. However, the difference between the two values is just short of statistical significance at conventional levels of significance ($t = 1.61$).

Table 5 Regression results on data for 2000

	Total S.E.	Total S.E.	Total S.E.	Own-account workers	Own-account workers	Own-account workers
ln GNP per capita	−2.021	−4.707***	−4.656***	−3.474***	−5.700***	−5.386***
	(1.52)	(3.72)	(3.66)	(2.79)	(3.76)	(3.14)
% Agriculture	0.392*	0.249	0.327**	0.367*	0.283*	0.341**
	(1.81)	(1.54)	(2.16)	(1.76)	(1.83)	(2.38)
% Services	0.505**	0.248	0.285*	0.479**	0.303*	0.334*
	(2.27)	(1.49)	(1.93)	(2.20)	(1.76)	(2.00)
Years of schooling	−1.812***	−0.801	−0.724	−1.426*	−0.386	−0.488
	(3.02)	(1.44)	(1.44)	(1.88)	(0.62)	(0.80)
ln procedures to start a business	3.895*	3.797**	4.241**	3.771	3.742*	4.073**
	(1.74)	(2.10)	(2.58)	(1.60)	(1.84)	(2.31)
Unemployment benefits index	−8.088*	−2.822	−1.053	−8.435*	−4.799	−3.596
	(1.98)	(0.80)	(0.29)	(1.84)	(0.93)	(0.63)
Firing costs			3.309			5.485
			(0.78)			(1.07)
Dismissal procedures			−7.886***			−6.786**
			(3.15)			(2.41)
Former command economy		−11.20***	−10.08***		−8.993***	−7.773**
		(4.21)	(4.01)		(2.87)	(2.36)
Constant	14.86	47.33**	42.19**	22.52	45.61*	39.17
	(0.57)	(2.16)	(2.02)	(0.89)	(1.87)	(1.48)
Adjusted R^2	0.686	0.776	0.797	0.698	0.755	0.766
SSE	1957.620	1366.638	1188.847	1723.429	1360.919	1234.432
Normality	0.59	1.09	1.25	1.72	16.87***	30.08***
Number of observations	54	54	54	46	46	46

The dependent variable in the first three columns is the rate of total self-employment as a percentage of all individuals in employment. In the remaining columns the dependent variable is the percentage of own-account workers in total employment. Both variables are dated at the year 2000

Notes: The coefficients are estimated by Ordinary Least Squares, with absolute t-ratios based on White heteroscedasticity-consistent standard errors shown in parenthesis below. *Asterisks* denote that a coefficient is significant at the 10% (*), 5% (**), or 1% (***) significance level on a two-tail test. SSE denotes the equation sum of squared residuals. Normality is the Jarque–Bera test of normality in the regression disturbances. It has an asymptotic χ^2 distribution with 2 degrees of freedom

See text for variable definitions and data sources

It suggests the possibility that strict employment protection legislation might discourage individuals from taking up self-employment, in contrast to the suggestion made by Grubb and Wells (1993) and OECD (1992, 1999) that such legislation might have the effect of promoting self-employment by encouraging firms to make greater use of outside contractors. Parker (1997) derives a theoretical model which shows that, other things equal, the rate of self-employment will tend to be lower the greater the risk associated with income in self-employment relative to the risk of earnings in paid employment. If stricter employment protection legislation has the

effect of reducing the risk of earnings in paid-employment relative to the risk of self-employment incomes this could explain the findings obtained here. One should be careful of reading too much into this result, however, as it has been shown not to hold in data for 2001. Nevertheless, the finding suggests that further research on this issue might be useful.[12]

3.1 Nascent Entrepreneurship

We turn next to consider the results for our third measure of entrepreneurship in an economy, the rate of nascent entrepreneurship – defined as the number of people actively attempting to start a business as a percentage of the adult population. As noted above, this measure provides us with an estimate of the rate of inflow into entrepreneurship and may therefore be interpreted as an indicator of the dynamics of entrepreneurship in an economy.

We begin, as before, with a baseline specification that excludes the various measures of social protection considered in the previous analysis (column (1) of Table 6).[13] In this case, however, the details of the baseline specification differ in two key respects from those estimated in our earlier investigation of the determinants of cross-national variations in the rate of self-employment. Firstly, we follow Wennekers et al. (2005) by estimating a quadratic specification of the relationship between the level of per capita GNP and the rate of nascent entrepreneurship in an economy. The signs of the coefficients on the two terms in per capita GNP indicate a U-shaped relationship between per capita GNP and the rate of nascent entrepreneurship, in keeping with the findings of Wennekers et al. though the coefficient on the quadratic term itself is not statistically significant.[14] Secondly, we include the dummy for former command economies in the baseline specification. As in Wennekers et al. (2005) and in our earlier examination of the determinants of the rate of self-employment, this variable is found to have a strongly significant negative effect on the rate of nascent entrepreneurship in an economy.

[12]Recent research by van Stel et al. (2007) highlights a distinction between 'opportunity' and 'necessity' entrepreneurship in this context, where the former refers to individuals who enter entrepreneurship in response to a perceived business opportunity while the latter view business entry as a last resort. van Stel et al. find evidence of a negative relationship between the rate of 'opportunity' nascent entrepreneurship and an index of the rigidity of employment in an economy, where higher values of the latter reflect increasing restrictions on hiring and firing decisions. In contrast, they find evidence of a positive relationship between the cost of dismissing a redundant employee and the rate of 'necessity' nascent entrepreneurship.

[13]Note that France and India are excluded from the data sample used for the regression analysis due to missing observations on some of the explanatory variables. This leaves us with 34 observations.

[14]The contrast here with the findings of Wennekers et al. (2005) might be due to the omission of observations for India and France. Alternatively, it might reflect differences in the specification of some of the other explanatory variables included in the regression analysis.

Table 6 Regression results for the rate of nascent entrepreneurship, 2002

	(1)	(2)	(3)	(4)	(5)	(6)
GNP per capita ($\times 10^{-3}$)	−0.254	−0.290*	−0.284*	−0.192	−.268*	
	(1.67)	(1.76)	(1.90)	(1.24)	(1.84)	
[GNP per capita]^2	3.42×10^{-9}	4.24×10^{-9}	4.03×10^{-9}	2.31×10^{-9}	3.55×10^{-9}	
	(1.20)	(1.30)	(1.41)	(0.79)	(1.28)	
ln GNP per capita						−1.622*
						(2.01)
% Agriculture	0.235***	0.196**	0.180**	0.182**	0.190***	0.183***
	(3.90)	(2.71)	(2.77)	(2.68)	(2.90)	(3.37)
% Services	0.156***	0.130*	0.124*	0.108*	0.122*	0.141**
	(2.87)	(1.99)	(1.91)	(1.83)	(1.75)	(2.37)
Years of schooling	0.164	0.207	0.260	0.255	0.262	0.223
	(0.54)	(0.70)	(0.88)	(0.89)	(0.94)	(0.76)
ln procedures to start a business	−0.726	−0.769	−0.789	−1.005	−0.608	−0.558
	(0.92)	(0.96)	(1.00)	(1.12)	(0.76)	(0.76)
Replacement ratio		−1.373				
		(0.96)				
Unemployment benefits index			−2.625**	−2.824*	−2.430*	−2.501*
			(2.18)	(1.85)	(1.98)	(1.84)
Sickness benefits				3.475		
				(1.15)		
Old age benefits				−3.875		
				(1.00)		
Firing costs					−1.366	
					(0.65)	
Dismissal procedures					−0.412	
					(0.30)	
Former command economy	−2.940***	−2.835***	−2.600**	−2.946***	−2.719 ***	−2.644 **
	(3.36)	(3.18)	(2.76)	(2.99)	(3.01)	(2.54)
Constant	−3.991	−1.386	−0.076	0.425	0.110	10.71
	(0.68)	(0.21)	(0.01)	(0.06)	(0.02)	(1.47)
Adjusted R^2	0.530	0.528	0.556	0.551	0.534	0.532
SSE	88.93832	85.93500	80.71772	74.99302	77.93577	88.468
Normality	1.58	1.40	1.66	2.07	1.95	1.79

The dependent variable is the number of people who report that they are actively engaged in starting a business as a percentage of the adult population
Number of observations = 34

Notes: The coefficients are estimated by Ordinary Least Squares, with absolute t-ratios based on White heteroscedasticity-consistent standard errors shown in parenthesis below. *Asterisks* denote that a coefficient is significant at the 10% (*), 5% (**), or 1% (***) significance level on a two-tail test. SSE denotes the equation sum of squared residuals. Normality is the Jarque–Bera test of normality in the regression disturbances. It has an asymptotic χ^2 distribution with 2 degrees of freedom

See text for variable definitions and data sources

Among the remaining explanatory variables, both the percentage of workers employed in agriculture and the percentage employed in services are found to have a positive and statistically significant effect. However, in contrast to the findings for the rate of self-employment, neither average years of schooling nor the log of the number of procedures required to start a business is found to have a statistically significant effect on the rate of nascent entrepreneurship. The latter finding, which is consistent with the results of Wennekers et al. (2005), is perhaps rather surprising as it implies that increases in the height of regulatory barriers to entrepreneurial entry do not, in themselves, act as a significant impediment to the rate of new business formation in an economy, a result that is counter to much current policy thinking on this issue.[15]

Column (2) of the Table introduces the first of our measures of social protection, which is the unemployment benefit replacement ratio. The coefficient for this variable takes on a negative sign, consistent with the results for the rate of self-employment. However, it is a long way from statistical significance. In contrast, Botero et al.'s overall index of the generosity of the unemployment benefit system has a statistically significant negative coefficient, emphasising that the detrimental effect of the benefit system on the incentives for entrepreneurship depends not only on the size of benefit payments available to the unemployed but also the eligibility criteria for the receipt of benefits and the waiting time before benefits can be claimed. The coefficient for the index of unemployment benefits retains its significance when the remaining indicators of the extent of social protection – the indices of the generosity of sickness and old age benefits and the measures of firing costs and the restrictions on dismissals – are added to the regression, while these variables themselves are found to have statistically insignificant effects.[16]

Finally, in column (6) of the Table, we examine the effect of replacing the quadratic specification for the effect of GNP per capita with the natural logarithm of this variable. A comparison of the results from column (6) with those in column (3) shows that overall there is little to choose between the two specifications, however, the quadratic specification offers a slightly better fit to the data.

In summary, the results from the analysis of the determinants of the rate of nascent entrepreneurship provide further support for the notion that the social

[15]van Stel et al (2007) find evidence of a positive relationship between the number of procedures a start-up business has to comply with in order to obtain legal status and the rate of 'necessity' nascent entrepreneurship in an economy. In contrast, rates of 'opportunity' nascent entrepreneurship and actual new business formation are found to be unrelated to the number of procedures required to start up in business. The authors argue that many necessity entrepreneurs in developing countries may be able to avoid the burden of formal regulations by setting up businesses in the informal sector.

[16]Hessels et al. (2007) similarly find a statistically insignificant effect of sickness benefits on the rate of nascent entrepreneurship. However, for a limited sample of 15 countries, they find evidence of a significant negative relationship between the level of sickness benefits (relative to earnings) and the rate of total early-stage entrepreneurial activity (from GEM).

support mechanisms created to protect individuals against fluctuations in income resulting from shocks to the economy reduce the incentives that individuals have to engage in entrepreneurship. In particular, the provision of a generous system of unemployment benefits is associated with a relatively low rate of new business formation amongst members of the adult population in an economy. In addition, the results from this analysis provide confirmation that the political culture created by a history of communist rule and the strictures of a command economy results in an environment that is detrimental to entrepreneurship.[17]

4 Summary and Conclusions

In this paper we have reviewed the theoretical arguments and empirical evidence concerning the effects of mechanisms designed to protect individuals from the risk of fluctuations in income due to economic shocks on the incentives for entrepreneurship in an economy. We have seen that in general theoretical analysis produces ambiguous predictions concerning the effect that such mechanisms might be expected to have on the incidence of entrepreneurship, while the results of empirical studies are not fully conclusive. In reviewing the empirical evidence, we noted that previous studies based on cross-national data have been confined to use of data from OECD countries. In this paper, therefore, we have sought to extend the analysis of the relationship between social protection systems and the rate of entrepreneurship to embrace a wider range of countries, including a number of less developed economies, the transition economies of the former Soviet Union and Eastern Europe, and China. The main source of data for this analysis has been a set of indicators of the extent of social protection mechanisms in a range of economies from the dataset compiled by Botero et al. (2004).

In our analysis, we have found evidence that the rate of entrepreneurship in an economy – as proxied by the rate of self-employment (including own-account workers and individuals who employ others) and the rate of nascent entrepreneurship – is negatively related to an index of the generosity of the unemployment benefit system. The value of this index reflects not only the value of the benefit

[17]For each of our measures of entrepreneurship, we have experimented with alternative specifications in which the dummy variable for former command economies was replaced with a measure of the presence of left of centre parties in government (from Botero et al. 2004). Left of centre governments may be more likely to introduce policies that limit the rewards for risk taking and diminish the incentives for entrepreneurship. This alternative measure of the influence of political culture usually takes on a significantly negative coefficient in the regressions (though it tends to be insignificant in the equations for nascent entrepreneurship) and overall the results are not very different from those with the dummy for former command economies as an explanatory variable. However, the fit of the equations is generally not quite as good as those in which the latter variable is included. The results are available from the author, on request.

payments received by unemployed workers (relative to earnings) but also the strictness of the eligibility criteria for the receipt of benefits and the waiting time before benefits can be claimed. This index is shown to be a better predictor of the rate of entrepreneurship in an economy than the benefit replacement ratio alone. However, the strength of the evidence on the effect of unemployment benefits on the rate of self-employment in an economy is shown to be sensitive to the choice of year in which the dependent variable is measured.[18]

There is some evidence that the rate of self-employment – both total self-employment and those who work solely on their own-account – may be negatively related to the strictness of regulations governing the protection of workers from the threat of dismissal. This evidence is consistent with the notion that stricter employment protection legislation reduces the risk of incomes in paid employment relative to the risk of income from self-employment and so reduces the attractiveness of the latter state relative to the former. However, the evidence is significant only for data on the dependent variable from the year 2000 and is insignificant in data for the year 2001. Moreover, there is no evidence of a significant effect of employment protection regulation on the rate of nascent entrepreneurship.

The strongest evidence to emerge from the study concerns the influence of political culture on the incidence of entrepreneurship. Countries that have a history of communist rule appear to have a lower rate of entrepreneurship – whether measured by the incidence of self-employment or by the rate of nascent entrepreneurship – other things equal, than countries with more market oriented economies. It is interesting to reflect further on the reasons for this finding and the possible implications for the future development of entrepreneurship in the countries concerned. Under communist rule, the former centrally planned economies were dominated by the presence of large firms. Small and medium sized enterprises, which in market economies often provide the seedbed for the emergence of new entrepreneurial talent, were almost non-existent (Earle and Sakova 2000; McMillan and Woodruff 2002).[19] Following the collapse of communism, while governments in the transition economies have proceeded at varying speeds down the transition path towards a fully-fledged market economy – liberalising markets and freeing up bureaucratic restraints on the ability of individuals to set up

[18]Closer examination of the data provides little insight into the reasons for this. For the 51 countries for which we have observations on the total rate of self-employment in both 2000 and 2001 the correlation between the values of the observations for the two years is 0.93, while for each year the raw correlation between the total rate of self-employment and the index of the generosity of unemployment benefits is similar (−0.56 in 2000 and −0.54 in 2001). Amongst the countries for which data on the total self-employment rate is available only for one of the years in question there are no particularly obvious outliers; though in each case we observe a country in which a high rate of self-employment is coupled with a particularly low value for the index of unemployment benefits (Bolivia in 2000; Kazakhstan in 2001).

[19]For evidence on the seedbed role of small firms for entrepreneurship in market economies see, for example, Johnson and Cathcart (1979) and Wagner (2004).

in business – impediments to the emergence of entrepreneurship have often remained. Expropriation of profits through official corruption, competition from newly privatised former state-owned enterprises and a lack of access to credit facilities have been among the problems with which entrepreneurs and potential entrepreneurs in the transition economies have often had to contend. However, even where these particular problems have been absent or their prevalence reduced a key remaining problem concerns the low levels of entrepreneurial human capital that have been engendered by decades of existence under a central planning system that tended to blunt individual incentives and which was founded, in principle at least, on the notion of 'each according to his needs'. The effects of this cultural legacy may take rather longer to overcome. In the light of the growing evidence highlighting the importance of entrepreneurship to the promotion of employment and wealth creation there is a clear imperative for the policy-making authorities in the transition economies to find a means of addressing the low rates of entrepreneurship prevalent in their economies, in particular through measures to promote investment in the accumulation of entrepreneurial human capital and foster a cultural and institutional climate that is more favourable to entrepreneurship.

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Appendix

See Table 7

Table 7 List of countries included in the data sample for each of the dependent variables

Country	SE 2001	SE 2000	OWN 2001	OWN 2000	NER 2002
Argentina	•	•	•	•	•
Armenia	•		•		
Australia	•	•	•	•	•
Austria	•	•	•	•	
Belgium		•			•
Bolivia		•		•	
Brazil	•		•		•
Bulgaria			•		
Canada	•	•			•
Chile	•	•	•	•	•
China					•
Colombia	•	•	•	•	
Croatia	•	•	•	•	•
Czech Republic	•	•	•	•	

(*continued*)

Table 7 (continued)

Country	SE 2001	SE 2000	OWN 2001	OWN 2000	NER 2002
Denmark	•	•	•	•	•
Dominican Rep.	•	•	•	•	
Ecuador	•	•	•	•	
Egypt, Arab Rep.	•	•	•	•	
Finland					•
Georgia	•	•	•	•	
Germany	•	•	•	•	•
Greece	•	•	•	•	
Hong Kong	•	•	•	•	•
Hungary	•	•	•	•	•
Indonesia	•	•	•	•	
Ireland	•	•	•	•	•
Israel	•	•	•	•	•
Italy	•	•	•	•	•
Jamaica	•	•	•	•	
Japan	•	•	•	•	•
Kazakhstan	•		•		
Korea	•	•	•	•	•
Kyrgyz Republic	•		•		
Latvia	•	•	•	•	
Lithuania			•	•	
Malaysia	•	•	•	•	
Mexico	•	•	•	•	•
Netherlands	•	•			•
New Zealand	•	•	•	•	•
Norway	•	•			•
Pakistan	•	•	•	•	
Panama	•	•	•	•	
Philippines	•	•	•		
Poland	•	•	•	•	•
Portugal	•	•	•	•	
Romania	•	•	•	•	
Russian Federation	•	•	•	•	•
Singapore	•	•	•	•	•
Slovak Republic	•	•	•	•	
Slovenia	•	•	•	•	•
South Africa	•	•	•		•
Spain	•	•	•	•	•
Sweden	•	•			•
Switzerland	•	•	•	•	•
Taiwan	•	•	•	•	•
Thailand	•	•	•	•	•
Turkey	•	•	•	•	
United Kingdom	•	•			•
United States	•	•			•
Uruguay	•	•		•	
Venezuela	•	•	•	•	
Vietnam	•	•	•	•	

Variable definitions: *SE* Total self-employment as a percentage of employment; *OWN* Own-account workers as a percentage of employment; *NER* Nascent entrepreneurs as a percentage of the adult population

A • denotes that the country is included in the data sample for the dependent variable in question

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Part IV
Development Over Time

Chapter 13
Uncertainty Avoidance and the Rate of Business Ownership Across 21 OECD Countries, 1976–2004

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Uncertainty avoidance and the rate of business ownership across 21 OECD countries, 1977–2004 (first published in: Journal of Evolutionary Economics, Vol. 17, No. 2, 2007)

1 Introduction

The prevalence of business ownership, expressed as the percentage of owner/managers of incorporated and unincorporated businesses within the labor force, differs strongly between countries. Even within the relatively homogeneous subset of the world's economically most developed nations (the OECD member countries), the diversity is considerable. In Greece, approximately one in five in the labor force is a (non-agricultural) business owner, whereas in Finland approximately one in fourteen operates a business of his own (average rates 1972–2004) (see e.g. Stel van 2005; Thurik and Wennekers 2004). A well-known approach explains this disparity by differences in prosperity (Kuznets 1971). The richer the country, the fewer business owners there are. However, the first cracks in this negative relationship appeared in the late 1970s (Blau 1987; Acs et al. 1999). In fact, the negative relationship between prosperity and business ownership now seems to be breaking down in several (but not all) of the most prosperous countries, as they have shown a resurgence of business ownership rates in the past decades (see Carree et al. 2002; Stel van and Carree 2004, for an analysis of the relationship between economic development and business ownership, and Carree and Thurik 2003, for a literature survey). Moreover, the dominance of economic variables explaining business ownership rates has been questioned, and other explanatory factors, such as culture, have been brought forward (Hofstede et al. 2004).

Slowly, data material has become available showing that business ownership rates follow some U-shaped path when related to the level of economic development (Thurik and Wennekers 2004). The switch between the downward phase of this U-shape and the upward one has to do with the changing role of entrepreneurial activities. The role of entrepreneurship has changed dramatically, fundamentally

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shifting between what Audretsch and Thurik (2001) introduced as the model of the managed economy and that of the entrepreneurial economy. In particular, Audretsch and Thurik (2001) argue that the model of the managed economy is the political, social and economic response to an economy dictated by the forces of large-scale production, reflecting the predominance of the production factors of capital and (unskilled) labor as the sources of competitive advantage (see also Audretsch and Thurik 2004). By contrast, the model of the entrepreneurial economy is the political, social and economic response to an economy dictated not just by the dominance of the production factor of knowledge – which can be identified as replacing the more traditional factors as the source of competitive advantage – but also by a very different, but complementary, factor: entrepreneurship capital, or the capacity to engage in and generate entrepreneurial activity. By and large, countries first move from a predominantly rural economy with a high level of business ownership to an industrial one where scale economies dominate, and then again to a service economy where small scale entrepreneurial activities are essential in many industries (see Wennekers et al. 2005, for an example of the U-shape using data material of the Global Entrepreneurship Monitor).

Differences in the business ownership rate between countries seem to be persistent despite the U-shaped path that appears driven by the level of economic development. There is a general intuition that cultural rather than economic variables play a role in explaining these differences, since cultural aspects are relatively time invariant (Noorderhaven et al. 2004). The present paper investigates the role of uncertainty avoidance. Elsewhere the role of variables such as post-materialism and dissatisfaction is studied (Uhlaner and Thurik 2007; Noorderhaven et al. 2004).

At the individual level, the decision to become a business owner can be viewed as the outcome of a process of occupational choice. This approach views agents as utility maximizers making an occupational choice decision – to become employee or business owner – on the grounds of the utility associated with the expected returns from the two activity types.[1] Personal characteristics[2] as well as cultural, institutional and economic conditions will influence these individual choices. An aggregation of these occupational choices at the level of countries shows the cumulative and interactive influence of the different determinants (Verheul et al. 2002). In the present paper, we will focus on a specific cultural determinant of business ownership, viz., uncertainty avoidance, which to date has received only scant attention.

[1]This approach is rooted in the work of Knight (1921) and starts from the functions of the provision of entrepreneurial ability and the bearing of risks. The second function underlines the importance of risk attitudes in the occupational choice process. See, for instance, Kihlstrom and Laffont (1979) and Parker (1997), where the degree of risk aversion and the differences in risk of becoming a business owner vis-à-vis an employee are given the central role in the determination of the occupational choice. See also Freytag and Thurik (2007).

[2]See Blanchflower and Meyer (1994), Blanchflower and Oswald (1998), Douglas and Shepherd (2002), Evans and Leighton (1989, 1990), Grilo and Irigoyen (2006), Grilo and Thurik (2005, 2008) and Lin et al. (2000) for empirical work.

Our *first* research question considers the concepts of uncertainty and risk and the relevance of cultural attitudes towards uncertainty for the occupational choice with respect to business ownership. What effects of uncertainty avoidance on the choice for business ownership can be assumed to exist at the individual level, and how does this influence work at the country level? Our *second* question pertains to the direct influence of uncertainty avoidance on the prevalence of business ownership at the country level. Are differences in business ownership rates at the country level related to differences in uncertainty avoidance? Our *third* question deals with an indirect role of uncertainty avoidance through an influence on the relationship between GDP per capita and business ownership. Do differences in uncertainty avoidance alter the trade-offs between the opportunity costs and benefits of entrepreneurship in relationship to the level of economic development, and hence indirectly affect business ownership rates?

2 Uncertainty, Risk and Entrepreneurship

2.1 Some Classical and Neoclassical Views

Since the publication in 1921 of Knight's dissertation *Risk, Uncertainty and Profit,* it has become common usage in the social sciences to distinguish between risk and (true) uncertainty (van Praag 1999, p. 322). Uncertainty is a basic fact of life. We speak of uncertainty when 'anything might happen'. Relevant examples in the economic domain are new inventions and changing consumer preferences. Basically, these are unique events. Hence there is no statistical basis for calculating a probability. Risk is a special case of uncertainty. It relates to 'disagreeable' events for which past instances may be assembled and analyzed, such as fire-damage or the insolvency of debtors. According to the Oxford Concise Dictionary, tenth edition, 1999, risk is "the possibility that something unpleasant will happen." Risk is often expressed in a percentage or probability and, accordingly, is to some extent insurable.

According to Knight, the entrepreneur's main function is bearing the real uncertainty by making judgmental decisions in the face of incalculable and uninsurable business hazards (van Praag 1999, pp. 322–323).[3] Knight's writings present an elaboration and generalization of Cantillon's views on entrepreneurship that were originally published in 1755 and in which the main entrepreneurial function is arbitrage between supply and demand. "As Cantillon describes it, entrepreneurs

[3]There is no generally accepted definition of entrepreneurship. See Wennekers and Thurik (1999) for an overview. In the present paper, we adopt a pragmatic approach by equating entrepreneurship, business ownership and self-employment, and an entrepreneur will simply be understood to be the owner/manager of either an unincorporated or an incorporated business. See also Thurik and Wennekers (2004) and Davidsson (2004).

buy at a certain price to sell again at an uncertain price, with the difference being their profit or loss" (Hébert and Link 1989, p. 42). Most (neo)-classical authors, including Say and Marshall, view entrepreneurs as being responsible for risk-bearing (van Praag 1999, p. 327). Later authors on entrepreneurship, particularly those in the (neo)-Austrian tradition (such as Kirzner), emphasize the entrepreneurial quality of perception of opportunities in the face of uncertainty.

By contrast, Schumpeter (1934) in his well-known *Theory of Economic Development* (reprinted in Swedberg 2000, p. 58) emphasizes the innovative function of the entrepreneur, the person who introduces 'new combinations' of productive means. Schumpeter's view "disposes of the conception of the entrepreneur as risk bearer." In a footnote, Schumpeter continues: "Risk obviously always falls on the owner of the means of production, hence never on the entrepreneur *as such*." Finally, T.W. Schultz (1975) defines "entrepreneurship as the ability to deal with disequilibria, rather than the ability to deal with uncertainty" (Hébert and Link 1989, p. 46). For Schultz, the bearing of risk is involved in entrepreneurship but it is "not a unique attribute of entrepreneurs."

In neoclassical economics, the role of entrepreneurship is limited to the entry that follows profit opportunities (Carree and Thurik 1995). Neoclassical economics suggests that there are a set of possible outcomes and a set of probabilities that each of these outcomes will actually occur (Varian 1992). Then, a distinction is made between risk and uncertainty. The distribution of probabilities says something about the amount of risk. If the probabilities are not known, the term 'true uncertainty' is used. In neoclassical economics, usually, the probabilities are assumed to be known. With regard to entrepreneurship and entry, the profit opportunities are supposed to be known and accessible to everybody. Therefore, pure uncertainty is commonly disregarded (Choi 1993; Wubben 1993).

Economists such as Knight and Keynes and economic schools such as the Austrians and the Post-Keynesians have given uncertainty more emphasis (Wubben 1993). They define uncertainty in similar terms, but state that "especially entrepreneurs do not know the full range of outcomes nor their possibilities of occurring" (Lachmann, in Wubben 1993).

2.2 Contemporary Views on Risk-Attitudes of Entrepreneurs

The topic of risk (i.e. chance of failure) has remained current in more recent academic literature on entrepreneurship. Kihlstrom and Laffont (1979) emphasize that individuals differ in 'risk aversion'. In their model, "more risk averse individuals become workers while the less risk averse become entrepreneurs." Likewise, Iyigun and Owen (1998) model the occupational choice between 'inherently risky entrepreneurial ventures' and relatively 'safe' alternatives such as professional activities.

McGrath et al. (1992) compare values, including attitudes towards risk and failure, of entrepreneurs (founder-managers of stand-alone businesses that were at least 2 years old and employed at least one other person) and non-entrepreneurs in

eight nations. Entrepreneurs were found to agree more often with statements such as 'start-up means risk but also excitement', whereas non-entrepreneurs agreed more to 'failure means losing face/respect'. Van Praag (1996) investigates which abilities and attitudes predispose individuals to entrepreneurship. In a sample of 1,763 economically active (Dutch) adults in their early fifties in 1993, more risk averse individuals were found to have a significantly smaller probability of being a business owner or having been one in the past.

Uncertainty is particularly relevant for start-up entrepreneurs because they cannot know the full range of possible outcomes (Bhide 1994). New business founders thus are often unable to calculate their future profits. For example, someone who plans a new outlet of an existing franchise chain might have a fair estimate of its success given the experiences with previous outlets. For founders of new businesses, or more generally for entrepreneurs who introduce an innovation, this does not hold.

2.3 Synthesis of Micro-Economic Views

Uncertainty is a concept that is central to entrepreneurship, as emphasized by eminent economists such as Cantillon et al. (Hébert and Link 1989; Ekelund and Hébert 1990). Without uncertainty, entrepreneurship would be unnecessary. In the East European socialist planning economies, entrepreneurship was unnecessary and sometimes considered as criminal because a system of complete planning was assumed to result in optimal resource allocation. However, since uncertainty is a fact of economic life, entrepreneurs are needed to arbitrage, to take risks and to innovate (van Praag 1996; Wennekers and Thurik 1999). Entrepreneurs are considered to be the primary agents dealing with uncertainty in the economy. Entrepreneurs are called for in the fast changing economic reality of today's society (Audretsch and Thurik 2000, 2001). Hébert and Link (1989, p. 47) attempt to synthesize the many diverging views. Their 'synthetic' definition of entrepreneurship incorporates (dealing with) uncertainty, risk, perception of profit opportunities, innovation and change.

Uncertainty is a wider concept, encompassing risks and opportunities as well as distinguishing between degrees of uncertainty. These dimensions are elaborated in Table 1. Across the rows of the table there is a dichotomy distinguishing between possible unpleasant outcomes ('risks') and possibilities of business success ('opportunities'). Next, the columns represent different degrees of uncertainty. Column (1) describes the relatively low uncertainty when the possible outcomes and their probabilities are known. A case in point is selling fire insurance or starting a new outlet of an existing franchise. Column (2) refers to medium-high uncertainty in the sense that there is only a notion of possible outcomes and probabilities, such as may be the case with many new business start-ups. Business founders may not be able to calculate risks and expected profits, but they will often have a perception of the risks, opportunity costs and profit opportunities of their venture. Column (3)

Table 1 Uncertainty encompassing risk and opportunity

	Degree of uncertainty		
Risks versus opportunities	(1) Possible outcomes and their probabilities are known	(2) There is a notion of possible outcomes and probabilities	(3) Anything might happen
Possibility of damage, loss or failure	Calculated risks	Perceived risks and opportunity costs	True uncertainty of loss or failure
Opportunity of profit or other business success	Expected profits	Perceived profit opportunities	True uncertainty of profit; serendipity

describes the 'true' uncertainty of future loss or profit, inherent to launching a radical innovation or to investing financial capital in fundamental research.

There is agreement that entrepreneurs (in the sense of business owners) make judgmental decisions in the face of uncertainty, reap the rewards of perceiving and utilizing opportunities and in the process also run the risk of losing their money and their reputation. There is also some consensus that entrepreneurs are less averse to risk, while alternative views hold that entrepreneurs are inherently more optimistic rather than less risk averse or dispose of relevant information reducing uncertainty and risk (Gifford 2003, pp. 37–41).

2.4 Cultural Traits with Respect to Uncertainty

Attitudes, such as risk aversion, pertain to individuals and may show a wide variety within groups. At the 'ecological level' of nations, *cultural traits* related to these individual attitudes may be distinguished. Empirically, these traits may be derived as mean, modal or extreme values of individual observations or through a direct analysis of 'ecological data' (pertaining to national practices and achievements). Cultural traits represent a nation's 'mental programs' that are developed in socialization processes in the family in early childhood and reinforced in schools and organizations (Hofstede 2001, p. xix). Accordingly, cultural traits may differ between societies.

A cultural trait that is strongly associated with individual attitudes towards risk and uncertainty is 'uncertainty avoidance'. According to Hofstede (2001, p. 146), uncertainty avoidance has to do with the extent to which societies tolerate ambiguity. A culture is characterized by high uncertainty avoidance when its members feel threatened by uncertain or unknown situations. People in these cultures "look for structure in their organizations, institutions and relationships, which makes events clearly interpretable and predictable" (Hofstede 2001, p. 148.) In countries with lower uncertainty avoidance, "not only familiar but also unfamiliar risks are accepted, such as changing jobs and starting activities for which there are no rules." Low uncertainty avoidance thus implies "willingness to enter into unknown

ventures" (Hofstede 2001, p. 164). Hofstede operationalizes uncertainty avoidance using three survey questions about whether employees feel "company rules should not be broken even when the employee thinks it is in the company's best interests," about their personal expected job stability and about how often they feel nervous or tense at work.

2.5 *Relevance of Uncertainty Avoidance for Explaining the Business Ownership Rate*

2.5.1 Direct Effect of Uncertainty Avoidance

A micro-economic model of occupational choice is introduced to clarify the ways in which uncertainty avoidance may have an impact on the prevalence of business ownership at the country level. In this model, the individual choice between self-employment and wage-employment depends on a personal assessment and utility valuation of the expected material and immaterial rewards of these occupational alternatives, while taking the perceived risks into account (see Wennekers 2006). For simplicity, we operationalize material rewards as the expected personal income generated by self-employment ($E(I)_{SE}$), compared with the wage one expects to earn in a job ($E(I)_{WE}$). We reduce the immaterial rewards of self-employment to a gain in autonomy compared with the degree of independence that an individual will experience when working as an employee.

Below, we summarize the model in a schematic manner:

$$OC^*_{SE,i} = \alpha_i U_{MR,i} + (1 - \alpha_i) U_{IR,i}; \quad 0 < \alpha_i < 1 \tag{1}$$

$$U_{MR,i} = \beta_i ((1 - \rho_{SE,i}) E(I)_{SE,i} - E(I)_{WE,i}); \quad \beta_i > 0; \quad 0 < \rho_{SE,i} < 1 \tag{2}$$

$$U_{IR,i} = \gamma_i \Delta AUT_i; \quad \gamma_i > 0 \tag{3}$$

where

$OC^*_{SE,i}$ = latent variable measuring total utility of choice for self-employment (individual i)

$U_{MR,i}$ = utility of expected change in material rewards due to self-employment

$U_{IR,i}$ = utility of expected gain in immaterial rewards due to self-employment

$E(I)_{SE,i}$ = expected income self-employment

$E(I)_{WE,i}$ = expected income wage-employment

ΔAUT_i = gain in autonomy (self-employment versus wage-employment)

α_i = parameter reflecting the relative weight in utility of material vs immaterial rewards

β_i = parameter transforming expected change in material rewards into utility

γ_i = parameter transforming expected gain in immaterial rewards into utility

$\rho_{SE,i}$ = discount parameter for perceived risks of self-employment

For empirical application, an observable occupational choice variable $OC_{SE,i}$ might be added, where $OC_{SE,i} = 1$ (i is self-employed) when $OC^*_{SE,i} > 0$ and $OC_{SE,i} = 0$ (i is an employee) when $OC^*_{SE,i} < 0$. Parker (2004, pp. 24–26) elaborates how this micro-economic model might be estimated after transformation into a probit or logit model. This is, however, not necessary for our purpose, i.e. the underpinning of a macro-economic regression model.

We assume that all parameters and variables in the model are idiosyncratic with respect to individuals, i.e. we assume that, for each individual, parameters and variable values are randomly drawn from probability distributions. In addition, we assume that attitudes towards uncertainty and risk play a role in the assessments and utility valuations of the expected material and immaterial rewards. In particular, we assume that the distributions of $\rho_{SE,i}$, γ_i, and $E(I)_{SE,i}$ are *systematically* influenced by the individual level of uncertainty aversion. That is, *ceteris paribus*, the distributions of these three parameters and variables are located more to the right or to the left, depending on the individual level of uncertainty aversion. This will be illustrated below. For simplicity let us assume that there are two groups of individuals, a group with a high uncertainty aversion level, H, and a group with a low uncertainty aversion level, L. First, it is assumed that an aversion of uncertainty causes people to perceive fewer profit opportunities and to see more risks in entrepreneurship. This causes a downward bias in their assessments of the expected income of self-employment, i.e. $\overline{E(I)}_{SE,H} < \overline{E(I)}_{SE,L}$, where the overscore denotes the median value of the distribution. Second, they will also attach a lower utility to a certain expected income when they feel that higher risks are involved, i.e. $\overline{\rho}_{SE,H} > \overline{\rho}_{SE,L}$. Third, it may be assumed that uncertainty averse individuals have a relatively low valuation of autonomy, i.e. $\overline{\gamma}_H < \overline{\gamma}_L$.

This model of individual occupational choice presents several bridges to the effects of uncertainty avoidance for the macro-economic business ownership rate. First, a culture of high uncertainty avoidance may imply a higher percentage of uncertainty/risk averse individuals within the population.[4] Applying our micro-economic model at the macro level, this implies lower assessments of the expected entrepreneurial income and a higher discount for perceived risks. On the other hand, countries with low uncertainty avoidance will count more individuals with entrepreneurial values who attach a higher utility to the rewards of self-employment. These countries thus have a relatively large supply of potential entrepreneurs (see Shane 1993, for indirect support of this assumption). In terms of our model, this means that there will be more people for whom the utility of the material rewards of self-employment (U_{MR}) is positive (negative) in countries with low (high) uncertainty avoidance.[5] This gives rise to the hypothesis that the prevalence of self-employment is diminished by high uncertainty avoidance

[4]In terms of our illustration above, the group of individuals with a high uncertainty aversion level, H, is larger than in a culture with low uncertainty avoidance.

[5]Note again that $OC^*_{SE,i}$ in (Eqn. 1) has to be positive in order for an individual to choose for self-employment, as the utility variables in the model are defined relative to the situation of wage-employment.

(UAI+), while it is stimulated by low uncertainty avoidance (UAI−). In our section on Method, two clusters of countries will be defined.

However, there may also be an opposite effect because a culture of high uncertainty avoidance at the country level may be expected to imply a restrictive climate within existing firms and organizations. This would offer a relatively large gain in autonomy (ΔAUT) to individuals choosing self-employment. Even when there are fewer enterprising individuals in such an economy, UAI + may push many of them towards self-employment. In terms of our model, this means that, on average, the utility of the immaterial rewards of self-employment (U_{IR}) will be higher in countries with high uncertainty avoidance. This leads to the hypothesis that high uncertainty avoidance (UAI+) may stimulate self-employment (see Baum et al. 1993, for an analogous reasoning with respect to the effect of low individualism at the country level).

Summarizing, there are two contradicting hypotheses with respect to the *direct influence* of uncertainty avoidance on the supply of business owners. On average, an UAI + culture will result in more individuals with a relatively low value of U_{MR}, but it will also result in more individuals with a relatively high value of U_{IR}. The overall impact of these opposite forces (i.e. the net-effect on the business ownership rate) is a subject for empirical research.

2.5.2 Indirect Effect of Uncertainty Avoidance

Uncertainty avoidance may also have an *indirect influence* on the rate of business ownership, i.e. the level of uncertainty avoidance in a nation may influence the manner in which other variables determine business ownership. For example, the degree to which increasing per capita income leads to a perception of increasing opportunity costs of entrepreneurship (compared with well-paid, safe jobs) versus a perception of increasing entrepreneurial opportunities (more niches; need for autonomy) may well be dependent on the level of uncertainty avoidance. Likewise, high unemployment levels may be interpreted as a decrease of the opportunity costs associated with business ownership, and hence stimulate entrepreneurship, but also with increased likelihood of failure, and therefore negatively related with business ownership levels, depending on the degree of uncertainty avoidance.

3 Modelling the Business Ownership Rate

The dependent variable in this study is the rate of business ownership in a nation at a certain moment in time. Our major interest is the direct and the indirect contribution of uncertainty avoidance to the variance in business ownership across nations and over time. We position our study within a broad multidisciplinary framework that is based on various strands of the entrepreneurship literature (see Verheul et al. 2002,

and Wennekers 2006, for a description of this framework). From this framework, we choose control variables for our regression model of the effects of uncertainty avoidance. Table 2 lists economic and demographic determinants of business ownership. Here, we not only focus on the underlying micro-economic studies of occupational choice, but also refer to surveys and empirical macro-economic investigations. The first column also contains an operationalization of the determinants used in the empirical analysis, while the final column indicates the data availability and the sources of the various variables. As we will use data for business ownership (the dependent variable in our study) for the years 1976, 1990 and 2004, and we will use a 4 year lag for the independent variables, we have aimed at collecting data for the years 1972, 1986 and 2000 for the variables in Table 2. However, when data are not available for one of these years, we use data for the closest available year. This is also indicated in the final column of Table 2.

3.1 Level of Economic Development

It has been observed in various studies that the business ownership rate decreases as economies become more developed (Schultz 1990; Yamada 1996; see Carree et al. 2002, for an overview). Economic development is usually measured by per *capita income*, but it is also reflected in the average *wage rate*. In the present discussion, we will include both per capita income and the wage rate.

A low level of prosperity usually coincides with a low wage level, implying little pressure to increase efficiency or the average scale of enterprise. Small firms in agriculture, crafts and retail trade are therefore dominant in such an economy. A major route for ambitious wage earners to increase their income, then, is to set up shop and become an entrepreneur.

Subsequently, economic development leads to a rise in wages, which stimulates enterprises to work more efficiently and to reap economies of scale and scope (Chandler 1990). Also, a declining share of agriculture and an increasing share of manufacturing diminish the opportunities for self-employment. At the supply side of the labor market, an additional effect of rising wage levels is an increased attraction of wage-employment, increasing the opportunity cost of self-employment (Lucas 1978). Iyigun and Owen (1998) argue that with economic development the "safe" professional earnings will rise and fewer individuals will be willing to risk becoming business owners.

In recent decades, statistical evidence points at a possible *reversal* of the negative relationship between real per capita income and self-employment at an advanced level of economic development. With rising per capita income, a differentiation of consumer demand for both goods and services creates new market niches and provides opportunities for business ownership. At the supply side of entrepreneurship, social psychology hypothesizes a hierarchy of human motivations, ranging from material needs to self-realization (Maslow 1970). By providing autonomy, entrepreneurship may become a more attractive occupational choice at higher levels of income.

Table 2 Major explanatory variables of the business ownership rate

Economic variables (operationalization)	Relevant literature	Data availability (years); Source
Level of economic development (GDP per capita)	Kuznets (1971), Lucas (1978), Schultz (1990), Yamada (1996)	1972, 1986, 2000; OECD National Accounts
Share of services (employment in services divided by total labor force)[a]	Stel van and Carree (2004)	1972, 1986, 2000; OECD National Accounts
Entrepreneurial income relative to the wage rate (labor income share)[b]	Parker (2004)	1972, 1986, 2000; own calculations, based on OECD National Accounts
Unemployment rate	Evans and Leighton (1989), Meager (1992)	1972, 1986, 2000; OECD Main Economic Indicators
Social security entitlements (unemployment replacement rate)	Parker and Robson (2004)	1972, 1986, 2000; OECD Benefits and Wages
Income disparity (Gini coefficient)[c]	Ilmakunnas et al. (1999)	mid-1980s; 2000; OECD
Cost of capital (long term interest rate)[d]	Parker (2004)	1991; 2000; OECD Economic Outlook 78 database
Assets; collateral (house prices)	Evans and Jovanovic (1989), Evans and Leighton (1989), Parker (2004)	insufficient data on house prices available
Demographic variables		
Age composition (number of people aged 25–39 years divided by number of people aged 25–64)	Storey (1994), Blanchflower et al. (2001)	1971, 1984, 1991; US Census Bureau, International Data Base
Population density	Audretsch and Keilbach (2004) Bais et al. (1995)	1972, 1986, 2000; OECD Labour Force Statistics (population), Grote Winkler Prins encyclopaedia (area)
Educational levels (gross enrollment rates for secondary and tertiary education)	Delmar and Davidsson (2000) Uhlaner and Thurik (2007)	1970, 1985, 2000; World Bank EdStats data base
Female labor participation	Delmar and Davidsson (2000), Verheul (2005)	1972, 1986, 2000; OECD Labour Force Statistics

[a]The services sector is broadly defined here, it contains the sectors Wholesale and retail trade, restaurants and hotels; Transport, storage and communication; Finance, insurance, real estate and business services; and Community, social and personal services

[b]The labor income share has been corrected for the imputed wage income of self-employed individuals. To make the variable better fitting with the (non-agricultural) business ownership rate, the labor income share has been computed excluding the agricultural sector

[c]No data available for 1972. Missing values for Belgium and Spain

[d]No data available for 1972

However, this reversal is not universal, as witnessed by the continued decline of business ownership in some highly developed economies such as France and Japan (Verheul et al. 2002). Two opposing forces may be at play here: while rising wage levels will continue to increase the opportunity costs of self-employment, differentiation of consumer wants will create more opportunities for new enterprises. Occupational choices in countries with low uncertainty avoidance may be influenced more strongly by the latter effect than by the first. In high uncertainty avoidance countries, it may be the other way around. Consequently, at advanced levels of economic development, we conjecture a differential impact of increasing prosperity in low (UAI−) and in high (UAI+) uncertainty avoidance countries. In UAI + countries, the negative relationship between the level of prosperity and the self-employment rate will be undiminished across economic development. In UAI- countries, the negative relationship between prosperity and the self-employment rate will be weaker or even reverse after a certain turning point.

3.2 Share of Services

At the high end of economic development, the share of the services sector usually increases relative to that of manufacturing. On average, self-employment rates in services are considerably higher than in manufacturing (see Stel van and Carree 2004). It requires only relatively modest investments to set up an enterprise in many services. We assume that an increasing share of the services sector will increase the business ownership rate.

So far, empirical research on this compositional effect on the business ownership rate is scant. Wennekers and Folkeringa's (2002) investigation of long-term trends in the business ownership rate of the Netherlands showed that sector shifts clearly played a part, but within-sector trends turned out to be even more important. For an analogous conclusion about trends in the firm size distribution of six large OECD countries, see Loveman and Sengenberger (1991).

3.3 Relative Earnings of Self-Employment

In a previous section of the present paper we discussed a model of individual occupational choice. This model assumes that relative earnings of self-employment versus wage-employment affect occupational choice. *Ceteris paribus*, the better the prospects of entrepreneurial income as compared to the wage income of employees, the more people will be attracted to self-employment.[6]

[6]In a micro-economic model of occupational choice (de Wit 1993), equality of entrepreneurial income and wages determine the equilibrium number of self-employed. In this model, an exogenous wage increase lowers the (equilibrium) number of self-employed while an exogenous upward shift of profits raises the equilibrium.

Parker (2004, pp. 68–70) presents a survey of the empirical evidence for this relationship. Various investigations using a structural probit model, including relative earnings as determinants of individual occupational choice, give mixed results. Two time-series studies at a more aggregate level, also cited by Parker, find a significant contribution of aggregate earnings differentials to explaining trends in the UK self-employment rate.

In our empirical analysis, we use the macro-economic labor income share as a (reverse) proxy for the (expected) entrepreneurial income relative to the wage income. The labor income share is defined as the sum of wages including 'imputed wage income of self-employed persons', expressed as a fraction of total income. This is admittedly a rough proxy.

The relationship between relative earnings and the business ownership rate may be moderated by the degree of uncertainty avoidance. In an occupational choice perspective, the weighing of expected entrepreneurial and wage income against one another also includes an assessment of the risks involved. In UAI- countries, the entrepreneurial risks will be viewed more lightly and accordingly the effect of relative earnings may be stronger than in UAI+ countries.

3.4 Unemployment

(The threat of) unemployment is a factor diminishing the opportunity costs of self-employment, particularly when unemployment benefits are low relative to (minimum or average) wages. However, when structural unemployment is very high, this may indicate bleak business opportunities and discourage business ownership (Hamilton 1989 and Meager 1992). Exactly where the negative influence of rising unemployment begins to outbalance the positive effect of decreasing opportunity costs depends on a perception of uncertain future events, and may therefore be related to the level of uncertainty avoidance in a country. Hence we expect the positive effects of unemployment to dominate in UAI- countries, and the negative effects in UAI+ countries.

3.5 Social Security Entitlements

High social security entitlements for employees contribute to the opportunity costs of entrepreneurship, and may be expected to have a negative influence on the business ownership rate. This has been confirmed in several empirical investigations (Ilmakunnas et al. 1999; Parker and Robson 2004; Hessels et al. 2006) reporting negative effects on self-employment of employers' social security contributions and/or the unemployment benefit replacement rate.

3.6 Income Disparity

Some scholars hypothesize that an equal income distribution may limit the required asset accumulation facilitating enterprise formation, while income disparity may be favorable to entrepreneurship (Ilmakunnas et al. 1999). At the lower end of the income distribution, inequality may act as a push factor to enter self-employment. Additionally, on the demand side of entrepreneurship, income disparity is likely to create a more differentiated demand for goods and services. Empirical research by Ilmakunnas et al. suggests that income inequality positively influences the rate of self-employment, although reversed causality cannot be ruled out.

3.7 Financial Variables

Starting and running a business requires financial capital. This capital is needed to purchase or rent the premises, to invest in equipment and/or vehicles, to purchase raw materials, to finance market research and advertising and to advance wages. The need for financial capital differs strongly with the line of business. Financial resources for business start-ups are often derived from self-financing (including savings, gifts, inheritances and lottery wins). Additionally, informal investors, mortgage loans, commercial credit and bank loans and (very rarely) venture capital can also be a source of start-up capital (Bygrave and Hunt 2005).

Capital constraints, often related to lack of assets or collateral, may create serious impediments for business start-ups (Blanchflower and Oswald 1998; Evans and Leighton 1989; van Praag 1996) and for young and growing firms (Chittenden et al. 1996; LeCornu et al. 1996). An influential paper by Evans and Jovanovic (1989) has stimulated research on credit rationing. For a survey of this literature, see Parker (2004). While a clear conclusion on the prevalence of credit rationing seems yet out of reach, there is ample evidence that self-employment rates are positively related to personal wealth (real estate and other assets).

Finally, the direct and indirect (opportunity) costs of financing a business depend on the rate of interest. Higher interest rates may be expected to have a negative effect on business ownership. Parker (2004, p. 104, 105) weighs the empirical evidence. In particular, several UK and US time-series studies show a significant negative effect of the interest rate on the self-employment rate.

3.8 Demographic Characteristics

With respect to gender, in most surveys women are found to be less likely to be involved in either self-employment or early-stage entrepreneurial activity than are men, although the difference varies across nations (Minniti et al. 2005; Verheul 2005). Econometric analysis of a large Swedish dataset of individual business start-ups has shown a remaining ‘pure’ gender effect after correcting for other differences, such as education and previous management experience (Delmar and

Davidsson 2000). A higher *labor participation rate of women* thus in itself means a lower overall business ownership rate in the labor force.

The role of *population density* at the national level is less obvious. Every local area needs a minimum supply of facilities in retail trade, repair and personal services. Therefore, thinly populated regions will have relatively many small retail outlets, workshops and service providers. Conversely, urban areas will give rise to economies of scale through which small-sized entrepreneurship in particularly retailing comes under pressure (Bais et al. 1995). On the other hand, networks and other supply side factors in urban areas are conducive to new entrepreneurship in many service industries (Audretsch and Keilbach 2004).

Education is somewhat of an anomaly. Research conducted on a Swedish sample at individual level, showing that nascent entrepreneurs attained on average a higher educational level[7] than those in a control sample (Delmar and Davidsson 2000), has been reconfirmed in recent investigations across several high-income countries (Acs et al. 2004). On the other hand, macroeconomic research with respect to a static index of entrepreneurship suggests the opposite conclusion. For instance, Uhlaner et al. (2002) found that countries with a higher level of education tend to have a smaller proportion of self-employment. In a recent comparative study across 27 OECD countries, countries with a higher level of enrollment in secondary education show a lower level of early-stage entrepreneurship, while higher enrollment in tertiary education was found to have a positive effect on both early-stage entrepreneurship and total business ownership (Uhlaner and Thurik 2007).

With respect to the *age composition of the population*, Blanchflower et al. (2001), p. 686) report that, while 'older people are more likely to be self-employed, it is younger people who say they would prefer to be self-employed'. Earlier research also shows that people in the middle age cohorts have the highest prevalence of incumbent business owners (Storey 1994). In many countries, prevalence rates of *nascent* entrepreneurship are highest in the age group between 25 and 34, while, according to some research, a tendency towards start-ups at a younger age is also apparent.[8] *Ceteris paribus*, the ageing of the population in most developed countries implies a threat to the future development of business ownership.

4 Method and Data

4.1 Method

First, we investigate the *direct* influence of uncertainty avoidance on the business ownership rate by means of a regression analysis of pooled panel data for 21 countries in 1976, 1990 and 2004, given the influence of (4 years lagged) per capita

[7]In addition, nascent entrepreneurs were found to have more management experience.

[8]Delmar and Davidsson (2000), EIM/EZ (2000), Gelderen van (1999, p. 21) and various annual Executive Reports published by the Global Entrepreneurship Monitor.

income and some other control variables (also 4 years lagged). The control variables are chosen from Table 2 on the basis of data-availability. We assume that the samples for 1976, 1990 and 2004 are sufficiently independent to warrant pooling them in one regression. Because uncertainty avoidance was measured only once (around 1970), its role in the pooled regression analysis may be interpreted as that of a country-specific time-invariant variable. Next, we use the years 1976, 1990 and 2004 as separate samples to investigate the stability of the direct relationship over time.

Second, we explore the possible *indirect* influence of uncertainty avoidance on the rate of business ownership. This means that we have added an interaction term between per capita income and uncertainty avoidance to the multiple regression analysis of the pooled sample for 1976, 1990 and 2004. Finally, we repeat this regression, substituting UAI by a dummy variable representing two separate clusters of countries. In our dataset, the following 13 countries form the cluster[9] of low uncertainty avoidance: Denmark, Finland, Germany, Ireland, the Netherlands, Sweden, Great Britain, Norway, Switzerland, USA, Canada, Australia and New Zealand. Another eight countries, i.e. Austria, Belgium, France, Italy, Greece, Portugal, Spain and Japan, make up the cluster with high uncertainty avoidance. By comparing these two models we hope to find indications whether the effects of uncertainty avoidance are discrete or continuous (see also Cohen and Cohen 1983).

4.2 Data

Harmonized non-agricultural business ownership rates for 23 OECD-countries are available from EIM's COMPENDIA data base.[10] These data include the owners of incorporated and unincorporated businesses but exclude unpaid family workers. The countries in COMPENDIA include 18 European countries as well as the USA, Japan, Canada, Australia and New Zealand. Data are available for the even years from 1972 onwards.

Additionally, Hofstede (2001) provides data on uncertainty avoidance for 21 of the 23 countries mentioned above.[11] Uncertainty avoidance is a key variable in Hofstede's well-known study[12] of cultural dimensions across some 50 different nations and regions. The uncertainty avoidance index (UAI) was computed on the basis of the country mean scores for three different survey questions already

[9]The clustering was carried out with the K-means algorithm. See Noorderhaven et al. (1999).

[10]COMParative ENtrepreneurship Data for International Analysis. See van Stel (2005). In the current paper, data from COMPENDIA version 2004.2 are used.

[11]No data on Hofstede's indices are available for Iceland, whereas for Luxembourg there are estimates that we have used for clustering only. See Noorderhaven et al. (1999).

[12]This study was first published in 1980, but the second edition, published in 2001, gives more information on stability and cross-validation of the data.

mentioned in a previous section of the present paper. Because the surveys on which the index was based were held between 1967 and 1973, the stability of the index is a crucial aspect for our study into the rate of business ownership in the years 1976, 1990 and 2004. Hofstede (2001, p. 34) claims that national cultures are extremely stable over time. He argues that '... this stability can be explained from the reinforcement of culture patterns by the institutions that themselves are products of the dominant cultural value systems'. In the long run, 'cultures shift, but they shift in formation, so that the differences between them remain intact' (Hofstede 2001, p. 255). Chapters 2 and 4 of Hofstede's book present abundant statistical information about the stability and reliability of the uncertainty avoidance index. Our best assessment is that this index can be used for explaining national rates of entrepreneurship during several decades following the measurement of the index.

An alternative would have been to use the uncertainty avoidance data reported by the GLOBE project (House et al. 2004). We refrain from doing so for two reasons. First, Hofstede's uncertainty avoidance index is well understood, and has been used in many previous studies. Hofstede (2001) also reports extensively on correlates of his uncertainty avoidance index with measures from over one hundred other studies. Comparable validation of the GLOBE uncertainty avoidance scales is not available. Second, there are some conceptual difficulties with the GLOBE uncertainty avoidance scales. GLOBE constructed two scales, the actual use of uncertainty avoidance mechanism in the respondent's society ("practices"), and the desired use of uncertainty avoidance mechanisms ("values"). These two scales are negatively correlated. The GLOBE practices scale is also negatively correlated to Hofstede's UAI scale, the GLOBE values scale positively (Sully de Luque and Javidan 2004).[13] This makes the GLOBE scales difficult to interpret. The authors note that most countries with high uncertainty avoidance practices are technologically developed nations (Sully de Luque and Javidan 2004, p. 621). This makes the index less relevant for the current study, as we are comparing levels of business ownership across developed countries only. Both GLOBE uncertainty avoidance scales are strongly correlated with economic prosperity, the "practices" scale positively, and the "values" scale negatively (Sully de Luque and Javidan 2004, p. 631). Hofstede's UAI, in contrast, is only weakly correlated to economic prosperity (Hofstede 2001, p. 201). Consequently, Hofstede's index measures cultural characteristics of countries that are relatively independent of wealth, and thus this index forms a good complement to the economic indicators we also use in this study.

For the operationalization and sources of the control variables, we refer to Table 2. Besides the controls included in Table 2, we also include year dummies in our analysis. Recent decades have witnessed a worldwide diffusion of new information and communication technologies, as well as a widespread tendency

[13]For the 19 countries in our dataset for which we have both Hofstede and GLOBE data on uncertainty avoidance, the correlations are: Hofstede UAI x GLOBE practices: −0.643; Hofstede UAI x GLOBE values: 0.607; GLOBE practices x GLOBE values: −0.869. All these correlations are significant at the 1% level.

towards deregulation of markets. Both phenomena have created opportunities for small scale business and new entrepreneurship. Audretsch and Thurik (2000, 2001) label this as a regime switch from 'a managed to an entrepreneurial economy'. We try to catch these developments using year dummies as controls in our analysis.

Table 3 presents the correlation matrix of the pooled sample for 1976, 1990 and 2004. The highest (positive) correlations among the control variables include those between per capita income, on the one hand, and the female labor share and tertiary education, on the other. Uncertainty avoidance and per capita income show a moderate degree of (negative) correlation in our sample.

5 Results

5.1 Direct Influence of Uncertainty Avoidance

Table 4 presents the regressions on the pooled sample for 21 countries in 1976, 1990 and 2004. First, we regress business ownership on uncertainty avoidance, GDP per capita and the year dummy variables. This is the 'base model', shown in the first column of the table. The significantly *positive* coefficient for uncertainty avoidance is support for Baum's hypothesis, stating that dissatisfaction with a climate of high uncertainty avoidance in large organizations may push enterprising individuals towards self-employment. GDP per capita and the year dummies are also significant and have the expected sign. Next, we introduce the other control variables one by one. In all but one of these regressions, the coefficient for uncertainty avoidance is significantly positive. The only exception is the regression including the Gini index, which is based on 37 observations only. With respect to the significant control variables, the only counterintuitive result is the positive sign for the long term interest rate. Subsequently, as shown in the second to last column of Table 4, we regress business ownership on uncertainty avoidance while including all control variables that are significant in the previous regressions[14]. Finally, the last column shows the variables that are significant in a 'complete model'. These are uncertainty avoidance (+), per capita income (−), the share of services (+), the unemployment replacement rate (−) and the dummy variables for 1990 and 2004 (+).

Table 5 presents the regressions in three separate sample years 1976, 1990 and 2004. For each year, the left-hand column presents a regression including the control variables that were listed in the second to last column of Table 4, while the right-hand column reports significant control variables only. The main finding for the sample of 1976 is a significantly positive influence of uncertainty avoidance

[14]Excluding the Gini coefficient and the long term interest rate, due to the smaller available number of observations of these variables.

Table 3 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Business ownership rate	1													
2. Uncertainty avoidance	0.49**	1												
3. GDP per Capita	−0.24#	−0.38**	1											
4. Labor income share	−0.42**	−0.42**	0.27*	1										
5. Unemployment	0.31*	0.09	−0.01	−0.10	1									
6. Female labor share	−0.21	−0.22	0.67**	0.19	0.001	1								
7. Population density	−0.03	0.28*	0.04	0.22#	−0.01	−0.14	1							
8. Share services	0.21#	−0.26*	0.54**	0.10	−0.02	0.18	−0.07	1						
9. Replacement rate unempl.	−0.26*	−0.18	0.32*	0.05	0.14	0.30*	0.27*	−0.035	1					
10. Gini index	0.71**	0.42**	−0.21	−0.35*	0.32#	−0.32#	−0.06	0.33*	−0.54**	1				
11. Long term interest rate	0.08	−0.14	−0.56**	−0.08	0.38*	−0.36*	−0.24	−0.25	−0.04	−0.26	1			
12. Share age group 25–39 in adult pop. (25–64 year)	0.05	−0.23#	0.42**	−0.15	0.18	0.32*	−0.15	0.49**	0.29*	−0.11	0.27#	1		
13. Secondary education	−0.06	−0.23#	0.59**	0.13	0.18	0.64**	0.10	0.26*	0.48**	−0.21	−0.48**	0.27*	1	
14. Tertiary education	0.06	−0.16	0.73**	−0.01	0.27*	0.66**	−0.13	0.44**	0.30*	0.11	−0.60**	0.38**	0.70**	1
N	63	63	63	63	63	63	63	63	63	37	40	63	62	62
Mean	0.11	62.9	14.762	0.77	0.056	0.39	1.20	0.42	0.25	0.29	0.074	0.43	0.96	0.36
Standard deviation	0.035	24.7	4.770	0.06	0.038	0.059	1.12	0.12	0.14	0.044	0.025	0.033	0.23	0.20

Note: Correlations are based on a pooled sample of 1976, 1990 and 2004 (63 observations maximum)
# $p < 0.10$;* $p < 0.05$;** $p < 0.01$

Table 4 The *direct* influence of uncertainty avoidance on business ownership, pooled sample 1976, 1990 and 2004 (21 countries)

	Base model													Com-plete mo-del
Constant	0.11	0.18	0.10	0.18	0.11	0.076	0.13	0.001	0.043	0.026	0.14	0.11	0.098	0.094
	(7.0)	(3.8)	(4.6)	(5.0)	(7.0)	(4.5)	(7.7)	(0.0)	(0.9)	(0.6)	(4.4)	(7.0)	(1.8)	(5.0)
Uncertainty Avoidance	0.041	0.036	0.043	0.036	0.048	0.045	0.031	0.009	0.041	0.044	0.036	0.043	0.035	0.038
	(3.1)	(2.9)	(3.0)	(2.4)	(3.5)	(3.9)	(2.4)	(0.4)	(2.2)	(3.6)	(2.7)	(3.3)	(2.4)	(3.3)
GDP per Capita	−0.38	−0.32	−0.32	−0.29	−0.35	−0.59	−0.39	−0.29	−0.26	−0.43	−0.37	−0.40	−0.50	−0.57
	(3.9)	(2.8)	(2.6)	(2.6)	(3.8)	(7.2)	(4.8)	(1.8)	(2.0)	(4.3)	(3.9)	(4.1)	(4.6)	(7.0)
Labor income share		−0.089												
		(1.3)												
Unemployment			0.13											
			(1.1)											
Female labor share				−0.21									−0.13	
				(2.6)									(1.5)	
Population density					−0.004									
					(1.4)									
Share services						0.15							0.10	0.14
						(5.4)							(3.1)	(4.6)
Replacement rate unempl.							−0.082						−0.063	−0.052
							(3.6)						(2.8)	(2.2)
Gini index								0.51						
								(4.8)						
Long term interest rate									0.78					
									(2.2)					
Share age group 25–39 in adult pop. (25–64 year)										0.22			0.12	
										(2.0)			(1.0)	
Secondary education											−0.025			
											(0.8)			
Tertiary education												0.031		
												(1.1)		
Year dummy 1990	0.023	0.022	0.015	0.033	0.023	0.023	0.032			0.018	0.026	0.019	0.033	0.029
	(2.8)	(2.4)	(1.3)	(3.3)	(2.7)	(3.3)	(3.9)			(1.9)	(2.4)	(2.1)	(3.2)	(3.8)
Year dummy 2004	0.046	0.041	0.037	0.060	0.044	0.048	0.059	0.009	0.051	0.045	0.055	0.034	0.065	0.055
	(4.3)	(3.4)	(2.9)	(4.5)	(4.2)	(6.1)	(5.9)	(0.9)	(3.3)	(4.1)	(3.3)	(2.5)	(4.9)	(7.0)
N	63	63	63	63	63	63	63	37	40	63	62	62	63	63
R^2	0.368	0.385	0.381	0.429	0.383	0.567	0.459	0.592	0.361	0.399	0.377	0.373	0.627	0.601

Dependent variable: number of non-agricultural business owners per labor force
Absolute heteroskedasticity consistent *t*-values are between brackets

Table 5 The *direct* influence of uncertainty avoidance on business ownership, separate samples 1976, 1990 and 2004 (21 countries)

	1976	1976	1990	1990	2004	2004
Constant	0.093 (1.4)	0.060 (2.2)*	0.16 (1.9)#	0.14 (3.4)**	0.32 (1.8)#	0.33 (2.0)#
Uncertainty Avoidance	0.054 (1.9)#	0.063 (3.1)**	0.029 (1.3)	0.032 (1.4)	−0.007 (0.4)	−0.0095 (0.6)
GDP per Capita	−0.39 (1.3)	−0.52 (2.7)*	−0.63 (3.0)**	−0.58 (3.1)**	−0.62 (4.4)**	−0.59 (4.0)**
Female labor share	−0.15 (1.3)		0.041 (0.3)		−0.59 (1.5)	−0.67 (2.0)#
Share services	0.11 (1.5)	0.15 (2.2)*	0.16 (2.2)*	0.13 (2.7)*	0.047 (0.7)	
Replacement rate unemployment	−0.030 (0.8)		−0.093 (1.7)	−0.10 (2.3)*	−0.056 (1.5)	−0.072 (2.3)*
Share age group 25–39 in adult pop. (25–64 year)	0.066 (0.6)		−0.091 (0.5)		0.40 (1.7)	0.50 (3.2)**
N	21	21	21	21	21	21
R^2	0.614	0.558	0.749	0.747	0.686	0.672

Dependent variable: number of non-agricultural business owners per labor force
Absolute heteroskedasticity consistent *t*-values are between brackets
# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

on the rate of business ownership. In 1990, the coefficient of uncertainty avoidance is again positive, but no longer fully significant. In 2004, no influence of UAI is found. All regressions confirm the well-known negative influence of GDP per capita.

The main outcome of Table 5 is that the positive effect of uncertainty avoidance fades away over time. Our interpretation is that the advent of the entrepreneurial economy in recent years, as discussed in our Introduction, has created new pull factors mobilizing the relatively abundant supply of potential entrepreneurial capital in countries with low uncertainty avoidance. So Baum's push hypothesis for high uncertainty avoidance and Shane's pull hypothesis for low uncertainty avoidance may now be equally valid, effectively countervailing one another in the regression for 2004. Another explanation could be that the measurement of uncertainty avoidance (which was carried out around 1970) has lost some of its validity 30 years onwards, but the arguments discussed in the Data section offer no specific support for this interpretation. The coefficients for GDP per capita and to a lesser extent for the share of services and the replacement rate are relatively stable over time. The two other control variables, i.e. the female labor share and the share of the age group 25–39, are only significant for 2004. These results are consistent with the findings in the last two columns of Table 4.

We conclude that there is evidence for a push effect of *high* uncertainty avoidance on the rate of business ownership. However, in recent years, a pull towards entrepreneurship in a climate of *low* uncertainty avoidance may have gained dominance vis-à-vis this longstanding historical push effect of high uncertainty avoidance. We have also found consistent confirmation of the well-known observation of a negative bearing of per capita income on business ownership. Finally, most results support a positive influence of the share of services and a negative effect of the replacement rate.

5.2 *Indirect Influence of Uncertainty Avoidance*

Next, we explore the possible *indirect* influence of uncertainty avoidance on the rate of business ownership, by adding an *interaction term* between per capita income and uncertainty avoidance to the pooled panel regressions. The two left-hand columns of Table 6 compare the results of the base model including this interaction term in addition to uncertainty avoidance, GDP per capita and the year dummy variables with the original base model as presented in Table 4. The main outcome is a significant (at 10% level) intermediate effect of uncertainty avoidance on the influence of GDP per capita.[15] What do these results mean in a quantitative

[15]This appears both from the significance level of the interaction term (p-value is 0.078) and from a loglikelihood test comparing the models in the first two columns of Table 6. The LR test statistic is 3.4 while the 10% critical value is 2.71.

Table 6 The *indirect* influence of uncertainty avoidance on business ownership, pooled samples 1976, 1990 and 2004 (21 countries); base model using UAI and per capita income only

	UAI continuous effect		UAI discrete effect	
Constant	0.11 (7.0)**	0.064 (2.6)*	0.14 (8.2)**	0.12 (7.9)**
Uncertainty Avoidance (UAI)	0.041 (3.1)**	0.11 (2.9)**		
Dummy UAI strong			0.016 (1.8) #	0.060 (2.5)*
GDP per Capita (YCAP)	−0.38 (3.9)**	−0.017 (0.1)	−0.42 (3.5)**	−0.28 (2.8)**
UAI * YCAP		−0.53 (1.8)#		
Dummy UAI strong * YCAP				−0.31 (1.8)#
Year dummy 1990	0.023 (2.8)**	0.022 (2.7)**	0.025 (2.8)**	0.024 (2.8)**
Year dummy 2004	0.046 (4.3)**	0.043 (4.1)**	0.050 (4.2)**	0.047 (4.3)**
N	63	63	63	63
R^2	0.368	0.400	0.347	0.383
Loglikelihood	137.3	139.0	136.3	138.1

Dependent variable: number of non-agricultural business owners per labor force
Absolute heteroskedasticity consistent *t*-values are between brackets
# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

sense? As an illustration, the results imply that for the country with the highest UAI-rate in the sample (Greece), an increase in real per capita income with $1.000 would imply a decrease of the business ownership rate with 0.61 percentage points, while for the country with the lowest uncertainty avoidance rate (Denmark), this increase in income would mean a decline in business ownership with 0.14 percentage points only. These differences show that the indirect effect exists indeed.

The right-hand columns of Table 6 present regressions in which uncertainty avoidance has been substituted by a dummy variable representing a high and a low uncertainty avoidance cluster of countries, as explained in the section on Method and Data. The results are similar to those including the continuous scale for UAI, as discussed in the previous paragraph. Again, the model including both a direct and an indirect effect of uncertainty avoidance outperforms the model including a direct effect only (at 10% level). An increase in real per capita income with $ 1.000 implies a decrease of the business ownership rate with 0.59 percentage points in the UAI + countries and a decline with 0.28 percentage points in the UAI− countries.

Next, we test the robustness of the indirect effect by adding the share of services and the replacement rate as control variables. Table 7 reports the results. As can be seen from columns 2 and 4, the indirect effect then becomes somewhat smaller and is no longer fully significant.

By and large, there are serious indications of a differential effect of per capita income on entrepreneurship across the rate of uncertainty avoidance, but the robustness of these results is limited. A final observation on the basis of Tables 6 and 7 is that the statistical fit of a 'discrete effect' of uncertainty avoidance is not significantly better than that of a 'continuous effect'.[16]

[16]Note that, in Table 6, the R^2 of the continuous effect model is (slightly) higher compared to the discrete effect model while in Table 7, this is the other way around.

Table 7 The *indirect* influence of uncertainty avoidance on business ownership, pooled samples 1976, 1990 and 2004 (21 countries), complete model

	UAI continuous effect		UAI discrete effect	
Constantx	0.094 (5.0)**	0.058 (2.0)*	0.11 (6.8)**	0.093 (5.3)**
Uncertainty Avoidance (UAI)	0.038 (3.3)**	0.089 (2.6)*		
Dummy UAI strong			0.022 (2.9)**	0.048 (2.2)*
GDP per Capita (YCAP)	−0.57 (7.0)**	−0.31 (1.8)*	−0.59 (6.8)**	−0.50 (5.5)**
UAI * YCAP		−0.38 (1.5)		
Dummy UAI strong * YCAP				−0.18 (1.1)
Share services	0.14 (4.6)**	0.14 (4.6)**	0.15 (5.5)**	0.15 (5.3)**
Replacement rate unemployment	−0.052 (2.2)*	−0.047 (1.9)*	−0.052 (2.5)*	−0.046 (2.0)*
Year dummy 1990	0.029 (3.8)**	0.027 (3.6)**	0.028 (3.9)**	0.027 (3.6)**
Year dummy 2004	0.055 (7.0)**	0.052 (6.1)**	0.055 (7.2)**	0.053 (6.5)**
N	63	63	63	63
R^2	0.601	0.617	0.617	0.629
Loglikelihood	151.8	153.1	153.1	154.1

Dependent variable: number of non-agricultural business owners per labor force
Absolute heteroskedasticity consistent *t*-values are between brackets
# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

6 Conclusions

The prevalence of entrepreneurship, expressed as the percentage of business owners in the labor force, differs strongly between countries. The causes of this disparity do not only have an economic basis, but also stem from cultural differences between countries (Hofstede et al. 2004; Noorderhaven et al. 1999). The persistence of the country differences throughout the economic cycles points at cultural determinants, which are relatively constant per country.

Using a pooled dataset of a large number of OECD countries in 1976, 1990 and 2004, we have found a positive *direct* influence of uncertainty avoidance on business ownership rates, indicating that, in those years, a climate of high uncertainty avoidance in existing firms and organizations may push enterprising individuals towards self-employment (Baum's hypothesis, as discussed before). These findings also show that a personal trait (risk aversion) and its cultural counterpart (uncertainty avoidance) may have a diverging impact on entrepreneurship. Repeating these regressions in three separate sample years confirms these results for 1976 and 1990. However, for the year 2004, the main outcome is that uncertainty avoidance no longer has any direct influence on business ownership. Our interpretation is that the advent of the entrepreneurial economy in recent years has created pull factors mobilizing the relatively abundant supply of potential entrepreneurial capital in countries with low uncertainty avoidance. In recent years, a pull towards entrepreneurship in a climate of *low* uncertainty avoidance has gained dominance vis-à-vis a longstanding historical push effect of *high* uncertainty avoidance.

We also found evidence for a negative *indirect* influence of uncertainty avoidance through a moderating effect on the influence of per capita income on business

ownership. In low uncertainty avoidance countries, the negative influence of per capita income on the rate of business ownership is clearly smaller than in high uncertainty avoidance countries. In a group of eight high-uncertainty avoidance countries, a relatively strong negative relationship between GDP per capita and the level of business ownership suggests that rising opportunity costs of entrepreneurship are the dominant perception in this cultural environment. On the other hand, in a group of 13 low-uncertainty avoidance countries, the relatively weak negative relationship between business ownership and per capita income suggests that rising opportunities are a countervailing force in an environment of low uncertainty avoidance.

A closer look at the underlying development of the business ownership rate in all 21 countries between 1972 and 2004 reveals the following. In the group of low-uncertainty avoidance countries, 8 out of 13 nations show either a clear U-shape (Finland, Germany, the Netherlands and New Zealand) or a vaguely U-shape trend (Australia, Great Britain, Sweden and USA), three show a continuously upward trend in entrepreneurship (Canada, Ireland and Switzerland), one shows a stabilization in the last 20 years (Denmark), while only one (Norway) shows a decreasing trend.[17] In the group of high-uncertainty avoidance countries, two out of eight countries (France and Japan)[18] show a strongly decreasing trend, while six show an increase or a U-shape, sometimes followed by stabilization. While the large number of countries with rising business ownership rates across both groups bear witness to a worldwide trend toward more entrepreneurship related to ICT and deregulation, the differential indirect effects of uncertainty avoidance also suggest that, in modern service economies, high uncertainty avoidance may indirectly have a negative impact on the development of business ownership and may hamper the exploitation of new economic opportunities.

Our study has some limitations that should be borne in mind when interpreting the results. First, the modest explanatory power of most of our regressions suggests that other cultural and psycho-sociological variables may also play a role[19]. Second, our paper only studies the effect of uncertainty avoidance on the *level* of entrepreneurship. It would be relevant to repeat the study for the *dynamics* of entrepreneurship, although a lack of time series of harmonized business start-up data across countries may hamper the latter at least in the near future. Finally, business ownership rates are available for a far smaller number of countries than uncertainty avoidance data. This inhibits fuller testing of the direct and the indirect effect of uncertainty avoidance.

[17]However, in 2004, Norway had a significant rise in the business ownership rate compared to 2002, possibly indicating a stabilization or even reversal of the downward trend. By contrast, while Canada and Switzerland show an increasing trend over the period 1972–1998, the business ownership rates of these countries are decreasing since 1998.

[18]In addition, Luxemburg, that estimates show to be a high uncertainty avoidance country, also has a declining trend.

[19]This includes individualism (Shane 1993), post-materialism (Uhlaner and Thurik 2007) and dissatisfaction (Noorderhaven et al. 2004).

Nonetheless, the present results may already have some relevance for policy-makers trying to promote entrepreneurship. While we would not advocate social engineering, the results do suggest that countries should investigate to what extent their educational system and relevant labor market, social and fiscal legislation foster a low or a high degree of uncertainty avoidance within the population.

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Chapter 14
Postmaterialism Influencing Total Entrepreneurial Activity Across Nations

Lorraine Uhlaner and Roy Thurik

Postmaterialism influencing total entrepreneurial activity across nations (first published in: Journal of Evolutionary Economics, Vol. 17, No. 2, 2007)

1 Introduction

The objective of this paper is to explore whether postmaterialism explains differences in *Total entrepreneurial activity* rates across countries. First coined by Inglehart (Abramson and Inglehart 1999; Inglehart 1977, 1990, 1992, 1997, 2000), postmaterialism describes the degree to which a society places immaterial life-goals such as personal development and self-esteem above material security. *Total entrepreneurial activity* is defined as the share of adults in the total population of 18–64 years old, who are either actively involved in starting a new business (*nascent entrepreneurship*) or in managing a business less than 42 months old (*new business formation*) (Reynolds et al. 2001, 2005).

Much of the past comparative research, at the country level, whether for self-employment or aspects of total entrepreneurial activity, has focused primarily on economic factors (Blau 1987; Blanchflower and Oswald 1994; Blanchflower 2000; Evans and Leighton 1989; Meager 1992; Acs et al. 1994; Audretsch et al. 2002; Grilo and Thurik 2005a, b; Sternberg and Wennekers 2005). However, a high level of unexplained variation in entrepreneurial activity across countries remains when only economic variables are taken into account (Freytag and Thurik 2008). Thus, more recently, researchers have also looked toward cultural factors to explain this variation (Hofstede et al. 2004; Wennekers et al. 2008; Noorderhaven et al. 2004). Most published studies to date use the variables developed by Hofstede to measure the cultural values, individualism, masculinity, uncertainty avoidance and power distance (Hofstede et al. 2004; Wennekers et al. 2008; Noorderhaven et al. 2004). The current study provides an opportunity to examine more specifically the effects

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of postmaterialism on total entrepreneurial activity, which combines rates for nascent entrepreneurship and new business formation.[1]

The understanding of the influence of cultural values is important because these characteristics are imbedded in the population and change more slowly than does economic policy, and may thus provide one explanation for differential effects of similar economic policies on entrepreneurship across cultures. Research evidence by Inglehart (1990) suggests that postmaterialism, though strongly and positively correlated with the economic well-being of a country's citizens, changes more slowly than the economic climate itself, and so may reflect an aspect of cultural values embedded in society. This should help to explain residual effects over and above what can be explained by economic factors themselves.

Section "Culture and Postmaterialism" provides background about the concepts of culture and postmaterialism. It also reviews some of the antecedents, correlates and consequences of postmaterialism. Section "Model and Hypotheses" presents the model and hypotheses tested, including further elaboration of the rationale for the linkage between postmaterialism and entrepreneurial activity. Sections "Research Method," "Results," "Discussion," and "Conclusion and Practical Implications of the Research" present the method, results, discussion, and conclusion sections, respectively.

2 Culture and Postmaterialism

This section reviews the basic terminology used with respect to culture, and more specific background regarding the variable of postmaterialism. This section also reviews some of the antecedents, correlates, and consequences of postmaterialism, including an explanation for why postmaterialism may be related to entrepreneurial behavior.

2.1 Definition of Culture

The notion of patterns of values which shape human behavior is common to different definitions of culture (Kroeber and Parsons 1958; Hofstede 1980). In some of the literature, the view is taken that cultural values are typically determined early in life (Hofstede 1980; Barnouw 1979) and tend to endure over time (Hofstede 1980; Mueller and Thomas 2000). Other researchers take a somewhat different view, that although certain values may prevail in a particular culture at a moment in

[1]In an earlier study, Uhlaner et al. (2002) examine the influence of postmaterialism on self-employment rate on a set of 14 OECD countries, finding a negative effect between the two variables.

time, over time shifts may take place from generation to generation, especially in societies undergoing radical industrial transformation. Thus, for instance, Kotzé and Lombard (2003) examine the shift in South Africa's value priorities from prematerialist to materialist between 1990 and 2001 and Inglehart examines the shift among Americans and West Europeans toward postmaterialism between 1970 and 1988 (Inglehart 1990).

2.2 Postmaterialism and the Cultural Dimension

Though less frequently used in macro-economic research as a predictor of economic activity than the cultural indices developed by Hofstede (1980), Inglehart's (1977, 1990, 1992, 1997, 2000) work on postmaterialism as a cultural attribute is well established. Inglehart uses the concept of postmaterialism to help explain observed changes in values in modern societies. More generally, the postmaterialism hypothesis describes the transformation in many countries from a culture dominated by materialistic-oriented individuals to a society in which an increasing proportion of the population favors non-materialistic life-goals over materialistic ones. Though beyond the scope of the current study, in recent research, the concept of the postmaterialism index has been expanded to include the notion of prematerialism (prior to a materialist culture) to provide better representation of values in developing countries (Kotzé and Lombard 2003).

The hypothesis of postmaterialism is based on two subhypotheses, that of *socialization* and that of *scarcity*. The socialization hypothesis assumes that one's values reflect to a great extent the prevailing circumstances during his formative years. The scarcity hypothesis assumes that someone's priorities reflect his socio-economic circumstances; therefore he attaches greatest value to relatively scarce goods (De Graaf et al. 1989; Inglehart 1981). Taken together, these two hypotheses imply that, as a consequence of the unprecedented prosperity and the absence of war in Western countries since 1945, younger birth cohorts attach less importance to economic and physical security (materialistic values) than older birth cohorts who experienced poverty (and/or other ravages associated with war) in their early years. Instead, younger birth cohorts give higher priorities to non-material goals such as esteem, self-realization and quality of life (postmaterialist values), often referred to in the psychology literature as Maslow's "higher order needs" (Maslow 1954).

In his research, Inglehart's (1990) findings support the conclusion that the primary reason for the shift toward postmaterialism is due to intergenerational replacement, and not to changes in values to individuals within their own life spans. A consequence of this shift is a declining emphasis on economic growth in these countries, together with an increasing emphasis on the protection of the environment and the quality of life. Other research on postmaterialism shows that, in countries with a prevailing postmaterialist climate, the emphasis on income attainment is smaller than in materialistic countries (De Graaf 1988), supporting

Inglehart's description of postmaterialist cultures as "economic underachievers." The assumption of stability of postmaterialist value-orientations within a culture over relatively long periods of time is supported by extensive empirical research from De Graaf using panel-data for the period 1974–1985 (De Graaf 1988), as well as others (Dalton 1984; De Graaf et al. 1989; Niehof 1992; Van Deth 1984). More recent research shows that the trend toward postmaterialism may be slowing (De Graaf 1996) or even declining (Van Deth 1995). Regardless of direction, the bulk of the research shows that these values are very slow to change within particular cultures. Furthermore, as noted in the introduction, research by Inglehart (1990) supports the view that postmaterialism is only partly influenced by economic climate.

2.3 Views Regarding the Relationships Between Cultural Values and Entrepreneurial Behavior

Since extensive research at the individual level of analysis shows a link between values, beliefs and behavior, it is plausible that differences in national culture, in which these values and beliefs are imbedded, may influence a wide range of behaviors, including the decision to become self-employed rather than to work for others (Mueller and Thomas 2000). Using this logic, several past studies have explored the relationship between various aspects of culture and entrepreneurial behavior across cultures (Busenitz et al. 2000; Davidsson 1995; Huisman 1985; Lee and Peterson 2000; McGrath and MacMillan 1992; Mueller and Thomas 2000; Tiessen 1997; Wennekers et al. 2008). The remainder of this section introduces first the notion of push versus pull factors as influences on entrepreneurship, more generally, and then the specific models related to culture, which parallel the views of these opposite forces.

2.3.1 Push vs. Pull Factors as Influences on Entrepreneurship

Applicable to both economic and cultural factors is the notion of supply or push and demand or pull factors for business start-up and entrepreneurship in general (Stanworth and Curran 1973; Thurik et al. 2008; Verheul et al. 2002; Wennekers et al. 2008).[2] Pull factors are concerned with the expectation of being better off as an entrepreneur. Thus, individuals are often attracted to entrepreneurship, with the expectation that it will provide greater material and/or nonmaterial benefits. As we will explain in more detail in this paper, the predicted impact of materialism/postmaterialism follows this view. Push factors take into account the conflict

[2]Verheul et al. (2002) describe a general framework which elaborates upon push and pull factors as determinants of entrepreneurship.

between one's current and one's desired state. Push factors are often associated with some level of dissatisfaction. Huisman and De Ridder (1984) report that frustrations with previous wage-employment, unemployment and personal crises are among the most cited motives of a large sample of entrepreneurs in 11 different countries.[3]

2.3.2 Different Theories on the Relationship Between Cultural Values and Entrepreneurial Activity

We can see a parallel to the push-pull argument in three different perspectives regarding the influence of cultural differences. Hypotheses on the relationship between cultural indicators and entrepreneurship differ, depending upon whether one chooses to view the relationship from one of the "pull" perspectives, such as the *aggregated psychological traits* perspective or *social legitimation* perspective, or, by a "push" perspective such as the *dissatisfaction* perspective (Davidsson 1995; Noorderhaven et al. 2004; Hofstede et al. 2004).

The *aggregate psychological trait*s perspective explains differences in rates of entrepreneurial activity as follows: if there are more people with entrepreneurial values in a country, there will be an increased number of people displaying entrepreneurial behaviors (Davidsson 1995, p. 42; also see Shane 1993, p. 67). Davidsson notes that this is essentially the perspective also taken by McClelland (1975) and other proponents of the individualistic view of culture.

The "*legitimation*" or "*moral approval*" of entrepreneurship focuses on the impact of social norms and institutions on society-at-large (Etzioni 1987, pp. 182–183). This view claims that greater rates of entrepreneurship are found in societies where the entrepreneur is viewed with higher social status, attention to entrepreneurship is paid within the educational system, and more tax incentives exist to encourage business start-ups. This results in higher demand for and supply of entrepreneurship (Etzioni 1987, p. 175). Although the direction of the predictions are the same for the legitimation and aggregated psychological traits perspectives, the explanations differ. Thus, in the legitimation view, the effect is due to institutional and cultural influences, whereas in the aggregated psychological traits view, the effect is due to aggregated effects of individual characteristics. For instance, in the legitimation view, more individuals value entrepreneurship as a result of the higher social status conferred on entrepreneurs in certain societies, whereas in the aggregated psychological traits view, the average person simply indicates that he holds entrepreneurs in high esteem. Although the theoretical explanations may differ, it may be difficult, especially at the macro level, to test empirically which of these explanations is correct since cultural indices are drawn from aggregating responses by individuals.

[3]For example, Van Uxem and Bais (1996) find that 50% of almost 2,000 new Dutch entrepreneurs mention dissatisfaction with their previous job among their motives to start for themselves.

The *dissatisfaction perspective* leads to opposite predictions than those derived from the first two views. This explanation for entrepreneurship at the macro level assumes that variation in entrepreneurship is based upon differences in values and beliefs between the population as a whole and potential entrepreneurs. Thus, in a predominantly non-entrepreneurial culture, a clash of values between groups may drive would-be entrepreneurs into self-employment (Baum et al. 1993, p. 505; Noorderhaven et al. 2004). There is some empirical support for the dissatisfaction hypothesis in research on culture and self-employment (Wennekers et al. 2008; Hofstede et al. 2004. For instance, countries with stronger uncertainty avoidance, that is, the extent to which the members of the culture feel threatened by uncertain or unknown situations (Hofstede 2001, p. 161), appear to be characterized by higher rates of self-employment (Baum et al. 1993; Etzioni 1987; Noorderhaven et al. 2004; Hofstede et al. 2004). The predicted relationship between the cultural indicators and entrepreneurship according to the dissatisfaction hypothesis is thus the opposite of that which might be expected according to the aggregate psychological trait or the legitimation views (Wennekers et al. 2008; Hofstede et al. 2004).

2.4 Control Variables and Correlates of Postmaterialism

2.4.1 Economic Climate and Postmaterialism

Postmaterialist values emerge among birth cohorts that grew up under conditions that enable one to take survival for granted (Inglehart 2003). Thus, the economic climate of the country may have an important effect on postmaterialist values. During the past 25 years, these values have become increasingly widespread throughout advanced industrial societies (Inglehart 2003). In spite of the obvious relationship between these two variables, Inglehart (1990) notes that there is no one-to-one relationship between economic level and the prevalence of postmaterialist values because postmaterialist values reflect one's subjective sense of security, not one's economic level per se. Although the wealth of a nation certainly has an influence, these feelings are also driven by the cultural setting and social welfare institutions of that country, for instance the types of 'safety nets' or other supports provided in case of sickness, loss of work, or other calamity. In short, the scarcity hypothesis alone does not predict value change. Thus, to understand better the separate impact of postmaterialism on rate of total entrepreneurial activity, it is important to control for economic factors. Research by Wennekers et al. (2005) identifies per capita income as an economic predictor of nascent entrepreneurship. This variable is therefore chosen as a control in the current study.

Recent research suggests that economic conditions drive change in cultural values, rather than the reverse. In particular, Inglehart (2003) concludes that democratic institutions do not automatically produce a culture that values self-expression. Rather, it seems that economic development must precede social and cultural changes that make democratic institutions more likely to survive and

flourish (Inglehart 2003). In short, there is strong evidence that the causal connection works from economics to politics, not the reverse. Inglehart (2003) also concludes that authority patterns within organizations seem to be shifting from the traditional hierarchical style toward a more collegial style in organizations as well. This shift may also help to explain the decrease in entrepreneurship in postmaterialist societies, since people may more easily be able to find ways to meet needs for self-expression within larger organizations in such cultures, without having to resort to self-employment.

2.4.2 Life Satisfaction and Postmaterialism

Inglehart (2003) reports a statistically significant and positive relationship between life satisfaction and postmaterialism. More recent research also shows a very strong relationship between values towards gender equality and postmaterialism (Inglehart and Norris 2003). By contrast, societies that rank high on survival values tend to emphasize materialist values, show relatively low levels of subjective well-being and report relatively poor health. Such societies have also been found to be relatively less tolerant toward "outgroups", that is, other groups in the society with dissimilar norms. Such societies are also found to be lower on interpersonal trust, and with greater emphasis on hard work, rather than imagination and tolerance, as important values to teach a child (Inglehart 2003).[4]

In his research on life satisfaction and economic wealth, Inglehart (1990) concludes that wealthier nations tend to show higher levels of life satisfaction than poorer ones.

Regarding entrepreneurship, the research on life satisfaction and entrepreneurial activity to date has led to contradictory conclusions (Noorderhaven et al. 2004; Verheul et al. 2006). One stream of research suggests that greater life satisfaction may be linked with *less* entrepreneurial activity, in line with the dissatisfaction hypothesis. Noorderhaven et al. (2004) find life dissatisfaction to be positively correlated with self-employment. Verheul et al. (2006) find just the opposite, that is, a positive link between life satisfaction and total entrepreneurial activity, especially for women. Either way, reviewing these studies, we consider life satisfaction an important control variable in a model of postmaterialism, in order to tease apart the effects of well-being per se (i.e. life satisfaction) from values associated with postmaterialism, especially since the two variables have been found to be positively correlated in previous studies.

[4]For more detailed discussion of the outgroup concept and its implications, see, for instance, Mackie et al. (1992) and Baron and Kerr (2003).

2.4.3 Education and Postmaterialism

The importance of education in prediction of occupation has long been recognized in sociological research. For instance, in an extensive study on the American occupational structure, Blau and Duncan (1967) conclude that educational attainment is a more important predictor of someone's occupation than background characteristics, such as the father's occupation or education. They also conclude that the intergenerational mobility within business families increases and, as a result, children of business owners choose to pursue a different career than their parents. More recent research at the individual unit of observation suggests that both nascent entrepreneurship (Delmar and Davidsson 2000; Davidsson and Honig 2003) and self-employment[5] (Robinson and Sexton 1994; Cooper and Dunkelberg 1987) are influenced positively by educational attainment.[6] However, macro research tends to show the opposite effects. Thus, a study at the macro level by Uhlaner et al. (2002) shows that a higher level of education in a country is accompanied by a lower self-employment rate. Since higher educational attainment is highly correlated with economic indicators, such as per capita income. In wealthier countries, individuals with more education have greater opportunity to achieve equal or higher social status when employed by others. Thus, entrepreneurship is no longer the only path leading away from lower socio-economic positions. Other research also supports the notion that education may be indirectly linked to a lower rate of entrepreneurship due to its inverse relationship to unemployment (Audretsch et al. 2002), which may be viewed as a push factor towards business ownership.

Coupled with this research are other findings that show a fairly strong positive relationship between levels of education and postmaterialism (Inglehart 1997). Rising levels of education lead to rising levels of postmaterialist values. These findings, together with those (negatively) linking education and business ownership, lead us to suggest that postmaterialist values may mediate the relationship between education and total entrepreneurial activity. Given this past research, education was chosen as a control variable, but with a distinction between secondary and tertiary education rates.

3 Model and Hypotheses

The underlying premise of this study is that nonmaterial motives for entrepreneurs notwithstanding: (a) material gains are central or crucial to entrepreneurship; and (b) since those gains, by definition, are of less value to postmaterialist individuals,

[5]Self-employed people here refer to people who have moved beyond the nascent entrepreneurship stage.

[6]See also Grilo and Thurik (2005a, b) and Parker (2004).

a society that is more postmaterialist is likely to be less entrepreneurial, other things being equal. This premise is closely linked to the psychological aggregate perspective in that it assumes that, in the aggregate, a society with fewer materialistic individuals will also have fewer entrepreneurs. Some researchers assert that nonmaterial motives such as need for autonomy (Van Gelderen and Jansen 2006) or dissatisfaction with the previous work itself (Brockhaus 1982) may be associated with entrepreneurial intentions or behaviors. However, the primary focus here is on the link between evidence that entrepreneurs are motivated, at least in part, by material gain. This premise has not been tested previously at the macro-level of analysis, but research aggregating individual responses provides some support for this argument. For instance, McGrath et al. (1992) find that individual business owners from a wide variety of countries are more likely to have materialistic values. Entrepreneurs in their study are more likely to define success as 'making lots of money' than their non-entrepreneur counterparts. However, they do not test for country differences. Blais and Toulouse (1990) do make such comparisons and conclude that entrepreneurs across countries tend to have similar motivations – in particular, that entrepreneurs place greater value on material gain than nonentrepreneur counterparts. In another study of individual entrepreneurs, Robichaud et al. (2001) find a positive correlation between extrinsic motivation of the entrepreneur and sales performance. They find negative relationships between intrinsic motivation, autonomy and independence and the dependent variable, sales performance.

To sum up, research to date, although primarily at the micro-level of analysis (i.e. comparison of individual entrepreneurs), supports the thesis that business owners, especially successful ones, are more materialistic than their counterparts being employed or unemployed. We make the link that, if indeed a society as a whole is more materialistic (as measured by the postmaterialism scale), the values of the society are more closely aligned with the goals of individual entrepreneurs. Lacking comparable research at the macro-level of analysis, using the aggregated psychological traits view (and/or the legitimation view), we predict that, in societies where making money is less highly valued by the average person, the rate of entrepreneurship is also likely to be lower. We state this as follows:

Hypothesis 1. *The more postmaterialist the culture, the lower the rate of total entrepreneurial activity.*

From past research evidence that shows a correlation between postmaterialism and other societal level characteristics, including per capita income, education, and life satisfaction, one might argue that the influence of postmaterialism could be spurious, or at least intertwined with these other factors. Thus, a second hypothesis posits a "culture" effect of postmaterialism values, even when controlling for these other variables. To summarize, we state Hypothesis 2 as follows:

Hypothesis 2. *Controlling for per capita income, education, and life satisfaction, there remains an independent (negative) influence of postmaterialism on rate of entrepreneurial activity.*

4 Research Method

4.1 Data and Variables

In order to test our central hypothesis about the influence of postmaterialism on entrepreneurial activity, data are used from different sources, including the Global Entrepreneurship Monitor (GEM) (Reynolds et al. 2002), World Value Surveys (Inter-University Consortium for Political and Social Research (ICPSR 1994), and the World Development Indicators database of the World Bank (2001, 2002). Details on the different variables used in the research are presented in Appendix. The primary measure for postmaterialism is based upon Inglehart's four-item postmaterialism index and data collected in 1990 as part of the World Values Survey 1990–1993 (ICPSR 1994). The four item index was selected because there appears to be more complete data across countries for this shorter index. Furthermore, the 1990 dataset is used because it is more complete dataset than the dataset for either the 1981 or 1995–1997 data collection periods.

Because of the known interactions between economic, social, demographic and cultural factors found in previous research, a set of control variables is also included to test for independent and/or mediating effects that postmaterialism may have in predicting the rate of entrepreneurial activity. Control variables include per capita income and per capita income squared, percentage of the population in the appropriate age range in secondary education, percentage of the population in the appropriate age range in tertiary education, and life satisfaction. Total entrepreneurial activity is made up of two components: nascent entrepreneurship and new business formation. For comparison purposes, in certain analyses, other dependent variables were substituted for total entrepreneurial activity, including rate of established business and total business ownership (which combines new business formation and established business together, but excludes nascent entrepreneurship) (See Appendix).

4.2 The Sample

Across the different datasets used for the study, 27 countries had complete data, including Argentina, Belgium, Brazil, Canada, Chile, China, Denmark, Finland, France, Germany (Western), Hungary, India, Ireland, Italy, Japan, Korea, Mexico, Norway, Poland, South Africa, Slovenia, Spain, Sweden, Switzerland, the Netherlands, the United Kingdom and the United States.

4.3 Data Analysis

To test for Hypothesis 1, postmaterialism is regressed alone against the dependent variable of total entrepreneurial activity. Bivariate correlations are also computed to

examine the effects of individual variables on the dependent variable of total entrepreneurial activity.

To test Hypothesis 2 multiple regression analysis is used in a series of models carried out to determine the effects of different variables, and possible mediating effects, using an approach described in Verheul, Uhlaner and Thurik (2005). Briefly, in each case, the control variable is entered first. The significance of the change in R-squared is computed when postmaterialism is added to the model. For the per capita income variable, since past research suggests a curvilinear effect on total entrepreneurial activity, preliminary analyses includes both the linear and squared term for per capita income. However, since the squared term adds nothing to the overall models, it is excluded from more detailed analyses. [7]

In addition to test the main hypotheses, with total entrepreneurial activity as dependent variable, similar regression analyses are carried out, using differing dependent variables, including nascent entrepreneurship, new business formation, established business and total business ownership rates. For all regressions, a VIF statistic and tolerance are computed to test for multicollinearity effects. A tolerance greater than 0.10 is used as a determinant of significance of multicollinearity effects. The VIF statistics are not reported here, but all tolerances were above 0.10, with the exception of per capita income and per capita income squared, when included together in the same model, as might be expected.

4.4 Tests for Robustness

To test for robustness of the primary model (all variable model in Table 2), two tests are carried out. First, the all-variable multiple regression models are calculated for prediction of total entrepreneurial activity for each of 27 subsamples, omitting one of the countries each time as a test for outlier effects.

In a second test of robustness, other postmaterialism indices (including the four-item measures for 1981 and 1995–1997) are substituted in prediction of new business formation and total entrepreneurial activity.

5 Results

5.1 Initial Test of Hypothesis 1: Bivariate Tests and Other Bivariate Relationships

In an initial test of hypothesis 1, using the Pearson Product-Moment Correlation coefficient, postmaterialism negatively relates to total entrepreneurial activity, consistent with the prediction made in Hypothesis 1 ($r = -0.37$, $p < 0.05$,

[7] Squared terms for postmaterialism and life satisfaction are also included in certain regression analyses, but again, no evidence was found to support a hypothesis of curvilinear effects.

n = 29) (see Table 1). Examining the subcomponents of total entrepreneurial activity separately, postmaterialism is more strongly (and negatively) linked to new business formation ($r = -0.45$, $p < 0.05$) than to nascent entrepreneurship ($r = -0.23$, ns). Results of other bivariate tests for independent, control, and dependent variables are also presented in Table 1. Postmaterialism is positively associated with per capita income ($r = 0.70$, $p < 0.01$), life satisfaction ($r = 0.68$, $p < 0.01$), secondary education ($r = 0.59$, $p < 0.01$) and tertiary education ($r = 0.62$, $p < 0.01$).[8]

5.2 *Test of Hypotheses 2 Using Total Entrepreneurial Activity as Dependent Variable*

Table 2 presents a summary of the multiple regression analyses carried out on total entrepreneurial activity. When controlling separately first for per capita income and per capita income squared, postmaterialism does not contribute to the explanation of the model (Model 2). The same is true for education (Model 3). However, when postmaterialism is added to a model with life satisfaction, the additional explanation (ΔR^2) is significant, suggesting that postmaterialism adds independent effects to the overall model with life satisfaction (Model 4). Furthermore, when all three control variables are combined with postmaterialism (Model 5), postmaterialism once again makes an added independent contribution to the model ($\Delta R^2 = 0.07$, $p < 0.05$). Adding the per capita income-squared term does not substantially change the remaining effects, except, as would be expected, the linear per capita income term.

Table 3 presents a series of additional regressions, with the same independent and control variables, but with different dependent variables. It would appear from these results, for instance, that, although the total R-squared is roughly the same, the contribution of postmaterialism to explanation of overall variance is much stronger for new business formation ($B = -9.77$, $t = -4.45$, $p < -0.001$) than for the nascent entrepreneurship rate, which is not significant ($B = -1.13$, $t = -0.45$, ns). Postmaterialism does not predict the rate of established businesses. The final model, dealing with the prediction of total business ownership, once again shows the predictive power of postmaterialism, but this is probably due to the fact that one component of total business ownership, new business formation (which was previously shown to be predicted by postmaterialism), plays an important role.

In sum, comparing the models presented in Table 3, and consistent with bivariate statistics presented in Table 1, the data suggest that postmaterialism most clearly

[8]An earlier version of the paper (Uhlaner and Thurik 2004) reports relationships between these variables and different cultural indices measured by Hofstede, including power distance, individualism, masculinity, and uncertainty avoidance. The Hofstede indices are also substituted for postmaterialism in a series of multiple regression analyses (Uhlaner and Thurik 2005).

Table 1 Pearson product-moment correlations among the independent, dependent and control variables[a]

Variable	1	2	3	4	5	6	7	8	9	10
1. Total entrepreneurial activity (%)	1.00									
2. Nascent entrepreneurship (%)	0.93**	1.00								
3. New business Formation (%)	0.89**	0.66**	1.00							
4. Established business (%)	0.56**	0.35	0.70**	1.00						
5. Total business ownership (%)	0.76**	0.53**	0.90**	0.94**	1.00					
6. Per capita income	−0.57**	−0.52**	−0.46*	−0.22	−0.35	1.00				
7. Postmaterialism	−0.45*	−0.31	−0.52**	−0.28	−0.41*	0.71**	1.00			
8. Life satisfaction	−0.04	−0.02	0.01	0.01	−0.00	0.58**	0.69**	1.00		
9. Education-secondary	−0.75**	−0.76**	−0.58**	−0.33	−0.47*	0.75**	0.59**	0.39*	1.00	
10. Education-tertiary	−0.32	−0.31	−0.22	−0.07	−0.15	0.79**	0.64**	0.43*	0.63**	1.00
Mean	7.99	4.73	3.64	6.15	9.78	20.12	1.91	7.26	101.33	42.70
SD	4.39	2.63	2.36	3.00	4.95	9.32	0.20	0.65	24.25	21.20

** Correlation is significant at the 0.01 level (two-tailed)

* Correlation is significant at the 0.05 level (two-tailed)

[a]Correlations are based on the 27 countries used in the multiple regression analysis

Table 2 Regressions on Total Entrepreneurial Activity (TEA) (Nascent Entrepreneurship plus New Business Formation) across 27 Countries

Variable	Postmaterialism on TEA (H1)	Postmaterialism and Per capita income on TEA (H2)	Postmaterialism and Education on TEA (H3)	Postmaterialism and Life Satisfaction on TEA (H4)	All variables on TEA	All variables plus per capita income^2 on TEA
	Model 1 B (t-value)	Model 2 B (t-value)	Model 3 B (t-value)	Model 4 B (t-value)	Model 5 B (t-value)	Model 6 B (t-value)
Postmaterialism	−9.80 (2.55)*	0.28 (0.06)	−3.21 (−0.84)	−17.46 (−3.57)**	−9.56 (−2.73)*	−8.61 (−2.33)*
Per Capita Income		−1.21(−3.21)**			−0.24(−2.52)*	−0.53 (–1.52)
Education-secondary			−0.16(−4.92)***		−0.12(4.58)***	−0.11 (−3.50)**
Education-tertiary			0.07(1.71)#		0.11(3.32)**	0.12 (3.39) **
Life Satisfaction				3.49(2.28)*	4.02(4.36)***	3.71 (3.73)***
Per capita income-squared		0.03(2.69)*				0.01 (0.86)
R	0.45	0.70	0.78	0.59	0.90	0.90
Adj. R^2	0.17	0.42	0.56	0.29	0.76	0.76
F-Statistic, df	6.49(1.25)*	7.33(3.23)***	12.18(3.23)***	6.40(2.24)**	17.58(5.21)***	14.59(6.20)***
ΔR squared when Postmaterialism entered last in equation		0.00	0.01	0.35**	0.07*	0.05*

# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3 Comparison of multiple regressions (using all variable model on (TEA) and other ownership variables across 27 Countries

Variable	All variables on TEA	All variables on % nascent entrepreneurship	All variables on new business formation	All variables on established businesses	All variables on total business ownership
	B (t-value)	B (t-value)	B (t-value)	B (t-value)	B (t-value)
Postmaterialism	−9.56 (−2.73)*	−1.13 (−0.45)	−9.77 (−4.45)***	−0.7.44 (−1.59)	−0.17.21 (−2.75)*
Per capita Income	−0.24 (−2.52) *	−0.11 (−1.58)	−0.12 (−0.1.92)#	−0.07 (−0.57)	−0.19 (−1.10)
Education-secondary	−0.12 (−4.58)***	−0.09 (−4.64)***	−0.04 (−2.41)*	−0.04 (−1.05)	−0.08 (−1.63)
Education-tertiary	0.11(3.32)**	0.05 (2.02)#	0.07 (3.35)**	0.06 (1.42)	0.13 (2.23)*
Life Satisfaction	4.02 (4.36) ***	1.67 (2.53)*	2.60 (4.50)***	1.89 (1.54)	4.49 (2.73)*
R	0.90	0.85	0.86	0.51	0.72
Adj. R^2	0.76	0.66	0.67	0.09	0.40
F-Statistic, df	17.58 (5.21)***	10.86 (5.21) ***	11.68 (5.21)***	1.50 (5.21)	4.45** (5.21)

# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

predicts new business formation, in contrast to either nascent entrepreneurship or established businesses.[9] The effects of the different control variables also differ depending upon the choice of dependent variable. Thus, the effect of per capita income all but disappears in the models predicting the rate of nascent entrepreneurship, new business formation, and established business. Secondary education has a negative effect on both components of total entrepreneurial activity, but not on the rate of established firms. Similarly, both life satisfaction and tertiary education have positive effects on both subcomponents of total entrepreneurial activity. However, neither is a significant predictor for the rate of established businesses.

5.3 Results of Tests for Robustness

As pointed out by Beugelsdijk et al. (2004), there is no uniform test for robustness. Given the small sample size, some tests for robustness are not considered practical. However, to check for robustness with respect to the composition of the sample, regressions for the primary model shown in Table 2 (model 5) are repeated for 27 subsamples, omitting one of the countries each time. The resulting adjusted R squared ranges from 0.74 to 0.82. Though minor fluctuations occur, the model remains fairly stable. With Korea omitted, the model is somewhat weaker (only a trend of $p < 0.10$ rather than significance level of $p < 0.05$ for the change in R squared of postmaterialism when added to the other variables in prediction of total entrepreneurial activity) but the fluctuations are minor.

In a second test of robustness of the effect of postmaterialism, postmaterialism indices from different years (including 1981 and 1995–1997) are substituted for the index from 1990 to predict total entrepreneurial activity and new business formation (See Table 4). Similar patterns of results are found, although due to much smaller sample sizes, the results do not always hold at the same level of statistical significance. In comparing the models, the 1995–1997 models are fairly similar. However, the significance level is lower, perhaps due to the fact that fewer countries (20 vs. 27) are included in the sample. The B value for the 1981 postmaterialism index is also negative but not significant at the 0.05 level, again, with a smaller ($n = 18$) sample.

[9]In other analyses, not shown here, postmaterialism is a significant negative predictor of nascent entrepreneurship, but only in a regression model with life satisfaction as a positive predictor.

Table 4 Comparison of multiple regressions on total entrepreneurial activity and new business formation using postmaterialism index from different years

Variable	All variables on TEA using 1981 data	All variables on TEA using 1990 data (same as Table 2)	All variables on TEA using 1995–1997 data (4 item)	All variables on NBF using 1981 data	All variables on NBF using 1990 data (same as Table 3)	All variables on NBF using 1995–1997 data
	B (t-value)	B (t-value)	B (t-value)	B (t-value)	B (t-value)	B (t-value)
Postmaterialism	−5.22 (−1.28)	−9.56 (−2.73)*	−5.72 (−1.72)	−4.26 (−1.46)	−9.77 (−4.45)***	−6.02 (−2.60)*
Per capita Income	−0.37 (−2.44)*	−0.24 (−2.52)*	−0.23 (−1.77)	−0.21 (−1.90)#	− 0.12 (−1.92)	−0.10 (−1.07)
Education-secondary	−0.09 (−2.24)*	−0.12 (−4.58)***	−0.18 (−4.59)***	−0.02 (−0.58)	− 0.04 (−2.41)*	−0.08 (−2.77)*
Education-tertiary	0.09 (2.04)	0.11(3.32)**	0.15 (3.11)**	0.07 (2.35)*	0.07 (3.35)**	0.09 (2.68)*
Life Satisfaction	3.46 (2.56)*	4.02 (4.36)***	3.90 (3.45)**	1.25 (1.30)	2.60 (4.50)***	2.40 (3.05)**
R	0.82	0.90	0.89	0.67	0.86	0.81
Adj. R^2	0.55	0.76	0.71	0.23	0.67	0.53
F-Statistic, df	5.47(5.13)**	17.58(5.21)***	10.48(5.14)***	2.10(5.13)	11.68(5.21)***	5.31(5.14)**
ΔR squared when Postmaterialism entered last in equation	0.04	0.07*	0.04	0.09	0.25***	0.17*

# $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

[a]Similar patterns were found for regressions with a common subset of 20 countries, for 1990 and 1995–1957. (Only 10 countries overlap both 1981 and the other time periods and thus all available countries were included for the 1981 period even though some of these countries did not overlap those included during other time periods)

6 Discussion

6.1 Discussion of Results

The results of this study confirm the importance of postmaterialism when explaining total entrepreneurial activity, but especially new business formation. In reviewing the two hypotheses as initially stated in this paper, there does appear to be reasonable support for Hypothesis 1, predicting a negative relationship between postmaterialism and total entrepreneurial activity. Support for Hypothesis 2 depends upon whether all controls are viewed together in the model (in which case, the Hypothesis 2 is supported), or separately (in which case, in some instances it is not). Lack of stability of findings does suggest some rather complex interrelationships amongst the control and independent variables. However, one possibility is that postmaterialism mediates the relationship between per capita income and total entrepreneurial activity, consistent with Ingelhart's conclusions that economic climate drives social change, rather than the reverse (Inglehart 1990). However, the results supporting such a conclusion are ambiguous. Indeed, in Model 5, the fact that the B weight for per capita income becomes non-significant when all variables (including postmaterialism) are added to the model would support the claim that postmaterialism mediates the relationship between economic climate and entrepreneurial activity.[10] However, results from Model 2 would lead one to the opposite conclusion (that economic activity mediates the relationship between postmaterialism and entrepreneurial activity). Clearly, further research is needed to tease apart these effects, perhaps on regional data which would provide a larger sample size.

Regarding effects of the different control variables, per capita income also has a negative effect, whether included alone or with the rest of the variables in the model. Preliminary regression analyses check for the possibility of a curvilinear effect of per capita income on total entrepreneurial activity (Carree et al. 2002; Wennekers et al. 2005; Sternberg and Wennekers 2005). However, it does not provide additional explanation of the dependent variable when postmaterialism, life satisfaction, per capita income, secondary education and tertiary education are included in the model. Secondary education appears to have a fairly consistent negative effect. Although zero-order effects for tertiary education on total entrepreneurial activity are not significant, the effect of tertiary education on total entrepreneurial activity becomes positive when controlling for all the other variables used in the study (see Models 5 and 6). Finally, life satisfaction, though not significant in zero-order statistics, consistently has a positive effect on total entrepreneurial activity in Models 4, 5, and 6, all of which include postmaterialism.

Results for the control variables are interesting, in comparison with past research. For instance, the negative relationship between per capita income and entrepreneurial activity is in line with findings by Wennekers et al. (2008), who find

[10]See detailed discussion of tests for mediating effects in Verheul et al. (2005).

higher self-employment in countries with less prosperity (lower per capita GDP). On the other hand, the findings in the current paper contradict findings by Wennekers et al. (2008) regarding life satisfaction and self-employment (their study finding a negative relationship between the two variables). There are three possible explanations for the differences in these results: (a) different sources of data were used in our study versus that of Wennekers et al. (2008), for both life satisfaction and entrepreneurship; (b) different samples of countries were used in the two studies, in particular their study limited only to OECD countries whereas our sample includes poor countries; and finally, (c) our study is primarily a cross sectional rather than panel study.

Regarding findings for education, consistent with Inglehart's other research, postmaterialism and education are positively related (Inglehart 1997). However, controlling for other factors, including postmaterialism and life satisfaction, secondary and tertiary education appear to have opposite effects on total entrepreneurial activity – secondary education with a negative and tertiary education with a positive effect. There are different possible explanations for these results. On the one hand, perhaps more widespread secondary education reduces the need for self-employment, and is a way to detect not only average income but also wider dispersion of income and employment opportunity within the population, consistent with other research which shows a negative relationship between secondary education and unemployment (Audretsch et al. 2002). On the other hand, the positive effect of tertiary education on total entrepreneurial activity suggests that higher level education may provide a larger pool of would-be entrepreneurs attracted to the nonmaterial rewards of entrepreneurship, such as greater autonomy (Van Gelderen and Jansen 2006) or achievement (McClelland 1975). Perhaps tertiary education also provides human capital for 'high-tech' entrepreneurship initiatives. Certainly more research is warranted that would examine different levels of education as separate dummy variables rather than assuming a linear relationship between education and entrepreneurial activity.

6.2 Limitations and Directions for Future Research

This study is limited by its small sample size (27 countries) and by its particular period of time (2002). For clarity regarding time lags, all variables reflect a measurement in one point in time. Sometimes the year chosen was more for practical reasons (more countries available for instance for 1990 than for 1981 and 1995–1997 for the postmaterialism index). However, it is possible that the relationships may alter if data are examined from different periods of time and/or different sets of countries. The relatively small number of cases also leaves open some unresolved questions of robustness. As reported earlier, findings are reasonably robust, though omitting one or two countries (Korea in particular) modifies the statistical significance of the postmaterialism index somewhat for total entrepreneurial activity (from the 0.05 level to the 0.10 level of significance for the delta

R-squared), although the signs remain the same. The effect of Korea, in particular, on the model suggests the need to sample from a more diverse group of countries, and, in particular, to represent Asian countries more broadly. Korea and Japan are the only two Asian countries with data available from both GEM and the World Values Survey. In short, conclusions drawn from this study should be viewed as tentative, at best. However, the strength and size of the findings, with respect to their significance levels and amount of variation explained, suggest possible benefits of pursuing the impact of postmaterialism on rate of total entrepreneurial activity, and new business formation, in particular.

Future research should explore the construct validity of the different cultural indices used in past and present research in entrepreneurial economics. Furthermore, longitudinal effects would be helpful in order to examine the stability and direction of change of postmaterialism in different cultures, although this is hampered somewhat by erratic data collection not only for postmaterialism but also possibly for other social and cultural variables. The present work suggests that it may be worth the effort to continue exploring these effects and the way in which they interact with one another and with economic and demographic variables at the country level, especially given the radical redefinition of many country borders within the past few decades, more refined analyses of subregions within countries and/or "supraregions" across countries (see Hofstede et al. 2004) may also yield interesting results.

In future research, it may be useful to consider carefully the differences in factors predicting nascent entrepreneurship, new business formation and the overall established business rate. For instance, for nascent and young entrepreneurs, factors that predict motivation and intentions may be more important than those that determine actual skill levels. Thus, push factors, such as secondary education, may trigger feelings of job security and act as a brake on entrepreneurial activity in the start-up phase, but have a much weaker effect, if any, on the determination of the rate for established firms. Tertiary education, in contrast, might be a reflection of the total human capital of a country, i.e. the specialized skills and abilities needed to launch high-technology or other knowledge-based firms.

Regarding postmaterialism and entrepreneurial activity, findings from the present study might be interpreted using the aggregated psychological traits view. That is, less postmaterialist cultures may have a larger proportion of individuals motivated by money, and in turn, successful at making (their first) sales. This does not explain why postmaterialism does not lack predictive power for other business ownership rates, including nascent entrepreneurship and established business ownership.

The lack of power of any of the selected factors to predict the rate of established firms is indeed puzzling, although the signs are in the same direction. Perhaps motivational factors become far less important in prediction of the survival of firms than various environmental factors, including institutional differences and economic policies which differ across countries. The economic literature is replete with examples of such explanations. A number of studies explain, for instance, the rebound in self-employment in the late twentieth century on supply factors such

as tax rates, unemployment, competition and female labor participation (Blau 1987; Blanchflower and Oswald 1994; Blanchflower 2000; Evans and Leighton 1989; Meager 1992, Acs et al. 1994; Audretsch et al. 2002). Differences in taxation policies, population density, investment in infrastructure (for roads, schools, etc.) are other factors that have been shown to help explain regional differences in incorporation rates across US states (Hendrickson and Woodland 1985). In summary, more accurate explanations of variation in business ownership may require differentiated models to predict nascent entrepreneurship, new business formation, and business survival rates, taking into account a variety of variables based on human capital (extrapolated from demographic variables such as education), culture (not just postmaterialism but other values), and economic policies (determining not only the average but also dispersion of resources within a society).

7 Conclusion and Practical Implications of the Research

The focus of this paper is on the determinants of entrepreneurial activity. Much of past research in this area has been dominated by investigation of economic factors. This study is not intended to discount the role that governmental policies play in stimulating self-employment and entrepreneurship. However, the results of this study provide support for the conclusion that cultural values, in this case, postmaterialism, may provide an added explanation for differing rates of entrepreneurial activity across countries. One implication of these results is that the effectiveness of various policy responses may be limited partially by cultural factors beyond the control of policy makers. Alternatively, policies to stimulate entrepreneurship in the future might be customized toward the cultural biases present in a particular society. Thus, for instance, in a more postmaterialist culture, it may be important to emphasize the nonmaterial benefits of launching one's own firm (autonomy, creativity, etc.) rather than on the economic benefits.

Two caveats are appropriate here. First, even if the relationship between postmaterialism and rate of total entrepreneurial activity holds across nations, it may not hold true for individuals within countries. The extent of materialist values at the individual level may play a role in predicting entrepreneurship behavior within countries, but this cannot be concluded from this cross-national study. Second, one must be prudent in extrapolating the conclusions found in this study to worldwide relationships. This study is based on a range of countries on four continents (North and South America, Europe, and Asia). However, it is limited to only 27 countries. This limitation, nonetheless, does not disqualify important findings from this study, which show that, for the countries under study, at least one aspect of national culture – postmaterialist values – may have powerful effects on the rate of entrepreneurial activity, especially the rate of new business formation.

In summary, our findings clearly confirm a negative relationship between postmaterialism and entrepreneurial activity; countries marked by less materialistic

values tend to have lower total (nascent and new business formation combined) entrepreneurial activity as a proportion of the adult population. Further, per capita income and the proportion of the population enrolled in secondary level education are both negatively associated with total entrepreneurial activity, whereas life satisfaction and tertiary education levels have the opposite effect, when other variables are controlled for. Other than the linear and squared term of per capita income, in spite of relatively high intercorrelation among the variables of the present study, multicollinearity is not a problem, and it appears that each variable contributes a unique and fairly consistent portion of the variance explained for the dependent variable of total entrepreneurial activity. However, further research is still warranted to confirm the stability of this relationship in a broader sample of countries and where available, with longitudinal data.

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Appendix: Details Regarding Measurement of Variables

Dependent Variables

Data on the entrepreneurial activity variables below are taken from the Global Entrepreneurship Monitor (GEM) 2002 Adult Population Survey (Reynolds et al. 2005). This database contains various entrepreneurial measures that are constructed on the basis of surveys of – on average – some 3,000 respondents per country (37 countries in total).

Total Entrepreneurial Activity 2002

Total entrepreneurial activity is measured as a combination of nascent entrepreneurship (the percentage of people in the age group of 18–64 years who are

actively engaged in the start-up process) or new business formation (those owning and managing a business less than 42 months old in 2002) (expressed in % of adults in the same age group). *Source:* Global Entrepreneurship Monitor.

Nascent Entrepreneurship 2002

The nascent entrepreneurship rate is defined as the number of people that are actively involved in starting a new venture, as a percentage of adult population (18–64 years old). An individual may be considered a nascent entrepreneur if the following three conditions are met: if he has taken action to create a new business in the past year, if he expects to share ownership of the new firm, and if the firm has not yet paid salaries or wages for more than three months (Reynolds et al. 2002, p. 38). *Source:* Global Entrepreneurship Monitor.

New Business Formation 2002

New business activity is measured as the percentage of people in age group of 18–64 years who are managing a business less than 42 months old in 2002 (expressed in %). A firm is defined as a 'new business' if the firm has paid salaries and wages for more than three months but for less than 42 months. *Source:* Global Entrepreneurship Monitor.

Established Businesses 2002

This variable is computed as a percentage of adult population (18–64 years old) with an 'established business'. A firm is defined as an 'established business' if the firm has paid salaries and wages for more than 42 months (Reynolds et al. 2002, p. 38). *Source:* Global Entrepreneurship Monitor.

Total Business Ownership 2002

This variable is computed as the sum of 'new businesses' and 'established businesses', both measured as a percentage of adult population (18–64 years old), taken from the GEM 2002 Adult Population Survey. A firm is defined as a 'new business' if the firm has paid salaries and wages for more than three months but for less than 42 months, and as an 'established business' if the firm has paid salaries and wages for more than 42 months (Reynolds et al. 2002, p. 38). The business ownership

variable thus measures the stock of incumbent business owners. *Source:* Global Entrepreneurship Monitor.

Independent Variables

Per Capita Income

Gross national income per capita 2001 is expressed in purchasing power parities per US$, and these data are taken from the 2002 World Development Indicators database of the World Bank. We do not use GDP per capita from the GEM database because this variable is measured at exchange rates. We do not want fluctuations in exchange rates to impact the ranking of countries with respect to their level of economic development.

Participation in Education (1997)

We have included gross enrollment ratios in secondary education and tertiary education. Gross enrollment ratios are defined as the total number of students enrolled divided by the total number of people in the appropriate age range. These data are taken from Table 2.12 of the 2001 World Development Indicators database from the World Bank. *Source:* World Bank.

Postmaterialism

The source of the postmaterialism data are the World Values Survey, 1990–1993 (ICPSR 1994). Scores for individual respondents are computed on the basis of their rankings of certain items. For the 4-item postmaterialism index, respondents were asked to select the most important and second important goal a country should have from the following four items: (a) Maintaining order in the nation, (b) Giving people more to say in important government decisions, (c) Fighting rising prices and (d) Protecting freedom of speech. The postmaterialism index is constructed as follows:

1 = Materialist: first choice item a, second choice item c or first choice item c and second choice item a.

2 = Mixed: first choice item a or c and second choice item b or d or first choice item b or d and second choice item a or c.

3 = Postmaterialist: first choice item b and second choice item d or first choice item d and second choice item b.

The country scores were aggregates of the individual respondent scores, thus also ranging between 1 and 3. A similar methodology was used for the 10-item indices, again with an eventual scale ranging between 1 and 3. *Source:* World Values Survey and European Values Surveys, cumulative data: 1990–1993.

Life Satisfaction

Life satisfaction is also derived from the World Values Survey, 1990–1993 (ICPSR 1994). The score for this variable is constructed as the average score of the inhabitants of a country rating life as a whole (life satisfaction) on a scale ranging from 1 (completely dissatisfied) to 10 (completely satisfied). *Source:* World Values Survey and European Values Surveys, cumulative data: 1990–1993

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