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Sander Wennekers

Roy Thurik

André van Stel

Niels Noorderhaven

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UNCERTAINTY AVOIDANCE AND THE RATE OF BUSINESS OWNERSHIP
ACROSS 21 OECD COUNTRIES, 1976-2004

Sander Wennekers EIM Business and Policy Research, Zoetermeer

Roy Thurik Erasmus University Rotterdam, EIM Business and Policy Research, Zoetermeer and
Max Planck Institute of Economics, Jena

André van Stel EIM Business and Policy Research, Zoetermeer, Erasmus University Rotterdam and
Max Planck Institute of Economics, Jena

Niels Noorderhaven Tilburg University

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ABSTRACT

Persistent differences in the level of business ownership across countries have attracted the attention of scientific as well as political debate. Cultural as well as economic influences are assumed to play a role. This paper deals with the influence of cultural attitudes towards uncertainty on the level of business ownership across 21 OECD countries. *First*, the concepts of uncertainty and risk are elaborated, as well as their relevance for entrepreneurship. An occupational choice model is introduced to underpin our reasoning at the macro-level. *Second*, regression analysis using pooled macro data for 1976, 1990 and 2004 and controlling for several economic variables, yields evidence that uncertainty avoidance is *positively* correlated with the prevalence of business ownership. According to our model, a restrictive climate of large organizations in high uncertainty avoidance countries pushes individuals striving for autonomy towards self-employment. Regressions for these three years separately show that in 2004 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. *Third*, an interaction term between uncertainty avoidance and GDP per capita in the pooled panel regressions shows that the historical 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.

JEL-CODES: P52, Z1, M13, O11, O57.

KEYWORDS: business ownership, uncertainty avoidance, cross country study, comparative analysis of economies, cultural economics, entrepreneurship

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CONTACT:

Sander Wennekers
EIM Business and Policy Research
P.O. Box 7001, 2701 AA Zoetermeer, the Netherlands
Phone: (+31) 79 343 0200
Fax: (+31) 79 343 0202
E-mail: awe@eim.nl

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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 out of the labor force is a (non-agricultural) business owner whereas in Finland approximately one in fourteen operates a business of their own (average rates 1972-2004) (see e.g. van Stel, 2005; Thurik and Wennekers, 2004). A well-known approach explains this disparity by differences in prosperity (Kuznets, 1971). The richer the country is, the fewer business owners there are. However, the first cracks in this negative relationship appeared in the late seventies (Blau, 1987 and Acs, Carlson and Karlsson, 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, van Stel, Thurik and Wennekers, 2002, and van Stel 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, like culture, have been brought forward (Hofstede et al., 2004).

Slowly data material becomes 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 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, van Stel, Thurik and Reynolds, 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 explaining these differences since cultural aspects are relatively time invariant (Noorderhaven, Thurik, Wennekers and van Stel, 2004). The present paper investigates the role of uncertainty avoidance. Elsewhere the role of variables like post-materialism and dissatisfaction is studied (Uhlener and Thurik, 2007 and 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 taking 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 characteristics² as well as cultural, institutional and

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).

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, Wennekers, Audretsch and Thurik, 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.

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?

UNCERTAINTY, RISK AND ENTREPRENEURSHIP

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: 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 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: 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 entrepreneur's function is arbitrage between supply and demand. "As Cantillon describes it, entrepreneurs buy at a certain price to sell again at an uncertain price, with the difference being their profit or loss" (Hébert and Link, 1989: 42). Most (neo)-classical authors, including Say and Marshall, view entrepreneurs as being responsible for risk-bearing (van Praag, 1999: 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: 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: 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

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 (2005a and 2005b) and Lin et al. (2000) for empirical work.

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).

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 and Wubben, 1993).

Economists like Knight and Keynes and economic schools like 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).

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, MacMillan and Scheinberg (1992) compare values, including attitudes towards risk and failure, of entrepreneurs (founder-managers of stand-alone businesses that were at least two years old and employed at least one other person) and non-entrepreneurs in eight nations. Entrepreneurs were found to agree more often to statements like ‘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.

Synthesis of micro-economic views

Uncertainty is a concept that is central to entrepreneurship, as emphasized by eminent economists such as Cantillon, Mangoldt, Knight and Keynes (Hébert and Link, 1989; Ekelund and Hébert, 1990). Without uncertainty, entrepreneurship would be unnecessary. In the East European socialist planning economies entrepreneurship was unneeded and sometimes considered as criminal because a system of complete planning was aimed at that would 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 and 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 and 2001). Hébert and Link (1989: 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 the 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) describes the ‘true’ uncertainty of future loss or profit, inherent to launching a radical innovation or to investing financial capital in fundamental research.

INSERT TABLE 1

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: 37-41).

Cultural traits with respect to uncertainty

Attitudes, such as risk aversion, pertain to individuals and may show a wide variety within groups of individuals. 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: 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: 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: 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: 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.

Relevance of uncertainty avoidance for explaining the business ownership rate

Direct effect of uncertainty avoidance

A micro-economic model of occupational choice is introduced to clarify in what ways uncertainty avoidance may have an impact on the prevalence of business ownership at 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:

- (1) $OC^*_{SE,i} = \alpha_i U_{MR,i} + (1 - \alpha_i) U_{IR,i}; \quad 0 < \alpha_i < 1$
- (2) $U_{MR,i} = \beta_i ((1 - \rho_{SE,i}) E(I)_{SE,i} - E(I)_{WE,i}); \quad \beta_i > 0; \quad 0 < \rho_{SE,i} < 1$
- (3) $U_{IR,i} = \gamma_i \Delta AUT_i; \quad \gamma_i > 0$

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: 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 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 which 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-

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 Equation (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.

employment is diminished by high uncertainty avoidance (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 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 for 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.

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.

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 do 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 the 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 four 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.

INSERT TABLE 2

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 a business owner.

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.

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.

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 van Stel 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 of this compositional effect on the business ownership rate is scant. Wennekers and Folkerlinga (2002) investigated long-term trends in the business ownership rate of the Netherlands. Sector shifts were clearly seen to play 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).

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 will 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 become self-employed.⁶

Parker (2004: 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.

⁶ In a micro-economic model of occupational choice (de Wit, 1993), equality of entrepreneurial income and wages will determine the equilibrium number of self-employed. In this model, an exogenous wage increase will lower the (equilibrium) number of self-employed while an exogenous upward shift of profits will raise the equilibrium.

In our empirical analysis we will 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.

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). 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.

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, Kannianen and Lammi, 1999; Parker and Robson, 2004; Hessels, van Stel, Brouwer and Wennekers, 2006) reporting negative effects on self-employment of employers' social security contributions and/or the unemployment benefit replacement rate.

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 for 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.

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, Hall and Hutchinson, 1996; LeCornu and McMahon, 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: 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.

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, Arenius and Langowitz, 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, van der Hoeven and Verhoeven, 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. On the one hand, research conducted on a Swedish sample at individual level and showing that nascent entrepreneurs attained on average a higher educational level⁷ than those in a control sample (Delmar and Davidsson, 2000), has been reconfirmed in recent investigations across several high-income countries (Acs, Arenius, Hay and Minniti, 2004). On the other hand, research with respect to a static index of entrepreneurship leads to the opposite conclusion. For instance, in a recent comparative study across 27 OECD countries, countries with a higher level of secondary education tend to have a smaller proportion of self-employment (Uhlener and Thurik, 2007).

With respect to the *age composition of the population*, Blanchflower, Oswald and Stutzer (2001: 686) reported 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.

METHOD AND DATA

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 (four years lagged) per capita income and some other control variables (also four 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 thirteen countries form the cluster⁹ 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

⁷ In addition, nascent entrepreneurs were found to have more management experience.

⁸ Delmar and Davidsson (2000), EIM/EZ (2000), van Gelderen (1999:21) and various annual Executive Reports published by the Global Entrepreneurship Monitor.

⁹ The clustering was carried out with the K-means algorithm. See Noorderhaven et al. (1999).

hope to find indications whether the effects of uncertainty avoidance are discrete or continuous (see also Cohen and Cohen, 1983).

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 study¹² 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 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: 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: 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. Secondly, 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: 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: 631). Hofstede's UAI, in contrast, is only weakly correlated to economic prosperity (Hofstede, 2001: 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 towards deregulation of markets. Both phenomena have created opportunities for small scale business and new entrepreneurship. Audretsch and Thurik (2000 and 2001) label this as a regime switch from 'a managed

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.

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: -.643; Hofstede UAI x GLOBE values: .607; GLOBE practices x GLOBE values: -.869. All these correlations are significant at the 1% level.

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.

INSERT TABLE 3

RESULTS

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 regressions¹⁴. 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 (+).

INSERT TABLE 4

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 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.

INSERT TABLE 5

The main outcome of table 5 is that the positive effect of uncertainty avoidance fades away over time. Our interpretation would be 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

¹⁴ Excluding the Gini coefficient and the long term interest rate, due to the smaller available number of observations of these variables.

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 in 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.

Indirect influence of uncertainty avoidance

Next, we have explored 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 also 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 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.

INSERT TABLE 6

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 would imply 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 have tested 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.

INSERT TABLE 7

By and large there are serious indications for 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 would be that the statistical fit of a ‘discrete effect’ of uncertainty avoidance is not significantly better than that of a ‘continuous effect’.¹⁶

¹⁵ This appears both from the significance level of the interaction term (p-value is .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.

¹⁶ Note that, in table 6, the R² of the continuous effect model is (slightly) higher compared to the discrete effect model while in table 7, this is the other way around.

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 and 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 in 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 would be 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 thirteen 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, eight out of thirteen nations show either a clear U-shape (Finland, Germany, the Netherlands and New Zealand) or a vaguely U-shaped 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 twenty 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 role¹⁹. Secondly, 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. To the contrary, 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 policymakers 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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Table 1 Uncertainty encompassing risk and opportunity

<i>degree of uncertainty</i> <i>risks versus opportunities</i>	<i>(1)</i> <i>possible outcomes and their probabilities are known</i>	<i>(2)</i> <i>there is a notion of possible outcomes and probabilities</i>	<i>(3)</i> <i>anything might happen</i>
<i>possibility of damage, loss or failure</i>	calculated risks	perceived risks and opportunity costs	true uncertainty of loss or failure
<i>opportunity of profit or other business success</i>	expected profits	perceived profit opportunities	true uncertainty of profit; serendipity

Table 2 Major explanatory variables of the business ownership rate

<i>Economic variables (operationalization)</i>	<i>Relevant literature</i>	<i>Data availability (years); Source</i>
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) ¹	van Stel and Carree, 2004	1972, 1986, 2000; OECD National Accounts
entrepreneurial income relative to the wage rate (labor income share) ²	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) ³	Ilmakunnas et al., 1999	mid-1980s; 2000; OECD
cost of capital (long term interest rate) ⁴	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
<i>demographic variables</i>		
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, 2004	1970, 1985, 2000; World Bank EdStats data base
female labor participation	Delmar and Davidsson, 2000; Verheul, 2005.	1972, 1986, 2000; OECD Labour Force Statistics

¹ 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.

² 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.

³ No data available for 1972. Missing values for Belgium and Spain.

⁴ No data available for 1972.

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	.49 **	1												
3. GDP per Capita	-.24 #	-.38 **	1											
4. Labor income share	-.42 **	-.42 **	.27 *	1										
5. Unemployment	.31 *	.09	-.01	-.10	1									
6. Female labor share	-.21	-.22	.67 **	.19	.001	1								
7. Population density	-.03	.28 *	.04	.22 #	-.01	-.14	1							
8. Share services	.21 #	-.26 *	.54 **	.10	-.02	.18	-.07	1						
9. Replacement rate unempl.	-.26 *	-.18	.32 *	.05	.14	.30 *	.27 *	-.035	1					
10. Gini index	.71 **	.42 **	-.21	-.35 *	.32 #	-.32 #	-.06	.33 *	-.54 **	1				
11. Long term interest rate	.08	-.14	-.56 **	-.08	.38 *	-.36 *	-.24	-.25	-.04	-.26	1			
12. Share age group 25-39 in adult pop. (25-64 yr)	.05	-.23 #	.42 **	-.15	.18	.32 *	-.15	.49 **	.29 *	-.11	.27 #	1		
13. Secondary education	-.06	-.23 #	.59 **	.13	.18	.64 **	.10	.26 *	.48 **	-.21	-.48 **	.27 *	1	
14. Tertiary education	.06	-.16	.73 **	-.01	.27 *	.66 **	-.13	.44 **	.30 *	.11	-.60 **	.38 **	.70 **	1
<i>N</i>	63	63	63	63	63	63	63	63	63	37	40	63	62	62
MEAN	0.11	62.9	14,762	.77	.056	.39	1.20	.42	.25	0.29	0.074	0.43	0.96	0.36
STANDARD DEVIATION	0.035	24.7	4,770	.06	.038	.059	1.12	.12	.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													complete model
Constant	.11 (7.0)	.18 (3.8)	.10 (4.6)	.18 (5.0)	.11 (7.0)	.076 (4.5)	.13 (7.7)	.001 (0.0)	.043 (0.9)	.026 (0.6)	.14 (4.4)	.11 (7.0)	.098 (1.8)	.094 (5.0)
Uncertainty Avoidance	.041 (3.1)	.036 (2.9)	.043 (3.0)	.036 (2.4)	.048 (3.5)	.045 (3.9)	.031 (2.4)	.009 (0.4)	.041 (2.2)	.044 (3.6)	.036 (2.7)	.043 (3.3)	.035 (2.4)	.038 (3.3)
GDP per Capita	-.38 (3.9)	-.32 (2.8)	-.32 (2.6)	-.29 (2.6)	-.35 (3.8)	-.59 (7.2)	-.39 (4.8)	-.29 (1.8)	-.26 (2.0)	-.43 (4.3)	-.37 (3.9)	-.40 (4.1)	-.50 (4.6)	-.57 (7.0)
Labor income share		-.089 (1.3)												
Unemployment			.13 (1.1)											
Female labor share				-.21 (2.6)									-.13 (1.5)	
Population density					-.004 (1.4)									
Share services						.15 (5.4)							.10 (3.1)	.14 (4.6)
Replacement rate unempl.							-.082 (3.6)						-.063 (2.8)	-.052 (2.2)
Gini index								.51 (4.8)						
Long term interest rate									.78 (2.2)					
Share age group 25-39 in adult pop. (25-64 yr)										.22 (2.0)			.12 (1.0)	
Secondary education											-.025 (0.8)			
Tertiary education												.031 (1.1)		
Year dummy 1990	.023 (2.8)	.022 (2.4)	.015 (1.3)	.033 (3.3)	.023 (2.7)	.023 (3.3)	.032 (3.9)			.018 (1.9)	.026 (2.4)	.019 (2.1)	.033 (3.2)	.029 (3.8)
Year dummy 2004	.046 (4.3)	.041 (3.4)	.037 (2.9)	.060 (4.5)	.044 (4.2)	.048 (6.1)	.059 (5.9)	.009 (0.9)	.051 (3.3)	.045 (4.1)	.055 (3.3)	.034 (2.5)	.065 (4.9)	.055 (7.0)
N	63	63	63	63	63	63	63	37	40	63	62	62	63	63
R ²	.368	.385	.381	.429	.383	.567	.459	.592	.361	.399	.377	.373	.627	.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	.093 (1.4)	.060 * (2.2)	.16 # (1.9)	.14 ** (3.4)	.32 # (1.8)	.33 # (2.0)
Uncertainty Avoidance	.054 # (1.9)	.063 ** (3.1)	.029 (1.3)	.032 (1.4)	-.007 (0.4)	-.0095 (0.6)
GDP per Capita	-.39 (1.3)	-.52 * (2.7)	-.63 ** (3.0)	-.58 ** (3.1)	-.62 ** (4.4)	-.59 ** (4.0)
Female labor share	-.15 (1.3)		.041 (0.3)		-.59 (1.5)	-.67 # (2.0)
Share services	.11 (1.5)	.15 * (2.2)	.16 * (2.2)	.13 * (2.7)	.047 (0.7)	
Replacement rate unemployment	-.030 (0.8)		-.093 (1.7)	-.10 * (2.3)	-.056 (1.5)	-.072 * (2.3)
Share age group 25-39 in adult pop. (25-64 yr)	.066 (0.6)		-.091 (0.5)		.40 (1.7)	.50 ** (3.2)
N	21	21	21	21	21	21
R ²	.614	.558	.749	.747	.686	.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.

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	.11 ** (7.0)	.064 * (2.6)	.14 ** (8.2)	.12 ** (7.9)
Uncertainty Avoidance (UAI)	.041 ** (3.1)	.11 ** (2.9)		
Dummy UAI strong			.016 # (1.8)	.060 * (2.5)
GDP per Capita (YCAP)	-.38 ** (3.9)	-.017 (0.1)	-.42 ** (3.5)	-.28 ** (2.8)
UAI * YCAP		-.53 # (1.8)		
Dummy UAI strong * YCAP				-.31 # (1.8)
Year dummy 1990	.023 ** (2.8)	.022 ** (2.7)	.025 ** (2.8)	.024 ** (2.8)
Year dummy 2004	.046 ** (4.3)	.043 ** (4.1)	.050 ** (4.2)	.047 ** (4.3)
N	63	63	63	63
R ²	.368	.400	.347	.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.

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	
Constant	.094 ** (5.0)	.058 * (2.0)	.11 ** (6.8)	.093 ** (5.3)
Uncertainty Avoidance (UAI)	.038 ** (3.3)	.089 * (2.6)		
Dummy UAI strong			.022 ** (2.9)	.048 * (2.2)
GDP per Capita (YCAP)	-.57 ** (7.0)	-.31 * (1.8)	-.59 ** (6.8)	-.50 ** (5.5)
UAI * YCAP		-.38 (1.5)		
Dummy UAI strong * YCAP				-.18 (1.1)
Share services	.14 ** (4.6)	.14 ** (4.6)	.15 ** (5.5)	.15 ** (5.3)
Replacement rate unemployment	-.052 * (2.2)	-.047 * (1.9)	-.052 * (2.5)	-.046 * (2.0)
Year dummy 1990	.029 ** (3.8)	.027 ** (3.6)	.028 ** (3.9)	.027 ** (3.6)
Year dummy 2004	.055 ** (7.0)	.052 ** (6.1)	.055 ** (7.2)	.053 ** (6.5)
N	63	63	63	63
R ²	.601	.617	.617	.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.

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