SCALES-paper N200301

Explaining nascent entrepreneurship across countries

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Zoetermeer, May, 2003

EIM
Business & Policy Research

SCALES
SCientific AnaLysis of Entrepreneurship and SMEs

The SCALES-paper series is an electronic working paper series of EIM Business and Policy Research. The SCALES-initiative (Scientific Analysis of Entrepreneurship and SMEs) is part of the 'SMEs and Entrepreneurship' programme, financed by the Netherlands' Ministry of Economic Affairs. Complete information on this programme can be found at www.eim.nl/smes-and-entrepreneurship

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ABSTRACT

This paper aims at explaining cross-country variation in nascent entrepreneurship. Regression analysis is applied using various explanatory variables derived from three different approaches. We make use of the Global Entrepreneurship Monitor database, including nascent entrepreneurship rates for 36 countries in 2002 as well as variables from standardized national statistics. The *first approach* relates the level of entrepreneurship of a country to its *level of economic development*. We find evidence for a U-shaped relationship. The *second approach* deals with *a regime switch* where the innovative advantage moves from large, established enterprises to small and new firms, because new technologies have reduced the importance of scale economies in many sectors. The *third approach* assumes that nascent entrepreneurship depends upon aggregate conditions such as *technology*, *demography*, *culture* and *institutions*, influencing opportunities, resources, skills and preferences. Several indicators of these aggregate conditions are found to correlate with nascent entrepreneurship. A full model combining the three approaches includes a U-shaped relationship with per capita income as well as with Porter's innovative capacity index in addition to effects of social security expenditure (-) and the total business ownership rate (+). Finally, a (former) communist-country dummy plays an important role.

INTRODUCTION

Many economies are troubled by low economic growth rates. Policymakers are looking for means to stimulate economic activity. A number of recent studies point at a positive impact of entrepreneurship on economic growth (see Carree and Thurik, 2003, for a survey). Hence it is important to investigate the determinants of entrepreneurship. By and large, three different strands of literature can be identified regarding the determinants of entrepreneurship. The *first* strand relates the level of entrepreneurship of a country to its *level of economic development*. The *second* strand deals with *a regime switch* where the innovative advantage moves from large, established enterprises to small and new firms. The *third strand* assumes that nascent entrepreneurship depends upon aggregate conditions such as *technology, demography, culture* and *institutions*, influencing opportunities, resources, skills and preferences. In the current paper we investigate these three strands of literature empirically using data for 36 countries from the Global Entrepreneurship Monitor database. We operationalize entrepreneurship as the rate of nascent entrepreneurship, defined in the GEM database as the number of people that are actively involved in starting a new business, as a percentage of adult population. We analyze separate models dealing with these three strands of literature, as well as a combined model. The organization of the paper is as follows. In the first section we discuss the three literatures. In the next two sections we deal with the data and the research methods employed. The last two sections contain results and conclusions.

LITERATURE REVIEW

Economic development and (nascent) entrepreneurship

Several authors (Kuznets 1971, Schultz 1990, Yamada 1996, Iyigun and Owen 1998) have reported a negative empirical relationship between economic development and the rate of business ownership (self-employment) in the labor force. Their studies use a large cross-section of countries with a wide variety of levels of economic development. There are several reasons for the decline of self-employment with increasing per capita income. At the demand side of entrepreneurship, a declining share of agriculture and an increasing share of manufacturing diminish the opportunities for self-employment. At the supply side, Lucas (1978) assumes an unequal distribution of "managerial" talent among the working population. He shows how rising real wages raise the opportunity cost of self-employment relative to the return, inducing marginal entrepreneurs to become employees. Iyigun and Owen (1998) assume a distribution of risk aversion. They argue that with rising economic development fewer individuals are willing to run the risk associated with becoming an entrepreneur as the "safe" professional earnings rise. More recently, statistical evidence points at a *reversal* of the negative relationship between real income and self-employment occurring at an advanced level of economic development. At the demand side, the employment share of manufacturing starts declining while that of the services sector keeps increasing with rising per capita income, providing more opportunities for business ownership. Also, from a certain level of economic development onwards, increasing income and wealth enhance the type of consumer demand for variety (Jackson 1984) that creates new market niches attainable for small firms. At the supply side, as often hypothesized in social psychology, there is a hierarchy of human motivations, ranging from physical needs at the bottom to self-realization at the top (Maslow 1970). Once the main material needs have been satisfied, a still higher level of prosperity will induce a growing need for self-realization. Because it provides more autonomy and independence, entrepreneurship then becomes more highly valued as an occupational choice than at lower income levels. Carree et al. (2002) summarize these arguments and hypothesize a U-shaped relationship between per capita income and the rate of self-employment in the labor force. In a three-equation regression analysis, using data for 23 OECD countries in the period 1976-1996, they find empirical support for this hypothesis. To our knowledge, an analysis of the relationship between the level of per capita income and either the annual gross inflow to self-employment or the nascent entrepreneurship rate has never been carried out. The above arguments with respect to the self-employment rate, also apply with respect to the (potential) inflow to self-employment. Thus, we expect a U-shaped relationship between per capita income and nascent entrepreneurship.

The changing role of entrepreneurship

Several studies argue that in the last 25 years the innovative advantage has moved from large, established enterprises to small and new firms, because new technologies have reduced the importance of scale economies in many sectors. Also, important developments like globalization, the ICT revolution and the increased role of knowledge in the production process have led to an increasing degree of uncertainty in the world economy from the 1970s onwards

(Audretsch and Thurik, 2001). This, in turn, has created more room for new-firm startups as agents of change, trying to exploit new ideas. Technology primarily influences the opportunities for entrepreneurship. Two regimes may be distinguished (Carree et al., 2002). In the Schumpeter Mark I regime ('creative destruction') new entrepreneurs challenge incumbent firms by introducing new inventions. In the Schumpeter Mark II regime ('creative accumulation') R&D activities of established corporations determine the rate of innovation. Industries in the latter regime develop a concentrated market structure, while industries in the former regime offer more opportunities to small firms and small entrepreneurial ventures. The bigger role in technological development for new-firm startups at the cost of large incumbent firms is sometimes indicated as the 'Schumpeterian regime switch' or a switch from a 'managed' towards an 'entrepreneurial' economy (Audretsch and Thurik, 2001). Elsewhere this switch is referred to as one from an economy dominated by 'exploitation' activities towards one dominated by 'exploration' activities. The emergence of the entrepreneurial economy is reflected by a higher employment share of the self-employed. We will capture this regime switch where innovation plays a pivotal role by using Porter's innovative capacity index assuming that a U-shaped relationship exists between nascent entrepreneurship and this index.

An eclectic framework of entrepreneurship

Clearly, both economic and non-economic conditions, such as *technology*, *demography*, *culture* and *institutions*, influence the rate of nascent entrepreneurship. Recently, these influences have been integrated into a model. This model is necessarily eclectic (Verheul et al., 2002) and distinguishes between the following parts. At the macro level, aggregate conditions create a stock of opportunities, resources, skills and preferences with respect to entrepreneurship, that are available to a nation's population. For each individual, relevant opportunities and one's own resources, skills and preferences determine the risks and rewards associated with wage-employment or business ownership. Individual occupational choice, including reconsideration of present occupational attainment, is based upon an assessment and weighing of these material and immaterial risks and rewards. The aggregation of these decisions determines the rate of nascent entrepreneurship.

We will discuss the findings in the literature with respect to some major conditions for entrepreneurship in each of the economic and non-economic domains. Next to per capita income, *other economic factors* also may impact nascent entrepreneurship. First, unemployment basically acts as a push factor for self-employment (Evans and Leighton, 1990; Audretsch and Thurik, 2000), while social security benefits determining the opportunity costs of unemployed persons interact with this factor (Noorderhaven et al. 2003). Second, in the short run business cycle fluctuations strongly influence the market opportunities for new entrepreneurs, as was born out by recent evidence (Reynolds et al., 2002). Third, income disparity can stimulate entrepreneurship. Strong income inequality may be both a push and a pull factor for low-income groups to enter self-employment. At the demand side, income disparity is likely to cause a more differentiated demand for goods and services. Empirical research by Ilmakunnas et al. (1999) on a cross-section of approximately 20 OECD-countries suggests that income inequality positively influences the rate of self-employment, although reversed causality cannot be ruled out. *Technology* has been dealt with above in the regime switch part of our model.

Additionally, specific factors such as the availability of computers or the use of internet services may play a role. *Demographic factors* include age distribution, level of educational attainment and female labor participation (Wennekers et al. 2002). Prevalence rates of nascent entrepreneurship are highest in the age group between 25 and 34, though a tendency towards start-ups at an even younger age is also apparent. Education is somewhat of an anomaly. Research conducted on a Swedish sample at the individual level shows that nascent entrepreneurs have attained on average a higher educational level than those in a control sample (Delmar and Davidsson, 2000). However, in a comparative study across fourteen OECD countries, a higher level of education tends to correlate with a smaller proportion of self-employment (Uhlaner et al., 2002). Female labor force participation is negatively associated with nascent entrepreneurship because men are more likely to have the intention to start a firm than are women (Delmar and Davidsson, 2000). *Culture* may be defined as 'patterns of values and beliefs distinguishing the members of one group or category of people from another'. Davidsson (1995) identifies two views regarding the relationship between cultural values and entrepreneurial behavior. The first view is based on the idea that if a society contains more people with entrepreneurial values, more people will be entrepreneurs. An interesting special case, empirically confirmed by de Wit (1993), is the hypothesis that children of self-employed fathers are more likely to become self-employed themselves. The second view holds that a clash of values between social groups may drive potential entrepreneurs away from the average organization and into self-employment. In this latter perspective, a national culture with strong uncertainty avoidance and low individualism may be conducive to (nascent) entrepreneurship (Wennekers et al., 2001). Relevant *institutions* include the educational system, fiscal legislation and specific government policies focusing on new firms. At the demand side, institutions and policies dealing with regulation of entry, competition and the scope of the private sector (Henrekson, 2000) influence the opportunities to start a business. At the supply side, institutions play a role in stimulating entrepreneurial capabilities and preferences. Relevant institutions for strengthening abilities and motivation are business support organizations, large corporations with an interest in intrapreneurship or 'spinning-off', educational institutions and the media (Stevenson, 1996). The (venture) capital market and financial support schemes influence the resources available for business start-ups. Finally, fiscal incentives, social security, labor market regulation and bankruptcy legislation influence the rewards and the risks of the various occupational opportunities.

DATA

In this section we discuss our data. We make use of the Global Entrepreneurship Monitor (GEM) and other sources. In 2002 there were 37 countries participating in GEM. Variables in the GEM database include nascent entrepreneurship, as well as a wide selection of explanatory variables from standardized national statistics. In this paper we employ three models explaining nascent entrepreneurship across countries. First, we hypothesize nascent entrepreneurship to be a function of economic development (as measured by per capita income). Second, we investigate a functional form with Porter's innovative capacity index. Third, we link aggregate

conditions such as demography, culture and institutions to nascent entrepreneurship. Besides these *structural* determinants of nascent entrepreneurship, in this model we also consider *cyclical variables* such as annual economic growth and the level of unemployment. In this section we describe the variables used in this paper. For those readers who are familiar with the GEM database we provide an appendix containing the GEM labels of the variables used in this study. For some variables there are missing data. We assembled as many additional data as possible. The remaining missing values are listed in the Appendix.

Nascent entrepreneurship
Data on nascent entrepreneurship in 2002 are taken from the GEM 2002 Adult Population Survey. 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). 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 or she has taken action to create a new business in the past year, if he or she 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). The nascent entrepreneurship rate (per 100 adults) ranges from 11.6 in Thailand, 10.9 in India, and 7.1 in the United States, to values below two in Russia, Sweden, Japan and Taiwan (2002).

Per capita income
Gross national income per capita 2001 is expressed in purchasing power parities per US$, and these data are taken from the 2002 World Development Indicators database of the World Bank.[1] Taiwan is missing in this database and we estimate the 2001 per capita income level in Taiwan to be 16,761 US$, based on information at the website of Tong Siak Henn.[2] We do not use GDP per capita from the GEM database because this variable is measured at exchange rates.[3] We do not want fluctuations in exchange rates to impact the ranking of countries with respect to their level of economic development.

GCR Innovative Capacity Index 2001
This variable is taken from chapter 2.2 of the Global Competitiveness Report 2001-2002 of the World Economic Forum (Porter and Stern, 2002). It describes national innovative capacity as "a country's potential –as both a political and economic entity- to produce a stream of commercially relevant innovations. This capacity is not simply the realized level of innovation but also reflects the fundamental conditions, investments, and policy choices that create the environment for innovation in a particular location or nation." (Porter and Stern, 2002, p. 105). The GCR Innovation Capacity Index combines four subindexes, which all capture a different aspect of 'innovative capacity'. Each subindex measures *the relative contribution* to the number of US patents in the period 1999-2000 (an indicator for a country's actual level of innovation), based on regressions using data from the GCR Survey.
The four sub-indexes are:

- the proportion of scientists and engineers in the workforce, which is an indicator for a country's innovation infrastructure,
- the innovation policy sub-index, captured by, among other things, intellectual property protection and R&D tax credits for the private sector,
- the cluster innovation environment sub-index, captured by, among other things, the pressure to innovate from domestic buyers and the presence of suppliers of specialized research and training, and
- the linkages (between innovation infrastructure and a nation's industrial clusters) sub-index, captured by the quality of scientific research institutions and the availability of venture capital.

For more information on the construction of the GCR Innovation Capacity Index we refer to Porter and Stern (2002). We constructed a value for Hong Kong, as this value is missing in the GCR.[4]

Other technology indicators

1. Computers per capita 2001.
2. Internet per capita 2001.

These two variables are defined as the number of computers respectively internet subscribers per 1000 people, and are taken from Tables 4.2.09 and 4.2.10 of the World Competitiveness Yearbook 2002 of the Institute for Management Development.

Demography

3. Age structure of population 2002.

We have shares in total population of five age groups: 20-24 years, 25-34; 35-44; 45-54 and 55-64 years. These data are taken from the International Data Base (IDB) of the US Bureau of the Census.

4. Female labor share 2001.

This variable measures the female share in total labor force and is obtained from Table 3.2.13 of the World Competitiveness Yearbook 2002. Values for Belgium and Switzerland are taken from OECD Labor Force Statistics 1981-2001.

5. Participation in education (1997).

We have gross enrolment ratios in primary education, secondary education and tertiary education. Gross enrolment 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 (World Bank).

6. Income disparity (1999).

This variable is defined as the share of total income by the *top* 20% of population divided by the income share of the *bottom* 20% of population (ranked on the basis of income). These data are taken from Tables 4.4.08 and 4.4.09 of the World Competitiveness Yearbook 2002.

Culture

7. Incumbent 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. Countries with more *incumbent* business owners may also have more people *planning* to become entrepreneur, because entrepreneurial role models are more readily available and entrepreneurship is considered a more common employment option in these countries.[5]

8. (Former) communist country dummy

Over many decades of the 20th century, the dominant culture in (former) communist countries has grown to be unfavorable or even hostile to self-employment. We control for this negative impact on entrepreneurship by introducing a (former) communist country dummy. The variable has value 1 for Russia, Hungary, Poland, China, Croatia and Slovenia, and value 0 for all other countries in our sample.

Institutions

9. Social security cost as % GDP (2000).
10. Tax revenue as % GDP (1999).

These two variables are taken from Tables 2.2.09 and 2.2.01, respectively, of the World Competitiveness Yearbook 2001.

11. Number of permits required to start a new business.
12. Number of days required to start a new business.

These two variables are taken from Tables 8.05 and 8.06, respectively, of the Global Competitiveness Report 2001-2002.

13. Average corporation tax rate (1999).

This variable is defined as the average corporation tax as % of pre-tax profits, and is taken from Table 2.2.07 of the World Competitiveness Yearbook 2001.

Other economic factors

14. Economic growth 2001.
15. Economic growth 2002.

These two variables are defined as the annual % GDP growth in constant prices (i.e., real growth) for the respective years, and are taken from the World Economic Outlook 2002 of the International Monetary Fund (IMF).

16. Unemployment rate 2001.

This variable is taken from Table 1.4.06 of the World Competitiveness Yearbook 2002. The value for Switzerland is missing and we use the unemployment rate from OECD Labour Force Statistics 1981-2001.

The correlation matrix is presented in Table 1. From the Appendix we see that Croatia has missing values for many variables. Therefore the correlations are computed excluding Croatia (36 observations). Equally, the variables female labor share, participation in education and income disparity are not in Table 1, because they have other missing values besides Croatia. Finally, the five age group population share variables are highly intercorrelated. Due to space

limitations, we include only the share of age group 45-54 in Table 1, as this variable is most strongly correlated with nascent entrepreneurship.

METHODS

As mentioned earlier, we employ three approaches explaining nascent entrepreneurship across countries. First, we hypothesize nascent entrepreneurship to be a function of economic development (as measured by per capita income). Second, we link it to the innovative capacity index. Third, we take the eclectic stand and link nascent entrepreneurship to a portfolio of determinants. Finally, we combine the three approaches to establish which approach is dominant.

In the *first* approach, we look at different functional forms of the relationship between nascent entrepreneurship and per capita income. We consider three specifications: a linear relation, a U-shape, and an L-shape.

- Linear specification. The cross-country variation in nascent entrepreneurship is explained by a constant and per capita income (YCAP). Nascent entrepreneurship continues to decline when per capita income rises, at a steady pace. In this specification, out-of-sample predictions imply that the entrepreneurship rate moves towards nil.
- Quadratic specification (U-shape). Besides a constant, we have both a linear and a squared per capita income term ($YCAP^2$). Nascent entrepreneurship declines with per capita income until a certain turning point, after which entrepreneurship increases with per capita income.
- Inverse specification (L-shape). Nascent entrepreneurship is explained by a constant and an inverse per capita income term, YCAP/(YCAP+1). Entrepreneurship gradually declines towards an asymptotic minimum value.

We look at the statistical fit of these three specifications (adjusted R^2 values). We also investigate whether there is a statistically superior specification, by applying likelihood ratio tests.

In the *second* approach we again test functional forms of nascent entrepreneurship but this time using the innovative capacity index instead of the level of economic development.

In the *third* approach, we try to explain variation in nascent entrepreneurship rates by using several structural and cyclical variables derived from the 'eclectic framework of entrepreneurship', including per capita income and the innovative capacity index. We establish an 'optimal' multiple regression specification using the method of *backward regression*. In this iteration method, the least significant variable is removed from the regression in each iteration, until each independent variable is significant (we use a significance level of 0.1).

RESULTS

Approach 1: economic development and entrepreneurship

We computed regressions for the linear, quadratic and inverse specifications, as described in the 'Methods' section, using data for 36 countries participating in GEM (Croatia excluded). Based on a comparison of adjusted R^2 values and nested likelihood ratio tests we conclude that the

linear specification is formally rejected, compared to the quadratic and inverse specifications. So, entrepreneurship does not continue to decline at a steady pace towards zero as per capita income rises. Additional likelihood ratio tests reveal that the statistical fit of the quadratic specification (U-curve) is somewhat better than that of the inverse specification. The difference is not significant though. Apparently, from a certain level of economic development onwards, entrepreneurship starts to rise again as per capita income increases still further. The coefficients for the linear and the quadratic per capita income terms are -.76 and .017 with t-values –3.4 and 2.8 respectively. As an illustration, we depict in Figure 1 the estimated U-curve as well as the positions of the 37 GEM countries (including Croatia) in the per capita income/nascent entrepreneurship space (country two letter codes are in the Appendix). The minimum of the curve lies at 21,866 US $, at the level of 3.3 nascent entrepreneurs per 100 adults. As a test of robustness we also carried out a regression excluding the uppermost observation at the right-hand side (the US). Both per capita income terms remain significant.

Approach 2: regime switch

To test the Schumpeterian regime switch we perform a similar exercise as in approach 1. Again we test linear, quadratic and inverse specifications, based on the innovative capacity index. We find again that the linear specification is rejected, and that, based on likelihood ratio tests, we cannot formally distinguish between the statistical fit of the quadratic and the inverse specifications. However, test statistics and adjusted R^2 values again favour the quadratic specification. This suggests that initially, an improving innovation system discourages new and small enterprises ('creative accumulation') until a certain point onwards, after which a still further improvement of the innovation system favours entrepreneurship ('creative destruction'). The coefficients for the linear and the squared innovative capacity index terms are –4.3 and .085 with t-values –3.1 and 2.8, respectively. See also the third column of Table 2. The minimum of the curve of 3.3 nascent entrepreneurs per 100 adults is reached at a level of the innovative capacity index of 25.5. For comparison, the index values for the 36 countries in our data set reach from 16.8 (Mexico) to 30.3 (the US), and 14 countries have a value higher than 25.5 (source: Porter and Stern, 2002, p. 104).

The innovation U-curve cannot be seen fully apart from the economic development U-curve as the innovative capacity index is positively correlated with per capita income (see Table 1). For instance, the proportion of scientists and engineers in the workforce (one of the innovation subindexes) is generally higher in countries with higher levels of economic development. On the other hand, countries do have ample opportunities for specific innovation policies, irrespective of their level of economic development.

Approach 3: eclectic framework of entrepreneurship

In the third approach we investigate the role of a large number of possible determinants of nascent entrepreneurship more extensively. From the Appendix we see that data for Croatia are missing for half of the variables. Therefore, we exclude Croatia and continue with a data sample of 36 observations. Of course, we cannot use all variables simultaneously in one multiple

regression. We therefore use backward regression. In this method the least significant variables are removed, one at a time. Multicollinearity problems are solved during the process, as variables with low t-values are removed, *one by one*, giving the variable selection procedure the possibility to upgrade t-values of variables for which t-values in initial regressions were (seemingly) low due to multicollinearity. We leave out female labor share, participation in education and income disparity from the initial set of variables as there are missing data for these variables (in other countries besides Croatia).

Let us now turn to the fourth column of Table 2. Our initial set includes a constant and 12 possible determinants, including linear terms of per capita income and innovative capacity. The initial and the final set of regressors (given our tolerance level of 0.1) are presented. The final set contains four determinants. *First*, incumbent business ownership has a positive influence on nascent entrepreneurship. The availability of entrepreneurial role models is thus found to be important. An additional explanation is that a larger number of incumbent business owners may also imply a higher turnover of enterprises. *Second*, the innovative capacity index has a negative impact on nascent entrepreneurship. This reflects that the downward part of the regime switch curve is dominant in our sample. *Third*, we find a negative effect of social security on nascent entrepreneurship. In countries with an extensive social security system, the unemployed experience little need to set up shop for themselves. Besides, the opportunity costs of becoming self-employed are relatively high compared with wage-employment. *Fourth*, there is a negative effect for the (former) communist country dummy. This reflects that the culture and institutions in the (former) communist countries are not yet very suitable for self-employment.

Full model

Finally, in the last columns of Table 2 we present our full model, i.e., the final set of variables from the backward regression procedure, combined with the per capita income variables (linear and squared terms) and the innovative capacity index (linear and squared terms). Three out of four of the determinants in the final set of the eclectic approach remain significant. Only social security is not significant in two of three of these regressions. However, its coefficient hardly changes over the various columns, indicating that the effect of social security is in fact quite robust. The per capita income terms as well as the innovative capacity index terms also remain significant when combined with the eclectic variables, which again underlines the robustness of these U-curves. However, when both U-curves are combined the per capita income term loose their significance. This indicates that the economic development U-curve at least partly reflects the Schumpeterian regime switch.

CONCLUSION

In this paper three approaches for explaining nascent entrepreneurship across countries have been tested, using data for 36 countries participating in the Global Entrepreneurship Monitor 2002. The first approach hypothesizes a U-shaped relationship between nascent entrepreneurship and the level of economic development. Regression analysis, using per capita

income as a measure of economic development, provides support for this hypothesis. The explanatory power of this model, as expressed by the adjusted R^2 is however quite modest. The second approach hypotheses a U-shaped relationship between nascent entrepreneurship and the innovative capacity index based upon the regime switch hypothesis. We also find support for this view. The third model is based upon the 'eclectic framework of entrepreneurship', relating nascent entrepreneurship to both economic and non-economic conditions. In a backward regression analysis, using 12 selected variables across these domains, three structural determinants are found to contribute to the explanation of nascent entrepreneurship, next to innovative capacity. These determinants are the incumbent business ownership rate (+), social security expenditure (-) and a (former) communist country dummy (-). The effects are both significant and robust, while their joint explanatory power is relatively high. A full model combining the three approaches has the highest explanatory power of all models (adjusted R^2 =.72), while including robust effects of all three determinants from the eclectic framework in addition to a (weakly) U-shaped relationship with per capita income and a significantly U-shaped relationship with the innovative capacity index.
These results suggest that the comparative rate of entrepreneurship is to some extent governed by underlying 'laws' related to the level of economic development. Cultural values, the availability of entrepreneurial role models, the incentive structure of the economic system and innovation policy provide additional structural influences on entrepreneurship. The combined impact of these structural variables suggests that the comparative rate of entrepreneurship is both quite stable and path-dependent. In the short run, the influence of government policy can thus only be relatively modest. In the long run, through its impact on culture and institutions, government policy may well be of crucial importance. Governments striving to promote entrepreneurship are thus advised to be patient and persevering. The road to an entrepreneurial society is a long one (Bosma et al., 2002).

Our study has several limitations that should be borne in mind when interpreting the results. *Firstly*, the analysis pertains to the differences in nascent entrepreneurship across countries at one moment in time only. This is probably the main reason why no effect of cyclical variables was found. A preliminary analysis carried out by Reynolds et al. (2002), comparing so-called total entrepreneurship activity (TEA) rates for 29 countries in 2001 and 2002 however suggests the existence of a strong cyclical component of entrepreneurship (new business start-up rates) in the short run. On the other hand, the fact that the relative rankings of countries with respect to these TEA-rates are remarkably stable between these two years, is support for the view that structural economic and non-economic variables determine the underlying rate of entrepreneurship in a society. *Secondly*, nascent entrepreneurship as used in our paper is an aggregate indicator of entrepreneurship. Disaggregation by sector may lead to different results. Neither did we make a distinction between 'necessity enterpreneurship' and 'opportunity entrepreneurship'. It seems likely that the role of social security and other institutional variables will come out more clearly when this distinction is made. As this distinction is available in the GEM-dataset, this is an obvious candidate for future research. *Thirdly*, by using the full set of GEM-countries in our regressions, the present paper implicitly assumed that the effects of the various independent variables are uniformly valid across a wide variety of countries. However, it

is likely that there are interaction effects in the sense that the level of economic development influences the effects of various other determinants. For instance, computers and internet use may be more important for setting up a business in highly developed countries than in less developed ones. Moreover, there may be interactions between GDP per capita and innovation capacity. Finally, the U-shaped relationship between nascent entrepreneurship and per capita income further supports the view that multiplier effects with respect to per capita income may exist since entrepreneurship is also assumed to affect economic development.

NOTES

[1] Internet: http://www.worldbank.org/data/databytopic/GNIPC.pdf.
[2] Internet: http://siakhenn.tripod.com/capita.html.
[3] GEM label GDPPC01.
[4] Although the overall index value is not given, three of the four sub-index values for Hong Kong *are* given, and based on that we approximate the Innovative Capacity Index for Hong Kong to be 22.8. We also corrected the values for Norway, Ireland and Israel, for which incorrect values were imported in the GEM database. Instead we use the original GCR data.
[5] Note that we do not use the concept of 'Total Entrepreneurial Activity (TEA)', which is used in many GEM-publications. The TEA measure combines the nascent entrepreneurs and the 'new businesses'. Our business ownership variable combines the new businesses and the established businesses, while we use nascent entrepreneurship as our object of research. We make this partitioning because we want to distinguish between entrepreneurs with an existing businesses and entrepreneurs who plan to start a business, but who did not yet start their business.

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REFERENCES

Audretsch, D.B. and A.R. Thurik (2000), Capitalism and democracy in the 21st century: from the managed to the entrepreneurial economy, *Journal of Evolutionary Economics* 10, 17-34.

Audretsch, D.B., and A.R. Thurik (2001), What is New about the New Economy: Sources of Growth in the Managed and Entrepreneurial Economies, *Industrial and Corporate Change* 10, 267-315.

Bosma, N., H. Stigter and S. Wennekers (2002), *The Long Road to the Entrepreneurial Society; Global Entrepreneurship Monitor 2001 The Netherlands*, Zoetermeer: EIM.

Carree, M.A, A.J. van Stel, A.R. Thurik and A.R.M. Wennekers (2002), Economic development and business ownership: an analysis using data of 23 OECD countries in the period 1976-1996, *Small Business Economics* 19**,** 271-290.

Carree, M.A. and A.R. Thurik (2003), The impact of entrepreneurship on economic growth, in D.B. Audretsch and Z.J. Acs (eds), *Handbook of Entrepreneurship Research*, Boston/Dordrecht: Kluwer Academic Publishers, forthcoming.

Davidsson, P. (1995), Culture, structure and regional levels of entrepreneurship, *Entrepreneurship and Regional Development* **7,** 41-62.

Delmar, F., and P. Davidsson (2000), Where do they come from?: prevalence and characteristics of nascent entrepreneurs, *Entrepreneurship and Regional Development* 12, 1-23.

Evans, D.S., and L.S. Leighton (1990), Small business formation by unemployed workers, *Small Business Economics* 2, 319-330.

Henrekson, M. (2000), Personal taxation and the scope for entrepreneurial activity. Paper presented at the Jönköping International Workshop on 'Institutions, Entrepreneurship and Firm Growth', 13-15 January 2000.

Ilmakunnas, P., V. Kanniainen and U. Lammi (1999), Entrepreneurship, economic risks, and risk-insurance in the welfare state, Discussion paper No. 453, Department of Economics, University of Helsinki.

Iyigun, M.F. and A.L. Owen (1998), Risk, Entrepreneurship, and Human Capital Accumulation, *American Economic Review, Papers and Proceedings* 88, 454-457.

Jackson, L.F. (1984), Hierarchic Demand and the Engle Curve for Variety, *Review of Economics and Statistics* 66, 8-15.

Kuznets, S. (1971), *Economic Growth of Nations, Total Output and Production Structure*, Cambridge, MA: Harvard University Press / Belknapp Press.

Lucas, R.E. (1978), On the Size Distribution of Firms, *BELL Journal of Economics* 9, 508-523.

Maslow, A.H. (1970), *Motivation and Personality*, New York: Harper and Row.

Noorderhaven, N., R. Thurik, S. Wennekers and A. van Stel (2003), *Self-employment across 15 European Countries: the Role of Dissatisfaction*, Zoetermeer: EIM.

Porter, M.E., and S. Stern (2002), National Innovative Capacity, in: M.E. Porter, J.D. Sachs, P.K. Cornelius, J.W. McArthur, K. Schwab (eds.), *The Global Competitiveness Report 2001-2002*, New York: Oxford University Press, pp. 102-118.

Reynolds, P.D., W.D. Bygrave, E. Autio, L.W. Cox, and M. Hay (2002), *Global Entrepreneurship Monitor, 2002 Executive Report*, Wellesley, MA: Babson College.

Schultz, T.P. (1990), Women's Changing Participation in the Labor Force: A World Perspective, *Economic Development and Cultural Change* 38, 457-488.

Stevenson, L. (1996), The implementation of an entrepreneurship development strategy in Canada: the case of the Atlantic Region, Paris: OECD.

Uhlaner, L.M., A. R. Thurik, and J. Hutjes (2002), Post-materialism and entrepreneurial activity: a macro view, *Proceedings, Small Business and Entrepreneurship Development Conference*, University of Nottingham, 15-16 April.

Yamada, G. (1996), Urban Informal Employment and Self-Employment in Developing Countries: Theory and Evidence, *Economic Development and Cultural Change* 44, 289-314.

Verheul, I., A.R.M. Wennekers, D.B. Audretsch and A.R. Thurik (2002), An eclectic theory of entrepreneurship, in D.B. Audretsch, A.R. Thurik, I. Verheul and A.R.M. Wennekers (eds.) *Entrepreneurship: Determinants and Policy in a European-US Comparison*, Boston/Dordrecht: Kluwer Academic Publishers.

Wennekers, A.R.M., N.G. Noorderhaven, G. Hofstede, and A.R. Thurik (2001), Cultural and economic determinants of business ownership across countries, *Frontiers of Entrepreneurship Research 2001*, Wellesley, MA: Babson College, 179-190.

Wennekers, A.R.M., L.M. Uhlaner and A.R. Thurik (2002), Entrepreneurship and its conditions: a macro perspective, *International Journal of Entrepreurship Education* 1, 25-64.

Wit, G. de (1993), *Determinants of self-employment*, Heidelberg: Physica-Verlag.

APPENDIX: participating countries in GEM and GEM-variable labels used in this paper

For the empirical part of the current paper we make use of the GEM database. The countries participating in GEM are listed below. Also, we provide the GEM labels of the variables used in this study (see section 'Data'), as well as countries for which data are missing (after adding data from other sources).

GEM participating countries (2002)

1. United States (US)
2. Russia (RU)
3. South Africa (ZA)
4. The Netherlands (NL)
5. Belgium (BE)
6. France (FR)
7. Spain (ES)
8. Hungary (HU)
9. Italy (IT)
10. Switzerland (SW)
11. United Kingdom (UK)
12. Denmark (DK)
13. Sweden (SE)
14. Norway (NO)
15. Poland (PL)
16. Germany (DE)
17. Mexico (MX)
18. Argentina (AR)
19. Brazil (BR)
20. Chile (CL)
21. Australia (AU)
22. New Zealand (NZ)
23. Singapore (SG)
24. Thailand (TH)
25. Japan (JP)
26. Korea (KR)
27. China (CH)
28. India (IN)
29. Canada (CA)
30. Ireland (IE)
31. Iceland (IS)
32. Finland (FI)
33. Croatia (HR)
34. Slovenia (SI)
35. Hong Kong (HK)

GEM variable labels (missing values)

1. COMPPC01 (HR)
2. NETUSE01 (HR)
3. POP2024
   POP2534
   POP3544
   POP4554
   POP5564
4. FEMALF01 (CH, HR)
5. ENPRIM97 (IS, TW)
   ENSEC97 (RU, IS, TW)
   ENTER97 (IS, HK, TW)
6. INCDIS99 (AR, HR)
7. BABYBU02+ESTBBU02
8. Variable not taken from GEM
9. SSPCGDP (HR)
10. TAXBYGDP (HR)
11. SUBPERM (HR)
12. SUBDAYS (HR)
13. CORPTAX (HR)
14. GR0001A
15. GR0102A
16. UNEMP01

Nascent entrepreneurship: SUBOAN02

Per capita income in purchasing power parities: variable not taken from GEM.

Innovative capacity index: GCINCP01 (HR missing)

36. Taiwan (TW)
37. Israel (IL)

Table 1 Correlation matrix, 36 observations (Croatia excluded)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Nascent rate	1.00															
2. Business ownership	.63**	1.00														
3. GCR Innov. Cap. Index	-.55**	-.29	1.00													
4. Social security cost	-.45**	-.43**	.05	1.00												
5. Communist country	-.19	-.16	-.41*	.23	1.00											
6. Computers per capita	-.38*	-.16	.89**	-.09	-.43**	1.00										
7. Internet per capita	-.34*	-.08	.81**	-.18	-.42*	.96**	1.00									
8. Tax revenue	-.43**	-.35*	.54**	.38*	-.03	.56**	.45**	1.00								
9. Permits req. to start bus.	.25	.14	-.41*	.27	.06	-.41*	-.36*	-.12	1.00							
10. Days req. to start bus.	.24	-.05	-.45**	.31	.03	-.50**	-.50**	-.08	.78**	1.00						
11. Corporate tax rate	.05	-.16	.11	.08	-.12	-.01	-.04	.13	.15	.22	1.00					
12. Economic growth 2001	.09	.21	-.21	-.04	.45**	-.22	-.22	.04	.28	.03	-.21	1.00				
13. Economic growth 2002	-.03	.04	.06	-.18	.24	.02	.06	-.13	.20	-.02	-.17	.67**	1.00			
14. Unempl. rate 2001	.03	-.20	-.31	.11	.08	-.48**	-.50**	-.03	.04	.27	.23	-.12	-.32	1.00		
15. Population share 45-54 yr.	-.63**	-.39*	.52**	.28	.35*	.54**	.52**	.45**	-.44**	-.41*	-.06	-.01	.07	-.32	1.00	
16. Per capita income	-.44**	-.29	.87**	.02	-.43**	.93**	.87**	.57**	-.38*	-.39*	.02	-.24	-.11	-.41*	.56**	1.00

* p< .05

** p< .01

Table 2 Regressions explaining nascent entrepreneurship in 2002

	Approach I: U-curve economic develop.	Approach II: U-curve regime switch	Approach III: Eclectic framework		Combinations		
Constant	11.8 (6.6)	58.8 (3.8)	18.7 (3.2)	14.7 (5.4)	9.8 (4.8)	48.5 (4.3)	44.5 (3.6)
Business ownership			.17 (2.0)	.17 (2.6)	.17 (2.4)	.15 (2.5)	.15 (2.5)
Social security cost as % GDP			-.031 (.8)	-.044 (1.8)	-.033 (1.2)	-.044 (2.0)	-.035 (1.6)
Communist country			-1.7 (.9)	-2.6 (2.7)	-2.4 (2.3)	-2.5 (2.9)	-2.5 (2.9)
Computers per capita			.003 (.5)				
Tax revenue as % GDP			.007 (.1)				
Number of Permits required to start bus.			-.091 (.5)				
Average corporation tax rate			.068 (1.6)				
Economic growth 2001			.097 (.5)				
Population share 45-54 years old			-.32 (.9)				
Unemployment rate			-.044 (.5)				
Per capita income	-.76 (3.4)		.029 (.2)		-.58 (3.1)		-.21 (1.1)
Per capita income, squared	.017 (2.8)				.012 (2.4)		.007 (1.5)
GCR Innovative Capacity Index		-4.3 (3.1)	-.60 (2.6)	-.45 (4.7)		-3.4 (3.5)	-2.9 (2.6)
GCR Inn. Cap. Index, squared		.085 (2.8)				.065 (3.1)	.051 (2.2)
Adjusted R^2	.31	.40	.58	.63	.58	.71	.72
Observations	36	36	36	36	36	36	36

Absolute t-values between parentheses.
Estimation samples exclude Croatian observations.

Figure 1: Nascent entrepreneurship versus per capita income, the U-curve (including Croatia)