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Number of Pages: 31

The *Papers on Entrepreneurship, Growth and Public Policy* are edited by the
Group Entrepreneurship, Growth and Public Policy, MPI Jena.
For editorial correspondence,
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ISSN 1613-8333
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The effect of business regulations on nascent and actual entrepreneurship

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Abstract:

This paper investigates the effect of business regulations on various measures of entrepreneurship. Using data for a sample of countries participating in the Global Entrepreneurship Monitor between 2002 and 2005, we estimate a two-equation model explaining the nascent and the actual entrepreneurship rate, while taking into account the interrelationship between the two variables. Various determinants of entrepreneurship reflecting the demand and supply side of entrepreneurship as well as business regulation measures are incorporated in the model. Data on various categories of business regulations are taken from the World Bank Doing Business data base. Our estimation results suggest that, while *entry regulations* only have a small and indirect impact on the actual entrepreneurship rate, the impact of *labour market regulations* is more important. We also find that the determinants of opportunity and necessity entrepreneurship are fundamentally different.

Version: February 2006

Prepared for: *Small Business Economics*, Special issue GEM conference 2005

Keywords: nascent entrepreneurship, young businesses, business regulations, Global Entrepreneurship Monitor, World Bank Doing Business

JEL-classification: K20, L51, M13, O57

Document: Van Stel et al GEM special issue.doc

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Acknowledgement: We are grateful to Sander Wennekers and two anonymous referees for comments and encouragement.

1. INTRODUCTION

The role that entrepreneurship plays in the economy has changed dramatically over the last half century. According to Audretsch and Thurik (2004, p. 144), “Entrepreneurship has emerged as the engine of economic and social development throughout the world.” The increased importance of entrepreneurship is clearly recognised by politicians and policy makers. For example, it is now deeply embedded in the current European policy approach that the creativity and independence of entrepreneurs can contribute to higher levels of economic activity. Indeed, “the challenge for the European Union is to identify the key factors for building a climate in which entrepreneurial initiative and business activities can thrive. Policy measures should seek to boost the Union’s levels of entrepreneurship, adopting the most appropriate approach for producing more entrepreneurs and for getting more firms to grow” (European Commission, 2003, p. 9).

Given this challenge an important question is which (combination of) policy measures contribute to boosting the level of entrepreneurship, as referred to in the citation above. The current paper addresses this question by investigating those determinants of entrepreneurship, at the country level, which are clearly under the control of politicians. Two groups of policy measures are identified. The first is the presence of administrative “burdens” or entry regulations¹ – such as the time and cost of starting a business – which are assumed to inhibit entrepreneurship. The evidence for this is provided by Djankov *et al.* (2002) who clearly link high administrative burdens of starting a business to low business formation rates, to low economic development and even to corruption. The second is the presence of government “support”- in the form of financial and/or soft assistance – advice, information, training etc. provided to small and new enterprises. It is assumed that support enhances entrepreneurship.

Unfortunately data are not consistently available for “support”, but information on “burdens” from the World Bank Doing Business data base can be used. Several categories of business regulations are distinguished such as entry regulations, labour market regulations, bankruptcy regulations, etc. This enables us to estimate the impact of such regulations upon two measures of entrepreneurship generated by the Global Entrepreneurship Monitor (GEM) – the nascent, and the young business, entrepreneurship rates.

We find that whilst *labour market* regulations may reduce entrepreneurship rates, there is no significant impact of most *entry regulation* measures identified by the World Bank Doing Business study. The only exception is the minimum capital requirement for starting a business which governments impose- which does have an impeding effect on the nascent entrepreneurship rate across countries. Differences between the determinants of opportunity and necessity entrepreneurship also emerge.

Our interpretation of these findings is that the role of administrative burdens on inhibiting enterprise is less important than the findings of Djankov *et al.* (2002) imply. Instead, our results are more in line with the hypothesis that many necessity entrepreneurs escape the impact of business regulations by starting and operating unregistered businesses.

¹ We emphasise that the term “burden” is in inverted commas because, whilst restrictions on starting a business may be viewed as a burden by the entrepreneur, they may provide assurance and confidence to the customers of that business. This point is discussed further below in the context of “impediments”.

The organisation of this paper is as follows. In Section 2 we position the role of entry regulations in a broader SME policy context. This section is based on Capelleras *et al.* (2005) and Storey (2006). Section 3 provides some references to the literature on the determinants of entrepreneurship. The eclectic framework of Verheul *et al.* (2002) is our main point of orientation. In Section 4 we present our data on entrepreneurship rates and entry regulations. Our data are mainly from the World Bank and GEM. In Section 5 we present our model and describe all variables included in our regression model. Our model develops the work of Grilo and Irigoyen (2006). Section 6 presents the estimation results while the final section is used for discussion.

2. THE ROLE OF ENTRY REGULATIONS IN PUBLIC POLICY TOWARDS ENTREPRENEURSHIP AND SMEs ²

It is now recognised that governments spend considerable sums of taxpayers' money³ in seeking to enable Small and Medium-sized Enterprises (SMEs) to come into existence and to grow. The simple justification for such expenditure is that SMEs are major sources of job creation, innovation and competitiveness in a modern economy and that it is governments' task to promote these characteristics in order to enhance the welfare of its citizens.⁴ According to Lundström and Steverson (2002) "The general goal of SME Policy is to strengthen the existing base of small enterprises by ensuring they can compete in the marketplace and they are not prejudiced because of their small size, relative to large firms".

Governments throughout the world have many different policies to support or directly assist SMEs. They provide finance directly and indirectly; they provide guidance and advice -soft support- to SMEs on a wide range of topics. They also try to influence the start-up of new firms, through measures such as grants, tax relief and educational programmes. Examples of these policies are provided by Storey (2003).

Besides providing direct assistance to entrepreneurs and SMEs, governments may also focus on lowering the 'burdens' or impediments to entrepreneurial activity. Examples of such burdens are the number of procedures a new business has to comply with in order to operate legally or the extent of bureaucratic red tape. In practice governments make different choices about the extent to which policies focus upon providing direct assistance and on lowering the 'burdens' or im-

² This section is based on Capelleras *et al.* (2005) and Storey (2006).

³ Storey (2006) reports that the UK spends a total of 8 billion pounds of public money on SME "support". To place this in context, the UK spends 7 billion pounds on its Police service!

⁴ Storey (2003) argues that this justification is in fact too simple because government intervention can have undesirable side-effects such as increased bureaucracy through maintaining (unproductive) policy programs. He argues that the correct justification of government intervention is the existence of market failures such as imperfect information on the private benefits of starting a business or imperfect information on the private benefits of obtaining external advice.

pediments. Figure 1, taken from Dennis (2004), shows a 2x2 matrix which makes a distinction between the provision of assistance and the lowering of impediments.⁵

Figure 1: A Typology of Public Policy toward Small Business

Low Direct assistance	LIMITING [Developing Countries]	COMPETING [US]
	COMPENSATING [EU]	NURTURING [US Minority]
High Direct assistance	High Impediments	Low Impediments

Source: Dennis (2004).

It shows that policy makers have four options. Most EU countries have, by world standards, comparatively high impediments to starting a business, as illustrated by Djankov *et al.* (2002). On the other hand they also have considerable sums of public money devoted to encouraging smaller enterprises, which can be considered as compensating for the impediments. For this reason, this box is labelled 'compensating'.

A very different approach is adopted in the US. Here the direct assistance is low, but so are the barriers to starting a business. Competition is therefore seen as the focus of US policy and this box is labelled 'competing'. The US however, does have some exceptions to this - its programmes to promote the interests of technology-based firms, and in the promotion of minorities. Here again the barriers are low but there is a high level of direct assistance provided. This is shown in the box labelled 'nurturing'. A country example of a 'nurturing' economy is New Zealand which has very low impediments to business starts but also provides substantial support to smaller firms through public programmes.

Finally there are many countries where the barriers to starting a business are high, but where public assistance is low. This box is labelled as 'limiting' and contains often large numbers of less developed countries in Africa, South America and some former communist countries.

The above illustrates policy makers do indeed have a wide choice on how, if at all, they wish to promote new and smaller enterprises. The current paper focuses on the impediments dimension in

⁵ The term 'impediments' is used as it is the one used by Dennis (2004). However the term clearly has negative connotations, implying perhaps that individuals are prevented from starting a business without good reason. Governments in countries that have high 'impediments', however, justify these policies on the grounds that this provides protection for the consumer. For example all countries impose 'impediments' preventing the unqualified establishing a business as a doctor or surgeon, whereas only some countries have similar restrictions on those wishing to start a business as an electrician or a driving instructor. The justification for 'impediments' to entry into the medical profession is presumably based on potential damage to the consumer's life. However errors or incompetence on the part of the electrician or the driving instructor can also clearly endanger human life, yet the extent to which these individuals are 'impeded' from starting a business varies considerably from one country to another, depending upon the extent to which emphasis is placed on the desire to protect the consumer.

Figure 1 and on entry regulations in particular. The impact of entry regulations on the economic landscape of countries has been the subject of a number of studies, providing mixed evidence. In their pioneering study Djankov *et al.* (2002) present data on the regulation of entry of start-up firms in 85 countries. They concluded that regulation is not in the public interest. They found that countries where regulations are most burdensome are less likely to be democratic, more characterised by corruption, have larger unofficial economies and lower levels of wealth. The case for lighter business regulation seemed clear. However, Capelleras *et al.* (2005), in a comparison between a lightly regulated economy (Great Britain) and a more heavily regulated economy (Spain) find no significant differences between these countries in terms of the average age of a firm, the initial startup size of new firms, and patterns of employment growth. Based on these results Capelleras *et al.* (2005) therefore question whether the move towards reducing regulations, at least amongst high income democratic countries, will lead to more dynamic, growth-orientated smaller enterprises.

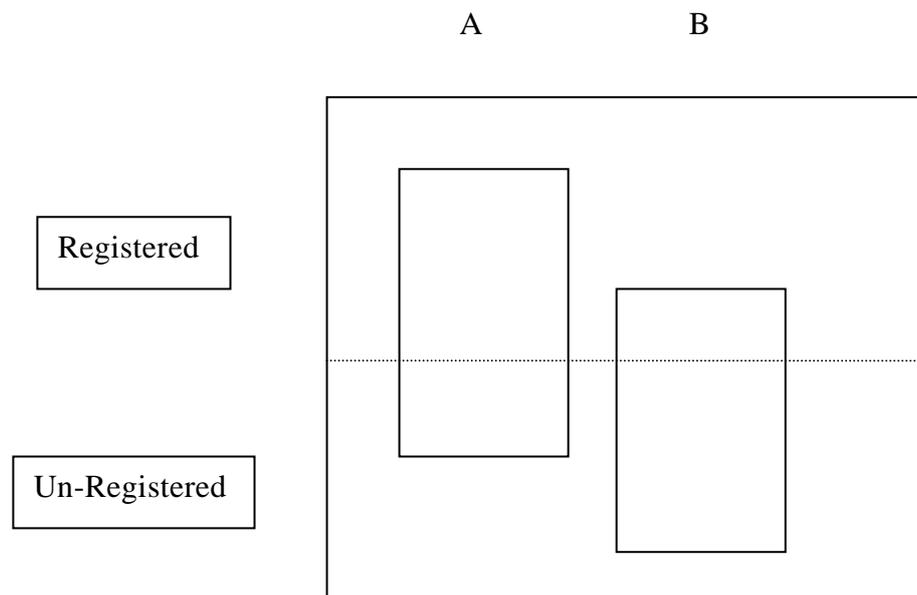
The Capelleras *et al.* (2005) argument is that seeking to link official new firm formation rates across countries to bureaucratic burdens could lead to seriously misleading conclusions. Djankov *et al.* (2002) argue that bureaucratic burdens lower the rate of new business formation, lower the growth of established SMEs and so impede economic performance. This interpretation encourages policy makers, particularly in highly regulated Europe, to seek to lower these 'burdens' in order to induce an improvement in economic performance.

Capelleras *et al.* (2005) take issue with this. They argue that, apart from the problems of mono-causal explanations, the use of official birth rates is misleading. This is illustrated in Figure 2 below. Here there are two hypothetical countries A and B. Each has a different proportion of its enterprises in the registered compared with the unregistered economy. In country A, a low regulation [LR] economy, because the costs of regulation are low most firms choose to register. In country B which is a high regulation economy [HR] a much lower proportion of firms register. However, Figure 2 shows that the total number of enterprises [registered and unregistered] is the same. In practice, of course, we do not know about the relative sizes of these two components, but what is clear is comparing only the registered firms in the economy is unsurprisingly correlated with the scale of regulation.

The contribution of Capelleras *et al.* (2005) is to compare, in so far as is possible, both registered and unregistered businesses in England and Spain. They show that, contrary to regulation theory, the start-up sizes and subsequent growth of new enterprises, as well as the factors explaining that growth do not differ, even though England [UK] is the fifth least regulated economy in the world whereas Spain is the fifty-fifth least regulated, according to Djankov *et al.* (2002).

The current paper adds to this debate by investigating the impact of various business regulations indicators on entrepreneurship rates across countries.

Figure 2: Proportion of registered versus unregistered businesses in two hypothetical countries A and B



3. DETERMINANTS OF NASCENT AND ACTUAL ENTREPRENEURSHIP

A broad range of determinants explains the level of entrepreneurship, including economic and social factors and many studies have been conducted to explain the level of entrepreneurship (for instance, Reynolds *et al.*, 1999, 2001 and 2002; Carree *et al.*, 2002; Acs, Audretsch and Evans, 1994; Stevenson and Lundström, 2001; Busenitz *et al.*, 2000; Verheul *et al.*, 2006).⁶ In particular, the model developed for the Global Entrepreneurship Monitor by Reynolds *et al.* (1999, 2001 and 2002), the Entrepreneurship Policy Typology proposed by Stevenson and Lundström (2001), the Country Institutional Profile by Busenitz *et al.* (2000) and the Eclectic Framework of Verheul *et al.* (2002) try to bring together elements from different fields and different levels of analysis. Despite substantial differences, these models share the purpose of developing a better understanding of cross-country variations in entrepreneurship.

The Eclectic Framework, which will be the basis for the investigations of the present paper, differs from the other models in that it explicitly deals with the individual decision making process and its links to macro conditions (economic and demographic). It makes use of the (neo-classical) economic theory of income choice where agents are viewed as (expected) utility maximisers taking an occupational choice decision – to become employees or self-employed – on the grounds of the utility associated with the returns accruing from the two types of activities (Parker, 2004; Grilo and Thurik, 2005a). It also attempts to make a connection to the literature of organising formation (Gartner and Carter, 2003) while discriminating between a demand side of business opportunities and a supply side of capabilities (Wennekers,

⁶ For an overview of 75 journal articles on the topic of nascent entrepreneurship we refer to Davidsson (2006).

Uhlaner and Thurik, 2002; Audretsch, Grilo and Thurik, 2006). Although the GEM model (Reynolds *et al.*, 1999, 2001 and 2002) devotes attention to the individual decision making process, distinguishing between opportunities and capacity, the Eclectic Framework discusses the process by which an individual deliberates upon different activities in more detail uncovering the underlying processes. The determinants of the nascent entrepreneurship rate are emphasised in Wennekers, Uhlaner and Thurik (2002) where use is made of the empirical micro literature in this area (Delmar and Davidsson, 2000; Davidsson and Honig, 2003; Van Gelderen, Thurik and Bosma, 2005). Moreover, the Eclectic Framework acknowledges that – when there are market imperfections – the government can intervene in the economic process following different routes. Although the Entrepreneurship Policy Typology (Stevenson and Lundström, 2001) also makes a distinction between different types of government policy influencing entrepreneurship, it does not (explicitly) link policy to other determinants of entrepreneurship, nor does it provide a direct rationale for the government to intervene in the economic process.

4. DATA ON ENTREPRENEURSHIP RATES AND ENTRY REGULATIONS

In this paper we will estimate the influence of several business regulations on the rate of entrepreneurship across countries. The subset of business regulations in which we are particularly interested is entry regulations. These deal with the legal requirements (e.g. licenses) that have to be met in order to start a business. When entry regulations are more rigid, entrepreneurship rates may be expected to be lower. In the current section we will introduce our data on entrepreneurship rates and on entry regulations. The full set of variables used in this study will be described in the next section of this paper.

We use data on rates of entrepreneurship from the Global Entrepreneurship Monitor (GEM). In particular we will use the *young business entrepreneurship rate*, defined as the percent of the adult population that is the owner/manager of a business that is less than 42 months old, and the *nascent entrepreneurship rate*, defined as the percent of adult population that is actively involved in starting a new venture (see e.g. Reynolds *et al.*, 2002). These two variables are the dependent variables in our two-equation model which will be discussed in the next section. Furthermore, we will use three more entrepreneurship rates from GEM in our model. These are the opportunity and necessity nascent entrepreneurship rates and the established business rate. Table 2a provides full details on these GEM measures.

The entry regulation data are taken from the World Bank Doing Business (WBDB) data base. According to the WBDB website “The Doing Business database provides objective measures of business regulations and their enforcement. The Doing Business indicators are comparable across 155 economies. They indicate the regulatory costs of business and can be used to analyse specific regulations that enhance or constrain investment, productivity and growth”.⁷ The indicators are categorised according to a number of topics, such as ‘Starting a business’, ‘Hiring and firing of workers’, ‘Getting credit’, etc. In this paper we will investigate whether the WBDB indicators are statistically significantly related to entrepreneurship rates across a wide range of countries participating in the Global Entrepreneurship Monitor between 2002 and 2005.

⁷ See www.doingbusiness.org.

The entry regulation data are those included in the WBDB category ‘Starting a business’. The data cover the number of days required to start a business, the number of procedures required to start legally and indicators on the financial costs involved in starting up. The exact definitions will be provided in the next section. The methodology used to construct these entry regulations indicators was originally developed in Djankov *et al.* (2002). They went through considerable effort to obtain reliable data, as is clear from the following quote:

“We collect data on entry regulation using all available written information on start-up procedures from government publications, reports of development agencies such as the World Bank and USAID, and government web pages on the Internet. We then contact the relevant government agencies to check the accuracy of the data. Finally, for each country we commission at least one independent report on entry regulation from a local law firm, and work with that firm and government officials to eliminate disagreements among them” (Djankov *et al.*, 2002, p. 6).

It is important to note that the WBDB indicators for ‘Starting a business’ focus on relatively large startups as their ‘standardised’ firm is a domestically owned limited liability company which has between 5 and 50 employees one month after startup. This may be a limitation of our research as many of the entrepreneurs captured by GEM operate in smaller businesses. However, a major advantage of the WBDB data base is that the measures are readily available, and that they are comparable across countries. Also, if we assume that country differences in regulations are stable across different types of firms (in terms of size, legal form or activity), the WBDB indicators may be appropriate to use in helping to explain country differences in entrepreneurship rates.⁸

As an illustration, Table 1 presents data on the number of days required to start a business for those countries participating in the Global Entrepreneurship Monitor in 2005. The table also includes data on the young business and nascent entrepreneurship rates, classified by opportunity and necessity entrepreneurship.

⁸ In some cases, there are differences in regulations within one country as well. For instance, in the United States entry regulations differ across states (Spall and Szerb, 2004). In WBDB for each country it is assumed that the business operates in the most populous city.

Table 1: Number of days required to start a business and entrepreneurship rates in 2005

	Number of days required to start a business	Young business entrepreneurship rate	Opportunity nascent entrepreneurship rate	Necessity nascent entrepreneurship rate
Australia	2	4.66	4.99	0.49
Canada	3	3.59	4.9	0.69
United States	5	5.23	7.16	1.06
Iceland	5	2.73	4.05	0.16
Denmark	5	2.44	1.5	0.08
Singapore	6	3.67	3.08	0.54
France	8	0.68	1.46	1.1
Jamaica	9	6.66	5.49	3.23
Netherlands	11	1.93	1.81	0.16
New Zealand	12	9.99	7.72	0.77
Norway	13	5.17	3.69	0.15
Italy	13	2.25	2.21	0.43
Finland	14	1.88	1.85	0.16
Sweden	16	2.54	1.33	0.17
United Kingdom	18	2.92	2	0.29
Latvia	18	2.77	2.91	0.6
Switzerland	20	3.71	2.28	0.16
Ireland	24	4.73	4.34	1.12
Germany	24	2.71	1.91	0.67
Chile	27	5.31	4.39	1.5
Austria	29	2.37	2.36	0.25
Japan	31	1.14	0.86	0.16
Argentina	32	3.93	4.43	1.4
Thailand	33	13.06	6.4	1.23
Belgium	34	1.17	1.7	0.11
South Africa	38	1.74	1.89	1.14
Greece	38	1.6	2.69	0.52
Hungary	38	0.82	0.37	0.11
Spain	47	3.36	2.08	0.3
China	48	9.4	3.67	1.16
Croatia	49	2.5	1.66	2.11
Mexico	58	1.36	2.78	0.6
Slovenia	60	1.44	2.29	0.22
Venezuela	116	7.48	11.16	6.83
Brazil	152	8.17	1.71	1
Average	30.17	3.86	3.29	0.88

Sources: World Bank Doing Business and Global Entrepreneurship Monitor.

5. MODEL AND OPERATIONALISATION

5.1 Model

In order to examine the determinants of *nascent* entrepreneurship and *young business* entrepreneurship we will estimate a two-equation model explaining these entrepreneurship rates separately, while taking into account the interrelationship between the two variables. Our model takes the following form:

$$(1) \quad N = f(\mathbf{X}_1, \mathbf{G})$$

$$(2) \quad Y = f(N, \mathbf{X}_1, \mathbf{X}_2, \mathbf{G})$$

Where:

N = nascent entrepreneurship rate

Y = young business entrepreneurship rate

X_1 = vector of explanatory variables reflecting the supply side of entrepreneurship

X_2 = vector of explanatory variables reflecting the demand side of entrepreneurship

G = vector of explanatory variables reflecting government intervention

The setup of the model parallels Grilo and Irigoyen (2006) where survey data from the 15 EU Member States and the US from the year 2000 are used in the framework of a two-equation model to establish the effect of demographic and other variables on latent and actual entrepreneurship. Latent entrepreneurship is measured by the probability of a declared preference for self-employment over employment.⁹ An important feature of our model is the specific role of the nascent entrepreneurship rate which appears both as a dependent variable in Equation (1) and as an independent variable in Equation (2). In the latter equation the coefficient of the nascent rate may be interpreted as the ‘conversion’ effect from nascent to actual entrepreneurship. A higher coefficient suggests that a higher proportion of individuals who are in the process of starting a business actually succeed in setting up the business (i.e., they ‘convert’ from nascent entrepreneur into actual entrepreneur). We recognise that the conversion interpretation is imperfect as GEM currently does not follow individual nascent entrepreneurs over time. Nevertheless we consider it likely that a strong statistical association between nascent and actual entrepreneurship at the *macro* level implies a strong statistical association at the *micro* level as well (the latter implying conversion in the actual meaning of the word). Therefore we will use this interpretation throughout the paper.

Verheul *et al.* (2002) develop an eclectic framework for the determinants of entrepreneurship distinguishing between the demand side and the supply side of entrepreneurship and government intervention.¹⁰ The demand and supply side factors create aggregate conditions that influence the so-called risk-reward profile of individuals which forms the basis for the entrepreneurial decision made at the individual level. The demand side creates entrepreneurial opportunities through the market demand for goods and services, whereas the supply side provides potential entrepreneurs that can act upon the opportunities (Verheul *et al.*, 2002). Examples of demand side factors are technological development, globalisation and industrial structure while examples of supply side factors are education, age structure of population and availability of capital. Finally government intervention may also influence the demand and/or supply of entrepreneurs. Examples are entry regulation, labour market regulation and the social security

⁹ Blanchflower, Oswald and Stutzer (2001) use a similar approach while their model should be interpreted as a reduced form. Grilo and Thurik (2005a) use 2004 survey data of the 15 ‘old’ Member States of the EU applying the original Grilo and Irigoyen (2006) model.

¹⁰ An update of the eclectic framework can be found in Audretsch, Grilo and Thurik (2006).

system.¹¹ Note that the SME policies described in Section 2 are only part of the total set of possible government intervention instruments.¹²

In our empirical application the incumbent business ownership rate will be used as an indicator of the *demonstration effect*. It has a special place in the eclectic framework in the sense that the demonstration effect *directly* influences the risk-reward profile of individuals (instead of through the aggregate conditions created by the demand and supply side factors). The more common entrepreneurship is in an economy (i.e., the more businesses there are), the more attractive entrepreneurship is perceived by people, independent of existing opportunities and individual characteristics. If many people are involved in self-employment, other people may be persuaded to start their own firm, without taking into account the aggregate conditions to successfully launch a business (Verheul *et al.*, 2002). Incumbent business ownership is operationalised as the established business rate, as measured by the Global Entrepreneurship Monitor. The established business rate is defined as the number of owner/managers in businesses older than 42 months as a percentage of adult population.

In terms of our model, supply side factors influence the stock of potential (or nascent) entrepreneurs. These factors may also influence the stock of actual entrepreneurs. Hence \mathbf{X}_1 appears both in Equation (1) and in Equation (2). However, concerning demand side factors one may argue that they influence the young business rate rather than the nascent rate because the demand side factors determine the market room for new businesses: they impact the actual *realisations* of new-firm startups. Hence, \mathbf{X}_2 appears in Equation (2) only.¹³ Government intervention factors influence both the nascent and the actual entrepreneurship rate. Furthermore, to test for the ‘conversion’ effect, the nascent rate is also included as an explanatory variable in the young business equation.¹⁴

Although the distinction between variables reflecting the supply and demand side of entrepreneurship can be made conceptually, it is less clear in the world of proxied variables. Therefore, we will also test for the impact of the variables classified as demand side variables on the nascent rate, even though vector \mathbf{X}_2 is not in Equation (1).

Finally, as entrepreneurs may start businesses for different reasons, we use the opportunity and necessity nascent entrepreneurship rates separately. By and large, opportunity nascent are in

¹¹ Supply side factors of entrepreneurship often interact with government intervention factors. For instance, education obviously influences the skills of people required to become an entrepreneur (supply side factor). However, education itself can be influenced by government intervention through spending more money on the education system.

¹² The eclectic framework is also used in Grilo and Thurik (2005b) where a multinomial logit approach is taken using survey data from the 15 EU Member States, Norway, Iceland, Liechtenstein and the US to establish the effect of demographic and other variables on various entrepreneurial engagement levels. See also Grilo and Thurik (2006b) for a similar analysis pertaining to the new 25 Member States.

¹³ Note that some of the determinants of the young business rate may impact this rate not only through more startups but also through the *survival* effect. For instance, it may be hypothesised that countries with a higher average education level of the population not only produce more startups but also produce more startups *that survive*. This effect is also captured in the model as the young business rate measures all owner/managers of firms younger than 3.5 years.

¹⁴ For a similar model using survey micro data, see Grilo and Irigoyen (2006). In their model the probability of actually being self-employed depends in part on the revealed preference for self-employment. In a follow-up study Grilo and Thurik (2005a) compare the 2000 results of Grilo and Irigoyen with new 2004 results. Also they make a comparison between the old 15 member states of the EU and the ten new ones in Grilo and Thurik (2006a).

the process of starting a business because they perceived a business opportunity, while the motive for necessity nascents is that they see no work options in paid employment. See also Table 2a. It may be that determinants of opportunity and necessity entrepreneurship rates are different. Furthermore, opportunity nascents probably more often succeed in ‘converting’ their startup activities into an actual startup, for instance because they may have more skills. This would imply that the ‘conversion’ coefficient in Equation (2) is higher for opportunity nascents than for necessity nascents.

5.2 Explanatory variables

In our empirical exercises the vectors \mathbf{X}_1 , \mathbf{X}_2 and \mathbf{G} contain several variables. Most variables reflecting the supply and demand side of entrepreneurship are taken from the Global Competitiveness Report 2001-2002 (GCR) or the World Competitiveness Yearbook 2001 (WCY). The variables reflecting government intervention are taken from the World Bank Doing Business data base. Below we describe the various groups of variables considered in our empirical application.

Explanatory variables reflecting the supply and demand sides of entrepreneurship

We include the following variables reflecting the supply side of entrepreneurship (vector \mathbf{X}_1): ‘Ease of access to loans’, ‘Venture capital availability’, ‘Working hours per year’, ‘Secondary school enrollment’ and ‘Tertiary enrollment’. For the demand side of entrepreneurship (vector \mathbf{X}_2) we include the following variables: ‘Economic growth rates’, ‘FDI and technology transfer’, ‘Company-university cooperation’ and ‘Industrial structure’ (share of services). The exact variable descriptions are again provided in Table 2a. Some variables taken from GCR or WCY are based on so-called Executive Opinion Surveys. The goal of these surveys is to capture a broad array of intangible factors that cannot be found in official statistics but that nonetheless may be of economic importance. For these variables the question asked of ‘experts’ (executives in top- and middle management of firms) is included in the table.

Explanatory variables reflecting government intervention (vector \mathbf{G}).

We will use variables from five categories of variables distinguished in the World Bank Doing Business methodology, which are assumed to have a potential influence on the number of entrepreneurs. These categories are ‘Starting a business’, ‘Hiring and firing workers’, ‘Getting credit’, ‘Paying taxes’ and ‘Closing a business’. They will be discussed below. The detailed descriptions of the individual variables are provided in Table 2b.

- World Bank Doing Business, topic ‘Starting a business’: measuring entry regulations

In this study we use the entry regulation measures from the World Bank Doing Business data base that are included in the topic ‘Starting a business’. This topic identifies the bureaucratic and legal hurdles an entrepreneur must overcome to incorporate and register a new firm. It examines the procedures, time, and cost involved in launching a commercial or industrial firm with up to 50 employees and start-up capital of 10 times the economy’s per-capita gross national income (www.doingbusiness.org). See Table 2b. For more details on these entry regulation measures we refer to Djankov *et al.* (2002).

- World Bank Doing Business, topic 'Hiring and firing workers': measuring labour market regulations

This topic measures the flexibility of labour regulations. It examines the difficulty of hiring a new worker, rigidity of rules on expanding or contracting working hours, the non-salary costs of hiring a worker, and the difficulties and costs involved in dismissing a redundant worker (www.doingbusiness.org). See Table 2b. For all variables classified under this topic it holds that higher values indicate more rigid regulations. Hence the expected influence on entrepreneurship rates is negative. For more details on these measures we refer to Botero *et al.* (2004). As a test of robustness we will also use two labour market indicators from other sources. These are the variables 'Employer's flexibility of hiring and firing' and 'Social security expenditure', see Table 2a.

- World Bank Doing Business, topic 'Getting Credit'

This topic explores two sets of issues—credit information registries and the effectiveness of collateral and bankruptcy laws in facilitating lending. We refer to Table 2b for the descriptions of the variables classified under this topic. For all variables higher values indicate that lending is better facilitated. Hence the expected influence on entrepreneurship rates is positive. For more details on these measures we refer to Djankov *et al.* (2005).

- World Bank Doing Business, topic 'Paying Taxes'

This topic addresses the taxes that a medium-size 'standardised' company must pay or withhold in a given year. The indicators include the frequency of tax payments and the amount of tax payments. Higher taxes or higher burdens related to a high frequency of paying taxes, makes running a business less attractive. Hence the expected sign of these variables is negative.

- World Bank Doing Business, topic 'Closing a business'

This topic identifies weaknesses in existing bankruptcy law and the main procedural and administrative bottlenecks in the bankruptcy process. The indicators include the time and cost associated with going bankrupt as well as the recovery rate which measures the amount of money claimants recover from an insolvent firm. When the recovery rate is higher, banks may be expected to be more willing to lend, hence this may have a positive impact on entrepreneurship. Also, when insolvency is efficiently organised, more entrepreneurs having to close their business may be encouraged to start a second time.¹⁵

¹⁵ Armour and Cumming (2005) investigate a different aspect of bankruptcy law in relation to entrepreneurship levels, viz., the time to discharge from personal bankruptcy.

Table 2a: Variable descriptions and sources

Variable	Description	Source
Nascent entrepreneurship rate.	The number of people that are actively involved in starting a new venture, as a percentage of adult population. 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 <i>et al.</i> , 2002, p. 38).	GEM
Opportunity nascent rate	The number of nascent entrepreneurs (as defined above) with an opportunity based motive, i.e., they indicate they will start a business because they have perceived a business opportunity. Opportunity nascents will start a business as one of several possible career options.	GEM
Necessity nascent rate	The number of nascent entrepreneurs (as defined above) with a necessity based motive, i.e., they indicate they will start a business because they see entrepreneurship as their last resort. Necessity nascents feel compelled to start their own business because all other work options are either nonexistent or unsatisfactory.	GEM
Young business entrepreneurship rate.	The percent of adult population that is the owner/manager of a business that is less than 42 months old.	GEM
Established business rate	The percent of adult population that is the owner/manager of a business that is older than 42 months.	GEM
Intercept poor countries	Dummy variable that is 1 if the per capita income level in 2000 exceeds 15,000 US \$ in purchasing power parities, and 0 otherwise.	WCY
Growth	Economic growth rates: gross domestic product, constant prices, annual percent changes.	IMF
Ease of access to loans	“How easy is it to obtain a loan in your country with only a good business plan and no collateral? (1=impossible, 7=easy)”.	GCR
Venture capital availability	“Entrepreneurs with innovative but risky projects can generally find venture capital in your country (1=not true, 7=true)”.	GCR
Working hours	Average number of working hours per year. Hypothesis: In countries where working long hours is more common, there may be a bigger supply of potential entrepreneurs (as entrepreneurs –in general– also work long hours).	WCY
Secondary school enrollment	Percentage of relevant age group receiving full-time education, 1997.	WCY
Tertiary enrollment	Gross tertiary enrollment rate 1997.	GCR
FDI and technology transfer	“Foreign direct investment in your country (1=brings little new technology, 7=is an important source of new technology)”.	GCR
Company-university cooperation	Technology transfer between companies and universities (answers ranging from insufficient to sufficient)	WCY
Industrial structure	Employment share services	WCY
Employer’s flexibility of hiring and firing	“Hiring and firing of workers is (1=impeded by regulations, 7=flexibly determined by employers)”.	GCR
Social security expenditure	This variable measures the employer’s compulsory social security contribution as a percentage of GDP per capita in 2000.	WCY

Note: GEM = Global Entrepreneurship Monitor

WCY = World Competitiveness Yearbook 2001

IMF = International Monetary Fund, World Economic Outlook Database, September 2005

GCR = Global Competitiveness Report 2001-2002

Table 2b: Variable descriptions and sources, World Bank Doing Business indicators

Variable	Description
	<i>World Bank Doing Business indicators, topic 'Starting a Business'</i>
Procedures	The number of different procedures that a start-up has to comply with in order to obtain a legal status, i.e., to start operating as a legal entity. A procedure is defined as any interaction of the company founder with external parties (government agencies, lawyers, auditors, notaries).
Time	The time it takes to obtain legal status to operate a firm, in calendar days. Time captures the median duration that incorporation lawyers indicate is necessary to complete all necessary procedures.
Cost	The cost of obtaining legal status to operate a firm as a percentage of per capita income. It includes all identifiable official expenses (fees, costs of procedures and forms, photocopies, fiscal stamps, legal and notary charges, etc.).
Minimum capital	The paid-in minimum capital requirement reflects the amount that the entrepreneur needs to deposit in a bank before registration starts. This variable is measured as a percentage of per capita income.
	<i>World Bank Doing Business indicators, topic 'Hiring and Firing Workers'</i>
Difficulty of Hiring Index	Difficulty of hiring a new worker.
Rigidity of Hours Index	Restrictions on expanding or contracting the number of working hours.
Difficulty of Firing Index	Difficulty and expense of dismissing a redundant worker.
Rigidity of Employment Index	This variable is computed as the average of the Difficulty of Hiring Index, the Rigidity of Hours Index and the Difficulty of Firing Index.
Hiring cost	This indicator measures all social security payments (including retirement fund; sickness, maternity and health insurance; workplace injury; family allowance; and other obligatory contributions) and payroll taxes associated with hiring an employee. The cost is expressed as a percentage of the worker's salary.
Firing costs	Cost of a redundant worker, expressed in weeks of wages.
	<i>World Bank Doing Business indicators, topic 'Getting Credit'</i>
Legal Rights Index	This index measures the degree to which collateral and bankruptcy laws facilitate lending.
Credit Information Index	This index measures rules affecting the scope, access and quality of credit information.
Public registry coverage	A public credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks. It collects information on the creditworthiness of borrowers (persons or businesses) in the financial system and makes it available to financial institutions. The coverage indicator reports the number of individuals and firms listed in the public credit registry with current information on repayment history, unpaid debts or credit outstanding. The number is expressed as a percentage of the adult population. If no public registry operates, the coverage value is 0.
Private bureau coverage	A private credit bureau is defined as a private firm or nonprofit organisation that maintains a database on the creditworthiness of borrowers (persons or businesses). The variable is defined analogously to the public registry coverage variable.

Source: World Bank, www.doingbusiness.org

Table 2b, continued

Variable	Description
	<i>World Bank Doing Business indicators, topic 'Paying Taxes'</i>
Number of payments	The number of times the company pays taxes in a year is the number of different taxes multiplied by the frequency of payment for each tax. The frequency of payment includes advance payments as well as regular payments.
Total tax payable	This indicator measures the total amount of taxes payable by the business in the second year of operation except for labour taxes. Labour taxes (such as payroll taxes and social security contributions) are included in the hiring cost indicator (see above). The total amount of taxes is the sum of all the different taxes payable after accounting for deductions and exemptions. The taxes withheld but not paid by the company are not included. Payable taxes are presented as a share of gross profit (defined as sales minus cost of goods sold and labour costs).
	<i>World Bank Doing Business indicators, topic 'Closing a Business'</i>
Time	Time to go through insolvency in calendar years. This variable captures the average time taken to go through insolvency, as estimated by bankruptcy lawyers. Information is collected on the sequence of the bankruptcy procedures and on whether any procedures can be carried out simultaneously. Delays due to legal derailment tactics that parties to the bankruptcy may use -in particular, the extension of response periods or appeals- are considered.
Cost	Cost of the bankruptcy proceedings, as a percentage of the estate value of the bankrupt business. ¹⁶ The cost of the bankruptcy proceedings is calculated on the basis of survey responses by practicing insolvency lawyers. Costs include court costs as well as fees of insolvency practitioners, independent assessors, lawyers, accountants and the like. Bribes are excluded.
Recovery rate	The recovery rate, which calculates how many cents on the dollar claimants (creditors, tax authorities, and employees) recover from an insolvent firm. This variable more or less combines the former two variables as the cost of bankruptcy proceedings is deducted from the initial available money, and the recovery rate is then calculated as the present value of what is left. ¹⁷

Source: World Bank, www.doingbusiness.org

6. EMPIRICAL ANALYSIS

6.1 Methodology and sample

Our goal is to estimate Equations (1) and (2) using the explanatory variables described above. We have data for 47 countries over the period 2000-2005. However, there are several missing data. First, data for the established business rate are available for the years 2002-2005 only. As the demonstration effect has been found to be empirically relevant in earlier studies (Wenckers *et al.*, 2005), we do not want to omit this variable. Second, several countries participated in GEM only once or twice. Third, there are missing values for several of the explanatory variables for Croatia, Uganda, Jamaica and Latvia. All in all, we are left with a maximum sample of 124 observations. Finally, several test regression revealed that some observations do not fit in our models in the sense that they have extreme residual values for which we have no sound explanation. After removing these observations we end up with an unbalanced panel of 112 observations and using this sample all regressions pass the Jarque-Bera test on normality

¹⁶ The data are computed for a 'standardised case', where a limited liability company has downtown real estate as its major asset. The company runs a hotel with 201 employees.

¹⁷ The third factor influencing the recovery rate is whether or not the firm survives as a going concern. In case the business is liquidated there is an additional loss of value impacting the recovery rate negatively (see World Bank, 2005, p. 69).

of the residuals.¹⁸ The distribution of these observations over the countries is given in Appendix 1 to this paper.

In our data set we have variables that vary over time as well as time-invariant variables. Of the variables described above the GEM variables (the nascent, young business and established business entrepreneurship rates) and growth of GDP vary over time while the variables derived from GCR and WCY are time-invariant. The indicators from WBDB are available for the period 2003-2005. We set the values for 2002 equal to those of 2003.¹⁹

In our estimation models we depart from a base model which includes the economic growth rate and the established business rate. These variables are important as they capture the business cycle effect and the demonstration effect, respectively. However, we cannot include all explanatory variables described above in a single equation estimation because of (assumed) multicollinearity. Therefore, to obtain a first glance of the impact of the various variables, we compute separate regressions each time including the economic growth rate and established business rate as control variables. In Equation (1) we also include a 'poor country' dummy. It is often observed that entrepreneurship rates are higher in poor countries because entrepreneurship is of a different nature compared with rich countries (i.e., more often necessity driven instead of opportunity driven or associated with the rural sectoral composition). We include a dummy to correct for this. We choose a per capita income level of 15,000 US \$ in purchasing power parities (year 2000) as the cut-off point. Appendix 1 shows which countries are labelled as poor.²⁰ In Equation (2) the inclusion of this dummy is not required because the nascent entrepreneurship rate (both opportunity and necessity driven) is included as an additional explanatory variable.

Given these baseline specifications, we include, one at a time, the explanatory variables described in Section 5 in separate (auxiliary) regressions. The regressions are estimated using OLS. As our data base contains very heterogeneous countries we compute standard errors which are robust to heteroskedasticity. Below we present the results for the entry regulation variables (our main interest) and the other explanatory variables.

6.2 Preliminary results for entry regulation variables

Results for Equations (1) and (2) focusing on the entry regulation variables are presented in Tables 3 and 4, respectively.

¹⁸ 12 Observations were removed in the outlier analysis.

¹⁹ Also, some variables are available for 2004 and 2005 only. In those cases the values for both 2002 and 2003 were set equal to those of 2004.

²⁰ Using this method some former communist countries are labeled as poor. In Wennekers *et al.* (2005) a separate dummy is used for these countries to capture the negative attitude toward entrepreneurship in these countries. We chose not to include a separate dummy for these countries as we do not want to manipulate results by using different types of dummies for specific groups of countries.

Table 3: Estimation results for auxiliary regressions explaining NASCENT entrepreneurship rates (112 observations)

	Dependent variable: Opportunity nascent entrepreneurship rate				
Intercept	.86 *	1.75 **	1.21 **	.90 *	.044
	(1.8)	(2.5)	(2.2)	(1.8)	(0.1)
Intercept poor countries	.84 *	1.52 ***	1.23 ***	1.28 **	1.37 ***
	(1.9)	(3.0)	(2.7)	(2.6)	(3.4)
Growth	.13 **	.11 *	.11 *	.13 **	.19 ***
	(2.0)	(1.6)	(1.6)	(2.1)	(4.2)
Established businesses	.33 ***	.33 ***	.34 ***	.36 ***	.46 ***
	(4.9)	(5.0)	(4.9)	(4.8)	(8.1)
World Bank Doing Business measures for 'Starting a Business'					
Procedures		-.14 **			
		(2.4)			
Time			-.015 **		
			(2.1)		
Cost				-.035	
				(1.2)	
Minimum capital					-.0050 ***
					(3.5)
R-squared	.359	.396	.388	.377	.497
Dependent variable: Necessity nascent entrepreneurship rate					
Intercept	.13	-.13	.045	.13	-.14
	(0.6)	(0.4)	(0.2)	(0.5)	(0.7)
Intercept poor countries	1.45 ***	1.25 ***	1.36 ***	1.46 ***	1.6 ***
	(5.4)	(4.8)	(5.0)	(5.1)	(5.9)
Growth	-.019	-.015	-.014	-.019	.003
	(0.4)	(0.4)	(0.3)	(0.4)	(0.1)
Established businesses	.072 **	.072 **	.069 **	.072 **	.12 ***
	(2.0)	(2.0)	(2.0)	(2.1)	(3.4)
World Bank Doing Business measures for 'Starting a Business'					
Procedures		.042 *			
		(1.7)			
Time			-.003		
			(1.1)		
Cost				-.0004	
				(0.03)	
Minimum capital					-.0017 **
					(2.4)
R-squared	.478	.494	.486	.478	.553

Note: Absolute heteroskedasticity-consistent t-values are between brackets. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Table 4: Estimation results for auxiliary regressions explaining YOUNG BUSINESS entrepreneurship rate (112 observations)

	Dependent variable: Young business entrepreneurship rate				
Intercept	-.17 (0.8)	.12 (0.3)	-.059 (0.2)	-.12 (0.6)	-.086 (0.4)
Opportunity nascent rate	.43 *** (7.0)	.39 *** (6.1)	.40 *** (6.7)	.39 *** (6.5)	.45 *** (6.5)
Necessity nascent rate	.60 *** (4.7)	.72 *** (4.8)	.67 *** (5.0)	.71 *** (4.9)	.58 *** (4.3)
Growth	.037 (1.0)	.044 (1.2)	.038 (1.0)	.050 (1.4)	.021 (0.6)
Established businesses	.25 *** (6.2)	.25 *** (6.7)	.25 *** (6.6)	.27 *** (8.2)	.22 *** (5.3)
World Bank Doing Business measures for 'Starting a Business'					
Procedures		-.042 (1.3)			
Time			-.004 (0.9)		
Cost				-.021 ** (2.0)	
Minimum capital					.0007 (0.7)
R-squared	.839	.842	.841	.847	.841

Note: Absolute heteroskedasticity-consistent t-values are between brackets. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Table 3 and Table 4 both show strong support for the demonstration effect. The rate of established business entrepreneurship has a positive and significant impact on both nascent and young business entrepreneurship. As regards economic growth rates, we see that there is a significant positive effect on the opportunity nascent rate but no effect on necessity nascent. This is in line with our expectations: as higher growth rates reflect a higher demand for goods and services, there are more opportunities to start new businesses. The necessity nascent rate is not affected as their motives are very different, i.e., unrelated to the level of demand. We find a weak positive effect of GDP growth on young businesses. Note however that there is also an indirect effect through the (opportunity) nascent rate.

Support is also found for the 'conversion' effect: the coefficients of the nascent rate variables in Table 4 are highly significant. Countries with more nascent entrepreneurs also have more entrepreneurs in actual young businesses. Perhaps somewhat surprisingly, the effect for the necessity rate seems to be higher than the effect of the opportunity nascent rate. Apparently, more nascent entrepreneurs with a necessity based motive succeed in actually setting up a business compared to nascent entrepreneurs with an opportunity based motive. Perhaps the lack of alternative options induces more necessity nascent to actually start businesses because they (are forced to) put more effort in the startup process. Note however that this does not imply that the necessity nascent are more 'successful' in terms of economic performance. Research by Van Stel, Carree and Thurik (2005) shows that in developing countries –where the number and share of necessity based entrepreneurs is high compared with developed countries (see Acs *et al.*, 2005, pp. 18-21) – higher levels of entrepreneurship contribute *negatively* to economic growth. This may be related to an assumed lack of human capital of the entrepre-

neurs in these countries.²¹ Hence, presumably many necessity startups do not survive or do not grow.

The entry regulation measures generate very mixed results. In the regressions explaining the opportunity nascent rate across countries, we find negative signs for all four indicators, three of which are significant. This suggests that, if regulations are more impeding, less people will consider starting a business. In the regressions explaining the necessity nascent rate we find positive as well as negative signs, while for the young business rate the negative sign seems to dominate. Hence, these first sets of auxiliary regressions suggest that there may be some impeding effect of entry regulations but that the distinction between opportunity and necessity nascent entrepreneurship rates is important. We return to these results in Section 6.4 where we analyse the results of a ‘complete’ model.

6.3 Preliminary results for other explanatory variables

Next to the entry regulation measures we include several explanatory variables reflecting the demand and supply side of entrepreneurship (results are presented in Table 5), as well as variables reflecting (other) business regulations or government intervention measures (see Table 6). Note that the results in these tables are from separate regressions, i.e., each cell contains a result obtained by adding the variable under consideration to the baseline specification described earlier.

From these tables we note that numerous variables have an impact on the nascent and/or young business entrepreneurship rate. Amongst the demand and supply side variables we find particularly strong effects (significant at 1% level) for tertiary enrollment and the employment share of services. The positive effect of tertiary enrollment on the nascent rate suggests that university students are more inclined to start businesses compared to others. This result is in line with Reynolds *et al.* (1999) who conclude that the larger a country’s investment in education at the tertiary level, the higher is the rate of new firm formation. Note that the effect of higher education is only significant for the *opportunity* nascent rate, not for the necessity nascent rate. This supports the hypothesis that opportunity based entrepreneurs may have higher human capital levels compared with necessity based entrepreneurs. Also note that tertiary enrollment indirectly influences the young business rate through the effect of the (opportunity) nascent rate which is very strong (see Table 4), although the variable is non-significant in the young business rate equation.

Concerning business regulation measures (Table 6), estimation results from the first set of variables (WBDB topic ‘Hiring and Firing Workers’) indicate a strong negative effect of rigid labour regulations. When labour regulations are more rigid, entrepreneurship rates tend to be lower. Formulated differently, in countries where the flexibility of employers to hire and fire employees is higher, the various rates of entrepreneurship also tend to be higher. There are two effects involved here. On the side of employees, the safety of their paid job is smaller which may make them more likely to decide to start their own business (push effect). On the side of

²¹ See also Van Stel and Storey (2004) who provide (indirect) empirical evidence that (UK) regions where more startups are subsidised have lower economic performance. The interpretation of the authors is that the subsidy programs cause many individuals with low human capital levels to start businesses. As these low skilled business owners do not grow their businesses and often leave the market after a while, the net effect on regional economic performance may well be negative.

the entrepreneurs, they have more flexibility in running their business which makes the self-employment occupation more attractive (pull effect). Both effects point in the direction of higher entrepreneurship rates.

In line with these results we also find a negative effect of social security expenditure. Again there are two effects involved. On the side of the beneficiaries, when social security entitlements are higher, incentives for paid employees or unemployed people to start their own business are lower because the opportunity costs of entrepreneurship are higher. On the side of the employers, a higher employer contribution implies higher wage costs, making the entrepreneurship option less attractive. See also Hessels *et al.* (2006) for an analysis of the relation between social security arrangements and entrepreneurship rates at the country level.

Considering the results from the last three panels of Table 6 we observe that there seems to be a positive impact of the variable Private bureau coverage, suggesting that if better information about creditworthiness of potential borrowers is available, credit rationing by lenders to small businesses will occur less often (Armour and Cumming, 2005). The influence of tax systems seems to be marginal while for the WBDB category 'Closing a business' we only find some counter-intuitive results for the necessity entrepreneurship rate (viz. a positive sign of the time to go through insolvency and a negative sign of the recovery rate).

Finally, when explaining necessity entrepreneurship in Tables 3 and 6, we observe several other counter-intuitive findings, such as the significantly positive signs for the number of procedures a start-up has to comply with, and the firing costs of a redundant worker. It may be the case that, in countries where business regulations are more burdensome, business owners are more reluctant to register their firms and so are more likely to operate in the informal economy (World Bank, 2005, p. 3). Countries with higher regulatory burdens are typically the poor countries (World Bank, 2005, p. 3) where the share and number of necessity entrepreneurs is relatively high (Acs *et al.*, 2005). Our interpretation of these counterintuitive findings is that high numbers of necessity based entrepreneurs in developing countries escape the heavy regulations by setting up a business in the informal sector.²²

²² Verheul *et al.* (2006) show that particularly women may be involved in informal entrepreneurship. Based on an analysis using Global Entrepreneurship Monitor data they consider it likely that for developing countries a substantial number of entrepreneurs measured in GEM's entrepreneurship rates are owner-managers of unregistered businesses. Based on their analysis the authors also argue that the distinction between the formal and informal economy should define an important topic for the Global Entrepreneurship Monitor research agenda: how many 'informal' entrepreneurs are included in the entrepreneurship measures of GEM's Adult Population Survey, and how does this affect empirical analyses that make use of the GEM data base? This issue is important in particular for studies focusing on GEM countries with large informal sectors (Verheul *et al.*, 2006).

Table 5: Effect of supply and demand side variables on entrepreneurship rates (112 observations); auxiliary, *separate* regressions

	Opportunity nascent rate	Necessity nascent rate	Young business rate
Supply side of entrepreneurship (X₁)			
Ease of access to loans (GCR)	.15 (0.5)	-.16 (1.5)	.20 * (1.7)
Venture capital availability (GCR)	.15 (0.6)	-.11 (1.2)	.20 ** (2.1)
Working hours (WCY) &	.0021 (1.5)	.0010 ** (2.0)	.0002 (0.4)
Secondary school enrollment (WCY) &	-.030 * (1.6)	-.013 (1.4)	-.005 (0.6)
Tertiary enrollment (GCR) §	.045 *** (4.1)	.006 (1.6)	-.002 (0.3)
Demand side of entrepreneurship (X₂)			
FDI and technology transfer (GCR)	.007 (0.02)	.031 (0.3)	.21 * (1.7)
Company-university coopera- tion (WCY) &	.21 (1.5)	-.003 (0.1)	.073 (1.0)
Employment share services (WCY) &	.050 *** (2.7)	.013 * (1.7)	.012 (1.2)

Note: Absolute heteroskedasticity-consistent t-values are between brackets. The results are from separate regressions that contain the same control variables as in Tables 3 and 4 (i.e., a constant, a dummy for poor countries, growth of gdp and the established business rate for the opportunity and necessity nascent equations and a constant, the opportunity and necessity nascent rates, growth of gdp and the established business rate for the young business equation). Coefficients of these additional explanatory variables are not reported. & Estimation based on 110 observations; Ecuador and Jordan missing in WCY. § Estimation based on 111 observations; Taiwan missing. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Table 6: Effect of government intervention variables on entrepreneurship rates (112 observations); auxiliary, *separate* regressions

	Opportunity nascent rate	Necessity nascent rate	Young business rate
Government intervention (G)			
World Bank Doing Business measures for 'Hiring and Firing Workers'			
Difficulty of Hiring Index	-.0081 (1.3)	.0038 (1.6)	-.0091 *** (2.9)
Rigidity of Hours Index	-.0249 *** (4.5)	-.0041 * (1.8)	-.0065 ** (2.1)
Difficulty of Firing Index	-.015 * (1.7)	.003 (0.7)	-.014 *** (3.4)
Rigidity of Employment Index	-.024 *** (3.0)	.0002 (0.1)	-.013 *** (3.5)
Hiring cost	-.034 *** (2.8)	-.007 (1.4)	-.011 ** (2.3)
Firing costs	-.0098 (1.3)	.0082 ** (2.5)	-.0010 (0.2)
<i>Robustness checks:</i>			
Employer's flexibility of hiring and firing (GCR)	.26 * (1.8)	.020 (0.4)	.23 *** (3.2)
Social security expenditure (WCY) ^{&}	-.039 *** (3.2)	-.006 (1.0)	-.015 ** (2.3)
World Bank Doing Business measures for 'Getting Credit'			
Legal Rights Index	.13 (1.6)	-.0089 (0.3)	.049 (1.3)
Credit Information Index	.24 ** (2.0)	.073 (1.1)	.073 (1.1)
Public registry coverage	-.0095 (0.9)	.0058 (1.2)	-.0071 (1.1)
Private bureau coverage	.018 *** (4.3)	.0018 (1.1)	.0049 ** (2.1)
World Bank Doing Business measures for 'Paying Taxes'			
Number of payments	-.016 (1.0)	-.0014 (0.2)	-.013 * (1.8)
Total tax payable	-.012 (1.2)	.0022 (0.4)	.0064 (1.0)
World Bank Doing Business measures for 'Closing a Business'			
Time	.13 (1.1)	.16 *** (3.4)	.038 (0.4)
Cost	-.023 (0.6)	-.0003 (0.03)	-.0017 (0.1)
Recovery rate	.0031 (0.4)	-.0084 *** (2.8)	.0024 (0.5)

Note: Absolute heteroskedasticity-consistent t-values are between brackets. The results are from separate regressions that contain the same control variables as in Tables 3 and 4 (i.e., a constant, a dummy for poor countries, growth of gdp and the established business rate for the opportunity and necessity nascent equations and a constant, the opportunity and necessity nascent rates, growth of gdp and the established business rate for the young business equation). Coefficients of these additional explanatory variables are not reported. [&] Estimation based on 110 observations; Ecuador and Jordan missing in WCY. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

6.4 Final results: 'complete' models

Having explored which variables may have an impact on the entrepreneurship rates by adding them separately to the baseline specifications, we now move on to build some 'complete' models. For each dependent variable we combine all significant variables from Tables 3 to 6 into one model specification which also includes the baseline variables. Next, we remove the non-significant variables, to end up with a model including only those explanatory variables which have a significant impact (next to the baseline variables). In this process we also take into consideration some restrictions that arise from multicollinearity. For instance, as the Rigidity of Employment Index is an average of three subindices (see Table 2b), these index variables are intercorrelated by construction. Hence we cannot include the sub-indices and the overall index simultaneously. For the opportunity nascent rate and the young business rate, where more than one of the three sub-indices spanning the Rigidity of Employment Index are significant in the auxiliary regressions (see Table 6), we include only the combined indicator. The results are shown in Table 7. In reading this table it is important to realise that empty cells imply a non-significant influence. Furthermore, an explanatory variable from Tables 3 to 6 that is not included in Table 7 means it has no impact on any of the entrepreneurship rates.

Table 7 contains some interesting results. *First*, concerning the impact of business regulations we note that the impact of entry regulations on entrepreneurship rates is limited whereas the impact of labour market regulations is more pronounced. From the four entry regulation variables (WBDB topic 'Starting a Business'), only the minimum capital requirement is an obstacle for entrepreneurship. These results are in line with those found by Capelleras *et al.* (2005). Based on a comparison of new ventures in Britain (a lightly regulated economy) and Spain (a highly regulated economy) they find that the regulatory framework only marginally impacts upon the performance of new and small firms. "Of greater significance are the characteristics of new and small firm owners. Their skills and determination appear to transcend national boundaries and, by implication, regulatory regimes" (Capelleras *et al.*, 2005). Interpreting our findings in this spirit, we speculate that the creative entrepreneur overcomes bureaucratic burdens such as the number of procedures or the amount of time that is required to start up, even if these burdens are relatively heavy. However the minimum capital requirement may be a more serious barrier because even skillful entrepreneurs may not be able to overcome this barrier if they do not dispose of assets of their own. This might explain the negative sign.

Hence we have seen that of the entry regulation measures there is only an impeding impact of the minimum capital requirement.²³ Moreover, the impact of this variable on *actual* entrepreneurship (the young business rate) emerges only in an indirect way, viz. through the effect of nascent entrepreneurs. This contrasts sharply with the impact of labour market regulations. In particular, the Rigidity of employment index acts as an obstacle for the *actual* entrepreneurship rate, both directly (the variable is significant at 1% level) and indirectly through the (opportunity) nascent rate. These results suggest that in order to increase entrepreneurship rates, policies focusing on making labour markets more flexible are more successful than policies focusing on lowering entry regulations.

²³ Note that the impact of the number of procedures on necessity entrepreneurship has a counterintuitive sign.

Table 7: Combined models

	Opportunity nascent rate	Opportunity nascent rate	Necessity nascent rate	Young business rate
Intercept	1.91 (1.2)	7.32 * (1.7)	-.27 (0.3)	.18 (0.7)
Intercept poor countries	1.84 *** (4.4)	1.48 *** (3.1)	.90 *** (4.9)	
Growth	.12 ** (2.4)	.13 ** (2.4)	-.015 (0.5)	.037 (1.1)
Established business rate	.31 *** (4.8)	.29 *** (4.6)	.11 *** (4.4)	.26 *** (7.9)
Opportunity nascent rate				.33 *** (5.2)
Necessity nascent rate				.75 *** (5.2)
Procedures			.043 ** (2.0)	
Minimum capital	-.0041 ** (2.6)	-.0059 *** (2.7)	-.0009 ** (2.5)	
Rigidity of Hours Index			-.012 *** (5.7)	
Rigidity of Employment Index	-.020 *** (2.7)	-.015 ** (2.0)		-.012 *** (3.1)
Firing costs			.0086 *** (3.7)	
Private bureau coverage	.011 *** (2.7)	.010 *** (2.7)		.0036 (1.6)
Recovery rate			-.010 *** (3.1)	
Tertiary enrollment (GCR) [§]	.028 *** (2.6)	-.15 (1.4)		
Employment share services ^{&} (WCY)	-.032 * (1.7)	-.11 * (1.8)	.014 * (1.7)	
Interaction variable: Tertiary enrollment × Employment share services		.0025 * (1.7)		
R ²	.576	.611	.724	.856
N	109	109	110	112

Note: Absolute heteroskedasticity-consistent t-values are between brackets. [&] Ecuador and Jordan missing in WCY. [§] Taiwan missing in GCR. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

A *second* interesting result from Table 7 is that the ‘conversion’ effect for necessity entrepreneurs is stronger than that for opportunity entrepreneurs (compare the coefficients in the young business rate equation). As we argued earlier, the lack of alternative employment options may cause necessity nascent entrepreneurs to invest more effort in starting up a new business.²⁴

Thirdly, determinants of opportunity and necessity entrepreneurship are different. Most notably, economic growth rates have a significantly positive effect on opportunity rates but no ef-

²⁴ Again we recognise that the conversion interpretation is to some extent questionable as we do not follow individual nascent entrepreneurs over time.

fect on necessity rates. Furthermore, whereas opportunity entrepreneurship is influenced by higher education levels (variable tertiary enrollment), necessity entrepreneurship is not influenced by this variable. As argued earlier this supports the hypothesis that opportunity based entrepreneurs have higher human capital levels compared with necessity based entrepreneurs. Also note from the first two columns that the effects of tertiary enrollment and the share of services interact. Higher tertiary enrollment rates only lead to more entrepreneurs if the share of services in the economy is high enough, and vice versa.²⁵

Fourthly, we notice several counterintuitive findings for the necessity rate equation, like positive signs for the number of procedures and for the costs of firing a redundant worker, and a negative sign for the recovery rate in case of bankruptcy. As argued earlier, our interpretation of these findings is that high numbers of necessity based entrepreneurs in developing countries escape the bureaucratic regulatory regimes by setting up a business in the informal sector.

7. DISCUSSION

This paper has investigated the impact of business regulations on entrepreneurship rates. We find evidence for a strong ‘conversion’ effect from nascent to actual entrepreneurship as well as preliminary indications that more burdensome *labour market* regulations may reduce entrepreneurship rates. However, we find no significant impact on business formations of administrative considerations such as the time, the cost, or the number of procedures needed to start a business. The only exception is the minimum capital requirement required to start a business which does seem to lower nascent, but not young business, entrepreneurship rates across countries.

Given the explicit link made by Djankov *et al.* (2002) between the ease with which businesses may be established in a country and its economic performance – and the enthusiasm with which this link has been grasped by European Union policy makers – our findings imply this link needs reconsidering. Instead our findings are more compatible with a Baumol (1990) inspired view that, whilst circumstances may influence the nature of entrepreneurship in society, it remains ever-present. Our findings provide little support for the simplistic view that “heavily regulated” countries (in terms of *entry* regulations) need only to reduce such “burdens” to become more enterprising and by implication more wealthy.

The current study also finds substantial differences between the determinants of opportunity entrepreneurship and those of necessity entrepreneurship. Whilst opportunity entrepreneurship is influenced by the level of higher education, necessity entrepreneurship is not. Our findings are compatible with the view that many necessity entrepreneurs in developing countries avoid business regulations by starting and operating a business in the informal sector. This result

²⁵ It is straightforward to compute that the turning point for the effect of higher education lies at a share of services level of 61%, i.e., only when the share of services in an economy is higher than 61%, an increase in the tertiary enrollment rate will contribute to higher opportunity entrepreneurship rates.

stresses the importance of measuring numbers of formal and informal entrepreneurs separately (see also Verheul *et al.*, 2006).²⁶

Our results are in line with those of Grilo and Irigoyen (2006) who found that having a preference for self-employment increases the probability of actually being self-employed.²⁷ Where we differ from them is that they find support for negative effects of the perceived lack of financial support and that of administrative complexities, whereas we do not.²⁸

In reaching these conclusions we are conscious of two limitations of our work. *First*, the WBDB indicators are generally defined for relatively large new firms. They relate to a 'standardised' firm, defined as a domestically owned limited liability company which has between 5 and 50 employees one month after startup. As the bulk of the entrepreneurs captured by GEM operate in smaller businesses, we implicitly assume that country differences in regulations are stable across size-classes. In other words, the countries where the WBDB regulation indicators are high for larger new firms are also the countries where it is difficult to begin a smaller new firm. A *second* limitation is that GEM does not have longitudinal data on the extent to which individual nascent entrepreneurs 'convert' into actual business starts. We interpret the estimated coefficient for the impact of nascent entrepreneurship on actual entrepreneurship as the 'rate of conversion'. This assumes that a strong statistical association between nascent and actual entrepreneurship at the *macro* level reflects a strong statistical association

²⁶ The call for measuring formal and informal entrepreneurship separately is also supported by observations made by Capelleras *et al.* (2005), described in Section 2. They argue that regulation does not affect entrepreneurship but merely influences the nature or form of that entrepreneurship. In other words it influences the distribution of entrepreneurship between registered and unregistered businesses. Unfortunately, the GEM data does not tell us what types of firm are included in actual entrepreneurship. In other words how many of the actual businesses are registered, and hence appear in official statistics and how many are unregistered? Amongst the unregistered there are two categories, the first are those which are legal, but merely are too small to appear in official figures, and the second are those which are illegal. We also do not know from the GEM data how many are in these two categories because GEM follows individuals without considering the number of businesses they have. So, an individual in a heavily regulated economy [HR] may well choose to establish more businesses which are below the official registration threshold, whereas in a lightly regulated economy [LR], an individual may choose to establish a single business but one that is registered. GEM data may be useful to investigate these types of questions. However, for this the setup of the GEM survey would have to be modified. In particular, we would need to know how many businesses each entrepreneur has and also whether these businesses are registered or unregistered.

²⁷ This is not a surprising finding but it implies that, given that the preference for self-employment does not change over time, being self-employed is, at least partially, the expression of a genuine wish rather than an accident or a constrained choice (Grilo and Irigoyen, 2006).

²⁸ More precisely, Grilo and Irigoyen (2006) find that concerning administrative and financial obstacles, both perceptions play a significant negative role in self-employment status, over and above its indirect effect through preferences. They conclude that these results, combined with the ones obtained for latent entrepreneurship, indicate that administrative complexities hinder both the willingness to become self-employed and its materialisation in actual status having therefore both a direct and an indirect effect (through preferences) on actual entrepreneurship; while lack of financial support has only a direct effect on the fact of being self-employed but no significant impact on preferences. Using an entirely different model explaining various entrepreneurial engagement levels Grilo and Thurik (2005b) conclude that, relative to never having considered setting up a business, the odds of thinking about it or having thought and given up are not significantly affected by the perception of administrative complexities. However, the odds of other more active entrepreneurial positions such as being in the process of starting a business or actually having started one (whether active for less or longer than three years) are significantly negatively affected by a perception of administrative complexity. However, they establish that the perception of lack of financial support has no discriminative effect across the various levels of entrepreneurial engagement.

at the *micro* level as well. Whilst this seems reasonable it is not something we are able to test given the data currently at our disposal.

Notwithstanding these limitations, we feel the current paper is a valuable starting point for research on the impact of public policy measures on the extent and nature of entrepreneurship in different countries. So, whilst the current paper focuses on impediments, future research might combine this with data on the scale of direct and indirect assistance to SMEs by governments. This could provide insights into the relative importance of the different public policy frameworks identified by Dennis (2004): direct assistance versus impediments (see Figure 1). Nevertheless the clear message from the research, thus far, is that the height of the conventional measures of administrative entry barriers plays only a very modest role in explaining variations in enterprise.

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Appendix 1: Estimation sample

Table A1 lists the distribution of observations in our estimation sample over the countries. A country can have 4 observations maximum (for the years 2002-2005). It is also indicated whether the country is ranked as a poor country. In total we have 112 observations 26 of which are of poor countries.

Table A1 Estimation sample

Country	N	Poor country?	Country	N	Poor country?
Argentina	4	Y	Japan	3	
Australia	4		Jordan	1	Y
Belgium	4		Mexico	2	Y
Brazil	1	Y	Netherlands	4	
Canada	4		New Zealand	3	
Chile	3	Y	Norway	4	
China	2	Y	Poland	2	Y
Denmark	4		Portugal	1	
Ecuador	1	Y	Russia	1	Y
Finland	3		Singapore	4	
France	4		Slovenia	4	
Germany	4		South Africa	4	Y
Greece	1		Spain	4	
Hong Kong	3		Sweden	3	
Hungary	3	Y	Switzerland	3	
Iceland	4		Taiwan	1	
India	1	Y	Thailand	1	Y
Ireland	4		United States	4	
Israel	2		United Kingdom	4	
Italy	3				