



the Autonomous Management School of  
Ghent University and Katholieke Universiteit Leuven

**Vlerick Leuven Gent Working Paper Series 2005/15**

**NATIONAL INSTITUTIONS AND THE ALLOCATION OF ENTREPRENEURIAL  
EFFORT**

HARRY P. BOWEN

Harry.Bowen@vlerick.be

DIRK DE CLERCQ

**ANTECEDENTS OF INTERNATIONAL AND  
DOMESTIC LEARNING EFFORT**

HARRY P. BOWEN

Vlerick Leuven Gent Management School

DIRK DE CLERCQ

We thank seminar participants at the Second GEM Research Conference for helpful comments.

**Contact:**

Harry P. Bowen

Vlerick Leuven Gent Management School

Tel: +32 16 32 35 86

Fax: +32 16 32 35 80

Email:Harry.Bowen@vlerick.be

## **ABSTRACT**

This paper examines how the allocation of entrepreneurial effort within a country is influenced by the country's institutional environment. We hypothesize that the likelihood that entrepreneurs launch a growth-oriented start-up is associated with the institutional environment in which entrepreneurs are embedded. We test our hypothesis using data on 44 countries over the three-year period from 2002 to 2004. The data are drawn from two sources: the Global Entrepreneurship Monitor and the World Economic Forum's Executive Opinion Survey. Our findings indicate that the likelihood of a growth-oriented start-up is positively related to a country's level of human capital targeted at entrepreneurship and the level of regulatory protection, but is negatively related to the extent of corruption and mistrust in public officials.

JEL categories: D21; M13, O49.

Keywords: institutions, entrepreneurship, resource, allocation

## **NATIONAL INSTITUTIONS AND THE ALLOCATION OF ENTREPRENEURIAL EFFORT**

A considerable body of recent research (e.g., Brock & Evans, 1989; Gavron et al., 1998; Grilo & Thurik, 2004; Storey, 1999; Thurik & Wennekers, 2002) has sought to understand the factors that determine the supply of entrepreneurial activity, and hence the creation of new ventures. While the question of what determines the supply of entrepreneurial activity, and how such activity might be promoted, is clearly important to both academics and policymakers, much less attention has been given to the nature of entrepreneurial activity that is undertaken. But the type of entrepreneurial activity chosen is clearly important for the effect that such activity may have on an economy. For example, new businesses may stimulate job creation or otherwise contribute to economic growth,<sup>1</sup> or they may instead promote only the private interest of entrepreneurs with little or no positive effect at the national level (e.g., activities started only to evade excessive taxation). The question of what determines the allocation of entrepreneurial effort across alternative activities is therefore an important, but largely ignored, aspect of entrepreneurship and entrepreneurial activity.

Baumol (1990) was perhaps the first to note the importance of the allocation of entrepreneurial activity for assessing the contribution of such activity to an economy, and to distinguish it from the level of such activity. Baumol suggested that the determinants of the supply of entrepreneurial activity in a country are myriad, often serendipitous, and relatively constant. Hence, gaining an understanding of what determines the supply of entrepreneurial effort is, at best, a difficult task. Baumol instead argued that the allocation of entrepreneurial effort between different types of entrepreneurial activities is likely to be strongly influenced by a country's institutions since institutions can influence the payoffs from alternative activities. As such, the task of understanding what determines the distribution of entrepreneurial activity may not only be an easier issue to tackle, but understanding this issue may also afford greater insight into the potential contribution of entrepreneurial activity, and why this contribution may differ among countries.

Baumol (1990) argued that, due to the way a society is organized, nations can differ in their ability to create economic prosperity and in the extent to which entrepreneurial resources are allocated to productive versus unproductive activities (when viewed from the

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<sup>1</sup> A number of studies suggest that the level and growth in entrepreneurial activity is an important source for economic growth (Ericson & Pakes, 1995; Hopenhayn, 1992; Klepper, 1996; Thurik & Wennekers, 2004; Wennekers & Thurik, 1999).<sup>1</sup>

perspective of national welfare). Examining different historical episodes (e.g., Ancient Rome, China under the Sung Dynasty, and the U.K. in the Late Middle Ages), Baumol concluded that institutional elements appear central for explaining the allocation of entrepreneurial effort across different types of activities. In particular, he suggested that some countries, by misallocating entrepreneurial resources, might historically have shown a lack of sustained growth despite the occurrence of important entrepreneurial activity within their borders. For example, ancient China produced numerous inventions (e.g., gunpowder) but the benefit of these inventions was diminished by China fostering a bureaucratic, rather than a business enterprise, system.

From an economic point of view, an entrepreneur combines physical and human capital to produce a good or service with the expectation of creating private economic value. The type of activity where entrepreneurial effort is directed can therefore differ across entrepreneurs. However, if the incentive and payoff structure embedded in a nation's institutional environment exerts a common influence on entrepreneurs within a given country, then the institutional environment largely shapes the selection of one activity or another within national borders (Baumol, 1990). If so, then one would expect the choice of activities to vary systematically across countries due to difference in institutional environments.

In this study, we hypothesize that a country's institutional characteristics will affect the internal allocation of entrepreneurial effort and we specifically examine the extent to which countries differ in their capacity to generate growth-oriented activities. Due to an absence of adequate data that could capture Baumol's distinction between productive and unproductive activity, we choose to focus in this paper on two characteristics that can be used to describe growth-oriented (productive) start-ups: (1) activities that are expected to create a significant increase in employment, and (2) activities that are expected to involve a high degree of internationalization. Both types of activities (or goals) represent positive contributions to an economy and in this sense are productive activities.

Given this, we empirically investigate Baumol's thesis of a link between the allocation of entrepreneurial activity and a nation's institutional environment by examining the likelihood of each type of activity in relation to a set of institutional characteristics. Our analysis adopts a broad conceptualization of the term "institutions." Specifically, we consider both the presence of environmental *resources* relevant for entrepreneurial activity as well as the *rules* that govern the undertaking of such activities. In short, we seek to explain differences across countries in terms of an entrepreneur's choice to be engaged in a growth-

oriented start-up activity, and we posit that this choice is guided by the resources and rules embedded in the economy where that entrepreneur resides.

Our work draws on institutional theory in arguing that the allocation of entrepreneurial effort is related to environmental factors. Institutional theory posits that the environment in which individuals and firms operate affects their behavior (Bartholomew, 1997; North, 1990; Powell & DiMaggio, 1991; Scott, 1995). More broadly, our paper fits the literature that has looked at the effect of institutional factors on the outcomes of economic activity (e.g. Bartholomew, 1997; Hall & Jones, 1999; Sachs & Warner, 1995; Zaheer & Zaheer, 1997). According to this literature, there is an important link between national institutions and economic outcomes (King & Levine; 1993; Rajan & Zingales, 1998). Recently, Hall and Jones (1999) went so far to argue that most of the “unexplained” difference in income per capita between countries is explained by differences in institutions. In addition, research on the role of institutional regimes for the development and functioning of capital markets has shown that better functioning legal environments promote greater development of financial markets (La Porta et al., 1999; 2000).

Our paper makes several contributions. First, Baumol used historical examples to illustrate and support his thesis of a link between the institutional environment and the allocation of entrepreneurial effort. But neither he, nor to our knowledge any other researcher, has undertaken to subject Baumol’s thesis to a systematic and rigorous empirical test. Our empirical analysis conducts such a test.

Second, prior cross-country empirical work in the area of entrepreneurship has mainly focused on different factors that explain the *level* of entrepreneurial activity within a country, with attention devoted to the role of economic, political and psychological factors (e.g., Grilo & Thurik, 2004). Our analysis complements this body of research by examining the role of institutional factors in guiding the *nature*, rather than the level, of entrepreneurial activity, and adds to prior research efforts that seek a better understanding of how environmental factors affect entrepreneurship (Busenitz et al., 2000; Thomas & Mueller, 2000).

Third, our empirical analysis makes use of a unique panel database to assess the nature of entrepreneurial activity within and between countries. When comparing the level of entrepreneurial activity across countries, researchers are confronted with huge challenges. One challenge is a lack of consensus about the definition of the term “entrepreneurship,” with the definition used depending on the focus of the research (e.g. Bull & Willard, 1993; Lumpkin & Dess, 1996; OECD, 1998). Lacking a universally agreed set of indicators to measure entrepreneurship, the measurement and comparison of entrepreneurial activity for

different countries is a complex process (Grilo & Thurik, 2004). Our analysis compares countries in terms of their *start-up* activity, i.e. businesses that are in the process of being established or that have recently been established. The data derive from the direct questioning of people, in a standardized manner across countries, who are or have been involved in setting-up a business venture. Our data are therefore directly comparable across countries, and are not based on secondary sources that must, for example, attempt to reconcile differences in country-specific definitions.

## **HYPOTHESES**

Following Baumol (1990), we posit that a country's institutional characteristics influence the allocation of entrepreneurial effort across alternative activities. The specific types of activity we investigate are those we label as growth-oriented, and hence "productive." Regarding the institutional environment, we make a distinction between specific *resources* embedded in the institutional environment [i.e. (1) financial capital and (2) human capital], and the *rules* governing the undertaking of economic activities within the environment [i.e. (3) regulatory protection; (4) regulatory complexity, and (5) the level of corruption].

### **Financial capital**

It has been argued that one channel through which institutions can affect firm behavior is finance. Firms often need to raise external capital to finance their investment projects. However, since capital markets are not perfect firms may experience difficulties in obtaining external finance. Prior research has established an empirical link between a country's financial development and firm behavior within its borders. In particular, well-developed financial markets have been shown to make it easier for firms to attract external financing for their investment needs (Demirguç-Kunt & Maksimovic; 1998; Rajan & Zingales, 1998).

Individuals starting a business may be particularly vulnerable to financial constraints. Because their personal wealth is often limited, new or potential entrepreneurs require substantial outside financing. However, lack of collateral and no track record often makes it difficult for entrepreneurs to obtain external financing. This can result in new businesses starting with a suboptimal level of capital (Evans & Jovanovic, 1989) and may also force entrepreneurs to rely on high-cost sources of finance (Pissarides, 1998). The financial barriers

affecting entrepreneurs can include high costs of credit, relatively high bank charges and fees, high collateral requirements, and limited access to outside equity and venture capital; in particular, banks are often orientated to providing loans to insolvent large enterprises rather than to starting entrepreneurs. In addition, information asymmetry between borrowers and lenders means that lenders (e.g., banks) may be unable to determine the real value of a high-potential entrepreneurial project (Stiglitz & Weiss, 1981). It has also been found that, in some cases, entrepreneurs may be reluctant to access formal sources of outside equity capital because this external capital may dilute their control of the firm (Sahlman, 1990).

Financial constraints may also be particularly harmful to entrepreneurs who seek to grow their business. Various studies have shown that financial constraints often limit business investments aimed at high-growth activities (e.g., Himmelberg & Petersen 1994; Huang & Xu; Hubbard 1998; Qian & Xu; 1998). For example, Qian and Xu (1998) argued that financing regimes may function as a mechanism firms use to select the innovation projects that they undertake. Huang and Xu (1999) developed an endogenous growth model to show how financial institutions can affect growth via their selection to fund R&D oriented projects. Further, Beck et al. (2005) found a negative relationship between firms' financing obstacles and their growth, with this negative effect stronger for small firms than for large firms.

Prior evidence suggests that a greater availability of financial capital targeted at entrepreneurial ventures<sup>2</sup> can give a country's entrepreneurs more possibilities to engage in growth-oriented activities, and hence raise the likelihood of a growth-oriented start-up. We therefore expect a positive relationship between the availability of such risk capital within a country and the allocation of entrepreneurial effort towards growth-oriented activities.

*Hypothesis 1a: The likelihood of a job-creation start-up will be positively related to a country's level of financial capital (targeted at entrepreneurship).*

*Hypothesis 1b: The likelihood of an international start-up will be positively related to a country's level of financial capital (targeted at entrepreneurship).*

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<sup>2</sup> An important source of external financing for entrepreneur is risk capital provided by business angels (Mason & Harrison, 1996) and venture capitalists (Wright & Robbie, 1998).



## **Human capital**

Human capital refers to the knowledge and skills acquired by, and embedded in, individuals (Becker, 1975). An important source of human capital is individuals' formal education and training aimed at updating and renewing capabilities. Prior research suggests that human capital has important and beneficial effects at both the firm level (Gimeno et al., 1997) and the societal level (Coleman 1988). For example, Maskell and Malmberg (1999) argued that the overall stock of skills in a country affects where business activities are undertaken, and therefore influences the country's overall competitiveness. Cannon (2000) argued that human capital raises overall productivity at the societal level through its effect on where physical and intellectual efforts are invested. Prais (1995) examined how a country's education and training system may foster overall productivity and he noted the need to have the right balance of educational resources devoted to general academic issues and matters directly connected to professional life. Similarly, Dakhli and De Clercq (2004) showed that a country's level of human capital (which was partly based on citizens' educational attainment) is positively related to its level of innovation.

Given the importance of human capital at all levels of activity, we conjecture that a country's level of entrepreneurship-specific human capital (realized through the educational system) will influence the distribution of start-ups across particular types of activities. Our rationale for this relationship is that entrepreneurs likely have different endowments of entrepreneurial abilities based on their training or education. In addition, entrepreneurs are likely to have varying levels of "self-efficacy," i.e., confidence in their ability to successfully undertake growth-oriented activities (Bandura, 1978). At the country level, growth-oriented entrepreneurship may therefore be more likely when a country's educational system prepares its residents for an entrepreneurial oriented career, and entrepreneurs will be more inclined to choose growth-oriented activities if they believe to have the knowledge base required to be successful (Chen et al., 1998).

Our rationale for a link between human capital targeted at entrepreneurship and the allocation of entrepreneurial effort is also consistent with human capital theory, which states that the more specific an investment is to its intended use, the higher the expected return (Becker, 1975). Hence, a high expected return to investments in specific knowledge (e.g. a country's investment in high-level entrepreneurship education) is likely to influence the

choice of business activity (e.g. growth-oriented entrepreneurship).<sup>3</sup> We therefore hypothesize a positive relationship between the allocation of entrepreneurial effort towards growth-oriented activities and a country's level of entrepreneurship-specific human capital (realized through the educational system).

*Hypothesis 2a: The likelihood of a job-creation start-up will be positively related to a country's level of human capital (targeted at entrepreneurship)*

*Hypothesis 2b: The likelihood of an international start-up will be positively related to a country's level of human capital (targeted at entrepreneurship)*

The previous paragraphs focused on the role of specific *resources* in the institutional environment (i.e. financial capital and human capital targeted at entrepreneurship) as influences on the allocation of entrepreneurial effort. Below we consider also the importance of alternative aspects of a country's institutional framework for explaining the allocation of entrepreneurial effort.

### **Regulatory protection**

It has been argued that property rights are one distinct channel through which institutional variables impact economic outcomes (Johnson et al., 2002). The nature of a country's property rights influences the choice of activities in which investments are made (Knack & Keefer, 1995), and protection of private property rights is a prerequisite for sustained economic growth. (Baumol, 2002; Mokyr, 1990; Rosenberg & Birdzell, 1986). An important aspect of a nation's regulatory environment is therefore the extent to which it protects intellectual property.

We conjecture that one mechanism through which regulatory protection of property rights affects a country's economic outcomes is its influence on *where* entrepreneurs put their effort. More specifically, we hypothesize a positive relationship between a country's level of regulatory protection and the allocation of entrepreneurial effort towards growth-oriented activities. Our reasoning is in line with prior empirical studies. For instance, Kumar et al.

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<sup>3</sup> Prior research has distinguished between general human capital and specific human capital (Florin et al., 2003). General human capital pertains to skills that are applicable to a broad range of activities; specific human capital pertains to skills relevant to particular activities, e.g., growth-oriented entrepreneurship.

(2002) found that the average size of firms is larger in countries that protect property rights through patents. Also, Johnson et. al. (2002) found that entrepreneurs make investments of their profits at lower rates in countries with weaker property rights. Similarly, Claessens and Laeven (2003) found that the growth of industries that rely on intangible assets is disproportionately lower in countries with weak intellectual property rights. Baumol (1990) also described the importance of regulatory protection for the allocation of entrepreneurial effort across activities. More specifically, Baumol gave a historical account of why in some societies (e.g. ancient China) growth through entrepreneurial activities may not have been feasible given a lack of property rights and the absence of strong enforceability of contracts.

We conjecture that growth-oriented entrepreneurial activities require an institutional environment in which entrepreneurs can have confidence that their accomplishments and contracts will be respected and protected (Baumol, 1990). When property rights are respected, arbitrary confiscation of physical assets is difficult, and entrepreneurs will be encouraged to invest in expansion activities. When there is uncertainty regarding the enforceability of contracts, or the protection of intellectual property, entrepreneurs will be discouraged to engage in growth-oriented activities. We therefore hypothesize a positive relationship between a country's level of regulatory protection and the allocation of entrepreneurial effort towards growth-oriented activities.

*Hypothesis 3a: The likelihood of a job-creation start-up will be positively related to a country's level of regulatory protection.*

*Hypothesis 3b: The likelihood of an international start-up will be positively related to a country's level of regulatory protection.*

### **Regulatory complexity**

Another institutional aspect we consider is the *complexity* of a country's regulations. Regulatory complexity refers to the paperwork and administrative formalities that entrepreneurs must confront (OECD, 2001). Prior research suggests that such complexity presents an extra hurdle for people considering an entrepreneurial career, particularly in developed countries. For example, Grilo and Thurik (2004) showed that individuals' perception of administrative complexities reduces the likelihood of starting a business. Based on such research, we conjecture that regulatory complexity may also have an important effect

on entrepreneurs' orientation toward starting a growth-oriented venture. Specifically, we hypothesize that a country's level of regulatory complexity will exert a negative influence on the allocation of entrepreneurial effort towards growth-oriented activities.

Baumol (1990) argued that excessive constraints on entrepreneurs may reduce their propensity to engage in productive activities. Empirically, it has been found that an important factor limiting the rise of biotechnology in Germany is the existence of government restrictions and administrative burdens that limit not only the number, but also the *growth*, of biotechnology firms (Krauss & Stahlecker, 2001). Similarly, Bartholomew (1997) found that national patterns in the biotechnology industry were related to the configuration of countries' institutional characteristics, such as the ease with which technology can be diffused.

Over-regulation may also provide an incentive for growth-oriented entrepreneurs to evade regulations (which leads to the flourishing of the grey economy), or to devote resources to influencing the regulatory environment in their own favor. These activities may not be beneficial, however, for the entrepreneur's long-term success, and can ultimately be detrimental to a country's overall welfare (Baumol 1990). More specifically, the uncertainty surrounding the unofficial institutions of the grey economy, and the uncertain effects of interest groups lobbying to influence regulatory outcomes, may reduce productive investments and slow growth.

Increased government rules and laws (Epstein, 1995; OECD, 2001) are an important concern for many (in particular) developed countries. While an environment conducive to high-potential entrepreneurship requires stable rules, an expansion in the number of rules may at some point yield diminishing returns in terms of growth-oriented activities. Complex rules and regulations can be especially hard on new ventures with strong growth ambitions (Baumol, 1990). For example, an entrepreneur motivated to grow by hiring extra employees or by seeking funding of foreign expansion activities, may be confronted with excessive administration burdens. Ultimately, the presence of complex rules and administrative procedures may produce a counterproductive result for entrepreneurs wishing to expand their activity. At the country level, we would therefore expect a negative relationship between the level of regulatory complexity and the allocation of entrepreneurial effort towards growth-oriented activities.

*Hypothesis 4a: The likelihood of a job-creation start-up will be negatively related to a country's level of regulatory complexity.*

*Hypothesis 4b: The likelihood of an international start-up will be negatively related to a country's level of regulatory complexity.*

## **Corruption**

The level of corruption in business transactions (i.e. the misuse of public power for private benefits, such as bribing of public officials or biased allocations of public funds) can also be expected to influence the allocation of entrepreneurial effort. Prior research shows that the prevalence of corruption affects the nature of investments undertaken within a country and consequently a country's overall level of economic prosperity (Knack & Keefer; 1995). Higher levels of bribery and corruption have been found to adversely influence the development of a country's financial infrastructure (La Porta et al., 1999), and to reduce the growth of new firms due to increased uncertainty related to undertaking business activities (Schleifer & Vishny, 1993). Outright corruption, and a lack of trust in public institutions, has also been found to be associated with lower productivity and lower output growth (Sachs & Warner, 1995).

We hypothesize that the allocation of entrepreneurial effort towards growth-oriented activities will be negatively related to the extent of corruption within a country. This relationship reflects that higher levels of corruption introduce uncertainty and complexity into the business environment, and make it more difficult for new companies with strong growth ambitions to develop. In particular, when corruption and unfair procedures are common in interactions with public officials, entrepreneurs may be discouraged to engage in risky growth-oriented activities as they may face arbitrary government policies that change frequently and unpredictably (Baumol, 1990). In addition, the potential for greater rewards from activities with high growth potential may mean greater exposure to corrupt practices that can limit such rewards, and therefore reduce the rate of return, and increase the risk of engaging in such activities. We would therefore expect that the higher is the extent of corruption and mistrust of public officials, the less attractive would be the choice to develop a high-growth activity, and hence the lower would be the likelihood of high-growth activity start-ups.

*Hypothesis 5a: The likelihood of a job-creation start-up will be negatively related to a country's level of corruption.*

*Hypothesis 5b: The likelihood of an international start-up will be negatively related to a country's level of corruption.*

## METHODOLOGY

### Model and Estimation

We model the likelihood that entrepreneurs in a given country will select a given type of growth-oriented activity (i.e., job creation or international) conditional on their country's institutional environment. The specific form of the model used is the common Logit specification. This specification was adopted for several reasons. First, our dependent variables are the proportion of a given type of start-up among all start-ups within a given country in a given year. As this proportion can be interpreted as the probability (or likelihood) that the given type of activity is chosen, a probability model is warranted. Second, since values of our dependent variables lie between zero and unity, the use of ordinary least squares regression would yield biased and inconsistent parameter estimates and is therefore inappropriate (Bowen & Wiersema, 2004). Since our dependent variables are the observed proportion of a given type of activity in a given country and year, and not data on the individual response (action) of each entrepreneur, we estimate a "grouped data" model.<sup>4</sup> In this setting, model parameters are estimated using the method of Maximum Likelihood, and we use "robust standard errors" when conducting tests of the significance of an estimated coefficient (Greene, 2004). Finally, to facilitate the comparison of results, all explanatory variables were standardized to have mean zero and variance equal to unity prior to estimation.

### Data Sources

Our database comprises a panel of forty-four countries in each of three years (2002, 2003 and 2004). Due to missing data on one or more variables, the data set used for estimation contains 83 observations for job-creation start-ups and 84 observations for international start-ups.<sup>5</sup> With one exception (our measure of corruption), the data for this

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<sup>4</sup> That is, our data only indicate the frequency of a particular type of start-up activity within a country and not the "yes" or "no" choice at the level of an individual entrepreneur in that country. Having this individual level data would allow for a much richer, and potentially more robust, analysis.

<sup>5</sup> The sample of countries comprises Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Croatia, Denmark, Ecuador, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Ireland, Israel,

study were derived from the responses to the *Adult Population Survey* and the *Expert Questionnaire* conducted as part of the Global Entrepreneurship Monitor (GEM). The data for our measure of corruption were derived from the responses to the *Executive Opinion Survey* (EOS) conducted by the World Economic Forum (WEF); the results of this survey are reported annually in the WEF's *World Competitiveness Report*.

Annual data on the allocation of entrepreneurial effort were drawn from GEM's *Adult Population Survey*. This survey is conducted, in each country, by private market survey firms based on a representative sample of adults (i.e., 18-64 year olds). Telephone interviews (or in a few countries, face-to-face interviews) are conducted using a standardized questionnaire translated from English into the native language(s) of a country. More than 300,000 individuals responded to the survey. These individual responses were then aggregated in order to come up with country-level data on entrepreneurship rates.

Annual data on country institutional characteristics (except for the measure of corruption) were derived from information collected by GEM's *Expert Questionnaire* which elicits responses by "country experts" (i.e., individuals with knowledge of entrepreneurship resulting from their experiences) who fall into one of two categories: professionals and entrepreneurs. *Professionals* include venture capitalists, academics, bankers, consultants, politicians and other people who are involved in entrepreneurial ventures in addition to their full-time professional activity. *Entrepreneurs* are individuals with a history of practical entrepreneurial activity in their country (e.g., founders of companies, or people who work in areas related to company development). A minimum of 36 experts in each country responded annually to the questionnaire. The *Expert Survey* is unique in that it assesses the institutional environment for entrepreneurship on the basis of standardized questions and measured scales across a large number of countries.<sup>6</sup>

Annual data on the extent of corruption in a country were derived from responses to questions asked on the World Economic Forum (WEF) annual *Executive Opinion Survey* (EOS). The EOS is administered in over 80 countries by WEF Partner Institutes (usually academic institutions) under the guidance of the WEF. The EOS is targeted at CEOs of companies that operate within a given country. The firms surveyed typically employ more

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Italy, Japan, Jordan, Korea, Mexico, Netherlands, New Zealand, Norway, Peru, Poland, Portugal, Russia, Singapore, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Uganda, United Kingdom, United States, and Venezuela.

<sup>6</sup> As discussed below, we assessed the validity of responses to questions on the *Expert Questionnaire* by comparing them to responses to similar questions on the WEF's *Executive Opinion Survey*.

that 100 persons, and are randomly selected based on a stratification of firms into primary, secondary and tertiary sectors that represents the contribution of each sector to a particular country's total value added (i.e., gross domestic product). The sample comprises domestically owned firms and foreign owned affiliates operating in a country's domestic market. The total annual number of respondents typically exceeds 7,000, with varying number of respondents per country. Further information on the characteristics of the survey, and the survey respondents, is provided in each issue of the WEF's *World Competitiveness Report* (World Economic Forum, various years).

## Measures

*Proportion of job-creation start-ups:* For each country, the proportion of job-creation start-ups is measured as the fraction of individuals who, in the year surveyed, were involved in setting up a venture (i.e., nascent entrepreneurs) or had recently set up a venture (i.e. new firm entrepreneurs),<sup>7</sup> and who indicated that they expected their firm would employ 20 or more people within five years. More specifically, this variable is calculated as the ratio of a country's rate of job creation start-ups divided by the country's total start-up rate.

*Proportion of international start-ups:* For each country, the proportion of international start-ups is measured as the fraction of a country's nascent or new firm entrepreneurs who, when asked what proportion of their customers would live outside their country (for nascent entrepreneurs) or lived outside their country (for new firm entrepreneurs), responded that at least 50% of their customers would be (or were) living abroad. This variable is measured as the ratio of a country's rate of international start-ups divided by the country's total start-up rate.

*Financial capital:* A country's level of financial capital (targeted at entrepreneurship) is measured by aggregating the scores (on a five-point Likert scale) of six questions on the GEM's Expert Questionnaire. The questions concerned the overall quality of the financial environment for entrepreneurs (e.g. "In my country there is sufficient equity funding available for new and growing firms") as well as the availability of specific financial instruments related to entrepreneurial activity (e.g. "In my country, there is sufficient venture

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<sup>7</sup> An individual was considered as a nascent entrepreneur if he or she (1) had taken action to create a new business in the past year, (2) expected to participate in the ownership of the new firm, and (3) had not yet paid salaries or wages for more than three months. An individual was considered as a new firm entrepreneur if he or she (1) was actively involved in the management of the firm, (2) participated in the ownership of the firm, and (3) had paid salaries for more than three months but less than 42 months.



capitalist funding available for new and growing firms”). The exact questions are listed in the Appendix. This construct evidenced good reliability over the years (e.g. in 2004 its alpha coefficient equaled 0.81). To further validate this measure, we calculated its correlation with the following question asked in the WEF’s Executive Opinion Survey: “Entrepreneurs with innovative but risky projects can generally find venture capital in my country.” A positive correlation of .70 ( $p < .001$ ) was obtained.

*Human capital:* A country’s level of human capital targeted at entrepreneurship is measured by aggregating the scores of three questions on the GEM Expert Questionnaire. These questions ask about the quality of a country’s higher educational system; the specific questions are listed in the Appendix. This construct also evidenced good reliability over the years (e.g. in 2004 its alpha coefficient equaled 0.77). To further validate this measure, we calculated its correlation with the following question asked in the WEF’s Executive Opinion Survey: “Scientific research institutions in my country, such as university and government laboratories, are the best in their fields.” We found a positive correlation of .30 ( $p < .01$ ).

*Regulatory protection:* A country’s level of regulatory protection is measured by aggregating the scores of five questions on the GEM Expert Questionnaire. These questions concern the protection of intellectual property rights and the respect for patents, trademarks, etc. (e.g. “In my country the Intellectual Property Rights legislation is efficiently enforced”). The exact questions are listed in the Appendix. This construct evidenced good reliability over the years (e.g. in 2004 its alpha coefficient equaled 0.87). To further validate this measure, we calculated its correlation with the following question asked in the WEF’s Executive Opinion Survey: “Intellectual property protection in my country is equal to the world’s most stringent.” A positive correlation of .79 ( $p < .001$ ) was obtained.

*Regulatory complexity:* A country’s level of regulatory complexity is measured by aggregating the scores of four questions on the GEM Expert Questionnaire. These questions concern the ease of getting licenses, the tax system, and the overall effectiveness of government policy measures (e.g. “In my country, taxes and other government regulations are applied to new and growing firms in a predictable and consistent way”). The exact questions are listed in the Appendix. Since these questions were worded in terms of the “simplicity” of the regulatory system, we reverse coded the responses (by subtracting the scores from “six”) in order to indicate regulatory complexity. This construct also evidenced good reliability over the years (e.g. in 2004 its alpha coefficient equaled 0.70). To further validate this measure, we calculated its correlation with the following question asked in the

WEF's Executive Opinion Survey: "Starting a new business in my country is generally extremely difficult." A positive correlation of .61 ( $p < .001$ ) was obtained.

*Corruption:* A country's level of corruption is measured by aggregating the scores (on a seven-point Likert scale) of nine questions on the WEF's Executive Opinion Survey. These questions concern the extent of corrupt business practices and level of trust in public officials. The exact questions are listed in the Appendix. Since these questions were worded in terms of the absence of corruption, we reverse coded the responses (by subtracting the scores from "eight") so that a higher value of the index indicates a higher level of corruption. This construct evidenced good reliability over the years (e.g. in 2004 its alpha coefficient equaled 0.96).

Finally, we use the level of a country's real Gross Domestic Product per capita (measured in constant \$US) to control for cross-country variation, and a set of time dummy variables (one for each year) to control for variation over time in the dependent variable(s) that is not captured by the included variables.

## RESULTS

Tables 1a and 1b show summary statistics and bivariate correlation coefficients for the job-creation and international start-up samples. Inspection of the correlations indicates a significant association in the direction hypothesized between each dependent variable and each of the five independent variables. More specifically, the proportion of job-creation start-ups and the proportion of international start-ups are each positively correlated with the level of financial capital, human capital, and regulatory protection, and negatively correlated with the level of regulatory complexity and the extent of corruption. These simple correlations offer preliminary evidence that the allocation of entrepreneurial effort within a country is related to these institutional factors, and in the hypothesized direction.

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Insert Tables 1a and 1b about here

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Table 2 shows results of estimating the Logit model for each dependent variable. The first two columns report the results for the "proportion of job-creation start-ups," and the last two columns report the results for the "proportion of international start-ups." Two results are

shown for each independent variable: its estimated coefficient and its “odds ratio.”<sup>8</sup> A variable’s odds ratio indicates how a unit change in that variable would change the odds favoring the choice represented by a given dependent variable, with values below unity indicating a decline in the odds in favor of a given type of start-up. These odds ratios are directly comparable across variables, similar to comparing beta coefficients in a standard regression framework (Bowen & Wiersema, 2004). The institutional variables (and control variables) are jointly significant for explaining the allocation of entrepreneurial effort, as indicated by the strong significance ( $p < 0.001$ ), for each model, of the “Model Chi-square” statistic. The “pseudo-R<sup>2</sup>” values reported in Table 2 are discussed at the end of this section.

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Insert Table 2 about here

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Table 2 indicates that, contrary to Hypotheses 1 and 4, neither financial capital (targeted at entrepreneurs) nor regulatory complexity exert a significant influence on the likelihood of choosing either a job-creation start-up or an international start-up. In contrast, Table 2 indicates strong support for Hypotheses 2a and 2b, that the likelihood of a job-creation start-up or an international start-up is positively related to a country’s level of human capital (targeted at entrepreneurship education). Table 2 also indicates strong support for Hypotheses 3a and 3b, that the likelihood of a job-creation start-up or an international start-up is positively associated with a country’s degree of regulatory protection. Finally, Table 2 indicates strong support for Hypotheses 5a and 5b, that the likelihood of a job-creation start-up or an international start-up is negatively related to the extent of corruption and mistrust in public officials.

For the human capital variable, the odds ratio indicates that a higher level of human capital impacts more the odds of an international start-up than the odds of a job-creation start-up. Specifically, a unit increase in human capital directed towards entrepreneurship raises the odds in favor of a job creation start-up by 4.4% and raises the odds in favor of an international start-up by 16.1% Higher regulatory protection has an almost equal impact on the odds in favor of each type of activity. Higher levels of corruption impact more the odds in favor of an international start-up than the odds in favor of a job creation start-up. In

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<sup>8</sup> The marginal effect for each variable was also calculated but is not reported since our hypotheses concern only the directional influence for a variable, not the magnitude of its effect on the dependent variable (Bowen & Wiersema, 2004).

particular, a unit increase in the corruption variable reduces the odds of choosing an international start-up by 30.8% (= 100 – 69.2) and reduces the odds of choosing a job creation start-up by 17.8% (= 100 – 82.2).

Table 2 indicates that the control variable, real gross domestic product per capita, is significant and negatively related to the likelihood of entrepreneurial effort being allocated to either type of start-up. The particularly strong negative relationship between a country’s GDP and the proportion of international start-up activity could be explained by the fact that lower GDPs reflect less potential for start-ups to generate revenues within their domestic market. Finally, the time dummy variables are generally significant for each type of start-up activity, and the values for job-creation start-ups suggest a trend decline in this variable over the sample period, potentially reflecting overall deteriorating economic conditions in the environment in which the start-ups operate.

To assess the “goodness of fit” of each model<sup>9</sup> we examined the extent to which each model is able to predict the actual proportion of start-ups across countries relative to using only the sample mean of the dependent variable as a “naive” predictor of this proportion. In this regard, Table 2 reports a slightly modified version of Efron’s pseudo R-square proposed for limited dependent variable models.<sup>10</sup> The values shown for this pseudo-R-square indicate a higher degree of fit for job creation start-ups than for international start-ups. The predictive ability of the model for a job creation start-up is about 43% better (in terms of reduced variance in prediction errors) than the naive predictor (i.e., the sample mean) while the predictive ability of the model for international start-ups improves on the naive predictor by about 26%.

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Insert Figures 1 and 2 about here

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<sup>9</sup> The concept of “goodness of fit” is problematic for model’s estimated using the method of maximum likelihood since the estimates obtained from this method are not based on “minimizing” any quantity, and in particular, not the squared deviations in model residuals as does the least squares method (Greene, 2004).

<sup>10</sup> Efron’s original version was based on ungrouped (individual response) data. Here we compute Efron’s pseudo

R-square as  $\left[ 1 - \frac{\sum_{i=1}^N (p_i - \hat{p}_i)^2}{\sum_{i=1}^N (p_i - \bar{p})^2} \right]$ , where  $p_i$  is the actual proportion of a given type of start-up in

country  $i$ ,  $\hat{p}_i$  is the predicted proportion for country  $i$ . This measure is similar to the R-square in linear regression in that it measures one minus the ratio of an error sum of squares relative to a total sum of squares. However, the correspondence is not exact since the expected mean function in the Logit specification is a nonlinear function of the variables so a linear decomposition of total variance is not possible. This means that values of the pseudo R-square can lie outside the 0-1 interval (Greene, 2004). Nonetheless, pseudo R-square values closer to one are indicative of a “good fit” since it implies a lower variance of prediction errors.

Figures 1 and 2 further examine the predictive “fit” of each model by showing the actual versus predicted proportion for each type of start-up. In each Figure, a text label indicates the country corresponding to a given data point. For a job creation start-up, Figure 1 indicates reasonable clustering of the predicted proportions around the 45° (perfect fit) line. However, it can be noticed in Figure 1 that the model for job creation start-ups tends to have large under-predictions (points are below 45° line) for countries with relatively high actual proportion of this type of start-up (e.g., China, Hong Kong, Iceland, Israel and Taiwan), and it tends to have large over-predictions of this proportion (points are above 45° line) for countries having an intermediate proportion of job creation start-ups. For an international start-up, Figure 2 indicates a similar pattern of over- and under-prediction, where again the extent of under-prediction varies positively with the actual proportion of international start-ups.

## DISCUSSION

This study has investigated empirically the hypothesis that the nature of an economy’s institutions, in terms of resources and rules, influences the allocation of entrepreneurial effort toward growth-oriented activities. In addressing this hypothesis, and assessing its empirical validity, our analysis both complements and extends recent research that only considers the role of institutions in influencing the *level* of entrepreneurial effort. Overall, our findings support Baumol’s (1990) thesis that the allocation of entrepreneurial activity across alternative activities within a country is strongly influenced by institutional factors, and more specifically, the way in which society is organized in terms of its resources and rules with respect to entrepreneurial activity.

Strong support was found for the hypothesis that the allocation of entrepreneurial effort toward growth-oriented activities is positively related to both a country’s level of *human capital* (targeted at entrepreneurship) and its level of *regulatory protection*. Strong support was also found for the hypothesis that the allocation of entrepreneurial effort toward growth-oriented activities is negatively related to a country’s *level of corruption*. No significant relationship was found between the allocation of entrepreneurial activity and the level of *financial capital* (targeted at entrepreneurship), nor between the allocation of entrepreneurial activity and the level of *government complexity*. We now discuss these findings in more depth.

Our finding of a positive effect for *human capital* indicates that attention given to entrepreneurship-related issues within a country's higher educational system does influence the choices that entrepreneurs make in terms of their involvement in job creation and internationalization activities. Our conjecture was that entrepreneurs are more likely to opt for growth-oriented activities if they are confident that they have the capabilities and background needed for success in such activities (Chen et al., 1998). The results in Table 2 (i.e. odds ratios) show that the positive effect of human capital is particularly strong in promoting international start-ups, that is, countries in which individuals are better prepared for a career as an entrepreneur are more likely to generate start-ups with a strong international focus. From a practical perspective, this finding suggests that countries are more likely to benefit economically if their young adults are prepared educationally to start a venture with strong growth ambitions. Our finding that the quality of a country's entrepreneurship education is related to the *nature* of its citizens' entrepreneurial efforts suggests that entrepreneurship education should not only create an awareness of a career as an entrepreneur, but should also focus on preparing individuals to detect and exploit high-growth opportunities. Educational experiences that teach individuals to jump hurdles and to set ambitious goals can help these individuals to further develop these capabilities later in their career, and ultimately to become growth-driven entrepreneurs.

Second, our finding of a positive relationship between the level of *regulatory protection* and the allocation of entrepreneurial efforts towards job creation and internationalization supports the thesis that growth-oriented entrepreneurship will benefit from an institutional environment in which individuals' activities and contracts are respected and protected (Baumol, 1990). Countries where the level of regulatory protection is low may be more likely to see their entrepreneurial activities diverted towards more short-term and less productive undertakings because entrepreneurs fear that third parties will expropriate their ideas. An effective legal framework may also be important for high-potential entrepreneurial activity because property rights – and the conditions of their application – affect the compensation for entrepreneurial endeavors (Kumar et al., 2002). From a practical perspective, the establishment of a regulatory framework that encourages growth-oriented entrepreneurship, and implementing such a framework, can be two different issues. Countries with a short history of legal protection mechanisms may confront barriers to regulatory transition (i.e. political and cultural) and high resistance to change (Baumol, 1990). Moreover, regulations that are effective in one country may fail in other countries because a regulatory framework also operates in a cultural context, which shapes how individuals

within that context make decisions (Powell & DiMaggio, 1991). Our finding indicates, however, that countries' continuing efforts to establish rules that protect intellectual property may pay off in the long run by influencing where entrepreneurs put their efforts.

Third, our finding of a negative relationship between the level of *corruption* and growth-oriented entrepreneurship provides further confirmation that the institutional environment matters for economic behavior and hence economic outcomes. Countries characterized by unfair interventions by government officials, or bribery in the allocation of subsidies, may create high levels of uncertainty that discourage entrepreneurs with strong growth ambitions (Baumol, 1990). In addition, growth-oriented activities may be perceived as highly risky in countries with high levels of corruption because successful endeavors may be more likely to be subject to unfair practices initiated by competitors. The results in Table 2 (i.e. odds ratios) indicate that the negative effect of corruption is particularly strong for international start-ups. This suggests that a corrupt domestic environment has an adverse spillover effect that discourages entrepreneurs from undertaking internationally oriented ventures.

Fourth, our findings did not support the prediction of a positive relationship between the level of financial capital (targeted at entrepreneurship) and the allocation of a country's entrepreneurial efforts to growth-oriented activities. This finding is contrary to prior research that suggests that well-developed financial institutions influence growth-oriented activities through a natural selection for high-potential projects and activities (Huang & Xu, 1999). Since financial constraints may be particularly detrimental to entrepreneurs planning to grow their enterprise, we expected that countries with a wide availability of risk capital (e.g. formal venture capital and business angels) would be characterized by a higher proportion of growth-oriented start-ups. Despite the positive correlation between "financial capital" and job creation, and between "financial capital" and internationalization (Tables 1a and 1b), no effect was found for the level of financial capital directed at growth-oriented entrepreneurship once other institutional factors are taken into account (Table 2). One explanation for this finding may be that the level of such financial resources is important for the level of start-up activity but not for the type of start-up activity selected. That is, given the lack of legitimacy for individuals considering a new venture (Stinchcombe, 1965), the availability of financial capital targeted at entrepreneurship may be more important for the decision whether or not to launch a venture. The nature of the start-up activities may instead be influenced more by an entrepreneur's personal ambitions and strategic choices (Child, 1972; Wiklund et al., 2003), and as our findings indicate, by other aspects of a nation's institutions.

Fifth, our findings indicate no significant relationship between the level of *regulation complexity* and the allocation of entrepreneurial toward growth-oriented activities. Although a negative simple correlation was found between the level of complexity and each dependent variable (Tables 1a and 1b), no significant effect was found once the influence of other institutional variables was taken into account (Table 2). We had reasoned that complex regulations within a country would be a disincentive for entrepreneurs to undertake growth-oriented activities since complex regulations increase the anticipated difficulty to grow a venture (Krauss & Stahlecker, 2001). Like our finding for the level of *financial capital*, an explanation for the lack of influence of the complexity variable may reflect that it primarily impacts on the decision of whether to start a company rather than on the type of start-up that is created. That is, once the decision to launch a venture is taken, entrepreneurs with strong growth ambitions may pursue their goal irrespective of potential administrative complexities or tax burdens (Wiklund et al., 2003).

While we believe that our study provides important insights into the question of what determines the allocation of entrepreneurial effort across alternative activities, we are aware that the study contains limitations, but that these limitations also open new avenues for further research. First, our analysis has been largely static, in that the relationship examined between our dependent and independent variables used the levels of the variables in the same year. Hence, some caution may be warranted when attempting to draw causal inferences. Future research should therefore attempt to incorporate dynamic elements into the relationship (lagged variables, or an examination of changes). This will require a longer panel (i.e., more time periods) than was used in the present study.

Second, our analysis has been conducted at the level of a nation. However, prior research has pointed out that differences in *regional* institutional factors may lead to differences in the economic value generated across regions within a country (e.g., Putnam, 1993). Future research could therefore examine the interplay between country and regional level factors for the allocation of entrepreneurial efforts toward growth-oriented activities, and determine which level (country or region) may be more influential for explaining the allocation of entrepreneurial effort.

Third, we examined the separate influence of several institutional factors on the allocation of entrepreneurial effort, but we may have neglected potentially important interaction effects among our constructs. For example, prior research has examined the role of institutional factors for the development and functioning of capital markets (e.g. La Porta, et al., 2000). This research indicated that better functioning legal environments promote



greater development of financial markets. Therefore, it would be interesting to examine, e.g. the potential interaction between a country's regulatory characteristics and its financial development on the one hand, and the type of start-ups created within its borders on the other.

Finally, we note two statistical issues concerning our analysis. First, we did not take account of potentially unmeasured sources of heterogeneity among countries. In a panel data setting, such unmeasured sources of heterogeneity would be modeled using country-specific dummy variables. Our use of the Logit specification precluded this type of analysis on statistical grounds (Greene, 2004). We could instead have used a Probit specification and modeled heterogeneity across countries using a "random effects" specification. However, the "random effects" specification requires one to assume independence between included and excluded (unmeasured) variables (Greene, 2004); we were not prepared to make this assumption. Second, the choices represented our dependent variables are not mutually exclusive, that is, an entrepreneur can undertake a job creation start-up that is also internationally oriented (and vice-versa). While this does not invalidate our analysis, future research would benefit by having a set of choices that are mutually exclusive. This would allow for a wider range of analysis (e.g., a multinomial analysis across several choices), and would also open the possibility for including respondent-specific data (e.g., a person's level of education) along with the data on the respondent's country.

In conclusion, this study contributes to the economics literature in general, and the entrepreneurship literature in particular, by providing an empirical test of Baumol's thesis that a country's institutional characteristics will significantly influence the allocation of entrepreneurial efforts. We hope that our study can serve as a stepping-stone to further investigation of the fundamental mechanisms by which a nation's institutional environment determines the allocation of entrepreneurial efforts, and hence also the contribution of such efforts to economic growth.

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**TABLE 1A:****Summary Statistics and Correlations: Job Creation Start-ups**

|  | Mean      | S.D.      | Min     | Max       | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
|--|-----------|-----------|---------|-----------|--------|--------|--------|--------|--------|--------|
| (1) Proportion of job-creation start-ups | 0.143     | 0.078     | 0.010   | 0.370     |        |        |        |        |        |        |
| (2) Financial capital                    | 2.704     | 0.481     | 1.590   | 3.880     | 0.281  |        |        |        |        |        |
| (3) Human capital                        | 2.798     | 0.370     | 1.890   | 3.810     | 0.267  | 0.356  |        |        |        |        |
| (4) Regulatory protection                | 3.168     | 0.633     | 1.880   | 4.480     | 0.224  | 0.623  | 0.354  |        |        |        |
| (5) Regulatory complexity                | 3.600     | 0.696     | 1.670   | 4.680     | -0.248 | -0.377 | -0.310 | -0.531 |        |        |
| (6) Corruption                           | 2.068     | 0.844     | 0.700   | 4.180     | -0.321 | -0.555 | -0.277 | -0.827 | 0.571  |        |
| (7) GDP per capita (real)                | 20565.947 | 13143.837 | 236.500 | 47315.602 | -0.017 | 0.409  | 0.102  | 0.707  | -0.384 | -0.714 |

Obs. = 83. Correlations whose absolute value exceeds 0.216 are significantly different from zero at the 5% level.



**TABLE 1B:****Summary Statistics and Correlations: International Start-ups**

|   | Mean      | S.D.      | Min     | Max       | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
|---|-----------|-----------|---------|-----------|--------|--------|--------|--------|--------|--------|
| (1) Proportion of international start-ups | 0.106     | 0.057     | 0.000   | 0.260     |        |        |        |        |        |        |
| (2) Financial capital                     | 2.701     | 0.483     | 1.590   | 3.880     | 0.435  |        |        |        |        |        |
| (3) Human capital                         | 2.803     | 0.360     | 1.890   | 3.810     | 0.416  | 0.357  |        |        |        |        |
| (4) Regulatory protection                 | 3.173     | 0.635     | 1.880   | 4.480     | 0.529  | 0.632  | 0.342  |        |        |        |
| (5) Regulatory complexity                 | 3.583     | 0.691     | 1.670   | 4.680     | -0.356 | -0.387 | -0.298 | -0.535 |        |        |
| (6) Corruption                            | 2.051     | 0.847     | 0.700   | 4.180     | -0.488 | -0.562 | -0.282 | -0.833 | 0.579  |        |
| (7) GDP per capita (real)                 | 20810.911 | 12949.879 | 236.500 | 47315.602 | 0.313  | 0.417  | 0.150  | 0.724  | -0.397 | -0.714 |

Obs = 84. Correlations whose absolute value exceeds 0.215 are significantly different from zero at the 5% level.

**TABLE 2:**

**Logit Results for Growth-Oriented Start-ups**

| Variable (Hypothesis)                 | Job-creation start-up    |                         | International start-up   |                         |
|---------------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
|                                       | Coefficient <sup>a</sup> | Odds Ratio <sup>b</sup> | Coefficient <sup>a</sup> | Odds Ratio <sup>b</sup> |
| Financial capital (H1)                | -0.042                   | 0.958                   | -0.026                   | 0.974                   |
| Human capital (H2)                    | 0.043*                   | 1.044*                  | 0.149***                 | 1.161***                |
| Regulatory protection (H2)            | 0.128**                  | 1.142**                 | 0.175***                 | 1.191***                |
| Regulatory complexity (H4)            | -0.03                    | 0.973                   | 0.061                    | 1.063                   |
| Corruption (H5)                       | -0.197***                | 0.822***                | -0.368***                | 0.692***                |
| GDP per capita                        | -0.141***                | 0.868***                | -0.081*                  | 0.922*                  |
| Constant                              | -1.363***                |                         | -2.291***                |                         |
| Time Dummy 2003                       | -0.796***                | 0.449***                | -0.410***                | 0.664***                |
| Time Dummy 2004                       | -1.042***                | 0.351***                | -0.07                    | 0.933                   |
|                                       |                          |                         |                          |                         |
| Log-Likelihood                        | -6701.3                  |                         | -4887.0                  |                         |
| Model Chi-square <sup>c</sup> (8 dof) | 539.801***               |                         | 297.352***               |                         |
| Efron Pseudo R-square                 | 0.431                    |                         | 0.257                    |                         |
| McFadden Pseudo R-square              | 0.0396                   |                         | 0.0399                   |                         |
| Observations (replicates)             | 83 (17824)               |                         | 84 (17734)               |                         |

\*  $p < 0.10$ , \*\*  $p < .05$ , \*\*\*  $p < 0.01$

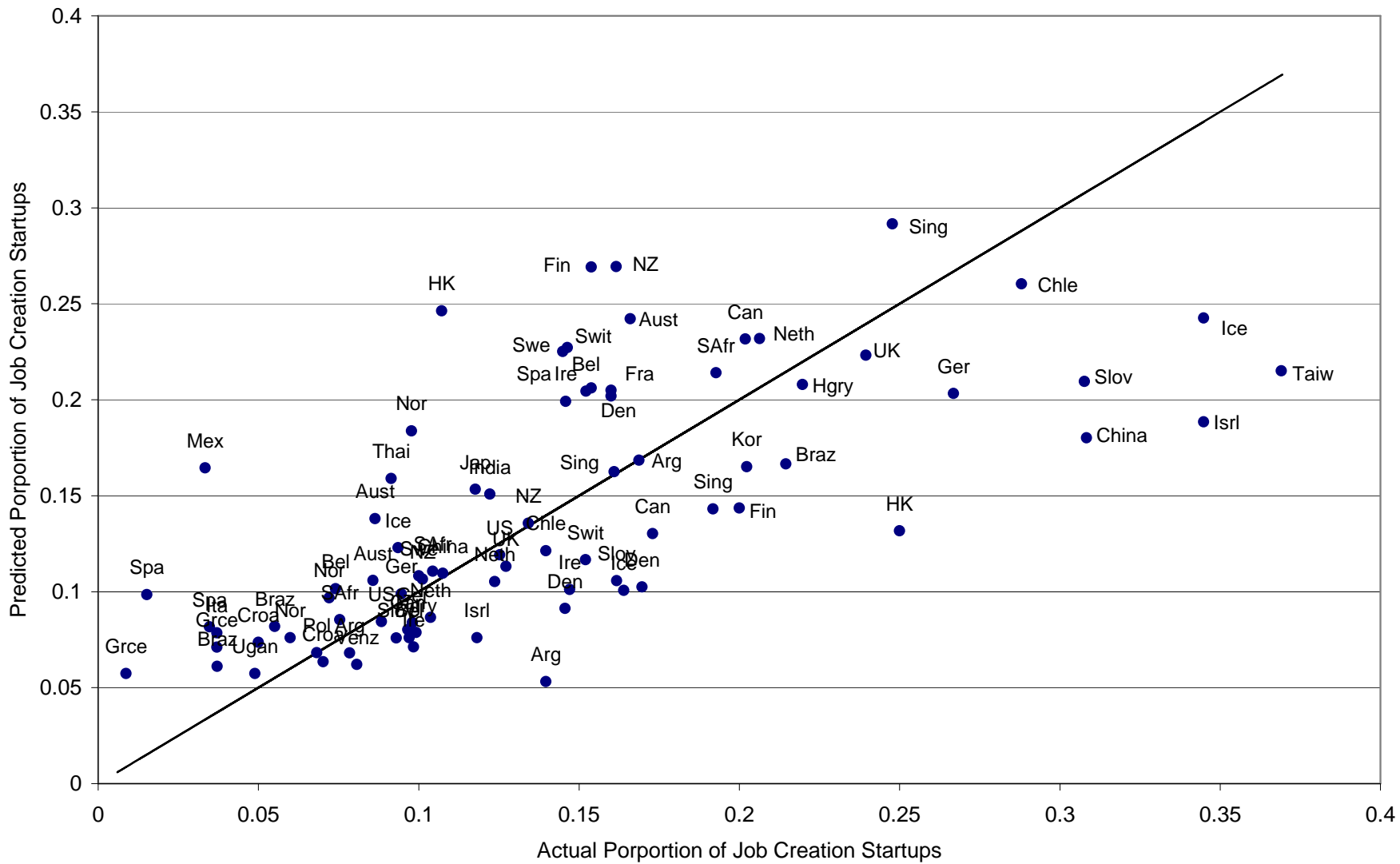
<sup>a</sup> The explanatory variables were standardized to have a mean of zero and a variance of one.

<sup>b</sup> Number indicates the change in the odds in favor of the indicated type of start-up due to a unit change in the indicated variable. Values less than unity indicate a decline in the odds ratios. For example, a value of 1.10 for the odds ratio indicates a 10% rise in the odds in favor of a particular type of start-up due to a unit increase in a variable while a value of 0.90 indicates a 10% decline in the odds in favor of a particular type of start-up due to a unit increase in a variable.

<sup>c</sup> Test of model that only includes a constant term against model with all variables included.

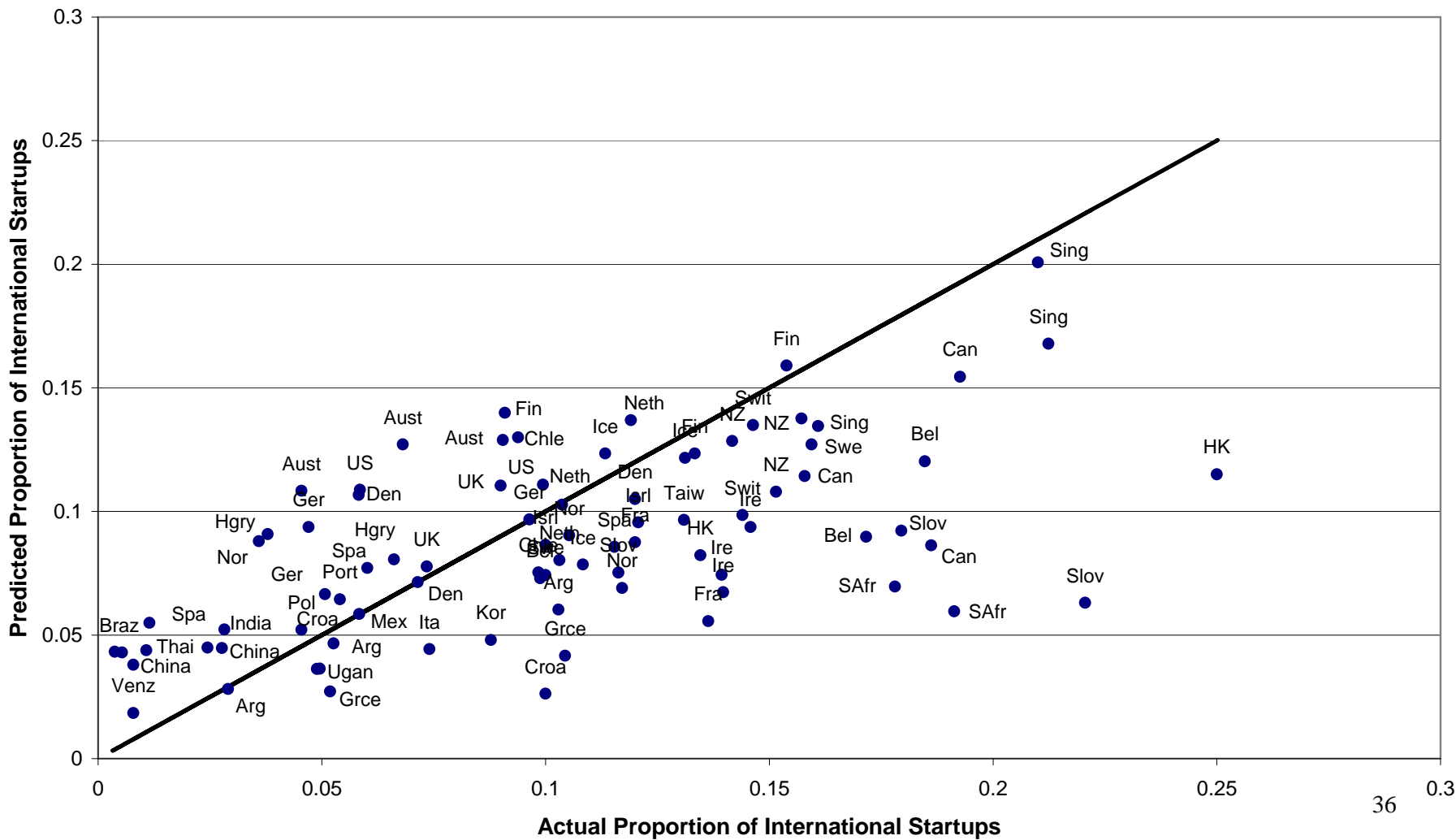
**FIGURE 1:**

**Predicted versus Actual Proportion of Job Creation Start-ups**



**FIGURE 2:**

**Predicted versus Actual Proportion of International Start-ups**



## APPENDIX

| Questions from GEM's <i>Expert Questionnaire</i>   | Questions from WEF's <i>Executive Opinion Survey</i>  |
|--|---|
| <p><u>Financial capital</u></p> <ol style="list-style-type: none"> <li>1. In my country, there is sufficient equity funding available for new and growing firms.</li> <li>2. In my country, there is sufficient debt funding available for new and growing firms.</li> <li>3. In my country, there are sufficient government subsidies available for new and growing firms.</li> <li>4. In my country, there is sufficient funding available from private individuals (other than founders) for new and growing firms.</li> <li>5. In my country, there is sufficient venture capitalist funding available for new and growing firms.</li> <li>6. In my country, there is sufficient funding available through initial public offerings (IPOs) for new and growing firms.</li> </ol> <p><u>Human capital</u></p> <ol style="list-style-type: none"> <li>1. In my country, colleges and universities provide good and adequate preparation for starting up and growing new firms.</li> <li>2. In my country, the level of business and management education provide good and adequate preparation for starting up and growing new firms. In my country, the vocational, professional, and continuing education systems provide good and adequate preparation for starting up and growing new firms.</li> </ol> <p><u>Regulatory protection</u></p> <ol style="list-style-type: none"> <li>1. In my country, the Intellectual Property Rights (IPR) legislation is comprehensive.</li> <li>2. In my country, the Intellectual Property Rights (IPR) legislation is efficiently enforced.</li> <li>3. In my country, the illegal sales of 'pirated' software, videos, CDs, and other copyrighted or trademarked products is not extensive.</li> <li>4. In my country, new and growing firms can trust that their patents, copyrights, and trademarks will be respected.</li> <li>5. In my country, it is widely recognized that inventors' rights for their inventions should be respected.</li> </ol> <p><u>Regulatory complexity (reverse scored items)</u></p> <ol style="list-style-type: none"> <li>1. In my country, new firms can get most of the required permits and licenses in about a week.</li> <li>2. In my country, the amount of taxes is not a burden for new and growing firms.</li> <li>3. In my country, taxes and other government regulations are applied to new and growing firms in a predictable and consistent way.</li> <li>4. In my country, government policies aimed at supporting new and growing firms are effective</li> </ol> | <p><u>Corruption (reverse scored items)</u></p> <ol style="list-style-type: none"> <li>1. The corporate ethics (ethical behavior in interactions with public officials, politicians, and other enterprises) of my country's firms in my industry are among the world's worst (best).</li> <li>2. Government subsidies to business in my country keep uncompetitive industries alive artificially (improve the productivity of industries).</li> <li>3. When deciding upon policies and contracts, government officials usually favor well-connected firms and individuals (are neutral among firms and individuals).</li> <li>4. How commonly do firms in my industry give irregular extra payments or bribes connected with import and export permits? Common (Never).</li> <li>5. How commonly do firms in my industry give irregular extra payments or bribes when getting connected to public utilities? Common (Never).</li> <li>6. How commonly do firms in my industry give irregular extra payments or bribes connected with annual tax payments? Common (Never).</li> <li>7. In my country, how commonly are public funds to companies, individuals, or groups diverted due to corruption? Common (Never).</li> <li>8. Public trust in the honesty of politicians is very low (very high).</li> <li>9. Do unfair or corrupt activities of other firms impose costs on my firm? Impose large costs (Impose no costs/not relevant).</li> </ol> |