

Property Rights, Supply of Formal and Informal Finance and Business Start-up Financing

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Abstract

This paper investigates the determinants of the volume and financial structure of business start-ups in 42 countries. Using the Global Entrepreneurship Monitor (GEM) surveys² for 1998-2003, we jointly examine how the business environment and individual characteristics of entrepreneurs affect their financing decisions. Our findings imply that start-up financial choices are affected by individual characteristics of entrepreneurs, their growth opportunities, ownership structure, and entrepreneurs' advantage of network resources. The supply of the informal finance in a country is shown to be associated with both entrepreneurial entry and the higher share of external finance in business start-ups finance, whereas the size of the formal financial sector appears to play a more important role for the entrepreneurial choice of self-finance. In addition, a more regulated financial system is likely to produce more start-up finance, but the sign of this effect reverses for a high level of regulatory intervention. More importantly we find that both the total volume of the start-up finance, and the volume of its external component are affected far more by strong property rights than by the financial environment in the country.

Keywords: start-ups, capital structure, financing, business environment, property rights.

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² Global Entrepreneurship Monitor is an international project co-ordinated jointly with Babson College, USA and London Business School, UK, and extended to involve forty other national teams.

1. Introduction

The existence of a positive link between entrepreneurship and economic development has been widely acknowledged (Baumol 1990; Wennekers and Thurik 1999; Minniti et al. 2005). Entrepreneurs are argued to be a driving force behind technological innovation and creation of jobs. They fill in market niches, increase competition and consequently promote economic efficiency (Minniti et al. 2005). However, the business environment in which entrepreneurs operate influences various aspects of entrepreneurial decision-making with further implications for the wider process of economic development.

While different in many aspects, entrepreneurs face similar challenges at the start-up. One of the common problems for new ventures is raising sufficient funding enabling them to launch and operate businesses successfully. Accordingly, finance availability and cost have been cited as one of the major constraints for entrepreneurship development (Beck et al. 2005). Several scholars recognised the financial gap that entrepreneurs face in terms of accessing the formal institutional finance such as bank credit and venture capital (Stanworth and Gray 1991; Storey 1994). According to the OECD 2006 study³, 80-90 percent of entrepreneurs worldwide admitted the existence of a financing gap which turns to be more pervasive in emerging economies than in developed countries. Given the specific features of start-ups, they are more likely to be financially constrained. The lack of credit history and credible reputation typically distinguish start-ups from established firms, creating a disadvantage for the former when it comes to the issue of funding. Given a higher asymmetry in information, financial institutions find it costly to monitor small businesses. Furthermore, the higher risk of failure further restrains small firms' accessibility of finance, in particular bank finance, and affects the relative cost of different financial options.

However, the relative difficulty of start-ups in accessing various sources of finance is likely to be aggravated by inadequate legal frameworks and

³ These figures are based on the OECD SME and Entrepreneurship Survey comprised of 20 OECD and 10 non-OECD economies (OECD 2006).

underdeveloped financial systems. The latter have implications for both the volume and the structure of finance that the entrepreneur is seeking. In turn, entrepreneurial financing choices shape the operations of business and affect its growth potential with further important implications for the economy as a whole.

In this paper, we investigate the determinants of start-up financial choices using the Global Entrepreneurship Monitor (GEM) 1998-2003 surveys. More specifically we examine how the financial environment and property rights system, and individual characteristics of entrepreneurs such as their wealth, education, experience and social capital affect entrepreneurial financing decisions at the time of entrepreneurial entry.

While firm finance literature abounds, it is largely centred around the established businesses. Limited empirical work has been done on start-up financing due to lack of data. In their majority, existing empirical studies focus on three major groups of factors determining start-up financial choices: firm-specific characteristics including ownership structure, growth opportunities, and owners' characteristics. With respect to the latter, the empirical studies further distinguish between socio-economic characteristics of entrepreneurs; start-up context-specific features (such as high failure risk, entrepreneurs' potential exposure to financial discrimination and high private benefits of control) and some other individual features such as embeddedness in entrepreneurial networks (Harris and Raviv 1991; Coleman 2000; Cassar 2003; Huyghebaert and Gucht 2007).

Accordingly, the examination of start-up capital structure in existing empirical research is centred around the demand side of finance, whereas in real life it is typically determined through the interaction between the ability and willingness of external financiers to provide the required funding and the firm's (or entrepreneur's) preferences for certain types of financing. The issue is further complicated by the fact that some firm- (and entrepreneur-) specific characteristics such as indicators of firms' growth opportunities provide guidance for external financiers when making their financial decisions. Accordingly, it is difficult to distinguish empirically if "banks select businesses, or businesses self-select for finance" (Cressy, 1996, p. 1254).

While exploring the capital structure of new firms, none of the existing empirical studies explicitly focuses on the supply side of finance – the size of both the formal and informal financial system and on the institutional

characteristics of the financial intermediation. Additionally, in their majority, research studies focus on existing established small firms as a proxy for a start-up activity rather than on the new entrants. As they use surveys of existing entrepreneurs, the potential for selectivity bias confounding these studies is high. In this case, the character of our data set gives us an advantage over existing studies, allowing for a reduction in the potential survivorship bias (on a similar note see Cassar, 2003).

More generally, the comparative advantage of our research can be summarised as follows.

First, our paper goes beyond exploring the impact of individual characteristics of entrepreneurs and their new ventures. Accordingly, in addition to the aforementioned standard variables, we also use institutional country-level variables to examine the impact of the business environment on start-up financial preferences. The start-up financing literature has not yet explored the effects of institutional heterogeneity on entrepreneurial financial choices. The present study looks at how some specific institutions, in particular the property rights system and the characteristics of the financial system, shape entrepreneurs' financial decision-making.

Second, bringing an element of institutional development into our analysis, we explore in more detail the financial sector characteristics, providing more in-depth analysis into the supply side of finance, in terms of availability of both formal and informal external funding, which is arguably missing in existing empirical research. We investigate the effect of financial development using various indicators, including the size of the financial sector and a measure of financial regulation. This paper provides evidence that the developed financial sector matters for the volume of self-finance, providing support for the capital accumulation hypothesis. In contrast, a strong property rights system is the most significant determinant of both the volume of external finance, and accordingly, of the volume of total start-up finance.

Third, unlike earlier research we closely look at the impact of the supply of informal finance from investors such as family members, friends, work colleagues and informal business angels on the financial size of start-up projects and on their financial structure. Some recent research, undertaken on informal financing on the basis of GEM studies, shows that informal funding is an important source

of financing of firms. However, the existing research on informal investment either focuses on its effects on early-stage entrepreneurial activity (O’Gorman 2003), on prevalence of opportunity-pulled entrepreneurship (Bygrave et al. 2003) or looks at the determinants of informal investment (Bygrave et al. 2001, Mason 2006). To our best knowledge, no empirical studies exist on effects of informal funding on the start-up financial volume and structure and we aim to fill this gap.

Fourth, a novel aspect of our research is that we look explicitly at the effect of financial regulation and find that it has a non-monotonic effect on the volume of external finance for start-ups – a more regulated financial system is likely to produce more start-up finance, but the sign of this effect reverses for a high level of regulatory intervention.

Fifth, in our research we use the GEM data set that has some advantages compared to most of datasets used for start-up research. The GEM data offers a unique opportunity to study nascent entrepreneurs (for the definition see section 3) along with existing businesses. The GEM data does not suffer from selectivity bias, given that samples are drawn from the working age population. Furthermore, to avoid losing the important full sample information, we employ the Heckman estimator which allows dealing with a sample selection using the full survey information. The model determines simultaneously the likelihood of entrepreneurial entry and start-up financial choices. Our key identification variable for the first stage (entrepreneurial entry) equation is the indicator of a regulatory start-up cost (see section 3 for definitions), which arguably should be treated as a sunk cost once the start-up process is triggered.

The paper proceeds as follows. The next section discusses some theoretical issues pertaining to the start-up financial structure, focusing on the determinants of entrepreneurs’ financial structure and declaring some explicit hypotheses to be tested. Section 3 describes the data and the methodology. Empirical results follow in Section 4. Finally, Section 5 presents major conclusions and policy implications.

2. Determinants of Start-up Financial Structure: Theoretical Arguments and Hypotheses

Empirical studies on start-up financing have been centred on the theories pertaining to the issues of information asymmetries. The central theme in this strand of literature is that in the situation of market imperfections capital rationing by investors is likely. With application to the credit market, for example, the presence of information uncertainty means that lenders do not have full information about the risk of entrepreneurs' projects, so it is difficult for them to distinguish between 'low risk' projects and 'high risk' projects. This is particularly true for start-ups given a lack of prior credit history and often the innovative and risky nature of their projects. Furthermore, entrepreneurs have an incentive to present information on their investment projects in the best possible light, even if they expect a high probability of default on a loan. This can potentially lead to the problem of 'adverse selection' (Akerlof, 1970) that might lead to credit rationing (Stiglitz and Weiss, 1981)⁴. Similarly, information asymmetries can also affect equity markets and limit the ability of firms to raise equity capital (see for example Greenwald et. al. 1984).

The adverse selection problem and its impact on firms' financial preferences is also examined by Myers (1984) and Myers and Majluf (1984). According to their pecking order theory, financial preferences are driven by the relative cost of finance. In the situation of informational imperfections, high exposure to risk and respectively high capital returns demanded by each source of financing imply that the firm prefers internal to external finance; short-term over long-term debt; and finally any debt over external equity. Start-ups, being particularly exposed to information asymmetries, are more likely to behave according to the pecking order theory. Indeed, previous empirical studies on start-up financing show that start-ups typically exhibit a moderately low level of

⁴ The credit rationing hypothesis has raised a debate regarding its validity. Parker (2004) argues that the theoretical arguments pertaining to this issue do not provide a clear picture and are subject to criticism; more empirical evidence is needed to shed some light on this. Some empirical studies conclude that there may be scope for credit rationing that explains the existence of a gap in financing small businesses (OECD 2006). Others argue that the phenomenon of credit rationing is marginal and therefore economically insignificant (Berger and Udell 1992; Cressy, 1996). The rest remain inconclusive. It is acknowledged that to reach any robust conclusions, further research on this subject is needed. For detailed overview of the relevant literature in the context of entrepreneurship see Parker (2004).

formal external financing, largely relying on their own equity and informal finance, primarily family and friends' funds and investment of other individuals comprising business angels (Bates 1997, Bygrave 2003, Huyghebaert 2001). Although to a smaller extent, entrepreneurs also tend to use trade credit, bank loans and leasing in financing their ventures (Hughebaert and Gucht 2007). The use of external equity, in particular institutional venture capital, is marginal in the prevailing majority of countries. Furthermore, according to Bygrave (2003), formal venture capital tends to play a more significant role only for a very limited number of firms, while in contrast, sources of informal financing are accessible by all entrepreneurial ventures, regardless of their observable growth and innovation prospects.

However, the costs associated with informational asymmetry and consequently the potential for credit rationing are expected to diminish with the development of legal and financial institutions. Existing research suggests that the institutional environment, comprised of formal and informal rules, plays an important role in entrepreneurship development (Baumol 1990; Johnson et al. 2002; Van Stel et al 2007; Ho and Wong, 2007; Aidis et al 2007, 2008a; Ardagna and Lusardi 2008). In particular, a poorly functioning legal environment, characterised by weak property rights and contract enforcement, has shown to discourage entrepreneurial entry (Aidis et al. 2007). Johnson's (2002) et. al. findings suggest that property rights appear to be a stronger determinant of entrepreneurs' financial choices than both contracting institutions and the development of financial institutions. More specifically, they provide some evidence that weak property rights discourage entrepreneurs to reinvest their retained profits into business. In an environment with weak protection of property rights, financial contracts are less likely to be concluded, leading to the underdevelopment of finance (Acemoglu and Johnson, 2005). Our discussion so far suggests that the impact on start-up finance is likely to be particularly detrimental.

To measure property rights Johnson et al. (2002) use measures of corruption and organised crime obtained from the survey of private manufacturing firms in five transition economies. These are measures closely related to the core concept of property rights (as distinguished from contracting institutions, see: Acemoglu and Johnson, 2005), to the extent that forced

payments associated with corruption or extortion, imply expropriation of entrepreneurs' assets. One of the indicators, commonly used by scholars (Acemoglu and Johnson 2005; Aidis et al. 2007; also see further references therein) is the Heritage Foundation index of property rights, which measures the degree of law protection and enforcement, implying that the greater the chances of government expropriation of property, the lower a country's score is.

Based on what we have said, our first hypothesis is formulated as follows.

H1: Weak property rights are likely to discourage financiers both formal and informal, limiting an entrepreneur's access to external finance and diminishing both (H1a) the share and (H1b) the volume of external finance and as a result, (H1c) the total volume of finance available for a start-up project.

Business entry regulations and the regulatory cost of entry are likely to influence entrepreneurial entry, but there is no reason to expect that they affect a new firm's financial choices and therefore should be seen as a one-off sunk cost. In their seminal study, Djankov et al. (2002) explored the required procedures governing entry regulation, as well as the time and the cost of those procedures in 85 countries, showing high cross-country heterogeneity. In their majority, empirical studies, inspired by the Djankov (2002) et al., find that lower entry barriers are positively associated with the level of firm entry (in particular, see: Klapper et al. (2006), Demirguc-Kunt et al. (2006), though both studies are limited to incorporated firms only). Van Stel et al. (2007) use aggregate macro indicators derived from GEM data to explore the effect of business regulations on start-ups. They claim that minimum capital requirements and inflexibility of labour markets discourage entry of new firms, while availability of credit information, used as a proxy for the financial development encourages it. However, in their study of entrepreneurship and institutions in emerging economies, Aidis et al. (2008a) fail to find any significant effects of start-up entry barriers on individuals' decisions to enter entrepreneurship. In this study we also intend to investigate the effects of business regulation on the level of entrepreneurial entry. Respectively, we postulate the following hypothesis.

H2: Less burdensome business entry regulations encourage individuals to enter entrepreneurship.

While examining institutional effects on entrepreneurship, many scholars emphasize the important role of informal institutions (see Dixit 2004 for a more detailed overview). Social networks gain particular importance for entrepreneurship when formal structures fail to function adequately. Thus, social capital is regarded as an entrepreneur's intangible asset that can be used to overcome difficulties arising from failure of formal institutions. Previous studies show that social networks facilitate entrepreneurs' access to finance (Aldrich *et al* 1987, Johannisson 2003), constituting a competitive advantage for entrepreneurs. Accordingly, our third hypothesis reads as follows.

H3: Entrepreneurs with a significant amount of social capital are more likely to obtain external finance.

Along with a well-functioning property rights system, developed financial institutions have been argued to play not only a less important role in enhancing the level of entrepreneurial activity (Aidis *et al.* 2008a) but also a firm's growth (Beck 2005 *et. al.*). Financial intermediaries facilitate the risk amelioration in the presence of problems created by information and transaction frictions, by developing expertise in monitoring managers and exerting corporate control (Levine 1997). Parallel to this, the financial sector affects firm financing through the wider allocation of savings towards potential investment projects (Levine *et al.* 1999). Recent empirical studies provide some support for a positive link between a developed financial system and firm financing and growth (Demirgüç-Kunt and Maksimovic 1998, Beck *et al.* 2005). Developed financial institutions are found to be particularly beneficial for small firms compared to large ones (Beck *et al.* 2005). The same should apply even more to start-ups.

Accordingly, the size of the formal financial system is expected to be positively related to the use of external financing, as a better functioning financial system should ease up borrowing constraints that entrepreneurs are likely to face in the presence of informational asymmetries. In the study of the determinants of the start-up financial structure, Huyghebaert and Gucht (2007) claim that as a

result of unique start-up contextual characteristics such as a lack of prior credible history and a high risk of failure the problem of adverse selection is particularly pronounced, so that they are *a priori* more likely to be financially discriminated. Furthermore, monitoring start-ups is very costly for banks given the small scale of entrepreneurial projects and the complexity of the monitoring process (Ravid and Spiegel 1997). All together, this may explain the rationale behind banks' decision to limit the size of loans to start-ups instead of employing costly screening and monitoring of new entrants (Huyghebaert and Gucht 2007). Thus we may expect financial constraints to preserve their significance even after controlling for financial development as captured by the size of the formal financial sector. However, we postulate that an efficient regulatory system may result in a financial environment, which would be offering more opportunities for start-up finance. Efficient regulation may improve the quality of the banking sector and drive banks away from 'easy' finance for well-established large clients, towards the choice of more difficult financing options, start-up finance in particular. However, we allow the possibility that overregulated banking sectors may become strangled by government intervention, which in this case results in less start-up finance being available. Consequently, our next hypotheses are formulated as follows:

H4: (H4a) Financial regulation will imply more start-up finance. (H4b) However, at a higher level of regulatory intervention, its effect may become negative, reflecting oppression of the financial sector and resulting in less start-up finance being available.

Constraints in accessing external finance can be mitigated through the process of capital accumulation (Parker 2000; Webb and de Meza 2001). More specifically, Parker (2000)⁵ suggests that when start-ups experience liquidity constraints, a stronger incentive to finance a venture increases the savings rate of (potential) entrepreneurs, but only patient individuals are more likely to become entrepreneurs in this case, as the beginning of the project can be

⁵ Parker (2000) recognises that not all individuals will be able to accumulate savings; some of them may be too poor to save enough that may be the realistic case of some of the countries comprising our sample.

postponed for an indefinite time until sufficient wealth is accumulated to reduce an entrepreneur's dependence on loans. In this way, a developed financial system tends to eliminate liquidity constraints through facilitating accumulation of entrepreneurs' savings (Webb and de Meza 2001). Additionally, financial development may contribute further to capital accumulation through offering a more competitive deposit rate as well as reducing the lending interest rate and consequently an overall debt burden on individuals, allowing for a further increase in savings accumulation. This leads us to formulate our next hypothesis.

H5: A more developed financial sector implies more opportunities to accumulate savings and therefore more funds that can be used for entrepreneurial projects.

As discussed above, start-ups tend to largely rely on informal finance comprised of family and friends' funds and investment of business angels. According to the most recent GEM study the total amount of money provided by informal investors accounted for 1.5 percent of the combined GDP of the 42 GEM nations. This is comparable with the amount of personal funding provided by GEM entrepreneurs (2.4 percent of GDP). In contrast, formal venture capitalists invested only 6 per cent of the total informal investment in 2006 (Bygrave and Quill 2007:5). Thus our next hypothesis should read as follows.

H6: The size of the informal financial sector is of significant importance to entrepreneurs in providing external funding in the early-stage of entrepreneurial activity.

Overall, entrepreneurial over-reliance on internal funding and informal investments as opposed to bank finance or formal venture capital may closely reflect the firm financing life cycle which explains the variation in alternative financial options used to finance a venture throughout its life as a result of the imperfect information, size, asset structure and growth potential (Myers 1984, Cassar 2003). The use of retained profits increases as business grows. However, the higher the rate at which a firm expands, the more likely it exhausts retained profits faster and that leaves no other alternatives for an entrepreneur, but to turn to external sources of finance. At the same time, start-ups with higher

growth opportunities, and consequently with higher expected returns, appear to be more attractive to external financiers. Accordingly, our next hypothesis is as follows:

H7: High-growth oriented projects are characterised by a larger size of start-up finance and by more reliance on external funding.

Our research also provides some insights into the effects of various personal characteristics on entrepreneurial financial choices.

In their majority scholars agree that entrepreneurs' personal characteristics, such as age, gender, education, income and work status are significant determinants in entrepreneurs' decision-making whether it concerns entering entrepreneurship or determining the firm's financial structure. Previous GEM studies suggest that middle-aged, working males with higher educational attainment are more likely to start a business (Minnitti et al. 2005). Similarly, we expect more mature, better-educated and working males to rely on external financing to a larger extent. They are more likely to have some credible personal borrowing history and an established reputation that can help external financiers such as, for example, bank managers make more informative financial decisions. Previous research indicates that some aspects of entrepreneurs' financial decision-making, in particular capital purchases, is a quadratic function of the entrepreneur's age (Holtz-Eakin et al. 1994). Non-linearity of age has also been shown in relation to entrepreneurship entry (Levesque and Minniti 2006, Aidis et al. 2007). We introduce age squared to test this non-linearity assumption.

Better education may be seen as a proxy for human capital and may be associated with launching more innovative high-value added projects, which are likely to be more capital-intensive, requiring access to external sources of finance. In turn, such projects may appeal more to potential outside investors, given higher expected returns on investment.

Finally, we expect wealthier entrepreneurs to go for high-growth larger scale projects, requiring access to matching external funding. In addition, the external funding may come on better terms (availability of a collateral, etc.), making it more attractive for those who are relatively better off in terms of income and wealth. Accordingly, our last hypothesis reads as follows.

H8: Differences in a socio-economic background of entrepreneurs and other individual characteristics of entrepreneurs are likely to explain the variation in start-up financial structures.

The next section describes our data and methodology.

3. Data and Methodology

3.1 Sample

To explore the determinants of the financial structure of business start-ups, we use the data collected through the GEM adult population surveys in 1998-2003, covering 41 countries worldwide⁶. The data consists of representative samples of at least 2,000 individuals in each country, drawn from the working age population. This allows avoiding the selectivity bias confounding other studies, which focus on the existing entrepreneurs only. GEM surveys were completed through phone calls and through face-to-face interviews in countries, where low density of the telephone network could create a bias. National datasets are harmonised across these countries⁷.

GEM data provides a unique opportunity to examine cross-national entrepreneurial activity, while focusing on the widest possible range of business creation, distinguishing between people with the intention to start a business, nascent entrepreneurs (who are already in a process of establishing a new firm, also labelled start-ups) and currently operating young firms (under 3.5 years)⁸. It also distinguishes between the opportunity- and necessity-driven entrepreneurship. While the dataset provides information on a whole range of businesses, for the purpose of this study we will focus on start-ups only. This is a category, where initial entrepreneurial financing decisions may be captured best, without being affected by a subsequent development of individual businesses. Start-ups or nascent entrepreneurs are, according to GEM criteria, defined as individuals between 18-64 years old, showing some action towards setting up a

⁶ For countries included into the 1998-2003 datasets and year coverage see Reynolds 2005.

⁷ For more details of the sampling procedure see Reynolds et al. 2005, 2008.

⁸ Along with these two last categories, reflecting total entrepreneurial activity, GEM also identifies established businesses (more than 3.5 years old) (Reynolds et al. 2005).

new business whether fully or partly owned. They also must not yet have paid any wages or salaries for more than three months. This definition is summarised in Table 1. GEM datasets provide unique information on entrepreneurs' personal characteristics, ranging from standard socio-economic characteristics to more specific entrepreneurial traits allowing us to draw some inferences on the effects of entrepreneurial embeddedness in the social networks; experience of being a business angel in the past; opportunity motivation and the past experience of business failure on a start-up capital structure. Along with individual characteristics, GEM data has some important information on nascent firm-specific characteristics⁹ such as ownership structure and growth opportunities, commonly used in empirical studies on start-ups. Finally, GEM also offers unique data on informal finance. The following sub-section discusses variable definitions and measurements in more detail.

3.2 Analytical framework and variable measurement

Start-ups operate in a complex environment. Their constant interaction with the environment shapes various aspects of their decision-making and performance with further implications for the economy as a whole. Accordingly, along with individual GEM data, we also use various country-level measures of institutional and macroeconomic development, comprising a start-up contextual environment. We can safely use this aggregate data as our explanatory factors without being concerned with simultaneity bias, as the individual decision of a potential entrepreneur does not affect country-level institutions or economic development. Looking at the effects of both the contextual factors and start-up individual characteristics on entrepreneurial financial choices enables us to undertake a comprehensive analysis of start-up financing.

There is no universally accepted set of measures of institutional quality. In their majority researchers have used what is commonly referred to as institutional outcome variables (Glaser et al. 2004). The commonly used measures of

⁹ The traditional set of explanatory variables used for small enterprises also includes firm size, proxied either by a firm's total assets or employment size. While our data set contains information on start-up employment, this is strongly correlated with actual stage of the entrepreneurial entry (as hiring new employees is a gradual process) and a large number of missing values reduces our sample size drastically. More information is available on the planned size of employment, which in our context is a better proxy for the start-up size (see below).

institutional quality include survey indicators provided by the International Country Risk Guide (e.g. a measure of risk of expropriation), those provided by the World Bank Governance project (measures of governance effectiveness); the World Bank's Doing Business survey; and the Heritage Foundation Economic Freedom database.

The question of the adequacy of these various measures of institutional quality has been material for continuous academic debates. Glaeser et al. (2004) argue that the majority of these indicators do not denote permanent features of government. They refer to constitutional rules and evidence of independent judicial checks as good examples of institutional indicators. However, in some developing or transition economies these actual rules may still not meet this criterion of 'durability', given relative 'youth' or the transitory nature of their institutions. In reality, there is a continuum between the long-term stable institutional arrangements and short-term government policies, and delimiting the two in an exact way is conceptually difficult. The expectations of the economic actors about durability of given policies, laws on books and administrative practice play a critical role, and identifying *a priori* the empirical characteristics of institutional and policy setup which is conducive to economic development and affects entrepreneurs' decision-making is not an easy task.

Aidis et al. (2007) provide an empirical analysis of institutional indicators which demonstrate that the property rights system plays a pivotal role, being located at the nexus of various other institutional indicators. Their results are entirely consistent with Acemoglu and Robinson (2005), who see property rights as the key institutional dimension which can be distinguished from 'contracting institutions'. Typically, the economic agents can overcome obstacles and deficiencies in 'contracting institutions' by changing the preferred form of contractual arrangements and developing private contracting systems. In contrast, instability of property rights has a more fundamental negative effect on economic activity. Accordingly, based on this and on our overview of existing empirical studies on institutions and entrepreneurial finance in section 2, we hypothesize that the strength of property rights and availability of finance are two key institutional dimensions that are likely to affect the start-up capital structure. In our research we primarily use the Heritage Foundation indicators for

institutions and World Bank World Development Indicators for macroeconomic control variables.

The Heritage Foundation 'property rights' indicator shows the degree of protection of individuals' private property rights by law on books and through its enforcement, and the extent to which private property is protected from expropriation (Beach and Kane 2008). The score ranges from 0, meaning poor law protection and enforcement to 100 percent, when property rights are fully guaranteed by the government and the contract enforcement is strong. We transform this index of property rights into odds¹⁰ to get a measure of the 'property rights' constraints, which has better distributional characteristics. However, we experimented with both using the original index and a dummy variable denoting property rights. The results are unaffected.

To measure the availability of formal finance we first use the ratio of domestic credit to private sector to GDP, obtained from the World Bank World Development Indicators. This measure has been used in previous studies (Klapper et al. 2006; Aidis et. al 2007). Moreover, we also use an indicator of financial regulation derived from the Heritage Foundation Financial Freedom index. The financial freedom index measures the extent of state intervention and regulation of a national financial system. On the one hand, each country provides some degree of prudential regulation and supervision of the financial sector to ensure the soundness of its operation. On the other hand, too excessive and intrusive state interference may result in financial market inefficiencies with further consequences for the economy as a whole (Beach and Kane 2008).

In their majority scholars advocate that countries with better developed financial systems, namely with a more dense and free banking system, and more flexible securities markets, grow faster than those where financial sectors are inhibited. Respectively, it has widely been argued that liberalisation of the financial sector through elimination of government constraints such as interest caps, high reserve requirements, control over credit allocation, imposed on the financial sector would result in the deepening of the financial sector, implying higher availability of finance to firms and vice versa (McKinnon 1993, Fry 1997).

¹⁰ To calculate odds we use the following formula: $[(\text{Index} / 100 - \text{Index})]$. Note that the highest value of the Heritage Foundation index in our sample is 90, which implies the maximum observed value of the transformed variable at 9.

For example, placing interest ceilings on loans by the government may discourage banks' lending, limiting the amount of finance available to the real sector. Similarly, introduction of some selective credit support to specific businesses may have a crowding out effect on other economic agents, new entrepreneurs in particular¹¹. Thus, financial regulation is likely to imply liquidity constraints that new firms may face as a result of this regulation. Similarly, Jappeli and Pagano (1994) argue that heterogeneity in liquidity constraints across countries is largely attributed to the regulation of the financial sector¹². Consequently, the Heritage Foundation measure of Financial Freedom provides important information on the likelihood of financial constraints. We transform the original index of financial freedom into odds to get a better proxy for constraints.¹³ Furthermore, we also introduce financial restraints squared, assuming that entrepreneurs' financial preferences are a quadratic function of financial constraints in line with the argument on the impact of financial regulation presented above.

Among other institutional measures we use the Heritage Foundation business freedom index which measures the rigidity of business regulation, reflecting various barriers to start, operate and exit business (Beach and Kane 2008). Burdensome business entry regulation is expected to bind individuals' decision to enter entrepreneurship, but is unlikely to have any pronounced effects on entrepreneurial financial choices, as hypothesized in the previous section. The World Bank Doing Business database would, perhaps, be more adequate to use in our analysis, given the nature of our study, but a lack of data prevents us to use their start-up regulatory indicators¹⁴.

¹¹ The extreme example is an introduction of a selective credit policy benefiting large state enterprises at the expense of the private real sector with new entrants suffering the most.

¹² Other main reasons behind liquidity constraints they name are the cost of enforcing loan contracts and the availability of information on borrowers' creditworthiness available to lenders (Jappelli and Pagano 1994). Note that the former issue is closely related to property rights protection.

¹³ Similar to property rights indicator, we transform the original indicator using the following formula: $[(100 - \text{Index}) / \text{Index}]$. Note the implicit change of sign so that the transformed index measures the extent of regulation.

¹⁴ The World Bank Doing Business public data is available from 2003, whereas our sample covers 1998-2003. Djankov's et al. (2002) study, which led to launching the Doing Business project, provides data for 1999. If there were little time variation in the data, we could introduce start-up regulation variables as time-invariant. However, our comparative analysis of the Djankov et al. data for 1999 and the Doing Business data for 2003 revealed that only a 'number of procedures' indicator, denoting the number of procedures required to start a business, had marginal or no variation over time, whereas other measures of start-up regulation, including cost

Our other macro-level explanatory variables include a measure of economic development represented by per capita GDP (at purchasing power parity) and GDP annual growth rate, obtained from the World Bank World Development Indicators, to capture cyclical effects on entrepreneurial entry and financial choices. A number of scholars acknowledge the existence of the link between entrepreneurial activity and per capita GDP (Carree et al. 2002, Wennekers et al. 2005). More specifically, Wennekers et al. (2005) find a U shaped relationship between the two variables, suggesting that entrepreneurial activity is high in low-income countries where entrepreneurship is often seen as an alternative for employment; with increase of per capita GDP, the rate of entrepreneurial activity drops and that may be attributed to the emergence of economies of scale and the dominance of larger firms; however it surges again after passing a certain threshold in high-income countries, signalling the accumulation of individual savings which can be used to start a business and economic environment conducive to exploitation of new opportunities. For our sample, we found that a nonlinear albeit monotonic transformation of GDP per capita (purchasing power parity) into natural logarithm fits data best. Correspondingly, in our Heckman specification that simultaneously estimates the likelihood of entering entrepreneurship and entrepreneurs' financing preferences, we also introduce per capita GDP squared within the selection equation to test this hypothesis of non-monotonicity, but fails to provide any supporting evidence for this. As far as start-up financing is concerned we expect a positive relationship between per capita GDP and the use of external finance as well as the project scale.

As already mentioned, we introduce the GDP annual growth rate variable to reflect a cyclical economic performance¹⁵. We expect that at the period of recessions when the financial sector contracts entrepreneurs to rely more on their own funds or informal investments from their family and friends.

of entry, time and minimum capital required to start a business, tended to vary significantly over time. Interestingly, the 'start-up procedures' have shown no significant effects on any of our specifications, but again the value of it still changed for a number of countries in our sample, including, for instance the impact of a regulatory liberalisation in France in the early 2000s. Therefore the lack of significance is likely to result from a measurement error, when available World Bank indicators are extrapolated back. The problem is largely ignored in the literature.

¹⁵ For discussion of two conflicting effects of economic growth on entrepreneurial rate of activity (push versus pull factors) see Aidis et al. 2007.

Furthermore, a project is more likely to be small in scale and therefore capital requirements are likely to be lower.

We also introduce the prevalence rate of informal institutional investors, which proxies for the supply of informal funds that can be used for start-up capital. It is derived from our GEM data, as a peer effect¹⁶, by taking the average percentage of respondents who invested in someone else's start-up in the past three years in each country-year sub-sample.

Along with it we also introduce a dummy variable denoting some individual experience of being a business angel in the past that is expected to be positively associated with the use of external funding and the overall financial scale of the new project.

Previous research shows also the importance of both the entrepreneurship role models and the importance of network effects of knowing other entrepreneurs to start a business (Aidis et al. 2008a). Wennekers's et. al. (2005) study suggests the existence of a positive relationship between the number of incumbent business owners and start-ups. Some start-ups fill in niches in which they effectively act as intermediaries, serving established enterprises (e.g. being their distribution channels, arranging settlements, providing consultancy and so on). Here, knowing other entrepreneurs or being an entrepreneur already may help to identify such opportunities for new start-ups. In addition, Minniti et al. (2005) looks at role models from the perspective of entrepreneurs' mindset, arguing that role models, in particular in terms of knowing some other entrepreneurs, is likely to shape individual perceptions about the entrepreneurial environment and generate more positive attitudes. We aim to capture these social network effects by introducing a dummy variable which shows if the nascent entrepreneur knows some other entrepreneurs. In addition, we introduce a dummy representing an owner of any other existing businesses. This captures both network effects (social capital of the potential start-up) and individual entrepreneurial experience enhancing his/her human capital.

Among the start-up specific individual factors we also include the ownership structure variable that identifies start-ups with more than one owner.

¹⁶ On the use of peer effects in econometric estimation see Wooldridge (2002).

Start-up ownership tends to be highly concentrated and there is rarely separation between ownership and control. Entrepreneurs may have a strong incentive to benefit from a start-up control at the expense of other stakeholders such as, for example, banks. This gives rise to agency costs which are expected to be smaller when ownership is less concentrated. A second positive effect of having business partners at the time of the start-up (resource-based view) may be again similar to the network effect discussed above: additional business partners enhance social capital of the new venture.

To measure the effects of start-up growth opportunities we introduce a dummy variable to identify entrepreneurs who expect to create more than one job in five years time. We also control directly for a declared motive for entrepreneurial entry distinguishing between the opportunity and necessity-driven entrepreneurs.

Other explanatory control variables are straightforward and do not require any detailed explanation. Table 2 provides definitions of all explanatory variables and reports respective descriptive statistics, whereas Table 3 does the same for our dependent variables.

We have a number of dependent variables to reflect various financial choices and to fit our specifications. First, we introduce a dummy variable coded as '1' to identify entrepreneurs who rely on external finance, and zero otherwise to be used in our Heckman probit model with sample selection specifications. Second, we also introduce a share of external finance as a proportion of total funds of a start-up. Third, we also look at the volume of individual start-up finance, both total finance, and the amount of external and personal finance. The volume of external finance is calculated as the difference between total and personal finance reported.¹⁷ We take the GEM data on all three expressed in local currencies and scale all by dividing by the nominal per capita GDP also expressed in local currencies to get cross-country compatible data.

Finally, for an additional robustness check, we use four measures identifying a use of a particular type of external financing, which came as a series of nested dummy variables, with each subsequent category being a subset of the previous one: (i) use of external funding; (ii) use of external funding other than family

¹⁷ For a small number of respondents, the declared amount of personal finance was higher than declared total finance. Here we took the external finance to equal zero.

(friends and colleagues and institutional providers of finance); (iii) use of external institutional funding (financial institutions and government); (iv) money from banks or other financial institutions. For further details regarding definitions and descriptive statistics see Table 3.

3.3 Methodology

For the robustness of our results we use a number of estimators, including Heckman selection models, probit, tobit (for censored data) and robust regression estimators.

The Heckman probit specification, also known as the tobit II model, allows dealing with a sample selection, while using the full survey information. Our empirical model determines simultaneously the likelihood of entrepreneurship entry and start-up financial preferences captured by an indicator of use of external finance, using a maximum likelihood method. Accordingly, the model consists of two parts: the outcome equation (1), identifying the binary choice of finance, and the selection equation (2), describing the binary choice of entrepreneurship entry¹⁸.

$$y_i^* = x_{1i} \mathbf{b}_1 + \mathbf{e}_{1i} \quad (1),$$

where y_i^* denotes an entrepreneur i 's financial choice (external versus internal funds) and which is not always observed and x_{1i} denotes a vector of exogenous factors (entrepreneurs' individual traits, institutional factors, start-ups' specific factors and others). The financial choice is not observed for individuals who do not enter entrepreneurship. To describe whether an individual enters entrepreneurship or not, we specify a second (selection) equation that is,

$$z_i^* = x_{2i} \mathbf{b}_2 + \mathbf{e}_{2i} \quad (2),$$

where the observation rule is as follows:

$$y_i = y_i^*, z_i = 1 \quad \text{if } z_i^* > 0 \quad (2.1)$$

$$y_i \text{ not observed, } z_i = 0 \quad \text{if } z_i^* \leq 0 \quad (2.2),$$

where y_i denotes the entrepreneur i 's financial choice in terms of external or internal finance.

¹⁸ For further technical details of the Heckman model see Verbeek (2000).

The specific parameter of a Heckman specification is the correlation coefficient between the two error terms. If it is statistically different from zero, the choice of a Heckman model is needed. But if it is equal to zero, we could simply estimate our financial choice equation by using a probit model and this is the case we have (see Table 4). Accordingly, we also estimate individually a probit regression and report the marginal effects to separate the use and the magnitude of start-up financing. We also use a bivariate probit, and probit estimations while investigating the determinants of different types of external financing (see Tables 8-9).

Along with the Heckman specification and probit models we also use the standard tobit model where our dependent financing variables are continuous, but their range is constrained (censored) with a substantial number of observations equal to zero, denoting those who do not use external finance; other observations are positive and may produce many different outcomes (Verbeek 2000).

Finally, for the robustness of our results, for the continuous variables with no censoring (amount of total funding and amount of personal funding) we account for the fact that the results may be sensitive to the presence of outliers by employing the robust regression estimation technique programmed in the STATA software¹⁹.

In the next section we discuss our empirical results.

4. Empirical Results

The results of the Heckman probit specification (see Table 4) indicate clearly that strong protection of property rights is conducive to the use of external finance. The impact of this variable dominates any other institutional or macro variable we use. The results of the Heckman specification model suggest that we can estimate both the selection and outcome equations independently. Therefore we focus on the sub-sample of actual new (nascent) entrepreneurs (start-ups) when employing alternative specifications (see Tables 5-7). We find that the

¹⁹ The model is first estimated by OLS regression to calculate the Cook's distance which is used to eliminate outliers if the Cook's distance exceeds 1. Afterwards, iterations are performed based on Huber weights and followed by iterations based on a biweight function (Jappelli and Pagano 1994).

results are robust and consistent in terms of both the use and the magnitude of finance. Furthermore, our analysis of the marginal effects suggests that varying the strength of property rights from its sample minimum of 0.42²⁰ to its sample maximum 9²¹ increases the predicted probability of the use of external financing by start-ups by 25% (from .36 to .61). Tables 6-7 reveal that weak property rights tend not only to discourage financiers, but also diminish the share and the volume of external finance as well as a project scale. Interestingly, the strength of property rights does not appear to be a significant predictor of the likelihood of entering entrepreneurship. Taken together, the results suggest that as a significant proportion of the entrepreneurial entry is 'push driven' not 'pull driven', weak protection of assets is not a major factor affecting entry. On the other hand the protection of property rights has a very strong impact on the quality of the entrepreneurial ventures as captured by their financial size and the use of external finance. In other words, while a weak property rights system does not result in a less extensive entrepreneurial sector, it has clear-cut implications for the quality of entrepreneurship and therefore for the wider economic effects of entrepreneurship. Interestingly, while entry barriers have the expected sign, they appear to be an insignificant impediment for the entrepreneurial decision to start a business and that is consistent with some previous research (see Aidis *et al.* 2007). The explanation for this is that the potential entrepreneurs are forward looking and the impact of the initial regulatory cost may be outweighed by other elements of the institutional environment that facilitates subsequent operations and development of businesses.

The Heckman specification estimates also suggest that the size of the informal financial sector affects the likelihood of entrepreneurial entry in a positive way to a considerably larger extent than the size of the formal financial sector. At the same time, the latter is shown to have an inverse impact on the likelihood of using external finance. One can clearly see a strong positive association of the size of the financial sector with the entrepreneurial choice of self-finance as compared with external finance. This evidently supports our

²⁰ This is equivalent to the score of 30 per cent in terms of the Heritage Foundation Index of Property Rights, implying that property ownership is weakly protected. In our sample only China and Russia score this low.

²¹ Similarly to the previous footnote, this is equivalent to the score of 90 per cent. Countries in this group include US, Germany and the UK; amongst the other major developed economies, Japan, France and Italy score lower.

hypothesis 5. The wider financial sector provides more opportunities for (potential) entrepreneurs to accumulate savings to be subsequently used for business formation.

Furthermore, we find a bell-shaped relationship between the extent of financial regulation and the choice of external funding, suggesting a positive relationship between the two up to the threshold of 1.18²² and its reversal beyond the turning point. We attribute this relationship to the positive impact of some degree of prudential regulation in the financial sector that allows authorities to secure the overall soundness of the financial system and to enable economic agents to make more informed decisions regarding their financing opportunities. However, beyond the threshold, state interference in the operation of the financial sector becomes too excessive and burdensome, so that the higher degree of financial regulation is likely to result in financial sector repression and lead to liquidity constraints. In particular, a high level of regulatory intervention may prevent the financial institutions from taking too much risk, which naturally has particularly detrimental effects in case of start-ups, and this is what we observe. We also test for the strength of this relationship with and without controlling for the size of the financial sector, and we reveal that both a non-monotonicity assumption and the strength of the relationship are robust under any of the two specifications. Respectively, these findings support both of our hypotheses: (H4a) prudent financial regulation is positively associated with the volume of start-up external finance; even when controlling for the size of the financial sector, financial regulation will imply more start-up finance. However, at high level of regulatory intervention, its effect becomes negative, reflecting liquidity constraints (H4b). Interestingly, the square of financial regulation enters the regression more significantly, suggesting that rigid financial regulation has more pronounced effects on entrepreneurial financial decision-making and consequently on start-ups' liquidity constraints. Linking this finding to the savings accumulation hypothesis we also find some support of the argument advocated by Parker 2000 and de Meza and Webb (2002), suggesting that in the presence

²² The calculations of the turning point are based on the results of probit regression presented in Table 6. This turning point corresponds to the score of 46 per cent in terms of the Heritage Foundation Index of Financial Freedom. In our sample Argentina, China, India and Russia appear to score below this threshold, implying that their financial regulation is too rigid, and it does affect start-up access to external finance in a negative way.

of liquidity constraints capital accumulation can alleviate the problem of credit rationing as suggested by the sign of the size of the financial sector indicator discussed above.

We test the robustness of these findings using alternative specifications such as the probit and tobit models (see Tables 5-6). The results are robust for various measures of entrepreneurs' capital structure, including our dichotomous variable identifying access to external funding (see Table 5) and the share of external funds in total funds (see Table 6). Expecting some possible multicollinearity between financial development and per capita GDP, we also test these results with and without controlling for per capita GDP. The direction and magnitude of these relationships change marginally when we do not control for per capita GDP. Finally, the results of the robust regression (see Table 7) suggest a strong positive association between the size of the financial sector and the financial scale of the start-up project.

Our other findings, based on the estimation of probit and tobit regressions, suggest that the size of the informal financial sector is statistically significantly and positively associated with the entrepreneurial choice of external finance as compared with personal finance.²³ We interpret this result as an indication of the pecking order in financing choices, redefined to distinguish between formal and informal finance. The latter is more attractive to the entrepreneur as it is characterised by a lower informational asymmetry and therefore more likely to be offered and at lower cost.

Entrepreneurs' growth opportunities, being a business angel in the past and ownership structure based on more than one business partner appear among other statistically significant predictors of the use and size of external financing. Ownership structure effects can be interpreted in two ways. First, less concentrated (non-single) ownership may increase access to finance through mitigating the agency problem. On the other hand, a larger number of business

²³ We noted before that China and Russia are characterised by both weak property rights and financial over-regulation. Both factors should imply little use of external finance by entrepreneurs. However, China is one of the two countries in our sample (the other being Thailand) with the widest availability of informal finance (between 6-7% prevalence rate). This is likely to counterbalance the negative effects of the other two factors. In contrast, availability of external informal finance in Russia is much lower (between 1-2% prevalence rate). A number of other developing and transition countries in our sample are characterised by even lower supply of informal finance, including Brazil, Croatia, Poland and South Africa.

owners signifies a higher input of financial, human and social capital that is likely to trigger entrepreneurs to go for larger scale projects and increase both access and demand for external financing. Among our two macroeconomic indicators only per capita GDP comes across as significant in explaining the amount of self-funding (with a negative impact). This can be attributed to a more favourable environment in terms of access to formal institutional funding that entrepreneurs in countries with higher per capita GDP are more likely to face.

Entrepreneurs' socio-economic characteristics, such as age, gender, human capital and wealth emerge consistently as strong predictors of a start-up capital structure. Age exhibits a non-linear relationship with the use of external finance, suggesting that while young entrepreneurs are more likely to rely more on external funds to launch their business, the use of external funding declines with age as individuals tend to accumulate savings to be invested into the business. However, beyond a certain age point this pattern is reversed with more mature entrepreneurs becoming larger users of external financing. By that time they are likely to have some established reputation with their bank that may ease up their access to bank credit.

Males are more likely to enter entrepreneurship, use external finance, as well as to go for larger projects and willing to risk their own money, investing it into their business. This finding is consistent with some previous studies of entrepreneurship (Minnitti et al. 2005, Aidis et al. 2007).

We find some fragmentary reverse effects of human capital, measured by post-secondary and higher education jointly, and the use of external funding (see Table 4). As far as incremental impact of higher education is concerned, it is only picked up by the robust regression (see Table 7), showing an inverse relationship between the amount of personal funds (scaled down by per capita GDP) and a higher educational attainment, implying that better-educated entrepreneurs are more likely to secure external funding for their project. Interestingly, our results on personal characteristics contrast to some extent with Cassar's (2003) findings, suggesting that entrepreneurial individual characteristics, such as education, experience and gender, don't exert a significant effect upon start-up financing when firm characteristics are taken into consideration.

Finally, personal wealth emerges as a significant predictor of the use of both internal and external finance and the scale of the project, implying that

wealthier people are more likely to operate larger firms. This finding allows us to make some other interesting observations referring to the issue of liquidity constraints. While investigating the link between aggregate wealth and the average self-employment rate, Evans and Jovanovic (1989)²⁴ find the significant effects of wealth, implying that liquidity constraints are binding. These individual differences in access to finance nicely complement our cross-country differences obtained on the basis of the measures of both financial regulation and the size of the financial sector.

In our research we fail to find any significant effects of entrepreneurial embeddedness in social networks and of the role models on the startup financial choice. Though variation in industrial structure is found to be significant in explaining entrepreneurship entry (Johnson 2004) and industrial controls are commonly utilised in examining entrepreneurs' financial preferences (Cassar 2003), we failed to find any significant industrial effects in our research (results available on request).

Last but not least, an opportunity motive appears to be strongly and positively associated with the overall financial size of the project (Table 7).

Finally, as an additional robustness check, Tables 8-9 report the results of probit regressions for various types of external financing. We find that a wider financial sector is negatively related to the choice of institutional external funding (financial institutions and government funding) as opposed to an internal one; that reiterates our earlier argument on capital accumulation hypothesis. Interestingly, it also seems to matter for those who rely on informal investment. Strong property rights are more conducive to the use of institutional finance and more specifically conducive to the use of bank credit. Finally, growth opportunities, personal wealth and presence of co-owners emerge as significant predictors of informal finance.

²⁴ Parker (2004) points to some limitations of Evans and Jovanovic's study and, drawing on other research, offers possible alternative explanations for their finding.

Conclusions

Our key results may be summarized as follows.

Consistent with the literature we see the protection of property rights as a basic defining feature of any institutional environment. However, for our sample, we found it has no significant effect on entrepreneurial entry. On the other hand it is the main factor affecting the presence and volume of external finance for new ventures and as a result also the main driver of the overall volume of finance used for a start-up.

The only type of external finance that does not respond to the variation in property rights system is finance from family and relatives, where formal legal structure and practice may be substituted with informal institutions and relational capital. On the other hand, poor protection of property rights discourages both non-family individuals and institutional providers of finance (including banks) to provide funds to new entrepreneurial ventures.

Entrepreneurial talent is only partly correlated with personal wealth. Therefore, where external entrepreneurial finance remains underdeveloped, some high value-added projects will not be implemented. Overall economic efficiency will suffer.

Our second set of results relate to the characteristics of the financial sector. The financial sector development is only partly correlated with the basic protection of property rights, as it links more with the features of 'contracting institutions', using a terminology introduced by Acemoglu and Johnson (2005). Therefore, its impact may be considered on its own. Our findings suggest that the large financial sector plays an important role providing opportunities for the accumulation of personal finance for the potential entrepreneurial projects. However, while it is clearly complemented to some extent by informal finance, the size of the financial sector has no explanatory power for the volume of external finance available for new ventures. We believe that the underlying reason for this is related to the nature of the regulatory regimes. Both regimes which are under-regulated, but even more those that are over-regulated discourage finance for start-ups, which is by its nature risky and demanding.

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Table 1: GEM Classification of Nascent Entrepreneurial Activity (Startups)

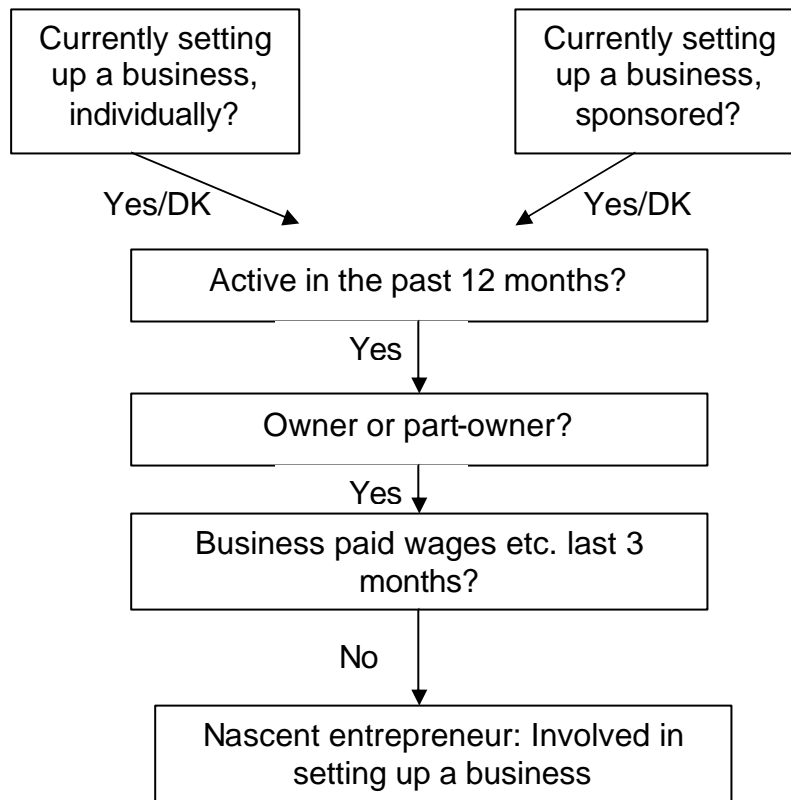


Table 2: Descriptive statistics and definitions of explanatory variables

Variable	Definition	Mean	S.D.	No of obser- vations	Available for years
Business environment variables:					
pro_rights	Heritage Foundation 'Property Rights' index, transformed in odds [Index/(100-Index)]; higher value denotes stronger property rights	6.46	3.55	358,278	1998-2003
credit_pri	Ratio of credit to private sector to GDP (WB WDI)	108.6	49.05	358,278	1998-2003
busang_prev	Informal investors prevalence	2.67	1.68	358,278	1998-2003
bus_constr	Heritage Foundation 'Business Freedom' index, transformed into odds [(100- Index)/Index]; higher value denotes higher entry barriers	0.33	.20	358,278	1998-2003
fin_reg	Transformed Heritage Foundation 'Financial Freedom' index, transformed in odds [(100-FFI)/FFI]	.62	.55	358,278	1998-2003
fin_reg_sq	The same squared			358,278	1998-2003
Control variables: Personal characteristics:					
male	1=male, zero otherwise	.47	.50	358,275	1998-2003
gemage	The exact age of the respondent between 14 and 99 at time of interview	43.87	17.00	326,487	1998; 2000-2003
gemage_sq	Age squared			326,487	
gemwork_dum	1=respondent is either in full or part time employment, 0 otherwise	.58	.49	317,649	1999-2003
educ_secpost	1=respondent has a post secondary or higher education attainment, 0 otherwise	.65	.48	347,746	1999-2003
educ_post	1=respondent has a higher education attainment	.29	.46	347,746	1999-2003
omestbbt_dum	1=current owner/manager of business, 0 otherwise	.05	.22	342839	2000-2003
busang_dum	1=business angel in past three years, 0 otherwise	.03	.16	357,773	1998-2003
discent_dum	1=respondent has shut down business in past 12 month, 0 otherwise	.03	.17	215,793	2002-2003
knowent_dum	1=personally knows entrepreneurs in past two years, zero otherwise	.33	.47	299,682	2000-2003

su_opport	1=nascent entrepreneur is driven by an opportunity motive, zero otherwise	.75	.43	10,081	2002-2003
gemhhinc_hig	1=respondent has high income, zero otherwise	.29	.45	232,960	1999-2003
suowner_mor1	1=start-up has more than one owner, zero otherwise	.44	.50	18,828	2000-2003
suyr5jo_mor0	1=start-up expects to create more than one job in 5 yrs	.54	.50	20,621	1999-2003
Control variables: measures of economic development					
gdp_pc_ppp	GDP per capita at purchasing power parity, constant at 2000 \$USD (WB WDI 2008)	23,158.79	8,310.30	358,278	1998-2003
d_gdp	Annual GDP growth rate (WB WDI 2008)	2.52	2.54	358,278	1998-2003

Source: GEM 1998-2003 unless specified otherwise

Table 3: Descriptive statistics and definitions of dependent variables

Variable	Definition	Mean	S.D.	No of observations	Available for years
suyy	1=respondent is engaged in startup activity, zero otherwise	.034	.18	342,839	2000-2003
sumon_ext	1=startup turns to external finance	.53	.50	6,600	2002-2003
sumon_exttot	Share of external funds in total startup funds				2002-2003
sumonext_gdp	Startup external funds in local currency scaled by nominal GDP (local currency) per capita (source for GDP: WB WDI 2008)	29.72	632.14	6,600	2002-2003
sumoney_indi	1=startup received external funding from individuals, 0 otherwise	.61	.49	5,588	2003
sumoney_inst	1=startup received external institutional funding, inc. bank finance, 0 otherwise	.44	.50	5,588	2003
sumoney_bank	1=startup received money from banks or other financial institut., 0 otherwise	.36	.48	5,588	2003
sumoney_nfam	1= startup received money outside family (individuals who are not relatives & institutions), 0 otherwise	.71	.45	5,588	2003
sumoney_ext	1=startup received any external funding (family, other indiv. & institutions)	.81	.39	5,588	2003

Source: GEM 1998-2003 unless specified otherwise

Table 4: Heckman probit estimation results

Outcome equation dependent: sumon_ext			Selection equation dependent: suyy		
Explanatory variables	Coef.	Robust Std. Err.	Explanatory variables	Coef.	Robust Std. Err.
gemage	-0.033^b	0.011	gemage	0.028^a	0.005
gemage_sq	0.000^c	0.000	gemage_sq	-0.000^a	0.000
male	0.039	0.127	male	0.303^a	0.031
gemwork_dum	0.078	0.104	gemwork_dum	0.198^a	0.050
educ_secpost	-0.167^d	0.095	educ_secpost	0.118^b	0.045
educ_post	-0.021	0.067	educ_post	0.108^a	0.037
omestbbt_dum	0.089	0.118	omestbbt_dum	0.060	0.050
busang_dum	-0.128	0.203	busang_dum	0.485^a	0.033
discent_dum	0.120^d	0.069	gdp_pc_ppp	-0.000	0.000
knowent_dum	0.108	0.079	d_gdp	-0.026	0.028
su_opport	-0.049	0.061	busang_prev	0.114^a	0.033
gemhhinc_hig	0.113^c	0.049	credit_pri	0.002	0.002
suowner_mor1	0.917^a	0.113	fin_reg	-0.368	0.362
suyr5jo_mor0	0.376^a	0.079	fin_reg_sq	0.116	0.161
busang_prev	0.025	0.051	bus_constr	-0.439	0.423
credit_pri	-0.002^d	0.001	pro_rights	-0.006	0.039
fin_reg	0.659^b	0.234	_cons	-2.889	0.426
fin_reg_sq	-0.266^b	0.089			
pro_rights	0.069^b	0.024			
d_gdp	-0.006	0.019			
gdp_pc_ppp	6.64E-06	0.000			
_cons	0.116	1.460			
No of censored obs	283751				
No of uncensored obs	3019				
rho (coef.)	-0.284		rho (robust std. err.)	.403	
Wald chi2 (21) (rho=0)	0.44 (p-value=0.505)				
Wald chi2	369.68				

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1

Table 5: Probit estimation results and marginal effects.

dependent:	probit results		probit marginal effects	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
sumon_ext				
gemage	-0.027 ^a	0.008	-0.011^a	0.003
gemage_sq	0.000 ^b	0.000	0.000^a	0.000
male	0.120 ^b	0.051	0.048^b	0.020
gemwork_dum	0.060	0.069	0.024	0.027
educ_secpost	-0.146^d	0.086	-0.058	0.034
educ_post	0.009	0.057	0.003	0.023
omestbbt_dum	0.110	0.106	0.043	0.041
busang_dum	-0.011	0.081	-0.004	0.032
discent_dum	0.126^d	0.071	0.049^d	0.028
knowent_dum	0.110	0.805	0.043	0.032
su_opport	-0.051	0.062	-0.020	0.024
gemhhinc_hig	0.116^c	0.052	0.046^c	0.020
suowner_mor1	0.951^a	0.084	0.364^a	0.030
suyr5jo_mor0	0.389^a	0.069	0.154^a	0.027
busang_prev	0.052^b	0.021	0.021^a	0.008
credit_pri	-0.001^d	0.001	-0.001^d	0.000
fin_reg	0.603^c	0.218	0.239^b	0.087
fin_reg_sq	-0.255^b	0.081	-0.101^b	0.002
pro_rights	0.073^a	0.016	0.029^a	0.006
d_gdp	-0.013	0.012	-0.005	0.005
gdp_pc_ppp	1.63E-06	4.79E-06	6.46E-07	1.90E-06
_cons	-0.867	0.280		
Number of obs	3019		3019	
Wald chi2 (21)	596.93		596.93	
Pseudo R2	0.154		.154	

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1

Table 6: Tobit estimation results

Explanatory variables	summon_exttot		sumonext_gdp	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
gamage	-0.010^a	0.003	-3.37	3.60
gamage_sq	0.000^b	0.000	0.010	0.047
male	0.074^b	0.024	68.45	52.07
gemwork_dum	0.025	0.033	27.38	51.69
educ_secpost	-0.055	0.039	-82.90	78.98
educ_post	0.008	0.024	39.65	45.06
omestbbt_dum	0.053	0.048	10.79	56.56
busang_dum	0.003	0.030	176.27	132.29
discent_dum	0.040	0.029	17.95	32.94
knowent_dum	0.040	0.038	52.97	47.69
su_opport	-0.027	0.026	-18.29	33.94
gemhhinc_hig	0.042^d	0.023	84.134	55.72
suowner_mor1	0.418^a	0.039	468.34^c	206.54
suyr5jo_mor0	0.203^a	0.035	233.54^c	115.52
busang_prev	0.025^a	0.007	14.08	9.90
credit_pri	-0.001^d	0.000	-0.501	0.559
fin_reg	0.230^c	0.089	203.23^c	91.66
fin_reg_sq	-0.102^b	0.036	-101.26^c	46.07
pro_rights	0.029^a	0.008	32.21^d	16.72
d_gdp	-0.004	0.006	-2.49	6.36
gdp_pc_ppp	2.85e-06	2.14e-06	-0.001	0.004
_cons	-0.398	0.105	-1114.52	473.43
Number of left-censored obs	1399		1399	
Number of uncensored obs.	1620		1620	
Sigma	0.521	.024	951.67	421.7
F (21, 2998)	35.79		9.65	
Pseudo R2	0.126		.0081	

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1

Table 7: Robust regression results

Explanatory variables	sumontot_gdp		sumonown_gdp	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
gemage	0.018^a	0.008	0.013^a	0.004
gemage_sq	-0.000^d	0.000	-0.000^c	0.000
male	0.245^a	0.043	0.120^a	0.023
gemwork_dum	0.067	0.052	0.039	0.028
educ_secpost	-0.048	0.057	0.038	0.024
educ_post	-0.049	0.046	-0.063^b	0.024
omestbbt_dum	0.050	0.073	0.016	0.038
busang_dum	0.327^a	0.064	0.127^a	0.034
discent_dum	-0.046	0.062	-0.026	0.033
knowent_dum	0.055	0.044	0.040^d	0.023
su_opport	0.146^b	0.051	0.096^a	0.027
gemhhinc_hig	0.184^a	0.042	0.075^a	0.022
suowner_mor1	0.184^a	0.040	0.035	0.021
suyr5jo_mor0	0.422^a	0.061	0.194^a	0.033
busang_prev	-0.007	0.009	-0.012^b	0.005
credit_pri	0.001^d	0.001	0.001^b	0.000
fin_reg	0.410^b	0.133	0.129^d	0.071
fin_reg_sq	-0.039	0.057	-0.005	0.030
pro_rights	0.033^a	0.009	0.007	0.005
d_gdp	0.005	0.009	0.005	0.004
gdp_pc_ppp	-0.000	4.17e-06	-0.000^a	2.24e-06
_cons	-0.589	0.202	-0.235	0.106
Number of obs	3280		3130	
F st.	17.19		13.41	

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1

Table 8: Bivariate probit regression results

Explanatory variables	sumoney_indi		sumonown_gdp	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
gemage	-0.021	0.014	-0.001	0.011
gemage_sq	0.000	0.000	0.000	0.000
male	0.113	0.077	0.193^b	0.066
gemwork_dum	0.041	0.086	-0.035	0.082
educ_secpost	-0.001	0.096	0.212^b	0.073
omestbbt_dum	-0.111	0.102	-0.048	0.084
busang_dum	-0.014	0.091	0.032	0.076
knowent_dum	0.058	0.076	0.035	0.064
su_opport	-0.019	0.053	0.013	0.081
gemhhinc_hig	0.116^d	0.060	-0.087	0.071
suowner_mor1	0.270^b	0.092	-0.010	0.055
suyr5jo_mor0	0.253^b	0.084	0.095	0.093
pro_strong	-0.259	0.191	0.512^b	0.163
credit_pri	0.003^d	0.001	-0.003^b	0.001
busang_prev	0.011	0.014	-0.025	0.019
d_gdp	0.014	0.029	0.015	0.032
_cons	0.175	0.344	-0.429	0.328
Number of obs	2299			
Wald chi2 (32)	1280.7 P-value=0.000			

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1

Table 9: Probit marginal effects: types of external financing

Explanatory variables	sumoney_bank		sumoney_inst		sumoney_nfam		sumoney_ext	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
gemage	-0.004	0.005	-0.000	0.004	-0.000	0.004	-0.003	0.003
gemage_sq	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
male	0.054^c	0.026	0.077^b	0.026	0.077^a	0.026	0.083^a	0.024
gemwork_dum	0.018	0.024	-0.014	0.033	-0.014	0.033	-0.002	0.028
educ_secpost	0.078^b	0.027	0.083^b	0.029	0.083^c	0.029	0.020	0.020
omestbbt_dum	-0.017	0.029	-0.018	0.033	-0.018	0.033	-0.021	0.026
busang_dum	0.026	0.034	0.013	0.030	0.013	0.030	-0.011	0.022
knowent_dum	0.019	0.027	0.014	0.025	0.014	0.025	-0.002	0.021
su_opport	-0.017	0.036	0.006	0.032	0.006	0.032	0.016	0.021
gemhhinc_hig	-0.039	0.026	-0.034	0.028	-0.034	0.028	0.026^d	0.015
suowner_mor1	-0.024	0.025	-0.004	0.022	-0.004^b	0.022	0.077^a	0.024
suyr5jo_mor0	0.028	0.032	0.037	0.037	0.037^b	0.037	0.083^b	0.035
pro_strong	0.137^b	0.053	0.199^b	0.060	0.199^c	0.060	0.062	0.046
credit_pri	-0.000	0.000	-0.001^b	0.000	-0.001	0.000	0.000	0.000
busang_prev	-0.019^a	0.006	-0.010	0.008	-0.009	0.008	-0.000	0.003
d_gdp	0.008	0.011	0.006	0.013	0.006^d	0.013	0.008	0.008
No. of obs	2299		2299		2299		2299	
Wald chi2	95.44		42.80		218.48		150.16	
Pseudo R2	0.031		0.030		0.094		0.05	

Note: ^a significant at 0.001; ^b significant at 0.01; ^c significant at 0.05; ^d significant at 0.1