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What determines the level of informal venture finance investment? Market clearing forces and gender effects

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Abstract:
We estimate a two-equation model to jointly determine the number of informal investors and the amount of money that they invest over the last 3 years. Our model uses data on 126,189 individuals in 21 highly developed countries in the period 2002-2006. We delve deeper into the hypothesis of Burke *et al* (2010) that 'the demand for informal venture finance tends to generate its own supply'. To our knowledge, we undertake the first research to move analysis of the supply of informal venture finance investment beyond estimating the propensity for a person to become an informal investor and onto the core concern which is the total volume of venture finance. We find that a one per cent increase in entrepreneurial activity increases the number of informal investors by 1.702 per cent. However, the average invested amount declines by 0.827 per cent leading to a net positive total increase by 0.861 per cent. This result indicates that, to a considerable extent, demand for informal investment creates its own supply. This effect is stronger for males than females. We also find that the level of venture capital investment has a net positive effect on the level of informal investment and that this effect is stronger for females than males.

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1. Introduction

Informal venture finance is the main source of external equity finance for business start-ups (Berger and Udell, 1990, and Bygrave et al., 2003). Compared to other forms of venture finance it is typically earlier stage. It is arguably the most important type of venture finance as it is focused at the start-up stage of business venturing where finance constraints are most acute i.e. most venture capital and loan finance is focused on lower risk and larger increment later stage finance. Informal venture finance comprises several forms of investment encompassing a spectrum from professional business angels through to amateurs. The importance of informal venture finance investment is also underlined by the fact that it is the biggest form of investment for new ventures – even business angel finance which is a subset of informal venture finance investment, has been shown to be larger than venture capital (Sohl, 1999, and Mason and Harrison, 2000). Despite its importance there has been no research to our knowledge which has addressed the pivotal question of: what determines the volume of informal venture finance investment? There have been several studies which extensively describe and analyze the characteristics and behaviour of informal investors (e.g. Hessels, 2005, Hindle and Rushworth, 2001, Wong and Ho, 2007, Maula et al., 2005, Szerb et al., 2007, Burke et al., 2010) and in the process give an insight into the question of who becomes an informal investor.

However, none have focused on the more important question of what determines the *total level of investment* undertaken by informal investors? This paper aims to fill this gap by jointly investigating the determinants of both the prevalence and the investment volumes of informal investors. The objective, therefore, is to explain the total level of informal investment in an economy which is simply the number of informal investors *multiplied by* the total amount invested per investor over the last 3 years. So the current paper builds on the work of Burke et al (2010) who investigated the relationship between entrepreneurial activity and the number of informal investors. They find a virtuous interactive effect where the demand for informal investment finance by entrepreneurs tends to generate some of its own supply. Hence the novelty of their paper is the finding of a market force which promotes market clearing in a market most known for finance gaps and constraints. This paper takes the analysis to the next logical step which is to estimate the determinants of the level of investment undertaken by informal investors so that an aggregate economy level net effect of entrepreneurial activity on the total level (in money terms) of informal investment can be estimated.

We also investigate how the determinants of total investment volumes differ between men and women. There is extensive evidence to support the view that female entrepreneurs face greater financial constraints than men in terms of debt and venture capital.[1] There has been less research on the gender dimension of business angel finance (Brush et al 2004, Amatucci and Sohl 2004, Becker-Blease and Sohl, 2007). Females account for a minority – typically less than 5% (Harrison and Mason, 2007) - of business angels. This can affect the supply of funds available to female entrepreneurs if female investors are more likely to invest in female entrepreneurs. There has been no research to our knowledge on the gender dimension

[1] There is a considerable body of research indicating that female entrepreneurs find it more difficult to raise loan finance than males (Riding and Swift 1990, Fay and Williams 1993, Carter and Rosa 1998 and Verheul and Thurik 2001).

of the determinants of the total volume of informal venture finance investment which comprises business angel finance and funding by the 3Fs – friends, family and fools (Bygrave et al., 2003, and Sohl, 1999, 2003).[2] In terms of finance gaps early stage finance for women is acutely important for entrepreneurial economic performance and on this basis alone deserves a special analysis. Therefore, our analysis also extends to address the related question of the assessing how the determination of the volume of informal venture finance investment varies by gender.

To these ends we employ a data base of 126,189 individuals in 21 highly developed countries that participated in the Global Entrepreneurship Monitor (GEM) in the period 2002-2006. For the individuals in the data base, it is known whether they informally invest, and if so, how much. Lots of other characteristics are available as well. Using these data, we estimate a two-equation model, explaining the prevalence of being an informal investor and the amount invested. To the best of our knowledge this is the first paper to estimate the determinants of the total supply of informal investment. In doing so, we aim to give some new insights into one of the key drivers of the entrepreneurial economy.

In the estimation model, we distinguish between micro-level and macro-level determinants. For the *micro-level* determinants we find that involvement in entrepreneurial activity – whether ongoing or having resulted in exit – increases the probability of becoming an informal investor. Regarding the amount invested, informal investors who currently own a business, or who think they have the skills to start a new business are likely to make a higher investment. The former effect (owning a business) primarily applies to women whereas the latter effect (self-efficacy) primarily applies to men. Focusing on the *macro-level* variables we find that a country's level of entrepreneurial activity increases the supply of informal investors but decreases the amount invested per investor. Nevertheless, at the macro level these results together imply a positive relation between a country's level of entrepreneurial activity and the total amount of informal investment. Hence, to some extent the demand for informal investment (indicated by entrepreneurial activity) creates its own supply. We find this effect is stronger for males rather than females which may indicate some homophily gender bias in informal investor decisions.

Our results also suggest that a higher level of formal venture capital investment (VCI) leads to a higher total level of informal investment. This net effect arises from a positive effect of VCI on the number of informal investors (likely to be a complementary effect due to increased opportunities for exit and/or follow on VCI finance) overpowering a negative (substitution/competition) effect of VCI on the amount invested per informal investor. This net positive effect is mainly a female driven outcome. This may be due to the fact that when VCI levels are high, competition among traditional (male dominated) VCI funds forces VC finance into more female ventures and hence due to homophily gender bias has a stronger net complementary effect on female informal investors.

The organization of the paper is as follows. The next section describes the data and theory to be tested. This section also describes the variables and data sources employed in

[2] O'Gorman and Terjesen (2006) address a very different research question. They look at statistical differences between the profiles of male and female investors and entrepreneurs in Ireland. They do not estimate either the determinants of a person becoming an informal investor nor the amount that they invest.

this paper. Since the investment volumes of informal investors are rarely used in empirical work, this section also contains a large array of descriptive statistics concerning prevalence and investment volumes of informal investors. Section 3 describes the estimation methods used to estimate prevalence and investment volumes of informal investors. The final sections provide estimation results and conclusions.

2. Theory and data

Burke et al. (2010) proposed the general hypothesis that the demand for entrepreneurial finance can generate its own supply. The proposition has significant relevance for policy as it indicates a degree of inter-temporal market clearing in the realm of early stage venture finance – the area most noted for venture finance gaps. A key argument proposed by Burke et al (2010) is that greater human and financial capital (particularly that accumulated through entrepreneurship) relevant for business angels are likely to increase the rate of return on informal investment activity. This increases both the number of people who choose to become informal investors and the amount invested per investor. Burke et al (2010) only test the first part of this central hypothesis by estimating the impact of macro and micro measures of entrepreneurial activity on the prevalence of informal investment activity. The results support the central hypotheses. The purpose of this paper is to push the analysis to its logical conclusion in order to assess the impact of entrepreneurial activity on the total level of informal investment - which is itself equal to the number of informal investors multiplied by the total amount invested per investor over the last 3 years. The aim is to be able to assess how the total level of informal venture finance responds to entrepreneurial activity and other core economic data. This will help policy makers better understand the economic circumstances in which there is most likely to be a deficient supply of informal venture finance but also the extent to which this finance gap is self-correcting through natural market dynamics.

Micro relationships

Since the theory in Burke et al (2010) is mainly focused on the determinants of the propensity to become an informal investor we need to augment this with some discussion of theory relating to the determinants of the amount of investment per investor. If one takes a short term fixed endowment of human and financial capital view then a classical economics limited resource allocation challenge arises. Evans and Jovanovic (1989), Burke et al (2000) and Campbell (2003) find the existence of finance constraints among entrepreneurs, and if one assumes a person's endowment of resources is fixed then more resources devoted to being an entrepreneur leaves less available for informal investment. In this light, one would expect a negative micro relationship between a person being an entrepreneur and the amount of money they would be likely to invest in a new venture.

However, if one considers longer term effects then an accumulative rather than trade-off micro relationship can exist between a person being an entrepreneur and the amount of informal investment that they make. Mason (2006) and The Economist (2006) note that prior to becoming informal investors people were often entrepreneurs. The evolution from entrepreneur to informal investor is driven by the finance received from business harvest and exit activity (Mason and Harrison, 2006). So over a longer time horizon entrepreneurial activity might enhance rather than deplete a person's financial endowment available for informal investment. In

addition, having already earned a good return on investment in their own business entrepreneurs are likely to be tempted to try investment in another entrepreneurial type investment. Thus, in this scenario one would expect a positive micro relationship between entrepreneurship and the amount of informal investment undertaken.

This outcome becomes even more likely if one considers the roles of human capital and non pecuniary motivation. The factors associated with determining the choice to become an entrepreneur such as business skills, tolerance for risk and uncertainty, and enjoyment from the excitement associated with new ventures (Knight, 1921, Burke et al., 2000, Campbell, 2003, Kelly, 2007, and Riding et al., 2007) are among the same attributes that attracts people to become informal investors (Burke et al, 2010). Some of these attributes may be enhanced by being an entrepreneur. Business skills can be enhanced by experience in entrepreneurship and likewise risk management skills are likely to be enhanced through real life experience of having to deal with risk. Uncertainty is reduced as entrepreneurial experience creates a more informed understanding of the risks and rewards of business venturing alongside a better understanding of the venture finance process. So combined these factors have potential to increase the amount invested by entrepreneurs. This leads to theorem 1.

> *Theorem 1: At the micro level, the effect of entrepreneurial activity on the amount of investment by informal investors will be negative or positive, dependent on whether financial constraints or human and capital accumulation effects dominate.*

Macro relationships

In addition to testing the micro relationships between an individual's entrepreneurial activity and the scale of the investment undertaken by the same individual we also look at the macro relationship between a country's level of entrepreneurial activity and the amount of investment undertaken by each individual – and then afterwards aggregate the latter up to a macro effect. The greater the level of total entrepreneurial activity (TEA) the more informal investment opportunities that exist. If investors perceive this as a greater supply of good investment opportunities then the number of informal investors will increase (evidence to support this is generated in Burke et al, 2010). However, the impact on the amount invested per informal investor is less clear. More investment opportunities may create greater scope to spread a given investment fund across a wider range of investments in a bid to reduce risk. It may also cause increased competition for funds among entrepreneurs and so imply that investors can place smaller investment amounts to gain the same amount of equity. These effects would cause a negative macro relationship between TEA and the amount of money invested per informal investor. But it is also plausible the greater ability to reduce risk through a wider portfolio of investment as well as cheaper equity through greater competition among entrepreneurs may actually cause informal investors to increase the amount of money they invest in business ventures.

> *Theorem 2: If the net effect of entrepreneurial activity on the number of people choosing to become informal investors and the amount they invest is positive then at the macro level, the demand for informal investment (as indicated by total entrepreneurial activity) will have a positive impact on total supply.*

It is also possible that the level of formal venture capital investment (VCI) can lead to a higher total level of informal investment. Venture capital can present opportunities for informal investors (who are usually early stage investors) to exit thereby increasing the liquidity and hence value of informal investment. Similarly, venture capital can increase the value of early stage informal investment by providing a supply of follow-on rounds of later stage finance for the same venture. These effects promote a positive relationship between VCI and both the number of people choosing to make informal investments and the amount that they invest. However, a proportion of VCI is typically targeted at early stage investment and hence is in competition with informal investment. Gompers and Lerner (1999) show a positive relationship between VCI levels and the proportion of venture capital devoted to early stage investments. This would thereby promote a negative relationship between the level of VCI and both the number of people choosing to make informal investment and the amount that they invest. Combined these effects lead to Theorem 3:

> *Theorem 3: VCI will have a positive effect on the total supply of informal investment if the positive complementary effects of exit and follow-on finance outweigh the negative competition effects.*

Gender effects

The gender dimension of entrepreneurial finance has highlighted the importance of networks, self-efficacy, confidence, and risk taking. Social behaviour is such that people can gravitate towards others who are similar to themselves and in this manner entrepreneurial networks can have a degree of gender segregation (Moore 1990, Ruef et al, 2003). If gender homophily also extends to business angels and likewise to their preference to invest in entrepreneurs of the same sex then the male dominance of business angel networks may pose a considerable financial constraint for female entrepreneurship (Aldrich 1989, Verheul and Thurik 2001, Ruef et al 2003, and Harrison and Mason 2007). Gender homophily could, therefore, play a positive moderating role on the positive relationship found by Burke et al (2010) where higher levels of entrepreneurial activity in an economy generate a greater supply of informal venture finance investors i.e. the demand for entrepreneurial finance can generate its own supply. Homophily also implies that having a higher level of female entrepreneurship in an economy expands the relatively small supply of female venture investment opportunities.

There is much evidence to suggest that females have lower entrepreneurial self-efficacy and confidence than males so restraining the supply of female entrepreneurs (Matthews and Moser 1995, and Kourilsky and Walstad 1998). If females are overly pessimistic about their entrepreneurial ability then this is likely to be revealed to those that engage in some form of entrepreneurship. The resulting upward re-evaluation of self-efficacy/confidence would be expected to have a moderating effect on the findings of Burke et al (2010) where the propensity to become an informal business angel was positively affected by experience in entrepreneurship.

> *Hypothesis 1: The positive impact of entrepreneurial experience on the supply of informal venture finance will be stronger for females than for males.*

Females are also viewed as being more risk averse than males (Powell and Ansic 1997, Jianakoplos and Bernasek, 1998, Grable 2000 and Ackert et al 2002). As a result, Becker-Blease and Sohl (2008) find evidence that females gravitate towards less risky later stage investment. But it is also the case that later stage investment typically entails larger investment per venture than more riskier early stage investment. Another possible impact of greater risk aversion among females is the tendency to overinvest in (i.e. overfund) ventures in order to reduce the probability of cashflow shortages and hence the associated risk of business failure. Combined, these points give us hypothesis 3.

> *Hypothesis 2: Greater risk aversion among females will reduce their propensity to become informal venture finance investors but, relative to males, increase the amount that they invest.*

2.1 Prevalence and investment volumes of informal investors

In order to enable an empirical investigation of the determinants of informal investment volumes and test the associated hypotheses, we use data from the Global Entrepreneurship Monitor (GEM). GEM is an international research program that provides harmonised annual data on national levels of entrepreneurial activity. Each year about 2,000 individuals, drawn randomly from the adult population, are being interviewed in an increasing number of countries using a standardised telephone survey. For the present paper we use data collected in the years 2002, 2004 and 2006[3] for 30 highly developed countries.[4] Since the set-up of the GEM survey is the same for each year we can pool the annual data into a single file containing 338,501 micro-level observations. Among this group 7,762 individuals (2.3%) are marked as an informal investor.[5] In the remainder of Section 2 we describe the variables used in this study, including their sources. This concerns the dependent variables in our estimation model, (i.e. the prevalence of informal investors and their investment volumes), as well as predictors that can possibly explain the variation of these two variables between individuals and across countries (Sections 2.1 and 2.2). We also provide several descriptive statistics describing prevalence and investment volumes of informal investors (Section 2.3).

Dependent variables

A respondent is defined to be an informal investor if he or she agrees with the following statement: "You have, in the past three years, personally provided funds for a new business started by someone else, excluding any purchases of stocks or mutual funds" *and*, in addition, reported the amount of money they invested in the

[3] The initial period under investigation was 2002-2006. Since for the years 2003 and 2005, data on an important explanatory variable (viz. Venture Capital Investment (VCI)) were not available, we left these years out of the analysis.

[4] Highly developed countries are countries that are categorised as "high-income economies" by the World Bank. The reason we only use data for highly developed countries is that the number of observations for the lower developed countries is insufficient. In particular, data of several control variables are missing.

[5] The descriptive statistics presented in this section are based on the larger sample of 7,762 informal investors. When we estimate the econometric model, in Section 4, less observations are used due to missing observations for several explanatory variables. See Appendix 1 for the distribution of available observations and missing values across countries and variables.

past three years.[6] The average invested amount among all informal investors is equal to $30,799. Each informal investor reports the invested amount in the currency of his or her country. To compute the average invested amount in US$ we therefore converted the reported amount to US$ using real exchange rates provided by the United States Department of Agriculture (USDA).[7]

2.2 Independent variables

The group of independent variables used can be split into two categories. The first group of variables are control variables containing demographic and structural characteristics at both the micro and macro level. The second group of variables are explanatory variables and mainly consists of measures of entrepreneurial activity at the individual and country level. We proceed with an overview and justification of all variables included in the analysis. Operationalizations of the variables are provided in Appendix 2.

Control variables – micro level

We control for gender, age, education and household income. Concerning gender, women are known to have a lower tendency to become an informal investor, hence we control for gender. Concerning age, the supply of informal venture finance is likely to be positively related to age as spending more years in the workforce enables greater accumulation of human and financial capital relevant for business angel activity. Greater levels of wealth increase the propensity of individuals to take venture finance risks (Burke and Hanley, 2003 and 2006) and hence can increase both the prevalence and volume of informal investment. Concerning education, the supply of informal venture finance is likely to be positively related to education as greater human capital increases the ability and hence performance of informal investors. Finally, a higher household income increases the financial possibilities to make an informal investment.

Control variables – macro level

We control for real GDP growth and the short-term interest rate. GDP growth is a measure of business opportunities and hence is used as a proxy for the demand for venture finance. Concerning the short-term interest rate, to the extent that loan finance is an alternative/substitute for equity finance, one would expect a positive relationship between the cost of loan finance (interest rates) and the demand for (hence return on) informal investment. However, loan finance is often used as a complement to equity finance – particularly, as gearing is a popular means of boosting return on investment – and so a higher cost of loan finance may reduce the expected returns and hence supply of informal equity finance.

Explanatory variables – micro level

We use a cohort of variables containing measures of entrepreneurial activity which provide insight into an individual's assessment of the expected return from informal investment as well as factors that influence an individual's level of human and financial capital relevant for performance as a business angel. In particular, the

[6] Respondents indicating to be an informal investor are asked additional questions with regard to the investment volume. Since not everyone answers these questions, we only count individuals reporting their investment volume as informal investors. Individuals who indicate they are an informal investor but who do not report their invested amount are treated as missing.

[7] See http://www.ers.usda.gov/Data/Macroeconomics/Data/HistoricalRealExchangeRatesValues.xls.

variables indicate whether an individual: is the owner-manager of a company; is trying to start a new business; has plans to start a business in the near future; is trying to start a new business on behalf of his or her employer; has shut down his or her business in the past 12 months; perceives new business opportunities; fears failure in case of a business start-up (an indicator of risk aversion); thinks he or she has the skills to start a new business; personally knows an entrepreneur.

Furthermore, in the equation explaining the investment volume of informal investors, we also use the relationship of the informal investor to the investee (family member; friend or colleague; stranger) and the informal investor's expected pay-off as additional variables. Investment in a friend or family member's business might be driven by non-pecuniary factors while one would imagine that investment in a business owned by a stranger would be more purely motivated by financial gain. Therefore, invesment levels in businesses owned by strangers may be expected to be higher. Regarding the expected pay-off, one would expect the average size of investment to be larger in cases where the informal investor expects to make a financial gain compared to those where the expectation is that the investment is effectively a gift or to some extent written off.

Explanatory variables – macro level

First, we use the percentage of adult population that is either actively involved in starting a new business or is the owner-manager of a young business (the so-called TEA rate, or total entrepreneurial activity rate). The greater the level of entrepreneurial activity the more the demand (opportunities) for informal investment finance. This is likely to give rise to an increase in the number of informal investors. Whether or not it increases the average size of investment made by informal investors depends on whether incremental changes in TEA comprise ventures above or below average size.

Second, we use formal VCI per capita. Venture capital is a typical source of follow on (later stage) finance for informal investors who typically provide seed or start-up finance. To this extent, higher VCI per capita may increase the returns on informal investment and so enhance the supply of informal finance. But a proportion of the VC industry competes with informal investors for investment opportunities in early stage investment. This proportion usually rises when there are high levels of VC funds (competition among later stage VCs forces some of them to migrate to early stage). This causes greater competition for early stage investment opportunities and so reduces the returns on and supply of informal venture finance.

2.3 Descriptive statistics

We will now present several descriptive statistics that provide insight into the distribution of informal investors, across several dimensions, as well as the amounts invested. These statistics are based on the group of 7,762 informal investors identified earlier. For some statistics this number is smaller due to missing observations on the dimension variable. The descriptive statistics will also be provided for males and females separately. Within the sample of males, the dataset identifies 4,700 informal investors, corresponding to 3.0% of the male adult population. In the sample of females, 3,062 (1.7%) informal investors are identified.

Gender

Table 1 shows the distribution of informal investors by gender. Most informal investors are men. Their average investment volume is twice that of women.

Table 1 Distribution of informal investors and amount invested by gender (N=7,762)

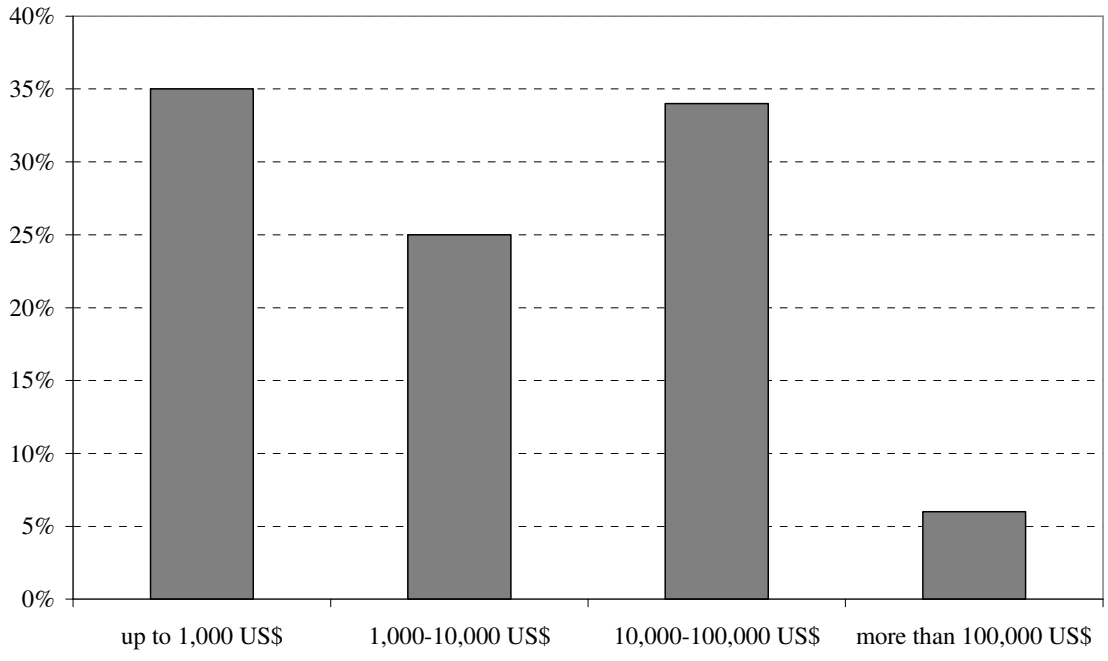
Gender	Percentage of informal investors	Average invested amount (US$)
Male	61	38,199
Female	39	19,440

Source: Global Entrepreneurship Monitor

Invested amounts

Figure 1 reveals that, over a three-year period, most informal investors invest an amount of money up to 1,000 US$ (35%). About a quarter invests between 1,000 and 10,000 US$, while 34% invests between 10,000 and 100,000 US$. Only 6% of the informal investors invests more than 100,000 US$.[8]

Figure 1 Distribution of investment volumes of informal investors, total sample (N=7,762)

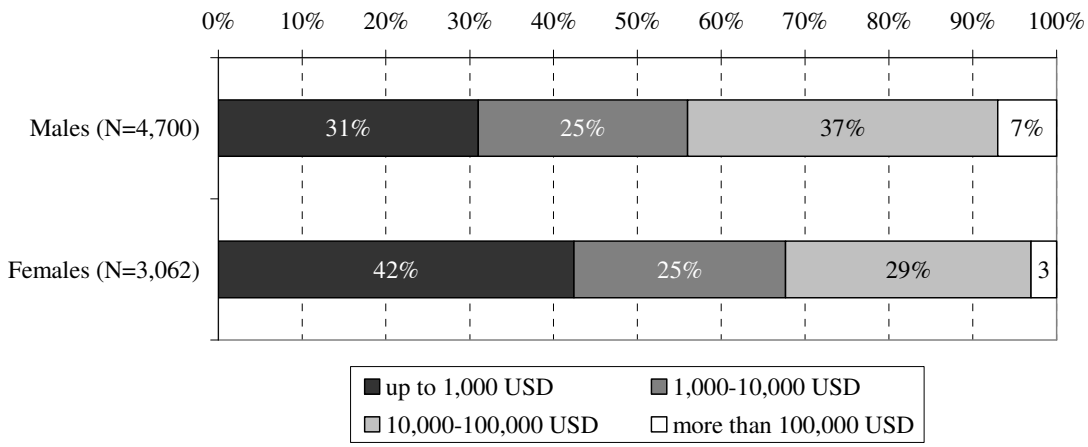


Source: Global Entrepreneurship Monitor

When focusing on males and females separately, Figure 2 shows that the distribution of investment volumes of male and female informal investors is quite different. While 31% of the males invest an amount up to 1,000 US$, 42% of the females invest a similar amount. About a quarter of both males and females invests between 1,000 and 10,000 US$, but substantially more males invest an amount higher than 10,000 US$ (44% of males versus 32% of females).

[8] For 30 observations (out of 7792) the informal investment volume exceeds $2 million US$. We do not consider the nature of these huge investments informal. We excluded these outlier observations from the analysis.

Figure 2 Distribution of investment volumes of male and female informal investors (N=7,762)



Source: Global Entrepreneurship Monitor

Age

Table 2 shows the distribution of the total sample of informal investors by age. The vast majority of informal investors is between 25 and 64 years of age (82%). The remaining two categories "18 to 24 years" and "65 years or older" mainly consist of students and retired persons respectively. When looking at the average amount invested (in US$) by age category, it follows that the average invested amount increases with the respondent's age. Young people (those younger than 35 years of age) make considerably smaller investment than people older than 35 years.

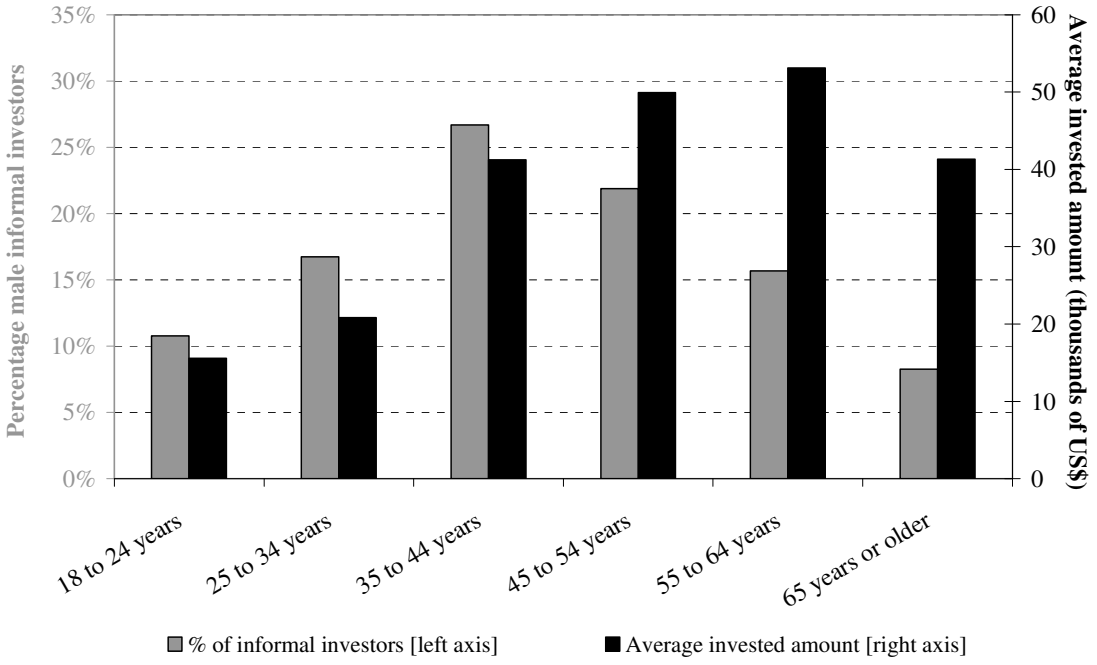
Table 2 Age distribution of informal investor prevalence and amount invested, total sample (N=7,331)

Age in 6 categories	Percentage of informal investors	Average invested amount (US$)
18 to 24 years	10	14,000
25 to 34 years	16	19,000
35 to 44 years	27	33,000
45 to 54 years	23	38,000
55 to 64 years	16	39,000
65 years or older	8	35,000

Source: Global Entrepreneurship Monitor

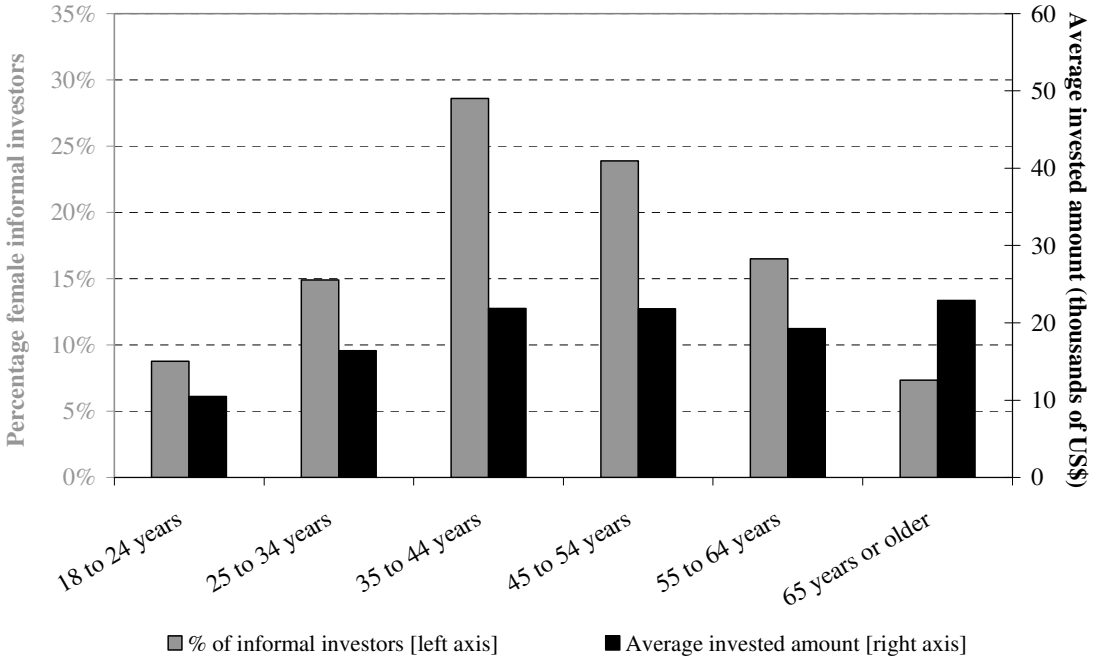
The age distributions for male and female informal investors separately, are displayed in Figure 3A and Figure 3B. Interestingly, this shows that the relative age distribution is similar for males and females. As for the total sample, the vast majority of informal investors is between 25 to 64 years of age. The difference between men and women concerns the amount they invest informally: males' average investment volume is twice that of females. Apart from the amount itself, the distribution by age category also varies. For males we clearly observe an increasing pattern (except for the oldest category) while for females the variation of investment volumes over the various age categories is not so large.

Figure 3A Distribution of male informal investors (%) and average amount invested (US$) by age category (N=4,459)



Source: Global Entrepreneurship Monitor

Figure 3B Distribution of female informal investors (%) and average amount invested (US$) by age category (N=2,872)



Source: Global Entrepreneurship Monitor

Education

Table 3 shows the distribution of the total sample of informal investors by education. Almost two-fifth (38%) of the informal investors are highly educated (i.e. completed post-secondary education and/or has graduate experience). The remain-

ing two groups of low- and medium-educated informal investors account for 30% and 32% respectively. Highly educated investors generally invest more ($46,000 on average) than informal investors with a low or medium level of education ($20,000 resp. $23,000).

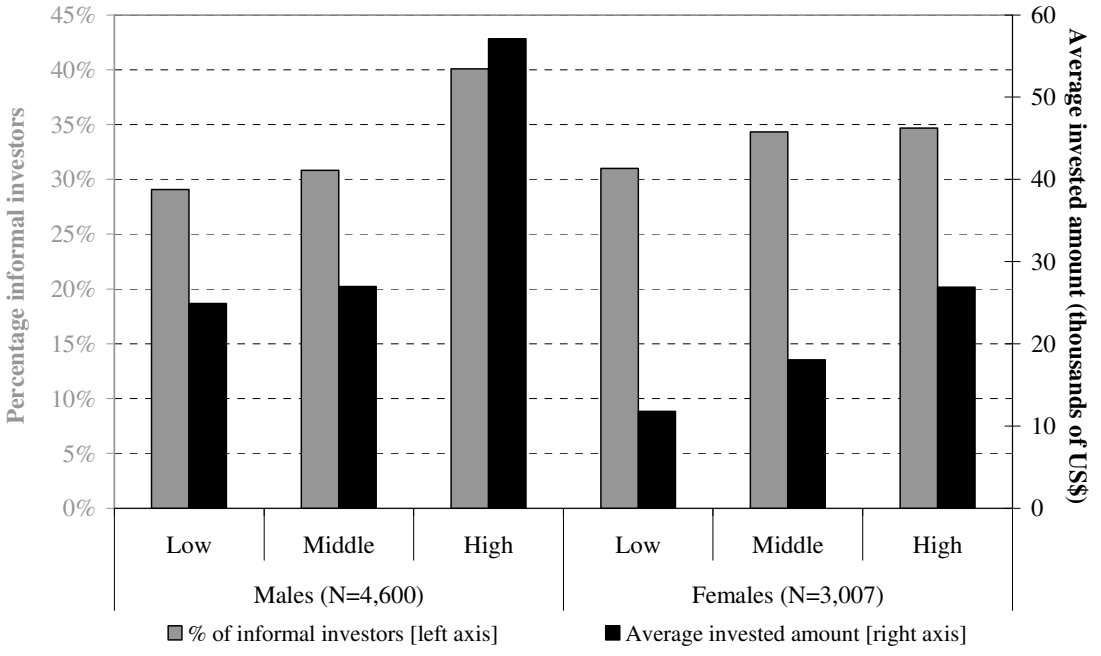
Table 3 Distribution of informal investors (%) and average amount invested (US$) by level of education, total sample (N=7,607)

Education in 3 categories	Percentage of informal investors	Average invested amount (US$)
Low	30	19,512
Medium	32	23,209
High	38	46,186

Source: Global Entrepreneurship Monitor

Figure 4 shows how education is related to the decision to informally invest for male and female informal investors separately. There is not much difference between the distribution of informal investors by level of education for males and females. Informal investment activity increases by level of education. This pattern also holds for the average invested amount. As education increases, male and female informal investors invest a larger amount. Highly educated male investors however, invest more than twice the amount medium-educated males invest. For female investors, the average invested amount increases more gradually with education.

Figure 4 Distribution of male and female informal investors (%) and average amount invested (US$), by level of education (N=7,607)



Source: Global Entrepreneurship Monitor

Relationship with investee

Table 4 shows that more than 50% of the informal investors invests in the company of a family member. In addition, a substantial group (37%) invests in companies of friends and working colleagues and only 9% of the informal investors in-

vests in firms of strangers. However, firms of strangers receive much more money: with an average amount of almost $80,000 the amount invested in firms of strangers is more than twice the amount invested in firms of family members or friends/colleagues.

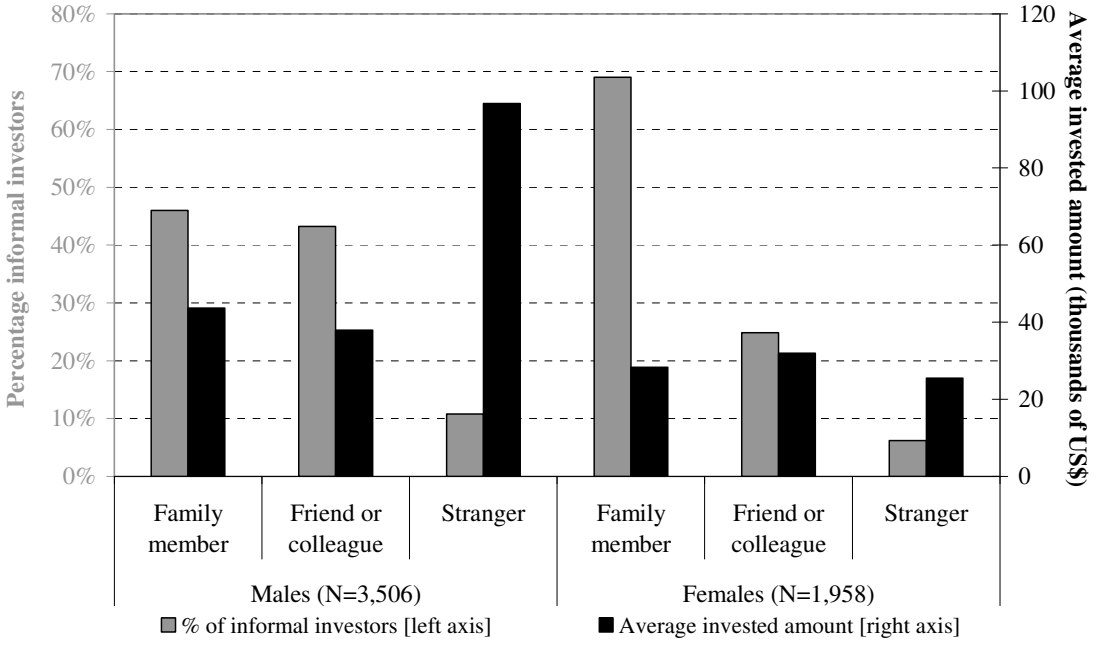
Table 4 Distribution of informal investors (%) and average amount invested (US$) by type of relationship with the investee, total sample (N=5,464)

Relationship with investee	Percentage of informal investors	Average invested amount (US$)
Family member	54	36,608
Friend or colleague	37	36,469
Stranger	9	79,472

Source: Global Entrepreneurship Monitor

The distribution of informal investors and the amount invested by males and females separately is illustrated in Figure 5. This shows some remarkable differences. The most striking difference is that male investors invest more often in firms owned by strangers (11% of males versus 6% of females) and their average invested amount is almost four times the average amount invested by female investors ($97,000 of males versus $25,000 of females). Females, on the other hand, invest substantially more often in businesses of family members. Close to 70% of female investors provide finance for a business of a family member whereas this is about 46% for males. Investment levels in firms of a friend or colleague are similar for males and females, although males invest more often in these businesses.

Figure 5 Distribution of male and female informal investors (%) and amount invested (US$), by type of relationship with the investee (N=5,464)



Source: Global Entrepreneurship Monitor

The expected pay-off

We will now take a closer look at the amount of money the informal investor expects to receive back (i.e. returns on investment). It follows from Table 5 that almost 40% of the informal investors expect to receive more money back than they

invested (positive return on investment), whereas 35% does not expect any money back at all. One fourth of the informal investors expects to receive back a part of the amount invested or about as much. Although there does not seem to be a clear relationship between the expected pay-off and an individual's decision to become an informal investor, Table 5 does suggest a positive relation between the expected pay-off and the amount invested. Especially when the investor expects to receive more than the invested amount back, investment volumes of informal investors increase radically.

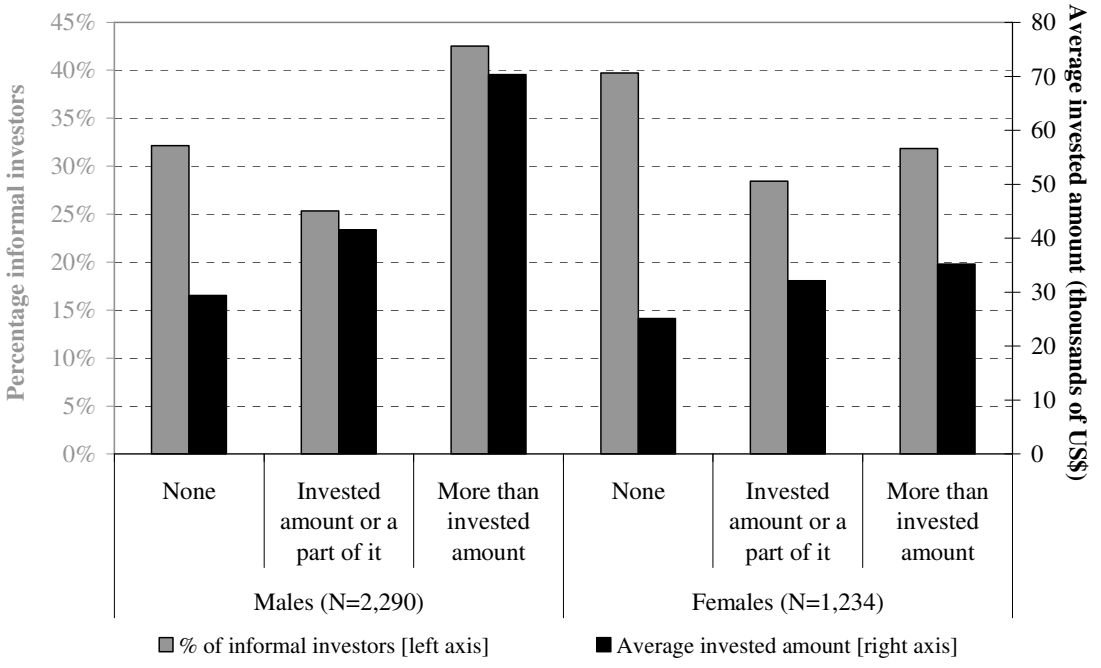
Table 5 Distribution of informal investors (%) and amount invested (US$) by expected return on investment (N=3,524)

Expected pay-off	Percentage of informal investors	Average invested amount (US$)
None	35	27,662
Invested amount or a part of it	26	38,001
More than invested amount	39	60,202

Source: Global Entrepreneurship Monitor

Focusing on male and female investors separately, Figure 6 suggests that female investors seem to be more altruistic, or at least more strongly influenced by non-pecuniary motives (e.g. Burke et al, 2000), than male investors in the sense that 68% of the female investors expect none or only a part of their invested amount back versus 57% of the male investors. This is probably strongly related to the informal investor's relationship with the investee. As we have seen, women invest more frequently in a firm of a family member (associated with a non-pecuniary invesment motive) whereas men relatively more often provide funds for a stranger's business (associated with a pecuniary motive).

Figure 6 Distribution of male and female informal investors (%) and average amount invested (US$), by expected return on investment (N=3,524)



Source: Global Entrepreneurship Monitor

3. Estimation methods

In this paper we use two different estimation techniques. First, for the model explaining an individual's decision to become an informal investor, we use a probit model, where the dependent variable indicates whether the individual is an informal investor or not. Second, for the model explaining the (natural logarithm of the) investment volume we use ordinary least squares (OLS). This model is estimated using the sample of informal investors only.

Importantly, it is possible that sample selection occurs, i.e., it is possible that the correlation between the error terms of the two models is not equal to zero. In that case the OLS results for the investment volume model would be biased, and estimation of a Heckman selection model would be appropriate. This type of model corrects for the correlation between the two error terms (Heckman, 1979). However, if the correlation is not significant, estimation of the Heckman model is actually less robust than using plain OLS.

In the Heckman model the so-called Inverse Mills ratio indicates whether or not the correlation between the error terms is significant, i.e. whether it is necessary to use the Heckman model or whether plain OLS would provide more robust results for the investment volume model. We estimated a Heckman specification for each of the variants discussed in this paper, and found that the Inverse Mills ratio was never significantly different from zero. Since this indicates absence of the sample selection problem, we used OLS to estimate the investment volume equation.

4. Estimation results

Estimation results are presented in Table 6.[9] In the estimation of the first equation, explaining the prevalence of informal investors, 126,189 observations (i.e. individuals drawn from the adult population) are used. In the second equation, explaining the investment volumes, 1,349 observations are used (i.e. only the informal investors).[10]

Explanatory variables

Table 6 shows that involvement in entrepreneurial activity strongly increases the probability of becoming an informal investor as all individual measures of entrepreneurial activity, except for business start-up and fear of failure, are positively significant in the probit model. Not surprisingly given the high risks associated with informal investment, individuals who fear failure, if they were to start a business, are less likely to become an informal investor. With regard to the investment volumes we observe that informal investors who currently own a business invest more than those that do not, indicating that the human and financial capital accumulation from being an entrepreneur enables greater ability and willingness to invest more as an informal investor. Similarly, those who believe that they have the required knowledge, skills and experience for starting a business, on average invest more, ceteris paribus. In essence these findings reflect Theorem 1. They point

[9] We checked that multicollinearity is not an issue, as correlations between independent variables are rather low.

[10] Due to missing values for several model variables (explanatory variables and control variables) the number of observations for the regression analysis is considerably smaller than for the descriptive analysis. In Appendix 1 we show how the observations are distributed over the countries, both for the descriptive statistics and for the estimation sample. We also show the number of available observations for each model variable. These overviews provide insight how the available observations (and hence also the missing values) are distributed over the countries and variables.

to a positive synergy between entrepreneurship and informal investment level in that both the skills and finance required for business angel activity can be generated by involvement in entrepreneurship. In short, involvement in entrepreneurial activity –whether ongoing or having resulted in exit– significantly increases an individual's probability of becoming an informal investor and, for two specific measures, also the amount of money invested.

Concerning the macro level variables – VCI per capita and the TEA rate – we also find interesting results. A high TEA rate significantly increases the probability of becoming an informal investor. Hence, the demand for informal investment (indicated by the extent of entrepreneurial activity at the macro level) to some extent creates its own supply (see also Burke et al., 2010). However, the investment volumes of individual informal investors decrease with macro-level entrepreneurial activity (although this effect is only significant at the 10% level). The net effect is positive and we discuss this estimate later in the paper.

Venture Capital Investment (VCI) per capita is significant for both the prevalence of informal investors (positive sign) and the amount invested (negative sign; only significant at 10% level). The positive coefficient in the equation explaining informal investor prevalence confirms earlier research which suggests that VCI and informal investment activities to some extent are complementary in that VC finance provides follow on finance for businesses funded by informal investors (Burke et al., 2010). However, for the informal investment *volume*, we observe a negative coefficient. This appears to reveal the competitive nature between these two sources of finance. Namely, higher VCI per capita (i.e. a bigger formal VC market) is often associated with greater seed and early stage VC investment (Gompers and Lerner, 1999) which means that venture capitalists will be in greater competition with informal investors who place most of their investment in early stage ventures. Alternatively, if there is little follow on VC finance available, then business angels may need to invest more to fill the gap and sustain the business.

Control variables

Concerning the micro-level control variables, we account for gender, age, education, and household income. The descriptive statistics suggested that males are more likely to be an informal investor and their average amount invested is higher than that of females. This is supported by the regression results as the dummy for male respondents is significantly positive in both equations. As far as age is concerned, we find that people aged 35 years and older have a significantly higher probability of becoming an informal investor than people aged between 18-34 years. Individuals in the age category 45-54 years seem to be most likely to invest in a business owned by someone else. Human and financial capital accumulated across the lifespan of a career appear to cause more informal investment activity. The increasing pattern in the age dummy coefficients in the second equation shows that investment *volumes* of informal investors increase with age.[11] Regarding education, Table 6 shows that higher educated individuals have a higher probability of becoming informal investors and on average also invest more compared to lower-educated individuals – again consistent with the importance of human capital for business angel activity. Regarding household income, we find that individuals

[11] Note that Table 6 does not include coefficients for the highest age category (65 years or older). After removing missing observations, it turned out there were no observations left in this category.

from a wealthier household are more often informal investor, as expected. Somewhat surprising, individuals with lower incomes more often invest than individuals with medium incomes. This pattern may be a result of a higher propensity to take risk among entrepreneurial people at the tails of the wealth distribution (Burke and Hanley, 2003 and 2006).

As far as the control variables at the macro level are concerned, we find that the probability of becoming an informal investor is positively related to GDP growth. However, for the average invested amount we find a negative sign (only significant at 10% level). These results cannot be interpreted without a high degree of speculation. One possible explanation is that higher GDP growth raises wealth and causes an increase in the supply of informal investors who at the margin may be smaller scale investors, thereby reducing the average investment size per investor.

The short-term interest rate is positively related to informal investor prevalence, but negatively to investment volumes. We think that the positive effect on the prevalence of informal investors is likely to be due to a substitution effect where a higher cost of loan finance for ventures increases the demand (opportunities) for equity finance. However, the higher cost of loan finance appears to cause the level of investment per informal investor to decline. In other words, since high gearing increases the rate of return on equity venture finance, higher interest rates increases the cost of gearing and hence limits the upside potential and optimal size of informal investment.

Table 6 Results total sample

	Prevalence of informal investors (probit model)		**Investment volume (linear regression model)**	
Estimation method	Maximum likelihood		Ordinary Least Squares	
Effective sample	126,189		1,349	
	Coefficient	Std. error	Coefficient	Std. error
Intercept	-7.433**	0.329	8.500**	1.128
Explanatory variables				
Entrepreneurial activity				
Owner-manager	0.309**	0.054	0.543*	0.275
Business start-up	0.088	0.074	-0.334	0.326
Future business start-up	0.359**	0.036	0.114	0.151
Bus. start-up for employer	0.201**	0.074	-0.053	0.339
Business shutdown	0.668**	0.055	0.092	0.226
New business opportunities	0.138**	0.023	0.053	0.108
Fear of failure	-0.055*	0.023	0.064	0.110
Skills to start new business	0.167**	0.023	0.281*	0.117
Knows entrepreneurs	0.512**	0.023	0.175	0.127
Relationship to investee				
Friend or family member (base category)				
Stranger	n.a.	n.a.	-0.414	0.252
Expected pay-off				
None (base category)				
Partly or about as much	n.a.	n.a.	0.098	0.160
More than invested	n.a.	n.a.	0.492**	0.159
Unknown	n.a.	n.a.	0.120	0.278
Macro level				
TEA rate (total)	0.304**	0.019	-0.145	0.080
VCI per capita	11.479**	0.980	-6.107	3.629
Control variables				
Gender				
Female (base category)				
Male	0.087**	0.022	0.333**	0.107
Age				
18 to 24 years (base category)				
25 to 34 years	0.021	0.040	0.836**	0.218
35 to 44 years	0.120**	0.036	1.127**	0.204
45 to 54 years	0.141**	0.037	1.465**	0.211
55 to 64 years	0.120**	0.039	1.619**	0.215
Education				
Low (base category)				
Medium	-0.007	0.028	-0.129	0.141
High	0.095**	0.029	0.210	0.127
Household income				
Low (base category)				
Medium	-0.085*	0.034	-0.120	0.170
High	0.075*	0.034	0.147	0.153
Macro level				
GDP growth	0.239**	0.064	-0.257	0.135
Short-term interest rate	0.218**	0.045	-0.457**	0.140

*Note: * Significant at 5% level; ** Significant at 1% level.*
Country and year dummies are included in both equations but are not reported.

Differences between determinants of male and female informal investment

The literature indicates that female entrepreneurs frequently face difficulties getting (informal) finance for their business. Males dominate both entrepreneur and informal investor populations. Therefore, it is important to investigate gender variances in the determinants of the level of informal venture finance investment. In this regard, in Section 2 we have derived two testable hypotheses relating to gender. Also since women's businesses are more likely to be in industries where males are less likely to operate, female entrepreneurs are sometimes ignored in informal investment finance by male investors. In order to investigate the determinants of male and female informal investors and their investment volumes separately, we estimate our model separately for males and females. The estimation results are presented in Table 7 and Table 8.

There are two main differences in the estimation results between male and female investors. The positive effect of owning a business on the investment volume turns out to primarily apply to female informal investors (Table 8). While the positive effect of self-assessed entrepreneurial skills on the investment volume turns out to primarily apply to male informal investors (Table 7). This result supports hypothesis 1 which states that the positive impact of entrepreneurial experience on the supply of informal venture investment finance will be stronger for females than males. Table 8 also reveals a significantly positive impact of female's fear of failure on their investment volume. In other words, if an informal investor fears failure for starting her own business, she is likely to invest a larger sum of money in someone else's business (mainly businesses owned by a family member). This result provides support for hypothesis 2 that greater risk aversion among females will reduce their propensity to become informal venture finance investors but increase the amount that they invest per capita.

Table 7 Results males

	Prevalence of informal investors (probit model)		**Investment volume (linear regression model)**	
Estimation method	Maximum likelihood		Ordinary Least Squares	
Effective sample	58,008		800	
	Coefficient	Std. error	Coefficient	Std. error
Intercept	-7.202**	0.402	8.910**	1.527
Explanatory variables				
Entrepreneurial activity				
Owner-manager	0.273**	0.071	0.059	0.337
Business start-up	0.186*	0.092	-0.168	0.399
Future business start-up	0.364**	0.045	0.136	0.190
Bus. start-up for employer	0.158	0.090	-0.131	0.407
Business shutdown	0.651**	0.070	0.056	0.276
New business opportunities	0.119**	0.030	0.196	0.133
Fear of failure	-0.055	0.031	-0.145	0.142
Skills to start new business	0.137**	0.030	0.327*	0.146
Knows entrepreneurs	0.488**	0.030	0.228	0.177
Relationship to investee				
Friend or family member (base category)				
Stranger	n.a.	n.a.	-0.264	0.317
Expected pay-off				
None (base category)				
Partly or about as much	n.a.	n.a.	-0.044	0.210
More than invested	n.a.	n.a.	0.520**	0.184
Unknown	n.a.	n.a.	0.501	0.340
Macro level				
TEA rate (male)	0.277**	0.024	-0.135	0.102
VCI per capita	8.718**	1.187	-7.977	4.296
Control variables				
Age				
18 to 24 years (base category)				
25 to 34 years	0.057	0.051	0.517*	0.259
35 to 44 years	0.125**	0.047	1.058**	0.239
45 to 54 years	0.128**	0.049	1.222**	0.257
55 to 64 years	0.088	0.051	1.550**	0.259
Education				
Low (base category)				
Medium	-0.020	0.039	-0.353	0.182
High	0.091*	0.039	0.094	0.158
Household income				
Low (base category)				
Medium	-0.142**	0.047	-0.169	0.212
High	0.050	0.046	0.075	0.179
Macro level				
GDP growth	0.143	0.074	0.056	0.166
Short-term interest rate	0.122*	0.060	-0.436*	0.192

*Note: * Significant at 5% level; ** Significant at 1% level.*
Country and year dummies are included in both equations but are not reported.

Table 8 Results females

	Prevalence of informal investors (probit model)		**Investment volume (linear regression model)**	
Estimation method	Maximum likelihood		Ordinary Least Squares	
Effective sample	68,181		549	
	Coefficient	Std. error	Coefficient	Std. error
Intercept				
Explanatory variables				
Entrepreneurial activity				
Owner-manager	0.369**	0.083	1.200**	0.443
Business start-up	-0.098	0.128	-0.739	0.544
Future business start-up	0.340**	0.060	0.135	0.265
Bus. start-up for employer	0.307*	0.130	-0.002	0.668
Business shutdown	0.698**	0.087	0.198	0.360
New business opportunities	0.171**	0.036	-0.119	0.182
Fear of failure	-0.058	0.034	0.355*	0.171
Skills to start new business	0.213**	0.034	0.152	0.195
Knows entrepreneurs	0.540**	0.035	0.084	0.197
Relationship to investee				
Friend or family member (base category)				
Stranger	n.a.	n.a.	-0.712	0.398
Expected pay-off				
None (base category)				
Partly or about as much	n.a.	n.a.	0.285	0.250
More than invested	n.a.	n.a.	0.473	0.297
Unknown	n.a.	n.a.	-0.313	0.463
Macro level				
TEA rate (female)	0.294**	0.026	-0.109	0.109
VCI per capita	15.059**	1.636	-4.423	6.686
Control variables				
Age				
18 to 24 years (base category)				
25 to 34 years	-0.024	0.063	1.547**	0.373
35 to 44 years	0.113*	0.056	1.503**	0.363
45 to 54 years	0.155**	0.057	2.004**	0.356
55 to 64 years	0.163**	0.060	2.059**	0.367
Education				
Low (base category)				
Medium	0.010	0.041	0.219	0.233
High	0.095*	0.044	0.414	0.222
Household income				
Low (base category)				
Medium	-0.001	0.050	0.042	0.272
High	0.125*	0.054	0.276	0.273
Macro level				
GDP growth	0.359**	0.104	-0.795**	0.217
Short-term interest rate	0.323**	0.066	-0.538*	0.211

*Note: * Significant at 5% level; ** Significant at 1% level.*
Country and year dummies are included in both equations but are not reported.

4.1 Elasticities

The estimation results from Table 6 enable us to shed light on effects of macroeconomic variables on the total supply of informal investment in a country. This can be seen as follows. From the first equation the effect of changes in macroeconomic variables on the probability of any adult becoming an informal investor can be computed. At the macro level, these changes in probability translate into changes in the number of informal investors. From the second equation the effect on average invested amounts can be computed. Combined, these two effects provide the effect on the total supply of informal investment, which is simply the number of informal investors multiplied by the average amount invested per investor.

In this section we compute elasticities of the prevalence and the investment volumes of informal investors, both with respect to VCI per capita and the TEA rate. From these elasticities, the elasticity of the total supply of informal investment follows as well. These elasticities, relating to Theorems 2 and 3, are computed at the mean values of the macroeconomic variables and are shown in Table 9.[12]

Table 9 Elasticities of macroeconomic variables, total sample

	Prevalence of informal investors	Investment volume per informal investor	Total supply of informal investment
VCI per capita	0.582	-0.315	0.265
TEA rate (total)	1.702	-0.827	0.861

A change in any of these macro-level variables affects both the probability of becoming an informal investor and the average amount of investment per investor. The combined effect is the effect on the total level of investment of all informal investors in a country. We see that a one per cent change in VCI per capita increases the probability of becoming an informal investor (at the macro level: the number of informal investors) by 0.582 per cent. However, the average amount invested decreases by 0.315 per cent. The net effect of a one per cent change in VCI per capita on the total supply of informal investment is therefore 0.265 per cent.[13] Hence, in economies with a strong formal VC market, the supply of informal investors increases and this increase is bigger than the decline in average invested amount. As a net result, the size of the total informal investment market (in terms of monetary value) increases.

Perhaps the more striking results are those for total entrepreneurial activity (TEA). A one per cent increase in entrepreneurial activity increases the number of informal investors by 1.702 per cent. However, the average invested amount declines by 0.827 per cent leading to a net positive total increase by 0.861 per cent. This result indicates that, to a considerable extent, demand for informal investment (reflected by TEA) creates its own supply.

[12] For the prevalence of informal investors (first column), the elasticities (elas) are computed as follows: elas = beta*(1-p)*x_ave, where beta is the estimated coefficient from the probit equation, p is the sample average of the dependent variable (i.e. the share of informal investors in the sample), and x_ave is the sample average of the independent variable under consideration. For the average investment volume (second column), the elasticities (elas) are computed as follows: elas = beta*x_ave (note that the dependent variable is expressed in logs). Please note that the elasticity formulas are different for probit and OLS models.

[13] This is computed as follows: 100*(1+0.00582)*(1-0.00315)-100=0.265.

Differences between the elasticities for males and females

Table 10 and 11 present the elasticities of the macroeconomic variables for males and females separately. Interestingly, VCI per capita has a much larger positive net effect on females than males with elasticities of 0.541 and 0.027 per cent respectively. This may be due to the fact that when VCI levels are high, competition among traditional (male dominated) VCI funds forces VC finance into more female ventures and hence due to homophily gender bias has a stronger net complementary effect on female informal investors.

Table 10 Elasticities of macroeconomic variables, males

	Prevalence of informal investors	Investment volume per informal investor	Total supply of informal investment
VCI per capita	0.436	-0.407	0.027
TEA rate (male)	2.045	-1.015	1.010

Table 11 Elasticities of macroeconomic variables, females

	Prevalence of informal investors	Investment volume per informal investor	Total supply of informal investment
VCI per capita	0.774	-0.231	0.541
TEA rate (female)	1.095	-0.413	0.678

The macro-level effect of a one per cent increase in total entrepreneurial activity (TEA) on the total supply of informal investment is smaller for women (0.678 per cent) than for men (1.01 per cent). This result could also be reflective of homophily gender bias and the finding that females have a lower tendency to become informal investors than males. Hence, if the demand for informal investment by women increases due to increased entrepreneurial activity, then there is lower response from (female) investors to accommodate this increased demand, compared to an increase in male entrepreneurial activity. This effect is evident in tables 10 and 11 where the elasticity relating to the prevalence of informal investors for women is roughly half of that for men.

5. Conclusions

In this paper we address the question, what determines the volume of informal venture finance investment and does it vary by gender? We estimate a two-equation model enabling us to jointly investigate the determinants of both the prevalence and the investment volumes of informal investors. Our models use GEM data on 126,189 individuals in 21 highly developed countries in the period 2002-2006.

We delve deeper into the finding of Burke et al (2010) that 'the demand for informal venture finance tends to generate its own supply'. We find that a one per cent increase in entrepreneurial activity increases the number of informal investors by 1.702 per cent. However, the average invested amount declines by 0.827 per cent leading to a net positive total increase by 0.861 per cent. This result indicates that, to a considerable extent, demand for informal investment creates its own supply. This net effect is stronger for males (1.01 per cent) than females (0.678 per cent) which we believe is due to investor homophily gender bias combined with the finding that females have a lower tendency to become informal investors than males. We also find that the level of venture capital investment has a net positive effect on the level of informal investment and that this effect is stronger for females than males.

In addition, we also propose and test two micro level hypotheses. The first is that the positive impact of entrepreneurial experience on the supply of informal venture finance will be stronger for females than males. This hypothesis is based on the notion that female entrepreneurs have less entrepreneurial self-efficacy and confidence than males and hence experience in entrepreneurship is likely to have a more positive moderating effect on this than for males. The evidence supports this as we find that the positive effect of owning a business on informal investment volume primarily applies to *female* informal investors. We also find corroborating associated evidence supporting the notion that males have higher confidence levels than females. In particular, we find that a positive effect of self-assessed entrepreneurial skills on investment volume primarily applies to males.

Second, we proposed and tested the hypothesis that greater risk aversion among females will reduce their propensity to become informal venture finance investors but, relative to males, increase the amount that they invest. We found supportive evidence as 'fear of failure' had a unique positive effect on investment volumes for females.

Finally, we also found evidence indicating that female informal venture finance investors were less influenced by pecuniary motivation than men as we discovered that investment volumes being positively driven by a high expected pay-off is purely a male characteristic.

To our knowledge, this is the first paper to directly estimate the determinants of the total volume of informal venture finance investment. Our focus on gender appears justified given the heterogeneity uncovered between males and females regarding the factors promoting and constraining the volume of informal investment.

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Appendix 1: Data availability by country and variable

Due to missing values for several model variables (explanatory variables and control variables) the number of observations for the regression analysis is considerably smaller than for the descriptive analysis. In this appendix we show how the observations are distributed over the countries, both for the descriptive statistics and for the estimation sample (Table A1). We also show the number of available observations for each model variable (Table A2). These overviews provide insight how the available observations (and hence also the missing values) are distributed over the countries and variables.

Table A1 Distribution of observations across countries

	Sample descriptive statistics		Estimation sample	
	# observations	# informal investors	# observations	# informal investors
Spain	47,155	1,169	25,386	298
Germany	26,284	577	10,290	204
United Kingdom	82,773	682	27,457	166
Sweden	30,457	411	22,519	153
United States	9,511	347	5,196	115
Denmark	13,961	303	6,974	80
Norway	6,843	214	2,083	45
Belgium	9,845	105	3,733	39
Ireland	5,943	102	2,310	31
Australia	7,855	146	2,097	30
Netherlands	10,512	98	3,050	29
Finland	5,961	94	1,567	28
France	5,799	104	2,980	26
Switzerland	1,987	59	1,016	25
Hungary	7,356	88	2,503	24
Italy	6,870	2,021	2,596	22
Greece	3,973	72	1,151	13
Canada	5,977	108	989	10
Iceland	5,779	211	954	6
New Zealand	3,844	82	153	3
Japan	5,890	8	1,185	2
Singapore	9,830	260	0	0
Korea	2,005	87	0	0
Portugal	997	6	0	0
Slovenia	6,992	76	0	0
Czech Republic	1,983	92	0	0
Hong Kong	3,993	87	0	0
Chinese Taipei	2,222	67	0	0
United Arab Emirates	1,986	42	0	0
Israel	3,918	44	0	0
Total	338,501	7,762	126,189	1,349

Table A2 Data availability by variable

	# observations	corresponding to # informal investors
Prevalence of informal investors / Invested volume	338,501	7,762
Explanatory variables		
Entrepreneurial activity		
Owner-manager	338,501	7,762
Business start-up	338,501	7,762
Future business start-up	188,788	3,228
Business start-up for employer	338,501	7,762
Business shutdown	338,213	7,750
New business opportunities	212,442	4,841
Fear of failure	245,869	5,545
Skills to start new business	246,152	5,504
Knows entrepreneurs	251,405	5,635
Informal investment activity		
Relationship to investee	.	5,464
Expected pay-off	.	7,762
Macro level		
TEA rate	338,501	7,762
VCI per capita	301,492	6,863
Control variables		
Micro level		
Gender	338,501	7,762
Age	320,041	7,331
Education	332,289	7,607
Household income[1]	338,501	7,762
Macro level		
GDP growth	338,501	7,762
Short-term interest rate	311,725	7,186

[1] Missing values imputed.

Appendix 2: Operationalizations of model variables

This appendix provides definitions and sources for the variables used in our paper.

Control variables – micro level

Gender	Dummy variable indicating the respondent's gender (1=male)
Age in 6 categories (dummy variables)	Age of the respondent in 6 (dummy) categories: 1. 18-24 years 2. 25-34 years 3. 35-44 years 4. 45-54 years 5. 55-64 years 6. 65 years or older
Education in 3 categories	Education of the respondent in three (dummy) categories: 1. low (summation of GEM's classifications 'no education' and 'some secondary education') 2. medium (GEM's 'secondary education' classification) 3. high (GEM's classifications 'post-secondary education' and 'graduate experience')
Household income in 3 categories	Household income in three (dummy) categories: 1. low; 2. medium 3. high These dummies indicate whether the household income of the respondent belongs to the lowest, middle or upper 33% tile for the country of the respondent.[14]

Control variables – macro level

Real GDP growth	The annual percent change in real GDP. We use data provided by the IMF *(World Economic Outlook Database, April 2008*).
Short-term interest rate	Interest rate on loan contracts or debt instruments, taken from OECD's Economic Outlook Database (*Volume 2009, Release 01*)

Explanatory variables – micro level

Owner-manager	Dummy variable indicating whether the respondent is currently the owner-manager of a company. The dummy takes the value '1' if the respondent agreed to the statement "you are, alone or with others, currently the owner of a company you help manage, self-employed, or selling any goods or services to others".
Business start-up	Dummy variable indicating whether the respondent is cur-

[14] Missing values are replaced by an imputation procedure in STATA, based on all variables in the regression model.

	rently trying to start a new business. The dummy takes the value '1' if the respondent agreed to the statement "you are, alone or with others, currently trying to start a new business, including any self-employment or selling any goods or services to others".
Future business start-up	Dummy variable indicating whether the respondent has plans to start a business in the next three years. The dummy takes the value '1' if the respondent agreed to the statement "you are, alone or with others, expecting to start a new business, including any type of self-employment, within the next three years".
Business start-up for employer	Dummy variable indicating whether the respondent is trying to start a new business on behalf of his or her employer. The dummy takes the value '1' if the respondent agreed to the statement "you are, alone or with others, currently trying to start a new business or a new venture for your employer as part of your normal work".
Business shut-down	Dummy variable indicating whether the respondent has shut down his or her business in the past 12 months. The dummy takes the value '1' if the respondent agreed to the statement "you have, in the past 12 months, sold, shut down, discontinued or quit a business you owned and managed, any form of self-employment, or goods or services to anyone".
New business opportunities	Dummy variable indicating the respondent's perceived opportunities. The dummy is assigned the value '1' if the respondent agreed to the statement "in the next six months there will be good opportunities for starting a business in the area where you live".
Fear of failure	Dummy variable indicating the respondent's fear of failure and hence providing a good indicator of risk aversion. The dummy is assigned the value '1' if the respondent agreed to the statement "fear of failure would prevent you from starting a new business".
Skills to start new business	Dummy variable indicating the respondent's perceived capabilities for starting a business. The dummy is assigned the value '1' if the respondent agreed to the statement "you have the knowledge, skills and experience required to start a new business".
Knows entrepreneurs	Dummy variable indicating whether the respondent personally knows an entrepreneur. The dummy is assigned the value '1' if the respondent agreed to the statement "you know someone personally who started a business in the past two years".
Relationship to investee in 3 categories	Relationship of the informal investor to the investee in three (dummy) categories. 1. Family member 2. Friend or colleague 3. Stranger or someone else
Pay-off in 4 categories	The informal investor's expected pay-off in 4 (dummy) categories: 1. None: the informal investor does not expect to receive any

money back from the investment.
2. Less or equal to the amount invested: the informal investor expects to receive a part of the amount invested or about as much.
3. More than invested amount: the informal investor expects to receive more money than invested.
4. Missing: the expected pay-off is not observed or missing.[15]

Explanatory variables – macro level

TEA rate — The TEA rate is defined as the percentage of the adult population (18-64 years of age) that is either actively involved in starting a new business (nascent entrepreneur) or is the owner-manager of a business that is less than 42 months old (young business owner). The TEA rate is taken from the GEM database.

VCI per capita — Venture Capital Investment (VCI) per capita measures a country's classic venture capital invested domestically in thousands of US$ divided by a country's population size. VCI data have been taken from the so-called "financing datasets" provided by GEM.[16]

[15] The fourth category is added because the number of missing values for the pay-off variable is high. In particular, the variable is not observed for the year 2002. The dummy for the fourth category indicates whether the expected pay-off is observed or not.

[16] More specifically, data for venture capital investment are taken from the data sets provided in the "GEM Members Area". For the year 2002 we have taken the variable labeled "Domestic $US (1,000): total classic" from the National Venture Capital Data reported in 2003. For the year 2004 we have taken the variable labeled "Classic VC invested domestically $US (1,000)" from the financing dataset of 2004. For the year 2006 we have taken the variable labeled "Classic VC invested by local (domestic) VCs $US (1,000)" from the financing dataset of 2006.

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