Gender Differences in Entrepreneurial Propensity

PHILIPP KOELLINGER*, MARIA MINNITI†, and CHRISTIAN SCHADE‡

* *Department of Applied Economics, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands*. (*e-mail: koellinger@ese.eur.nl*)

†*Department of Strategy and Entrepreneurship, Southern Methodist University, P.O. Box 750333, Dallas, TX, 75275 USA*

(*e-mail: mminniti@cox.smu.edu*)

‡*Institute for Entrepreneurship and Innovation Management, School of Business and Economics, Humboldt-Universität zu Berlin, Unter den Linden 6, 10099 Berlin, Germany*

(e-mail:cds@wiwi.hu-berlin.de)

Abstract

Using data from representative population surveys in 17 countries, we find that the lower rate of female business ownership is primarily due to women's lower propensity to start businesses rather than to differences in survival rates across genders. We show that women are less confident in their entrepreneurial skills, have different social networks and exhibit higher fear of failure than men. After controlling for endogeneity, we find that these variables explain a substantial part of the gender gap in entrepreneurial activity. Although, of course, their relative importance varies significantly across countries, these factors appear to have a universal effect.

JEL classification numbers: L26, J24, J16

Keywords: Entrepreneurship, gender, perceptions, female entrepreneurship

I. Introduction

The number of self-employed women in the U.S. has increased significantly (Devine, 1994a, 1994b; Fairlie, 2004). Similar trends are shown in many other developed and developing countries (Brush 2006), although female self-employment rates vary considerably across them (Cowling 2000). Yet, across countries, women own significantly fewer businesses than men (Blanchflower, 2004; Minniti and Nardone 2007). Interestingly, evidence shows that, after correcting for various factors such as size and sectoral distribution, women's failure rates are not significantly different from those of men (Kepler and Shane, 2007; Perry, 2002). Thus, at least a portion of the difference between genders must be due to the fact that fewer women than men start businesses.

Ample data exist about self-employed individuals (for example, see Blanchflower, 2004). Such data allow the analysis of people's *actual* employment situations. They do not allow, however, the important distinction between entry decisions and survival, and do not yield accurate explanations of possible differences in startup *propensity*. Thus, previous studies on gender differences in entrepreneurial propensity failed to consider the proper population of individuals involved in the actual process of starting a business. Using a large cross-country data set particularly well-suited to study startup propensity we fill this gap in the literature.

Our study substantiates the role of perceptions in explaining the gender gap using an econometric approach that controls simultaneously for unobserved heterogeneity and for the endogeneity of perceptions in the decision to start a business. Although we recognize the existence and importance of country specific differences influencing the size and causes of the

observed gender gap, we show that the lack of confidence among women in their own entrepreneurial skills is a major reason for the gender gap in *all* countries in our sample. We see two possible explanations for this finding. Either, men and women perceive entrepreneurial opportunities differently. Or, they have objectively different skills and circumstances. Our results suggest that both explanations are correct to some extent. In addition, we find some evidence that men and women have different social networks and different attitudes towards failure, factors that also explain a substantial part of the gender gap in business start-ups.

II. Theoretical background and related literature

Using a large sample of 30 developed and developing OECD countries, Blanchflower (2004) showed the decision to start a business or become self-employed, for both men and women, to correlate to several variables such as age, education, work status, and household income. However, even after correcting for differences in the distribution of these characteristics, as well as country characteristics, the rates of self-employment have been shown to differ significantly across gender for a sample of 37 countries in various stages of development (Minniti and Nardone 2007). Thus, other factors are at play.

A sizeable amount of literature suggests that, when considering new business creation and self-employment, women face higher opportunity costs then men, primarily because of the role they play in the family. Several works provide evidence for the United States. Devine (1994a, 1994b), for example, found that being married with a spouse present and being covered by someone else's health insurance increases the likelihood of self-employment for women.

Similarly, Lombard (2001) found that a woman is more likely to choose self-employment if her husband has health insurance, and the greater her relative earnings potential as self-employed and her demand for flexibility are. Finally, Edwards and Field-Hendrey (2002) found that self-employment is a more likely choice for women whose fixed costs of work are high, such as women who have small children.

Several studies have confirmed that the gender asymmetry in opportunity costs of self-employment is not a U.S. specific phenomenon. Using U.K. data, Cowling and Taylor (2001), among others, suggested that decisions about employment and marriage, household production and child-rearing are interdependent. Rosti and Chelli (2005) showed that, in Italy, women are more likely to enter self-employment from inactivity or unemployment whereas men tend to enter to improve their long term career options. Georgellis and Wall (2005) found that, for German women, self-employment is a closer substitute for part-time work and labor-market inactivity than it is for men, and attribute such differences to the different labor market opportunities and occupational strategies of women.

Other works have suggested that gender differences in self-employment stem from discrimination and cultural factors. Clain (2000), for example, found that U.S. women who choose self-employment have personal characteristics that are less valued in the market place than women who work full-time in wage and salary employment, while the reverse is true for men. Kuhn and Schuetze (2001) found the increase in the number of self-employed Canadian women to result from their relative disadvantage in paid employment as opposed to men whose increase in self-employment resulted from a secular deterioration of the labor market. Honig (1998) showed that Jamaican women receive substantially lower returns to self-employment than

men. And, using a panel of Dutch entrepreneurs, Verheul and Thurik (2001) showed that an important component of the gender difference in self-employment may stem from women's ability to obtain financing.[1]

Although there is evidence that all these factors are somewhat important within and across countries, their combined power in explaining gender differences with respect to self-employment remains unclear (Parker 2009). In addition to these economic explanations, behavioral differences related to gender-specific perceptions and preferences may be important. Gneezy et al. (2003) run experiments in Israel and provided evidence that men and women have different attitudes toward competition. Using a sample of Swedish students, Bengtsson et al. (2005) provided evidence that gender differences exist in self-confidence and optimism. Dohmen et al. (2010) found different risk attitudes among German men and women. Finally, and importantly, Croson and Buchan (1999) provided evidence that some gender differences in preferences hold even across cultures.[2]

As Casson (1982, 14) put it, 'The essence of entrepreneurship is being different – being different because one has a *different perception* of the situation.' In other words, an important difference between an individual starting a business and one who is not doing so is that the former perceives a business opportunity where the latter does not. A potential implication is that

[1]The evidence on financing is inconclusive. Considering the U.S., for example, Buttner and Rosen (1988) found evidence suggesting that women face modest penalties in commercial financing, whereas Cole and Wolken (1995) found that the gender asymmetry disappears when sectoral distribution, age, and size of the business are corrected for.

[2] Croson and Gneezy (2009) provide a comprehensive overview of gender differences with respect to preferences and, in particular, report evidence showing that men tend to be more self confident than women in a variety of domains.

gender-specific differences in perceptions could influence the propensity to start a business. We contribute to the literature by substantiating this hunch with robust empirical evidence and by showing that, although country specific contexts matter for gender differences and for the magnitude of such differences, different perceptions across genders emerge as a significant human universal.

III. Data

Data used in our analysis come from the Global Entrepreneurship Monitor (GEM) project. GEM is an ongoing large scale project designed to collect data on entrepreneurial behavior across countries. From 2001 to 2006, the 17 countries listed in Table A2 participated in the study. Each year, a new randomly-drawn representative sample of population was surveyed in each country to identify individuals who, at the time of the survey, owned and managed a business or were in the process of starting one.[3]

Surveyed individuals were classified as nascent entrepreneurs (*nascent*) if they were engaged in startup activities during the 12 months preceding the survey, were full or part owners of the new business, and the business had paid wages to the owners or others for a period not exceeding 3 months. Nascent entrepreneurship accounts for all individuals committed to starting a business, whether or not they will succeed, and is a good measure of entrepreneurial propensity. Nascent entrepreneurs were also asked about the nature of their business to determine the sectoral distribution of their activities. Furthermore, individuals were classified as new

[3] Details about data collection procedures and measures of reliability for GEM data are reported in Reynolds et al. (2005).

entrepreneurs (*newentr*) if they were managing and owning a business that had paid wages for the 3-42 months preceding the survey. Individuals were classified as established entrepreneurs (*establ*) if, at the time of the survey, they owned all or part of a business they helped manage, and that had paid wages or profits for longer than 42 months. Finally, individuals were classified as non-entrepreneurs if they were not involved in any business.

All survey participants were asked a number of questions related to their subjective perceptions (*perceptual* variables in the rest of the paper). Respondents were asked whether they believed they had the knowledge, skill and experience required to start a business (*suskill*), and whether they thought that good opportunities for starting a business could be found in the area where they lived in the six months following the survey (*opport*). Respondents were also asked whether fear of failure (*fearfail*) would prevent them from starting a business. Finally, respondents were asked whether they personally knew someone who had started a business in the two years preceding the survey (*knowent*). Knowing other entrepreneurs may provide relevant knowledge and social cues and it is likely to influence subjective perceptions, although it is unlikely to directly trigger a startup decision.

Finally, respondents were asked whether they had shut down a business in the 12 months preceding the survey (*closebus*). Whether someone has closed a business provides an objective and exogenous indicator of whether a person had experiences that can help in planning and executing a new venture. However, like *knowent*, it is unlikely to cause directly the opening of a new business.

Our data contain variables measuring entrepreneurial perceptions and activity for the period 2001 to 2006 for 17 countries. In addition, individual level data were also

available for work status, education level, and relative income group in some of these countries for 2001, 2002 and 2006. This information was harmonized to uniform scales across countries and years. A detailed description of all variables used in the paper is presented in the Appendix.

As mentioned earlier, previous studies addressing women's startup activity have been often limited by data availability. Our data, on the other hand, are exceptionally well suited for our purpose. By looking at differences in the probability that men and women will start a business (*nascent entrepreneurs*) rather than at differences in actual ownership rates we avoid confounding entry and survival effects. Also, by comparing nascent, new, established entrepreneurs and non-entrepreneurs we are able to capture how gender differences in business ownership come into place as the entrepreneurial process unfolds.

Some additional features of our data deserve highlighting. Previous studies addressing returns from startup activity that have included subjective variables, such as the perception of opportunities and of one's own skills, were based on experimental data with students (Camerer and Lovallo, 1999). When field data were available, previous studies had to rely on noticeably smaller samples of established business owners from just one country (Busenitz and Barney, 1997; Cooper et al., 1988). GEM data, on the other hand, allow us to compare entrepreneurial propensity, activity and business characteristics across countries. Moreover, our data allows us to calculate country specific rates of startup activity averaged over six years, hence limiting the influence of random fluctuations and business cycle effects. Finally, unlike most surveys, our data do not rely on the respondents' ex post explanations for their own decisions and, therefore, do not suffer from hindsight bias (Thaler 2000).

IV. Descriptive findings

Figure 1 illustrates the *entrepreneurial propensity* in each country by gender. In all 17 countries significantly more men than women are involved in starting a business and, on average, the ratio of men to women is 1.9. Countries vary with respect to the percentage of individuals involved in nascent entrepreneurship and the size of the corresponding gender gap.

< Figure 1 about here >

Not surprisingly, significant gender differences are also found in the average prevalence of male and female *established entrepreneurs*. On average, there are 2.15 men for every woman who qualifies as established entrepreneur. The ratio of established to nascent entrepreneurs over time may be used as a rough approximation of the average survival chances of nascent entrepreneurs in a country. Figure 2 shows that across countries and time, on average, the transition ratios of male and female entrepreneurs are almost identical.[4] Thus, it seems unlikely that the lower startup propensity of women be the result of lower chances of success. In fact, transition ratios suggest that the survival chances of women entrepreneurs are *higher* than those of men entrepreneurs in 6 of the 17 countries in our sample. In particular, comparing Figure 1 and 2, we see that the gender gap in nascent entrepreneurial activity in Spain, Norway, Japan and the Netherlands is larger than average, albeit women in these countries seem to have better chances of success than men. In summary, there seems to be no obvious relationship between survival chances and entry rates.

< Figure 2 about here >

[4]Clearly, this ratio is a valid proxy for survival only if both the prevalence of startup activity and the survival chances of new businesses are stable over time. Although this is a strong assumption, in this paper the problem is somewhat reduced because we consider six consecutive years of data thereby reducing business cycle effects.

Furthermore, employment figures for men and women across countries suggest that gender differences in entrepreneurial propensity cannot be attributed to differences in labor market participation. Figure 3 shows the percent of wage earners by gender across countries in our sample (i.e., men and women who hold a full or part time wage employment). In most countries, gender differences among wage earners are modest. In Ireland, Norway, Denmark, Sweden and Finland there are more women wage earners than men. The ratio of men to women wage earners is not significantly correlated with the gender ratios for nascent entrepreneurship (-0.27, p = 0.30) or with the survival chances of nascent entrepreneurs (0.14, p = 0.59) across countries.

< Figure 3 about here >

Our descriptive results, however, show pronounced gender difference in perceptual variables as summarized in Table 1. 58% of men believe to have sufficient knowledge, skills and experience to start a new business (*suskill*), compared to only 41% of women. This pronounced discrepancy could result from objective differences in entrepreneurial skills between men and women (Kepler and Shane, 2007) or from different cognitive styles (Bengtsson, 2005; Correll, 2001; Frederick, 2005).

< Table 1 about here >

Figure 4 illustrates the robustness of gender specific differences in entrepreneurial skill perceptions. In all 17 countries, men are significantly more confident in their entrepreneurial

skills than women, although the gender differences in *suskill* are more pronounced in some countries (e.g. the Netherlands) than in others (e.g. Norway).[5]

< Figure 4 about here >

Table 1 shows that highly significant gender differences are also found for the perception of opportunity *(opport)* and for fear of failure *(fearfail)*. 41% of men say that there will be good opportunities for starting a business in the area where they live in the six months following the surveys (*opport*), compared to only 33% of women. Differences in opportunity recognition are significant in all 17 countries, and could reflect different abilities of men and women in identifying business opportunities (Burke et al., 2000) or objectively worse business opportunities for women (Fischer et al., 1993). 33% of men say that fear of failure (*fearfail*) would prevent them from starting a business, compared to 40% of women, and women are more afraid of failure than men in 16 out of 17 countries, with Japan being the only exception. Differences in fear of failure are consistent with more pronounced degrees of loss aversion often observed among women (Dohmen et al., 2010, Wagner, 2004), but they could also reflect less favorable conditions for potential female entrepreneurs.

Finally, men are more likely than women to personally know someone who started a business (*knowent* - 43% men compared to 31% women). This pattern is highly significant in all 17 countries and suggests that men and women operate in different social networks and have

[5] Figure 4 also suggests that pronounced differences in *suskill* levels exist across countries regardless of gender. For example, 65% of Argentineans say they have sufficient skills to start a business, while only 16% of Japanese say so. These differences could result from objective skill differences or from institutional factors that make starting a business more (or less) difficult or promising in some countries than others (Baumol, 1990).

different access to people who can act as entrepreneurial role models or provide them with information (Aldrich & Cliff, 2003).

To summarize, descriptive evidence from our data shows significant and systematic differences in entrepreneurial propensity across gender that are robust across countries and appear unrelated to gender differences in success rates or wage employment. This raises the question if fear of failure, having met other entrepreneurs, and subjective and possibly biased perceptions about one's own skills and opportunities may explain a part of the observed gender differences in startup activity.

< Table 2 about here >

Table 2 shows the means of *suskill*, *opport*, *fearfail*, and *knowent* at different stages of the entrepreneurial process with respondents grouped by gender. Strong differences emerge between non-entrepreneurs and entrepreneurs as individuals in all stages of the entrepreneurial process are more confident in their entrepreneurial skills (*suskill*), more likely to see good business opportunities (*opport*) and to know other entrepreneurs (*knowent*), and less afraid of failure (*fearfail*) then non-entrepreneurs. The direction of causality between the variables in Table 1 and the actual starting of a business is, of course, not always clear. On the one hand, individual differences in perceptions can influence how attractive a decision alternative appears and hence how likely it will be pursued. On the other hand, once individuals have made a decision, some of their perceptions may change as a result of various factors including learning by doing, new information, or self-justification of their own behavior. Consequently, the perceptual variables in our study could be endogenous. Unfortunately, our data do not allow us to follow individuals over time. However, they do allow us to compare people involved in different stages of

the entrepreneurial process and to use appropriate econometric techniques that can test and correct for the potential endogeneity of these variables.

V. Startup decisions and perceptual variables

Startup decisions

To begin our analysis of why women are less likely to start a business, we run three probit models on nascent entrepreneurship (*nascent*) to investigate changes in the coefficient of the gender dummy resulting from a stepwise inclusion of socio-economic characteristics and subjective variables for each respondent. Significance levels in all our models are calculated via a robust covariance matrix of the parameter estimates using the sandwich estimation procedure (White, 1982).[6] Results are reported in Table 3.

< Table 3 about here >

Model 1 includes only the gender dummy and a constant. The estimated effect of being female is -0.32 and highly significant. Model 2 adds age, education, work status, household income and whether the respondent shut down a business in the 12 months preceding the survey. The log-likelihood improves significantly compared to Model 1 and the gender gap slightly decreases to -0.29, but remains highly significant. This result supports finding by Blanchflower (2004), and Devine (1994a, 1994b), among others, showing that these variables are important for startup decisions. However, it expands upon them by showing that these variables explain only a

[6] The sandwich estimation procedure has the desirable property of yielding asymptotically consistent covariance standard error estimates that are independent from distributional assumption. The large sample size in our study makes robust covariance estimates particularly attractive (Kauermann and Carroll, 2001).

relatively small portion of the gender gap in startup propensity. Model 3 includes the potentially endogenous variables *suskill, opport, fearfail* and *knowent.* The gender gap in model 3 decreases to -0.14, less than half the effect in Model 2, but remains still highly significant. As expected, fear of failure (*fearfail*) is negatively correlated with starting a business, while sufficient skill perceptions (*suskill*), personally knowing another nascent entrepreneur (*knowent*) and the perception of good business opportunities (*opport*) are positively correlated with startup activity. *Suskill* is the variable with the strongest correlation to nascent entrepreneurship (coefficient value 0.84), followed by opportunity perceptions (coefficient value 0.39). These results confirm earlier findings that perceptual variables are highly correlated with entrepreneurial propensity (Koellinger et al. 2007) and suggest that perceptual differences help to explain the gender gap. As expected, having previous entrepreneurial experience (*closebus)* has a positive and highly significant effect in both models.

Differences in perceptual variables

To check the robustness of our descriptive findings that gender differences exist in perceptual variables, we ran two probit models on each of the perceptual variables *suskill, fearfail, opport* and *knowent*. The first model include all individual level observations and gender, household income, education, work status, age, entrepreneurial experience, year and country dummies as regressors. The second model also includes the potentially endogenous entrepreneurial activity variables. Table 4 shows our results which support the descriptive findings. In all eight models, the gender difference remains highly significant. Hence, gender differences in these four variables are important and are not explained by observed differences in socio-economic variables or entrepreneurial experience.

< Table 4 about here >

Of course, differences in the type of business men and women start may lead to gender differences in perceptions. Indeed, Table A3 in the appendix shows significant differences in the distribution of male and female nascent entrepreneurs across sectors. For example, consistently with findings by Bates (1995) and Du Reitz and Henrekson (2000), men are overrepresented in mining, construction and business services, while women are overrepresented in retail, hotels, restaurants and health, education and social services. To investigate this possibility we ran additional probit models on *suskill*, *fearfail*, *opport* and *knowent* among the sample of nascent entrepreneurs, using gender, income, education, working status, age, previous start-up experience and *sector* of start-up activity as regressors.

Table 5 shows that even after controlling for these factors, women nascent entrepreneurs are still significantly less likely than men to think they have sufficient entrepreneurial skills (*suskill*). In addition, they are still more afraid of failure (*fearfail*) and less likely to know another nascent entrepreneur (*knowent*) than men. The only difference across gender explained by controlling for the type of business started is that in opportunity perceptions (*opport*). This suggests that gender differences in opportunity perceptions do not stem from subjective perceptions but, rather, from objective differences in the sectors where men and women start their businesses.

< Table 5 about here >

To summarize, we find gender differences in *suskill*, *fearfail* and *knowent* to be highly significant and not attributable to socio-economic differences or the type of business started. The

latter, however, seems to explain gender differences in *opport*.

VI. Explaining the gender gap in entrepreneurial propensity

To address the potential endogeneity of *suskill*, *fearfail*, *opport* and *knowent* in the decision to start a business, as well as potential biases from unobserved variables, we introduce instrumental variables in the recursive, simultaneous-equations bivariate probit model suggested by Evans and Schwab (1995) and Greene (1998; 2003, p. 715). Thus, we run four alternative models. In each of these models, the two dependent variables are y_1 = *nascent* entrepreneurship and one of the four perceptual variables. In other words, y_2 is either *suskill*, *fearfail*, *opport* or *knowent*. From these alternative models, however, we report below only the results for the one where y_2 = *suskill* since this was the only perceptual variable to yield an insignificant gender dummy in the equation for nascent entrepreneurship. This is consistent with the findings in Table 3 that showed the highest positive correlation between nascent entrepreneurship and *suskill* out of all variables included in the model. The other three perceptual variables were included in different specifications of the model as robustness checks and, although it did not disappear, the gender effect did become smaller in all these model specifications.

Using *suskill*, we are interested in

$$\Pr[nascent = 1, suskill = 1 | x_1, x_2] = \Phi_2(\beta_1' x_1 + \gamma y_2, \beta_2' x_2, \rho)$$

where Φ_2 is the bivariate normal cdf and ρ is the covariance of the error terms from estimating $\Pr[nascent = 1 | x_1, suskill]$ and $\Pr[suskill = 1 | x_2]$. The independent variables in the model are z_1 = *constant*, z_2 = *gender*, z_3 = *household income*, z_4 = *education*, z_5 = *work status*, z_6 = *age*, z_7 =

fearfail, z_8 = *opport*, z_9 = *knowent*, z_{10} = *closebus*. The regressor vectors are

$$x_1 = z_1, z_2, z_3, z_4, z_5, z_6, z_7, z_8 \quad \text{and} \quad x_2 = z_1, z_2, z_3, z_4, z_5, z_6, z_7, z_8, z_9, z_{10}.$$

This model has a number of desirable properties. First, in the bivariate probit model proposed above, the simultaneity of *nascent* and *suskill* can be ignored in formulating the likelihood function. Hence, the standard bivariate probit estimation procedure can be used (Greene, 1998; 2003, p. 715). Second, the model allows a rigorous test for the presence of unobserved factors influencing both *nascent* and *suskill* simultaneously by allowing the error terms of both equations to be correlated and by estimating the covariance of these error terms.[7] If no unobserved factor influencing both variables exist, the error terms in both equations should not be correlated, $\rho = 0$, and vice versa. The hypothesis that $\rho = 0$ can be evaluated with a Wald test. The bivariate probit model consistently estimates the coefficients of the regressors even if $\rho \neq 0$, thereby avoiding the omitted variable bias that single equation probit models would suffer from in this case.

The bivariate probit equation system is identified if at least one variable in x_1 is not contained in x_2 (Evans and Schwab, 1995). We use two instrumental variables in x_2 that, as mentioned in section 3, are likely to influence *suskill* without having a direct effect on *nascent*, namely *knowent* and *closebus*. A formal test of the quality of *knowent* and *closebus* as instruments requires that (1) they be correlated with *suskill* and (2) they be not correlated with the error term of $\Pr[nascent = 1 | x_1]$. The results reported in Table 6 show highly significant

[7] This aspect of the model is similar in spirit to seemingly unrelated regression (SUR) for continuous dependent variables.

coefficients when regressing *closebus* and *knowent* on *suskill*. In addition, an identically specified single equation probit model that estimates $\Pr[suskill = 1 | x_2]$ yields the highly significant coefficients of 0.52 for *knowent* and 0.8 for *closebus*. Hence, the first requirement is easily passed. To test for the second requirement, we estimate the single equation probit model for $\Pr[nascent = 1 | x_1]$. The correlation of the error term is 0.04 with *knowent* and 0.02 with *closebus*. Given the large size of our sample, these small correlations are still significant. Nonetheless, their coefficients can be viewed as evidence that both variables are reasonably good instruments for our purpose.

< Table 6 about here >

Turning to Table 6, we see that, as indicated by the coefficients of the female dummy in the top row, the gender gap among nascent entrepreneurs (*nascent*) completely disappears (i.e. the gender dummy in the left column is 0), while a significant gender gap in sufficient skill perceptions (*suskill*) remains (i.e. the gender dummy in the right column is -0.31 and highly significant). That is, the model explains the gender difference in entrepreneurial propensity, while gender differences in self-perception of entrepreneurial skills remain robust. This suggests that women are less likely to think they have sufficient entrepreneurial skills even *after* controlling for observed and unobserved heterogeneity as well as for the potential endogeneity of *suskill*. Thus, gender differences in *suskill* cannot be explained by unobserved qualifications of men and women such as holding a business degree. They cannot even be explained by the start-up activities of men and women and the endogeneity of *suskill*. Thus, the fact that *suskill* has the highest positive coefficient of all included dummy variables in the equation on *nascent*, suggests that gender-differences in cognitive styles influence and ultimately help to explain the gender

gap in start-up propensity.[8]

The results in Table 6 suggest that perceptual variables help in explaining the gender gap in startup activity, and show that the latter completely disappears if we control for unobserved heterogeneity that influences *suskill* and *nascent* simultaneously. Thus, *suskill* is confirmed to be a very important component of the gender gap in entrepreneurial propensity and unobserved heterogeneity is shown to explain almost 50% of it. This warrants some further interpretation of ρ, the correlation of the error terms of both equations, which is significant and negative (-0.63). The negative sign of ρ indicates that unobserved variables have a joint effect on sufficient skill perceptions and start-up activity albeit in opposite directions.[9]

A possible interpretation of this finding is that ρ accounts for the ambiguous effect of skills on entrepreneurial propensity. Having high skills raises potential productivity in both self-employment and paid employment. Roessler and Koellinger (2009) formalize this argument and show that occupational choice ultimately depends on endogenous opportunity costs (i.e. the best available wage offer one receives, which depends on the characteristics of all individuals in the

[8] Our robustness checks that used *knowent, fearfail* and *opport* as potentially endogenous variables showed that we cannot reject the endogeneity of *knowent* and *fearfail*. However, this is not a problem for the interpretation of our results because *closebus* turns out to be a valid instrument for both variables and the regression results support our main story: Gender differences in *knowent* and *fearfail* remain highly significant and help to explain the gender gap in entrepreneurial activity, although not as strongly as gender differences in *suskill*. The Wald test rejected the endogeneity of *opport*.

[9] We ran various additional regressions to check the robustness of these results, including separate models for men and women, country-specific models, and models that excluded income and work status which are potentially endogenous. All additional estimations yield qualitatively identical results.

labor market) and that there is typically no simple sorting of people into entrepreneurship based on skills alone.[10]

The finding that the gender gap in entrepreneurial propensity disappears in Table 6 (controlling for ρ) suggests that this may be the case because men and women have in fact different unobserved characteristics (e.g. more men holding business degrees than women), or because the opportunity costs of starting a business differ for men and women even *if* they have identical qualifications and talents. For example, because of a glass ceiling in established firms, highly qualified women could be more likely to start a business than their male counterparts. Similarly, because of lower average wealth, women with low labor market qualifications could be less likely to start a business than their male counterparts. Finally, and possibly most importantly, different gender roles in the household could generate different opportunity costs to startup activities for men and women with otherwise equal qualifications. Thus, our results show that arguments along these lines are an important part of the gender gap in entrepreneurial propensity. Unfortunately, our data do not allow us to observe and estimate the importance of these effects directly.

We also estimate the simultaneous bivariate probit model from Table 6 for every country separately to investigate country heterogeneity. Our primary interest is in establishing to what extent gender differences in perceptions are robust across countries and to explore country

[10] Skills can influence significantly the opportunity costs of starting a business. For example, people with high intelligence, entrepreneurial talent or holding a business degree will tend to get more attractive job offers than people who don't. At the same time, these characteristics should correlate positively with an individual's perception of having sufficient skills to start a business. In this scenario, individuals may not become entrepreneurs although they believe to have the skills to do so. In an alternative, obstacles faced in the job market (discrimination, lack of education, etc.) reduce the opportunity costs of self-employment. However, they should also reduce one's own skill perceptions. In this scenario, individuals start a business although they do not believe to have the skills to do so.

specific gender differences in entrepreneurial propensity. Our results are summarized in Table 7. In all 17 countries, women are less likely to believe in their entrepreneurial skills even after controlling for socio-economic differences, entrepreneurial activity and unobserved heterogeneity. This suggests that gender differences in perceptions are a phenomenon that consistently appears across countries and cultures.

The gender gap in entrepreneurial activity becomes insignificant in 11 out of 17 countries. Women are still less likely to start a business than men in Ireland, Italy, Japan and Norway. However, the results also suggest that women would be *more* likely to start a business than men in Germany and Sweden, were they identical to men in their socio-economic background and perceptions. A possible reason for this heterogeneity is that women across countries have different preferences for self-employment, which may depend on culture and institutional differences. This is consistent with existing literature showing that, although women (and men) tend to react to the same set of variables, the intensity and direction of these reactions are influenced by country specific characteristics (Blanchflower 2004; Minniti and Nardone 2007).

< Table 7 about here >

VII. Conclusion

Up to date, research has established that women's businesses are concentrated in specific sectors, use lower amounts of startup capital and tend to grow less. However, even after correcting for these factors, across countries, women own significantly fewer businesses than men. We show that this gap is due primarily to the lower propensity of women to start businesses rather than to

different survival chances across genders. We also identify a variety of factors that contribute towards, and ultimately explain, this gap.

First, a significant portion of the gender gap in entrepreneurial propensity is explained by subjective perceptions whereas socio-economic variables appear to play a smaller role. In fact, when perceptual variables are considered, the explanatory powers of age, education, work status, and household income decrease or disappear completely, suggesting that these variables may influence startup decisions primarily because of their influence on perceptions. Among subjective perceptions, belief in one's own skills and fear of failure emerge as particularly significant. On average, women are more afraid of failure and less confident in their entrepreneurial skills than men. Women are also significantly less likely to know other entrepreneurs then men are. The combination of higher fear of failure, lower exposure to other entrepreneurs, and lower entrepreneurial self-confidence reduce women's propensity to start businesses. Gender differences in these perceptual variables are highly significant and not explained by observed socio-economic differences or by self-selection into different sectors.

Second, having started a business and the perception of one's own skills are significantly influenced by a common set of unobserved factors explaining about 50 percent of the gap in startup activity. Our results show that the latter disappears entirely when unobserved heterogeneity that influences both variables is controlled for. Importantly, these unobserved factors influence startup propensity and belief in one's own skills in opposite directions. Unfortunately, we have no direct evidence of what these factors may be. One possible explanation rests on gender differences in the opportunity costs of *starting* a business or in entrepreneurial skills unobserved in our dataset such as holding a business degree or being

interested in business-related matters. An additional (and complementary) explanation rests on gender differences in the opportunity costs of *running* a business. Among them are asymmetries in labor market opportunities and differences in the division of labor within households, which gives women a higher incentive to remain out of the labor force or seek wage employment.

In summary, our results suggest that men and women perceive the world around them with "different eyes". These differences in cognitive processes and perceptions influence the decision to start a business and contribute towards explaining the gender gap in entrepreneurial activity. Noticeably, these factors have a universal effect, although, of course, their relative importance varies significantly across countries due to differences in underlying conditions that further encourage or deter women from entering self-employment.

Appendix

Independent variables

Table A1 shows the relative frequencies for all independent variables used in our study.

TABLE A1

Variable definition and un-weighted descriptive statistics, GEM data 2001-2006

Variable (corresponding survey question)	*Value*	*Relative Frequency*
Gender	Man	46%
	Woman	54%
Opport (In the next six months there will be good opportunities for starting a business in the area where you live.)	No	23%
	Yes	43%
	Don't know / missing	34%
Suskill (You have the knowledge, skill and experience required to start a new business.)	No	42%
	Yes	35%
	Don't know / missing	23%
Fearfail (Fear of failure would prevent you from starting a new business.)	No	49%
	Yes	29%
	Don't know / missing	22%
Closebus (Shut down business in the last 12 months)	No	90%
	Yes	2%
	Don't know / missing	8%
Workstatus (Present work status of the individual)	Not working	17%
	Working	70%
	Retired, students	12%
	Missing	1%
HHIncome (Household income of the individual recoded into thirds relative to country income distribution.)	Lowest 33%	37%
	Middle 33%	26%
	Upper 33%	20%
	Missing	17%
Education (Educational attainment of the individual.)	Less than secondary	30%
	Secondary degree	29%
	Post secondary degree	20%
	Grad exp	20%
	Missing	1%
Age – in 5 categories (What year were you born?)	18-24 yrs old	11%
	24-34 yrs old	20%
	35-44 yrs old	26%
	45-54 yrs old	23%
	55-64 yrs old	21%

Base: N = 236,556

Unfortunately, individual level data about work status (*workstatus*), household income (*hhincome*), and education (*education*) are not available for all countries and all years. Table A2 shows sample sizes by year for countries where individual-level socio-demographic data are

available and that could, therefore, be included in the micro-level analysis.

TABLE A2

GEM survey participants with socio-demographic information by countries and years

	Year of survey				
	2001	*2002*	*2005*	*2006*	*Total*
Argentina	1719	1719	1746	1755	6939
Australia		2709	2002	1971	6682
Belgium		3102	4047	2001	9150
Brazil			2000	2000	4000
Denmark	1596	1925	1968	10000	15489
Finland	1462	1434	2010	2005	6911
Germany	5308	11262	6577	4049	27196
Ireland				1961	1961
Italy	1724		1793	1626	5143
Japan	1775	1883	1931	1923	7512
Netherlands		2740	2706	2685	8131
Norway		1534	1562	1503	4599
Singapore	1078	1920	3876	3883	10757
Spain			18953	28306	47259
Sweden	1820	1733	1717	1747	7017
United Kingdom		12708	9167	34896	56771
United States	1603	5581	1530	2325	11039
Total	18085	50250	63585	104636	236556

Sectoral distribution of nascent entrepreneurial activity

GEM codes activity according to the International Standard Industry Codes (ISIC) and consistently with the Statistical Classification of Economic Activities in the European Community (NACE Rev 1.1). Table A3 shows the sectoral distribution of nascent entrepreneurial activity by gender.

TABLE A3

Variable definition and un-weighted descriptive statistics, GEM data 2001-2006

Sectors of nascent entrepreneurial activity	*Men*		*Women*	
	% of male	*N*	*% of female*	*N*
Agriculture, forest, hunting, fishing	3.4	77	3.4	48
Mining, construction	6.8	154	3.4	48
Manufacturing	7.4	168	7.7	110
Transport, communication, utilities	6.8	154	4.1	58
Whole sale, repair	8.2	185	3.9	56
Retail, hotel, restaurants	21	477	31.2	443
Finance, insurance, real estate	5.9	134	3.8	54
Business services	26.4	599	17.5	249
Health, educadtion, social services	6.4	145	13.5	192

Consumer services	7.7	175	11.5	164
Total	100	2,268	100	1,422
Test for gender differences in sectoral distribution: Pearson chi2(9) = 190 Pr = 0.00				

References

Aldrich, H.E. and Cliff, E.J. (2003). 'The Pervasive Effects of Family on Entrepreneurship: Toward a Family Embeddedness Perspective,' *Journal of Business Venturing* Vol.18, pp. 573–596.

Bates, T. (1995). 'Self-employment entry across industry groups', *Journal of Business Venturing* Vol.10, pp.143-156

Baumol, W. J. (1990). 'Entrepreneurship: Productive, unproductive, and destructive'. *Journal of Political Economy* Vol.98, pp.893–921.

Bengtsson, C., Persson, M., and Willenhag, P. (2005). 'Gender and Overconfidence', *Economics Letters*, Vol.86, pp.199-203.

Blanchflower, D. (2004). 'Self-Employment: More May Not Be Better', *Swedish Economic Policy Review*, Vol.11, pp.15-74.

Brush, C. (2006). 'Women entrepreneurs: A research overview', in A. Basu, M. Casson, N. Wedeson, and B. Yeung (eds), *The Oxford Handbook of Entrepreneurship,* Oxford Publishing, London, UK.

Burke, A. E., FitzRoy, F.R., and Nolan, M.A. (2000), 'When Less is More: Distinguishing Between Entrepreneurial Choice and Performance', *Oxford Bulletin of Economics and Statistics* Vol. 62, pp.565-587.

Busenitz, L. and Barney, J. (1997). 'Differences Between Entrepreneurs and Managers in Large Organizations: Biases and Heuristics in Strategic Decision-Making', *Journal of Business Venturing*, Vol.12, pp.9-30.

Buttner, E.H. and Rosen, B. (1988). 'Bank Loan Officers' Perceptions of Characteristics of Men, Women and Successful Entrepreneurs', *Journal of Business Venturing* Vol.3, pp. 249–258.

Camerer, C. and Lovallo, D. (1999). 'Overconfidence and Excess Entry: An Experimental Approach', *American Economic Review*, Vol.89, pp.306-318.

Casson, M. (1982). *The Entrepreneur – An Economic Theory* (Cheltenham Glos, UK: Edward Elgar).

Clain, S.H. (2000). 'Gender differences in full-time self-employment', *Journal of Economics and Business*, Vol.52, pp.499-513.

Cole, R.A. and Wolken, J.D. (1995). 'Financial Services Used by Small Businesses: Evidence from the 1993 National Survey of Small Business Finance', *Federal Reserve Bulletin* Vol.81, pp. 629–667.

Cooper, A., Woo, C. and Dunkelberg, W. (1988). 'Entrepreneurs' Perceived Chances for Success', *Journal of Business Venturing*, Vol.3, pp.97-108.

Correll, S. (2001). 'Gender and the Career Choice Process: The Role of Biased Self-Assessments', *American Journal of Sociology* Vol.106, pp.1691–1730.

Cowling, M. and Taylor, M. (2001). 'Entrepreneurial women and men: Two different species?', *Small Business Economics* Vol.16, pp.167-176.

Cowling, M. (2000). 'Are entrepreneurs different across countries?', *Applied Economics Letters* Vol.7, pp.653-657.

Croson, R. and Gneezy, U. (2009). 'Gender differences in preferences', *Journal of Economic Literature* Vol.47, pp.1-27.

Croson, R. and Buchan, N. (1999). 'Gender and Culture: International Experimental Evidence from Trust Games', *American Economic Review Papers and Proceedings*, Vol.89, pp.386-391.

Devine, T.J. (1994a). 'Changes in wage-and-salary returns to skill and the recent rise in female self-employment', *American Economic Review* Vol.84, pp.108-112.

Devine, T.J. (1994b). 'Characteristics of self-employed women in the United States', *Monthly Labor Review* Vol.117, pp. 20-34.

Dohmen, T., Falk, T., Huffman, D., Sunde, U., Schupp, J., and Wagner, G. (2010). 'Individual risk attitudes: Measurement, determinants and behavioral consequences', *Journal of the European Economic Association*, forthcoming.

DuReitz, A. and Henrekson, M. (2000). 'Testing the Female Underperformance Hypothesis', *Small Business Economics*, Vol.14, pp. 1–10.

Edwards, L. and Field-Hendrey, E. (2002). 'Home-Based Work and Women's Labor Force Decisions', *Journal of Labor Economics* Vol.20, pp.170-200.

Evans, W. and Schwab, R. (1995). 'Finishing High School and Starting College: Do Catholic Schools Make a Difference?', *Quarterly Journal of Economics*, Vol.110, pp.941-974.

Fairlie, R. W. (2004). 'Recent Trends in Ethnic and Racial Business Ownership', *Small Business Economics* Vol.23, pp.203-218

Fischer, M.E., Rueber, R., and Dyke, L.S. (1993). 'A Theoretical Overview and Extension of Research on Sex, Gender, and Entrepreneurship', *Journal of Business Venturing* Vol.8, pp. 151–168.

Frederick, S. (2005). 'Cognitive Reflection and Decision Making', *Journal of Economic Perspectives*, Vol.19, pp.25–42.

Georgellis, Y. and Wall, H. (2005). 'Gender Differences in Self-Employment', *International Review of Applied Economics*, Vol.19, pp.321-337.

Gneezy, U., Niederle, M., and Rustichini, A. (2003). 'Performance in Competitive Environments: Gender Differences', *Quarterly Journal of Economics*, Vol.118, pp.1049-1074.

Greene, W. (1998). 'Gender economics courses in liberal arts colleges: Further results', *Journal of Economic Education* Vol.29, pp.291-300.

Greene, W. (2003). *Econometric Analysis*, 5th edition, Prentice Hall, Upper Saddle River, NJ.

Hausman, J. (1978). 'Specification Tests in Econometrics', *Econometrica*, Vol.46, pp.1251-1271.

Honig, B. (1998). 'What determine success? Examining the human, financial, and social capital of Jamaican micro-entrepreneurs', *Journal of Business Venturing* Vol.13, pp. 371-394.

Kepler, E. and Shane, S. (2007). 'Are male and female entrepreneurs really that different?', The Office of Advocacy Small Business Working Papers, USA. http://www.sba.gov/.

Kauermann, G. and Carroll, R. (2001). 'The Sandwich Variance Estimator: Efficiency Properties and Coverage Probabilities of Confidence Intervals', *Journal of the American Statistical Association*, Vol.97, pp.482-493.

Koellinger, P., Minniti, M. and Schade, C.. (2007). ''I think I can, I think I can': Overconfidence and Entrepreneurial Behavior', *Journal of Economic Psychology*, Vol. 28, pp.502-527.

Koellinger, P., Minniti, M. and Schade, C. (2011). 'Perceptions and heuristics in entrepreneurial decisions - the example of overconfidence', in M. Minniti (ed.), *The Dynamics of Entrepreneurship: Evidence from Global Entrepreneurship Monitor Data.* Oxford University Press, UK.

Kuhn, P.J. and Schuetze, H.J. (2001). 'Self-Employment Dynamics and Self-Employment Trends: A Study of Canadian Men and Women, 1982-1998', *Canadian Journal of Economics* Vol.34, pp.760-784

Lombard, K. (2001). 'Female Self-Employment and Demand for Flexible, Nonstandard Work Schedules', *Economic Inquiry*, Vol.39, pp.214-237.

Minniti, M., and Nardone, C. (2007). 'Being in Someone Else's Shoes: Gender and Nascent Entrepreneurship', *Small Business Economics Journal* Vol.28, pp. 223-239

Parker, S. (2009). *The Economics of Self-Employment and Entrepreneurship*. University Press, Cambridge, UK.

Perry, S. (2002). 'A Comparison of Failed and Non-Failed Small Businesses in the United States', *Journal of Developmental Entrepreneurship*, Vol.7, pp.415-428.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., de Bono, N., Servais, I., Lopez-Garcia, P., and Chin, N. (2005). 'Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998-2003', *Small Business Economics Journal* Vol.24, pp.205-231.

Roessler, C. and Koellinger, P. (2009). 'Entrepreneurship, firm formation, and organizational design', Discussion Paper No.2009-003/1, Tinbergen Institute, Erasmus University, The Netherlands.

Rosti, L. and Chelli, F. (2005). 'Gender Discrimination, Entrepreneurial Talent and Self-Employment', *Small Business Economics* Vol.24, pp. 131-142

Thaler, R. (2000). 'From Homo Economicus to Homo Sapiens', *Journal of Economic Perspectives*, Vol.14, pp.133-141.

Verheul, I. and Thurik, R. (2001). 'Start-Up Capital: "Does Gender Matter?"', *Small Business Economics* Vol.16, pp.329-345.

Wagner, J. (2004). 'What a Difference a Y Makes -Female and Male Nascent Entrepreneurs in Germany', Discussion Paper No. 1134, IZA, Bonn, Germany.

White, H. (1982). 'Maximum Likelihood Estimation of Misspecified Models', *Econometrica*, Vol.56, pp.997-1019.

TABLE 1

Perceptual differences between men and women

	suskill (yes)		*fearfail (yes)*		*opport (yes)*		*knowent (yes)*		
	Men	Women	Men	Women	Men	Women	Men	Women	N
Total sample	58%	41%	33%	40%	41%	33%	43%	31%	108,919

Note: Gender differences in perceptions are significant at > 99% confidence according to a chi2-test for all categories.

TABLE 2

Perceptual differences between men and women at different stages of the entrepreneurial process

	suskill (yes)		*fearfail (yes)*		*opport (yes)*		*knowent (yes)*		
	Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*N*
Non-entrepreneurs	49%	35%	37%	41%	37%	30%	39%	29%	91,059
Nascent entrepreneurs	89%	84%	21%	24%	63%	61%	64%	57%	3,915
New entrepreneurs	90%	85%	20%	28%	56%	49%	63%	54%	3,948
Established entrepreneurs	89%	83%	21%	23%	47%	42%	54%	46%	8,362

Note: Gender differences in perceptions are significant at > 99% confidence according to a chi2-test for all categories except opportunity perceptions among nascent entrepreneurs.

TABLE 3

Probit estimates on nascent entrepreneurship (nascent)

	Model 1		*Model 2*		*Model 3*	
Variable	*β*	*P>|z|*	*β*	*P>|z|*	*B*	*P>|z|*
Female	-0.32**	0.00	-0.29**	0.00	-0.14**	0.00
Hh income - middle 33% income			0.00	0.99	-0.04*	0.07
Hh income - upper 33% income			0.11**	0.00	-0.01	0.76
Education – secondary			0.10**	0.00	0.04*	0.06
Education - post-secondary			0.18**	0.00	0.07**	0.01
Education – gradudate			0.23**	0.00	0.09**	0.00
Work status – working			0.21**	0.00	0.18**	0.00
Work status – retire/student			-0.29**	0.00	-0.30**	0.00
Age 25-34			0.06*	0.04	0.01	0.79
Age 35-44			0.04	0.14	-0.01	0.79
Age 45-54			-0.09**	0.00	-0.11**	0.00
Age 55-64			-0.21**	0.00	-0.23**	0.00
Fear of failure (*fearfail*) – yes					-0.30**	0.00
Opportunity perception (*opport*) – yes					0.39**	0.00
Sufficient skill perception (*suskill*) – yes					0.84**	0.00
Knowing another entrepreneur (*knowent*) – yes					0.32**	0.00
Shut down business in past 12 months – yes			0.57**	0.00	0.34**	0.00
Constant	-0.90**	0.00	-1.26**	0.00	-2.02**	0.00
Model diagnostics						
Number of observations	95,895		95,895		95,895	
Loglikelihood	-18,410		-17,793		-15,415	
Prob > chi2	0.00		0.00		0.00	

Reference categories: Male; age 18-24; household income -lowest 33%; education – less than secondary degree.

Notes: Estimation included country and year dummies. Only observations that classify as nascent entrepreneurs or non-entrepreneurs are included are included, young entrepreneurs and experienced business owners are excluded. Robust standard error estimates.

* denotes significance at >90% confidence

** denotes significance at >99% confidence

TABLE 4

Probit estimates on perceptual variables, all observations

	Y = suskill		*Y = fearfail*		*Y = opport*		*Y = knowent*									
Variable	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*
Female	-0.40**	0.00	-0.35**	0.00	0.15**	0.00	0.12**	0.00	-0.21**	0.00	-0.18**	0.00	-0.27**	0.00	-0.23**	0.00
Hh income - mid 33% income	0.07**	0.00	0.07**	0.00	-0.02**	0.01	-0.02**	0.00	0.04**	0.00	0.04**	0.00	0.09**	0.00	0.09**	0.00
Hh income - upper 33% income	0.27**	0.00	0.23**	0.00	-0.17**	0.00	-0.14**	0.00	0.16**	0.00	0.15**	0.00	0.27**	0.00	0.24**	0.00
Education – secondary	0.15**	0.00	0.15**	0.00	-0.05**	0.00	-0.05**	0.00	0.07**	0.00	0.07**	0.00	0.11**	0.00	0.11**	0.00
Education - post-secondary	0.28**	0.00	0.28**	0.00	-0.11**	0.00	-0.10**	0.00	0.20**	0.00	0.19**	0.00	0.23**	0.00	0.23**	0.00
Education – gradudate	0.32**	0.00	0.32**	0.00	-0.06**	0.00	-0.05**	0.00	0.29**	0.00	0.28**	0.00	0.33**	0.00	0.32**	0.00
Work status – working	0.24**	0.00	0.11**	0.00	-0.04**	0.00	0.02	0.10	0.06**	0.00	0.02*	0.07	0.16**	0.00	0.09**	0.00
Work status – retire/student	-0.07**	0.00	-0.04*	0.02	-0.10**	0.00	-0.11**		-0.06**	0.00	-0.05**	0.00	-0.03	0.14	-0.01	0.62
Age 25-34	0.25**	0.00	0.24**	0.00	0.05**	0.00	0.06**	0.00	-0.03*	0.03	-0.05**	0.00	-0.06**	0.00	-0.08**	0.00
Age 35-44	0.32**	0.00	0.28**	0.00	0.05**	0.00	0.07**	0.00	-0.08**	0.00	-0.10**	0.00	-0.19**	0.00	-0.22**	0.00
Age 45-54	0.30**	0.00	0.26**	0.00	0.01	0.70	0.03*	0.06	-0.15**	0.00	-0.15**	0.00	-0.36**	0.00	-0.39**	0.00
Age 55-64	0.27**	0.00	0.22**	0.00	-0.15**	0.00	-0.13**	0.00	-0.17**	0.00	-0.17**	0.00	-0.49**	0.00	-0.51**	0.00
Nascent entrepreneur	-	-	1.14**	0.00	-	-	-0.44**	0.00	-	-	0.62**	0.00	-	-	0.57**	0.00
New entrepreneur	-	-	1.19**	0.00	-	-	-0.45**	0.00	-	-	0.40**	0.00	-	-	0.52**	0.00
Established entrepreneur	-	-	1.15**	0.00	-	-	-0.47**	0.00	-	-	0.22**	0.00	-	-	0.40**	0.00
Shut down business <12 mon.	0.90**	0.00	0.80**	0.00	-0.15**	0.00	-0.07**	0.01	0.21**	0.00	0.13**	0.00	0.56**	0.00	0.48**	0.00
Constant	-0.29*	0.00	-0.37**	0.00	0.12**	0.00	-0.68**	0.00	0.36**	0.00	-0.40**	0.00	-0.01**	0.59	-0.36**	0.00

Model diagnostics								
Number of observations	108,309	108,309	108,309	108,309	108,309	108,309	108,309	108,309
Loglikelihood	-65,635	-64,233	-65,634	-68,152	-65,635	-65,684	65,635	-65,635
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Reference categories: Male; age 18-24; household income -lowest 33%; education – less than secondary degree, work status – not working; currently non-entrepreneur; not shut down business in past 12 months.

Notes: Estimation included country and year dummies. Robust standard errors estimates.

* denotes significance at >90% confidence

** denotes significance at >99% confidence

TABLE 5

Probit estimates for perceptual variables of nascent entrepreneurs

	Y = suskill		*Y = fearfail*		*Y = opport*		*Y = knowent*	
Variable	*β*	*P>|z|*	*β*	*P>|z|*	*β*	*P>|z|*	*B*	*P>|z|*
Female	-0.19**	0.01	0.13*	0.04	-0.05	0.36	-0.23**	0.00
Hh income - middle 33% income	0.07	0.45	-0.11	0.14	0.10	0.14	0.00	0.99
Hh income - upper 33% income	0.12	0.17	-0.09	0.25	0.19**	0.01	0.16*	0.02
Education – secondary	0.08	0.42	-0.03	0.75	-0.02	0.77	0.04	0.63
Education - post-secondary	0.09	0.38	-0.01	0.89	-0.04	0.60	0.03	0.76
Education – gradudate	0.21*	0.05	0.04	0.64	-0.10	0.24	0.16*	0.06
Work status – working	0.24*	0.02	-0.22*	0.01	0.08	0.30	0.27**	0.00
Work status – retire/student	0.07	0.69	-0.23	0.14	-0.03	0.83	-0.03	0.82
Age 25-34	0.37**	0.00	-0.01	0.92	0.05	0.58	0.00	0.99
Age 35-44	0.43**	0.00	-0.05	0.60	-0.01	0.89	-0.14	0.15
Age 45-54	0.44**	0.00	-0.04	0.69	-0.18*	0.06	-0.29*	0.00
Age 55-64	0.62**	0.00	0.03	0.81	-0.14	0.20	-0.32**	0.01
Sector:								
Mining, construction	0.58*	0.04	-0.04	0.85	0.39*	0.06	0.47*	0.02
Manufacturing	-0.14	0.54	0.09	0.65	0.03	0.85	0.18	0.33
Trans, comm, util	0.33	0.21	-0.09	0.67	0.20	0.30	0.26	0.17
Whole, mv sale, repair	-0.11	0.65	-0.27	0.20	0.13	0.51	0.48*	0.01
Retail, hotel, restaurant	-0.01	0.95	-0.01	0.94	0.34*	0.05	0.38*	0.02
Finance, insurance, real est.	0.32	0.24	-0.28	0.21	0.44*	0.03	0.44*	0.03
Business services	-0.00	0.98	-0.13	0.48	0.21	0.21	0.42*	0.01
Health, educ, social services	-0.15	0.51	-0.13	0.52	0.31*	0.09	0.52**	0.00
Consumer services	-0.10	0.64	-0.02	0.92	0.26	0.16	0.28	0.12
Shut down business in past 12 mon.	-0.01	0.96	-0.01	0.89	0.02	0.87	0.32	0.00
Constant	0.58*	0.02	-0.67**	0.00	0.18	0.38	-0.06	0.78
Model diagnostics								
Number of observations	2,566		2,566		2,566		2,556	
Loglikelihood	-916		-1,254		1,622		1,566	
Prob > chi2	0.00		0.00		0.00		0.00	

Reference categories: Male; age 18-24; household income -lowest 33%; education – less than secondary degree; work status – not working; sector -agriculture, forest, hunting, fishing; not shut down business in past 12 months.

Notes: Estimation included country and year dummies. Only observations that count exclusively as nascent entrepreneurs (and no other category) are included. Robust standard error estimates.

* denotes significance at >90% confidence

** denotes significance at >99% confidence

TABLE 6

Recursive simultaneous bivariate probit model

	Equation for nascent entrepreneurs (nascent)		*Equation for sufficient skill perception (suskill)*	
Variable	*β*	*P>|z|*	*β*	*P>|z|*
Female	0.00	0.99	-0.31**	0.00
Hh income - middle 33% income	-0.05**	0.01	0.05**	0.00
Hh income - upper 33% income	-0.06**	0.00	0.15**	0.00
Education – secondary	-0.01	0.51	0.14**	0.00
Education - post-secondary	-0.03	0.19	0.24**	0.00
Education – gradudate	-0.02	0.47	0.27**	0.00
Work status – working	0.12**	0.00	0.11**	0.00
Work status – retire/student	-0.23**	0.00	-0.07**	0.00
Age 25-34	-0.10**	0.00	0.27**	0.00
Age 35-44	-0.15**	0.00	0.36**	0.00
Age 45-54	-0.24**	0.00	0.36**	0.00
Age 55-64	-0.33**	0.00	0.32**	0.00
Fear of failure (*fearfail*) – yes	-0.13**	0.00	-0.33**	0.00
Opportunity perception (*opport*) – yes	0.22**	0.00	0.31**	0.00
Sufficient skill perception (*suskill*) – yes	1.86**	0.00		
Knowing another entrepreneur (*knowent*) – yes			0.51**	0.00
Shut down business in past 12 months – yes			0.84**	0.00
Constant	-2.13**	0.00	-0.49**	0.00

Model diagnostics	
Number of observations	95,895
Loglikelihood	-73,607
Prob > chi2	0.00
Rho	-0.63**

Reference categories: Male; age 18-24; household income -lowest 33%; education – less than secondary degree.
Notes: Estimation included country and year dummies. Only observations that classify as nascent entrepreneurs or non-entrepreneurs are included are included, young entrepreneurs and experienced business owners are excluded. Robust standard error estimates.
* denotes significance at >90% confidence
** denotes significance at >99% confidence

TABLE 7

Country-specific gender effects in the recursive simultaneous bivariate probit model

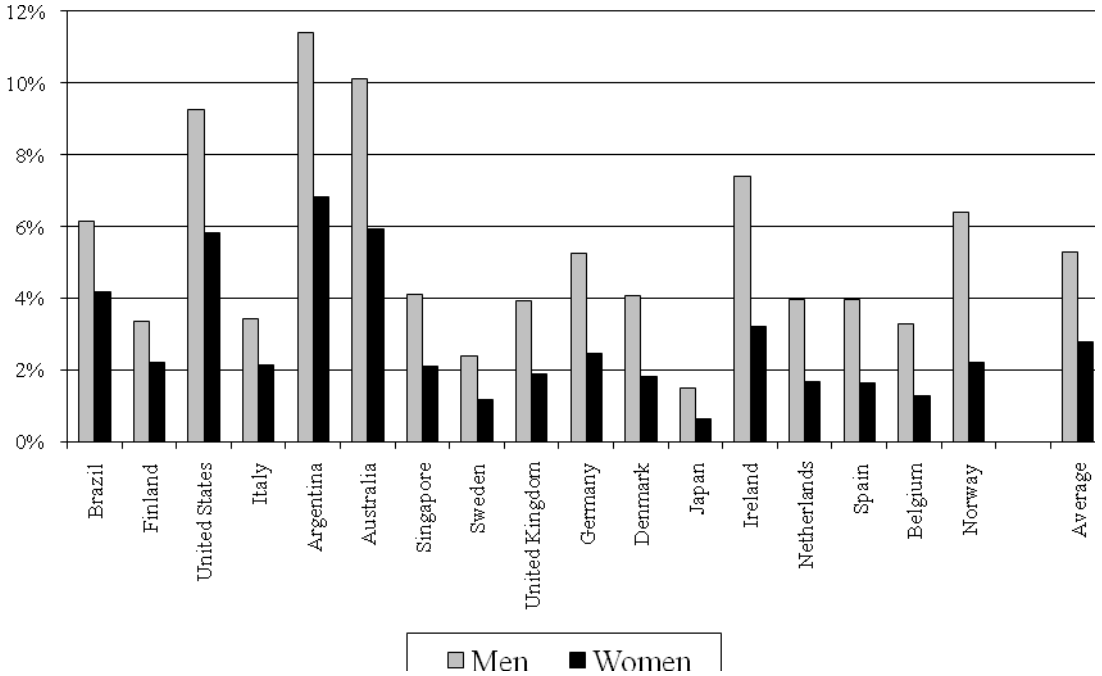
	Female coefficient in equation for nascent entrepreneurs (nascent)		*Female coefficient in equation for sufficient skill perception (suskill)*		
Country	*B*	*P>|z|*	*β*	*P>|z|*	*N*
Argentina	0.02	0.76	-0.15*	0.01	2,269
Australia	0.11	0.15	-0.35**	0.00	2,916
Belgium	-0.05	0.62	-0.39**	0.00	3,364
Brazil	0.01	0.95	-0.21**	0.00	1,989
Denmark	0.02	0.84	-0.44**	0.00	6,543
Finland	0.16	0.12	-0.28**	0.00	1,739
Germany	0.10*	0.01	-0.35**	0.00	11,630
Ireland	-0.26*	0.10	-0.40**	0.00	794
Italy	-0.36*	0.10	-0.37**	0.00	908
Japan	-0.33*	0.08	-0.38**	0.00	1,967
Netherlands	0.01	0.91	-0.55**	0.00	3,374
Norway	-0.24*	0.02	-0.36**	0.00	2,241
Singapore	-0.07	0.30	-0.24**	0.00	3,942
Spain	-0.02	0.56	-0.05*	0.03	17,327
Sweden	0.17*	0.08	-0.44**	0.00	3,445
United Kingdom	-0.00	0.92	-0.39**	0.00	25,830
United States	0.05	0.30	-0.36**	0.00	5,617

Notes: Reported results are based on country-specific replications of the pooled model reported in Table 6.

* denotes significance at >90% confidence

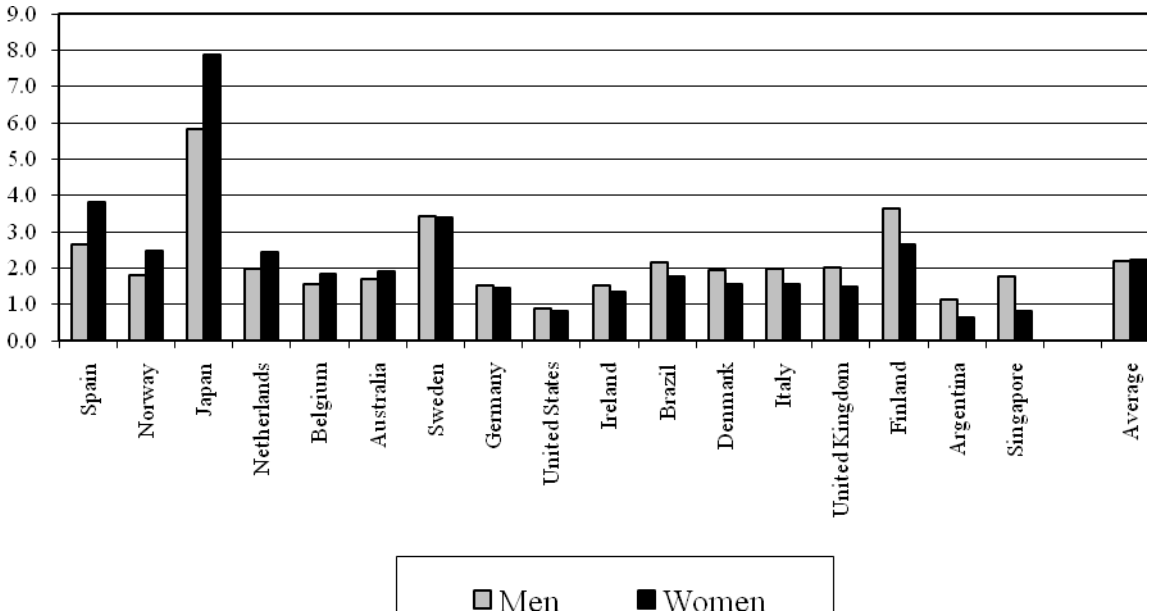
** denotes significance at >99% confidence

Figure 1. Nascent entrepreneurs as percent of adult population, country averages 2001-2006



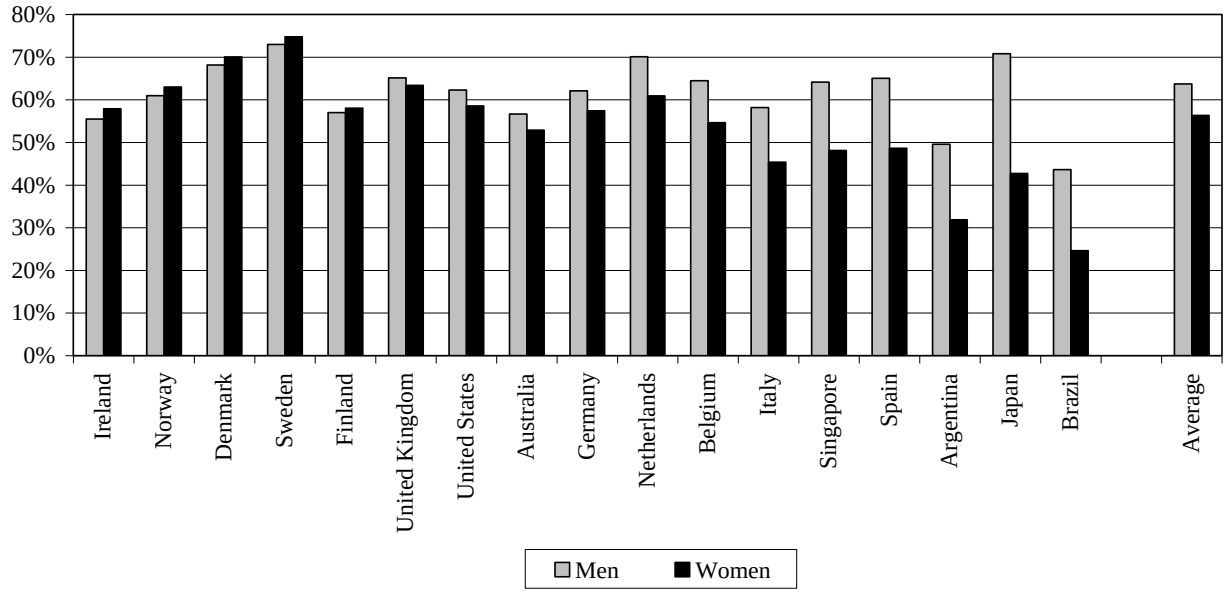
Source: GEM adult population surveys for respondents 18-64 years old, un-weighted sample frequencies for individuals involved in starting a business (*nascent*). Countries are ordered according to the ratio of men to women involved in startup activity with the gender gap increasing from left to right.

Figure 2. Ratios of nascent entrepreneurs to established business owners, averages 2001-2006



Note: Countries are ordered such that countries further left have higher average survival chances for women compared to men.

Figure 3. Wage earners as percent of adult population, country averages 2001-2006



Source: GEM adult population surveys for respondents 18-64 years old, un-weighted sample frequencies for individuals who have a full or part time job and are not involved in any entrepreneurial activity. Country averages based on data availability (see Table A2). Countries are ordered according to the ratio of men to women being employed increasing from left to right.

Figure 4. *Suskill* across countries by gender, averages 2001-2006