Seeing the World with Different Eyes: Gender Differences in Perceptions and the Propensity to start a Business

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Abstract

Across countries, women own significantly fewer businesses than do men. We show that this is due, in large part, to the fact that the propensity to start businesses of women is significantly lower than that of men. The lower propensity of women, in turn, appears to be highly correlated to women's lower average levels of optimism and self-confidence, and higher fear of failure. Ceteris paribus, women and men have different perceptions of the business environment and, as a result, make different decisions. We provide some evidence that this may be universally true and independent from culture, although country specific factors seem to influence perceptual differences between genders. We also show that women who are more self-confident and undeterred by failure have a greater probability to start a business than men with similar characteristics.

I. Introduction

Across countries, women own significantly fewer businesses than do men.[1] This difference may be due to the fact that women fail more often than men or that fewer women than men start businesses to begin with, or both. Some evidence exists that, after correcting for various factors such as size and sectoral distribution, women's failure rates are not significantly different from those of men [Perry, 2002; Kepler and Shane, 2007]. Thus, at least a portion of the difference between genders must be due to the fact that fewer women than men start businesses. In other words, the start up propensity of women must be lower than that of men. But why would this be true?

The obvious answer (at least to economists) is that women and men have different socio-economic characteristics and that if we were to correct for factors such as education, wealth, family and work status, which might influence the expected return from starting a business, those gender differences in start up propensity would disappear.

In addition, the propensity of women to start a business may differ from that of men because they might have different preferences. One could argue that men and women have different motivations and that women like being self-employed less than men do. After all, de gustibus non est disputandum [Stigler and Becker, 1977]. In other words, the utility women receive from starting their own businesses could be lower than that of men because men and women respond to different models of employment or because women are more risk averse. For example, there is some evidence that single women may be more risk averse than men with respect to financial decisions [Jianakoplos and Bernasek, 1998; Schubert et al., 1999].

However, after controlling for risk preferences, there are various reasons to believe that women should actually have a stronger preference for self-employment than men. For example, the human capital explanation of gender differences in employment decisions is that, owing to

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[1] In addition to works by, among others, Blanchflower [2004] and Georgellis and Wall [2005], this claim is supported by a large number of statistics worldwide, including the Employment Statistics of the U.S. Bureau of the Census, the Social Trends Datasets (Self-employment by Gender and Industry) of the Office of National Statistics of the U.K., and the Bureau of Statistics of the International Labor Office (http://www.ilo.org/stat/).

specialization in household production, women intent to work in the labor market more intermittently than men and hence invest less, leading to lower remuneration and a lower ability to participate in the formal labor market [Neumark and McLennan, 1995; Polacheck, 1975, 1981]. In addition, discrimination against women in the labor market [Bertrand and Hallock, 2001; Goldin and Rouse, 2000] could further lower the incentives of women to seek wage employment. This reasoning would rather imply that women should have stronger preferences for starting businesses than men since working for one self eliminates the potential discrimination in the labor market and affords the type of flexibility that the standard labor market may not be able to offer. In addition, some recent studies have shown that independence and self-realization are more important for women than men and that women value time flexibility more than men do [Edwards and Field-Hendrey, 2002; Lombard, 2001]. Finally, in some countries, women's access to the official labor market is restricted by various social constraints and this too should give them incentives to try self-employment. Consequently, it seems at least doubtful whether gender differences in start-up propensity can be directly attributed to a lower preference of women for self-employment.

We offer an alternative explanation which is based on the insight that men and women often perceive and interpret relevant information in a systematically different way. Thus, it may be that men and women who have the same preferences differ in their interpretation of their decision environments and, as a result, they make different choices even in objectively identical situations. The results of our empirical study provide evidence for the importance of gender differences in perceptions and their relation to the propensity to start a business.

Using a large data set obtained from surveying random samples of population in a large number of countries, we study the existence and characteristics of differences in the start up behavior of men and women. We find that the ratio of men to women involved in start up activities significantly exceeds 1 across all countries in our sample and is systematically close to 1.7. A preliminary look at the data suggests that socio-economic characteristics do not entirely explain the difference in start up propensity across genders. In addition, although it is certainly true that, especially in some countries, women are less likely to start businesses than men because of cultural barriers, we find that even after taking into account country differences and socio-economic factors, men are still more likely to start businesses than women.

We find that the remaining gender gap is largely related to systematically different perceptions of men and women. Men across countries tend to be more self-confident and optimistic about business opportunities, and less deterred by fear of failure than women. This is consistent with previous findings about overconfidence and self-confidence [Bengtsson, 2005]. Second, our results show that socio-economic and perceptual differences *together* explain the differences in prevalence rates of business start ups across genders in 14 of the 17 countries included in our data. In other words, we find some evidence that perceptual differences may be universally true and independent from cultural factors although culture seems to amplify or reduce them. This is consistent with results from a field study by Gneezy and Rustichini [2004], who have shown gender differences in competitive behavior to emerge even in children less than 10 years old, and with Croson and Buchan [1999] who have found differences in the intensity with which women and men reciprocate to hold across countries. Third, we find some evidence that women who are self-confident in their entrepreneurial skills and undeterred by fear of failure have a greater probability to start a business than men with otherwise similar characteristics. This indicates that women are unlikely to have a lower preference for self-employment than men.

Uniquely, our results are obtained from consistent cross-country survey data rather than experimental evidence. Thus, we provide evidence that differences in cognitive styles across genders that have an economic impact are found not only in controlled settings but also in field data and across countries.

II. Theoretical background

In spite of evidence from most other social and behavioral sciences, economic studies on preferences and decision making rarely take into account the possibility of behavioral differences across genders [Eckel and Grossman, 1998]. Only recently, works in experimental and behavioral economics have begun showing that differences in perceptions, attitudes, or preferences may exist and may have important implications for economic theory. Gneezy et al. [2003], for example, have provided evidence that men and women have different attitudes toward competition. Andreoni and Vesterlund [2001] have provided evidence of gender differences in altruism and fairness. Bengtsson et al. [2005] have provided evidence that gender differences

exist in self-confidence and optimism. Frederick [2005] has shown that men and women have different cognitive abilities, which are related to different time and risk preferences. Finally, Croson and Buchan [1999] have provided evidence that some gender differences hold even across culture.

Below, we explain how perceptual differences can influence the economic decision of starting a business and we discuss the possibility of systematic gender differences in perceptions and their potential economic consequences.

1. Perceptions and start-up decisions

Starting a business is an individual decision that involves uncertainty. The potential outcomes of a new venture and their likelihood of occurrence are usually unknown [Knight, 1921; Ellsberg, 1961]. This requires the individual to form a belief and to exercise judgment about expected outcomes and probabilities. For an individual to start a new business, the subjective expected utility of the new business must be higher than the subjective expected utility of an alternative course of actions, such as staying in a wage job. As a result, smaller *perceived* down-side risks and losses combined with higher *perceived* chances of success and higher potential gains increase the entrepreneurial propensity of an individual. Thus, in spite of being subjective and possibly biased, individual perceptions that influence expected outcomes and probabilities will have an impact on start-up decisions.

Perceptions and judgments of uncertain outcomes and probabilities have been shown to be subject to a variety of biases that can influence decision processes in a systematic way. For example, overconfidence [Camerer and Lovallo, 1999], the influence of prior gain and loss experiences [Thaler and Johnson, 1990], and the incorporation of irrelevant information [Tversky and Kahneman, 1974] can all lead to individual judgments that deviate from objective facts. Beliefs are often expressed in statements like "I think that…," "chances are…," "it is unlikely that…" and so forth. Human judgment of outcomes and probabilities obviously requires perception, i.e. the process of acquiring, selecting, interpreting and organizing of sensory information. However, perceptions can vary among individuals and one object can give rise to different perceptions among individuals [Arnheim, 2004]. Similarly, an object or situation may

fail to give rise to any perception at all if the perception has no grounding in a person's experience, the person may literally not perceive it. As Casson [1982, 14] explained, '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 sees a business opportunity where the latter does not. Thus, different perceptions may lead to different decisions in identical situation, even if individuals have identical information, preferences and opportunity costs.

2. <u>Gender differences in cognition and perception</u>

An increasing amount of studies from various disciplines, including psychology, neuroscience, and economics, is providing evidence that men and women perceive the world around them with "different eyes".

Among other things, gender dimorphism occurs in self-evaluations [Correll, 2001]. Men are generally more confident in their own abilities than women and show a stronger bias towards overconfidence [Bengtsson, 2005]. This effect has been demonstrated for various tasks, but appears to be strongest for tasks that are assumed to be primarily in the masculine domain [Deaux and Farris, 1977; Beyer, 1998]. For example, in a study among 97 college students, women outperformed men on most verbal tests and men outperformed women on visual-spatial tasks [Weiss et al., 2003]. However, in a self-rating scale, men rated their spatial abilities significantly superior to those of women, while women did not rate their verbal abilities superior to those of men. A similar effect has been demonstrated in an economic context: Theoretical models predict that excessive trading is a sign of overconfidence and Barber and Odean [2001] have shown that men trade common stock investments more excessively than women.

Interestingly, recently accumulated evidence shows remarkable effects of sex hormones on brain activity and cognitive skills. For example, the performance levels of both heterosexual and homosexual males and females in spatial tasks were found to be influenced by the effects of free testosterone [Neave et al., 1999]. The link between hormonal levels and cognition has been shown to occur very early and to remain sensitive throughout life [Kimura, 1992 and Kimura and Hampson, 1994]. This suggests that from the start the environment is acting on differently wired

brains in boys and girls [Kimura, 1992]. Such findings imply that it is hard if not impossible to isolate the role of experience and physiological predisposition on cognitive abilities and gender-specific perceptions. Yet, at least part of the sexual dimorphism seems to be inherited rather than learnt. For example, a recent study by Connellan et al. [2001] provided evidence that gender differences in perception are at least in part biological. The study examined 102 human neonates, who by definition have not yet been influenced by social and cultural factors, to see if there was a difference in looking time at a face (social object) and a mobile (physical-mechanical object). Results showed that the male infants showed a stronger interest in the physical-mechanical mobile whilst the female infants showed a stronger interest in the face.

Whatever the origins are in each particular case, whether they are born or made, women and men show remarkable differences in cognitive processes and perceptions. We suggest that such gender-specific differences in perceptions influence start-up decisions in a systematic way. And, in particular, we find evidence that higher levels of optimism, self-confidence and risk tolerance in men compared to women explain, at least in part, the higher start-up propensity of men. We test this conjecture empirically using survey data from 18 different countries.

III. Data

Data used in our analysis were collected for the 2001 population survey of the Global Entrepreneurship Monitor (GEM) project. GEM is an ongoing large scale research project designed to study the causes and implications of entrepreneurial behavior across countries. Initiated in 1999 with 10 countries, the project collects data annually and has grown to include more than 40 countries in 2006. GEM data used in this paper were collected in 2001 in 29 countries. A representative population survey with at least 2,000 observations was conducted in each of the participating countries, yielding over 74,000 completed interviews collected between May and June 2001. The main purpose of the survey was to create a representative random sample of population in each country and to identify what percentage of these individuals, at the time of the survey, owned and managed a business or were in the process of starting one. If either or both of these criteria applied, respondents were asked follow-up questions that allowed the construction of a profile of the respondents and of their businesses. Among other things,

respondents were asked the age of their venture and whether or not the business had already paid wages. These criteria were then used to identify the number of people involved in entrepreneurial activity in each country, and to distinguish between nascent entrepreneurs and non entrepreneurs. Details about data collection procedures and measures of reliability are reported in Reynolds et al. [2005].

Individuals were coded as nascent entrepreneurs (*nascent*) if they claimed to have been engaged in start-up activities during the 12 months preceding the survey, to have been full or part owners of the new business, and to have paid wages to the owners or others for a period not exceeding 3 months. Individuals stating to be managing and owning a business that had paid wages for 3-42 months were coded as new entrepreneurs (*newentr*). In addition, respondents 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 had paid wages or profits for longer than 42 months.[2] The dataset contains also basic demographic information for each respondent, including age and gender. For most countries, data are also available about working status, education level, and relative income group. 11 countries had data gaps in one or more of the demographic and socio-economic variables and, therefore, were excluded from our analysis, reducing the working sample to 18 countries for a total of more than 40,000 observations. Countries included in our study are Argentina, Canada, Denmark, Finland, Germany, Hungary, India, Israel, Italy, Japan, New Zealand, Poland, Portugal, Russia, Singapore, South Korea, Sweden, and USA.

Each survey participant was also asked a number of questions related to perceptual variables often associated with start up activities. Among other things, respondents were asked whether they believed they had the knowledge, skill and experience required to start a business (*suskill*). This variable describes the subjective assessment of one's own skills, knowledge and ability with respect to starting a business; it is expected to be positively linked to entrepreneurial propensity. Respondents were asked whether they thought that good opportunities for starting a business would exist in the area where they lived in the six months following the survey (*opport*). This variable describes a personal assessment of the existence of opportunities and is also expected to

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2 The main emphasise of our analysis is on nascent entrepreneurs. However, we use these two additional categories of more advanced entrepreneurs for causality and endogeneity tests of our main results, see Appendix.

have a positive connection to entrepreneurial propensity. Finally, respondents were asked whether fear of failure would prevent them from starting a business. This variable is expected to have a negative link to individuals' entrepreneurial propensity. In fact, fear of failure (*fearfail*) may be viewed as a proxy for downside risk tolerance. A detailed description of all independent variables is presented in the Appendix together with descriptive statistics for the co-variables used in the estimated models.

The decision to start a business or become self-employed has been shown to correlate somewhat to several variables such as age, education, work status, household income, etc. [Blanchflower, 2004; Blanchflower and Oswald, 1998]. Surprisingly, we find that all these variables have very limited power in explaining differences between genders with respect to starting a business. These differences, instead, seem to rest on significant perceptual differences. Earlier studies dealing with the influence of perceptions and overconfidence on start up activity were based on experimental data with students [Camerer and Lovallo, 1999], or had to rely on noticeably smaller samples of established business owners from just one country [Busenitz and Barney, 1997; Cooper et al., 1988]. To our knowledge, except for experimental studies, all available empirical evidence is based on the study of successful self-employed individuals or small business owners. In other words, primarily because of the lack of available data, existing studies failed to consider the proper population of individuals involved in the actual process of starting a business. GEM data, on the other hand, are exceptionally well suited for our purpose. To our knowledge, the dataset is the only major cross-country study of new business creation that uses a consistent methodology and a set of simple, comparable variables measuring relevant individual perceptions in each country. More important, GEM data do not rely on the respondents ex post explanations for their own decisions. In other words, they do not suffer from "hindsight bias" [Thaler 2000].

Finally, although causality is not an issue in our study, it should be noted that the direction of causality between the three perceptual variables described above (*suskill, opport, fearfail*) and the likelihood of starting a business is somewhat ambiguous. However, the estimation results reported in the Appendix, Table A3, provide some informal evidence that the perceptual variables included in this study are more likely to be drivers rather than results of entrepreneurial activity. For example, the perception of seeing good business opportunities (*opport*) peaks among nascent

entrepreneurs and declines as groups of increasingly more experiences business owners are considered, even after controlling for gender, income, education, working status and age. Similarly, estimation results show that fear of failure (*fearfail*) is lowest in the group of nascent entrepreneurs. In addition, all groups of entrepreneurs are significantly more convinced about their entrepreneurial skills and abilities (*suskill*) than the group of non-entrepreneurs. The differences in *suskill* among the three groups of entrepreneurs are not very large. Nevertheless, nascent entrepreneurs and new entrepreneurs are more confident in their skills than experienced entrepreneurs, suggesting a tendency towards overconfidence of nascent entrepreneurs [Camerer and Lovallo, 1999; Koellinger et al. 2007].

IV. Descriptive findings

Figure 1 shows the percentage of individuals coded as involved in starting a business (*nascent*) in each country. A break-down by gender shows that men in all countries are more frequently involved in start-up activities than women. This gender gap in start-up activity is more pronounced in some countries than in others. In figure 1, countries are presented in a decreasing order given their gender gap. On average, there are 1.7 men involved in starting a business for every woman. According to the Chi-squared test, these gender differences are statistically significant in all countries in the sample, with the single exception of Italy.

Table 1 shows descriptive statistics for all perceptual variables included in this study. It can be seen that men are on average more optimistic, self-confident and less afraid of failure than women. These differences in perception are highly significant. Importantly, the estimation results reported in the appendix, Table A3, also show that these perceptual differences between men and women cannot be explained by gender differences in income, education, age and working status. Thus, these perceptual distinctions could reflect objective gender differences to some extent. For example, it could be that men are on average objectively better skilled at tasks related to starting a business and that they have better chances to survive in the market or less severe consequences of a business failure. Yet, the strong differences between men and women also seem to have a subjective and biased component. For example, men have systematically more optimistic expectations about future business condition than women living in the same country (figure 4).

This is consistent with related findings showing that men are generally more optimistic than women [Bengtsson, 2005]. Also, the higher confidence of men in their own business skills could be at least partially the result of a higher propensity of men to be overconfident [Deaux and Farris, 1977; Beyer, 1998; Barber and Odean, 2001]. In addition, gender differences in perception remain highly significant even in the group of nascent entrepreneurs, after controlling for the sector in which individuals attempt to start a new business, income, education, working status and age (see Table A4 in the Appendix). Thus, independent of whether the reported perceptions of individuals are biased or not, the gender differences reported here cannot be explained by socio-economic differences between men and women or the type of business they have in mind when they answer the survey questions. Rather, they seem to reflect more fundamental differences how men and women perceive themselves and the world around them.

Perceptual differences between men and women appear across all countries in the sample. However, there are pronounced differences in the prevalence ratios of the perceptual variables across countries. In addition, perceptual differences between men and women are stronger in some countries than in others. As shown in Figure 2, men are more confident in their entrepreneurial skills than women across all 18 countries. Yet, the difference is more pronounced in India than, for example, in Canada. In India, 58% of the men believe to have sufficient skills to start a business, compared to only 29.3% of the women. In Canada, 59% of men are confident in their business skills, compared to 46.5% of women. Such a pattern suggests that cultural, economic and social factors that vary across countries influence both the average prevalence rate of self-confidence with respect to starting a business and also the extent to which men and women exhibit differences in their self-perceptions. Yet, the finding that men in all countries are more self-confident than women could also be partially attributed to evolutionary factors rather than to the socialization process.

Similarly, Figure 3 shows that women in all countries (with the single exception of Japan) report to fear failure more often than men. Similarly to the previous variable, the extent of the gender difference in fear of failure varies across countries. For example, 41% of men in both Argentina and Germany state that fear of failure would prevent them from starting a business. The share of women making that statement is higher in both countries. However, the gender gap is much more pronounced in Germany than in Argentina (54% vs. 48% of women respectively).

Finally, Figure 4 shows that all countries (with the single exception of Singapore) women perceive the existence of good business opportunities less than men. Similarly to the previous variables, the extent of the difference in opportunity perceptions between genders varies across countries and the gap is more pronounced in some countries than others. For example, the gender gap in opportunity perception is more pronounced in Sweden than in New Zealand. In both countries about 50% of men see good opportunities for starting a business in the area where they live (50% in New Zealand, 48% in Sweden) and they are more optimistic than women living in the same country. While 46% of women in New Zealand see good business opportunities, only 36% of women in Sweden do so.

V. Econometric analysis

To study the correlation between perceptual and socio-economic variables and the difference in start up rates across genders, we use a fixed effects estimation approach to eliminate country-specific influences and possible interaction terms from the regression.[3] For this purpose, we define the cross-sectional survey data as a panel by grouping observations according to their country of residence c. The decision to start a business is modeled as a binary choice with $y_{ci} = 1$ if individual $i = 1,...,N$ in country $c = 1,...,C$ is starting a business at the time of the survey, and $y_{ci} = 0$ otherwise. In our analysis, y_{ci} indicates if an individual fits the GEM definition for being a nascent entrepreneur ($y_{ci} = nascent$). The probability p_{ci} that an individual will fall into this category is $E(y_{ci}) = p_{ci}$. Individual i in country c will decide to start a business, if her specific

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[3] Section 3 illustrated that gender-specific differences in perceptions are not independent from country-specific effects. Thus, there are possible interaction effects of country and individual-specific variables on entrepreneurial activity. In addition, country-specific effects can be expected to directly affect both the individual propensity to start a business and the observed gender gap. Thus, in order to consistently estimate the main effects of socio-demographic and perceptual variables on start up propensity, our econometric model should consider explicitly both the country-specific effects and possible interaction terms of countries with other explanatory variables. However, including all possible interaction terms in the regression equation would lead to multicollinearity and make the results very hard to interpret.

economic situation and her expectations about the value of the new business exceed some critical, unobservable threshold. This threshold is

$$y_{ci} = 1 \ if \ y_{ci}^* > 0$$
(1)
$$y_{ci} = 0 \ if \ y_{ci}^* \leq 0$$

and

(2)
$$y_{ci}^* = X_{ci}' \beta + u_{ci}$$

where X_{ci} is the vector of individual-specific socio-economic and perceptual variables.

The individual probability to start a business also depends on unobserved individual factors and on the country of residence. The base-line probability to start a business is allowed to vary across countries. In turn, the error term u_{ci} consists of two components: a country specific effect μ_c and an individual specific effect $v_{ci} \sim IID(0, \sigma_v^2)$. Hence, $u_{ci} = \mu_c + v_{ci}$ and

(3) $\Pr[y_{ci} = 1] = E(y_{ci} \mid X_{ci}, \mu_c) = \Pr[y_{ci}^* > 0] = \Pr[v_{ci} > -X_{ci}'\beta - \mu_c] = F(X_{ci}'\beta + \mu_c)$.

where F is the cumulative distribution function of the individual error term v_{ci} that maps the linear index into the (0;1) range. The descriptive findings in Section 3 showed that the explanatory variables X_{ci} are not independent from the country specific effect μ_c, $E[\mu_c \mid X_{ci}] \neq 0$. Thus, in order to estimate β, we need to eliminate μ_c from equation (3).[4] Following Chamberlain [1980], the solution to this problem is a conditional likelihood approach, using a set of sufficient statistics for μ_c. By definition of a sufficient statistic, the distribution of the data given this sufficient statistic will not depend on μ_c anymore. Chamberlain [1980]

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[4] μ_c contains both the direct effect of country dummies on the individual propensity to start a business, and possible interaction terms of country dummies with any individual characteristic contained in X_{ci}.

showed that a sufficient statistic for μ_c is $\sum_i y_{ci}$ if F is the logistic cdf. The conditional log-likelihood function only depends on β, X_{ci}, and y_{ci}:

$$(4) \quad \ell_c = \sum_c \ln[\exp(\overline{\beta}' \sum_i X_{ci} y_{ci}) / \sum_{d \in B_c} \exp(\overline{\beta}' \sum_i X_{ci} d_i)]$$

where

$$B_c = \{d = (d_1, ..., d_{nc}) \mid d_i = 0 \ \ or \ \ 1 \ \ and \ \ \sum_i d_i = \sum_i y_{ci}\}$$

and n_c is the number of individuals in country c.

By conditioning the log-likelihood function on $\sum_i y_{ci}$, the μ_c are eliminated and a consistent estimate of the average value of β across countries is obtained. The estimator for β is independent of direct country effects and possible interaction terms of country dummies and X_{ci}. This way, we get a parsimonious model that estimates the main effects of socio-economic and perceptual variables on entrepreneurial activity across countries. The dataset used for our application consists of different numbers of observations per country. The panel is therefore unbalanced. However, since the estimation is carried out with maximum likelihood (ML), and ML is consistent and asymptotically efficient even for unbalanced groups [Baltagi and Chang, 1994; Harville, 1977], equation (4) is adequate for our particular data structure.

VI. Results

Table 2 shows the estimation results. We ran two different models. For each individual, model 1 includes socio-economic variables. That is, gender (*female*), household income (*gemhhinc*), educational attainment (*gemeduc*), work status (*gemwork*), and age cohort (*age*). Model 1 is used as a reference to show how model fit and β - values change when we add perceptual variables. In model 2, in addition to socio-economic variables, we control for perceptual variables. That is, model 2 also includes fear of failure (*fearfail*), sufficient skill perception (*suskill*), and opportunity perception (*opport*). All explanatory variables are dummies and the estimated β -

coefficients are reported as odds-ratios. All models compare *nascent*, that is individuals involved in starting a business ($y_{ci} = 1$), with individuals not involved in start up activities ($y_{ci} = 0$).[5]

The inclusion of the perceptual variables in model 2 improves the log-likelihood significantly. Also, all perceptual variables are significantly associated with start-up propensity. In fact, the factor with the highest odds ratio (5.929) is whether individuals believe to have the sufficient skills, knowledge and experience to start a new business (*suskill*). Controlling for individual perceptions explains about 50% of the remaining gap in entrepreneurial activity between men and women after controlling for age, income, education, and work status. Thus, perceptual differences between men and women account for a large share of the observed differences in the rate of start up activity between genders.

Since men and women have different perceptions, it could be that men and women react differently to the same set of factors when deciding whether to start a business. To test this proposition, we ran separate fixed-effect models for women and men.[6] The results are given in Table 3. According to a Chow Test [Greene, 2003], the null hypothesis that the coefficients in both models are equal must be rejected with more than 99% confidence.[7] Hence, men and women respond differently to changes in socio-economic conditions and subjective perceptions. Women who are confident in their entrepreneurial abilities are more likely to start a business than otherwise comparable men. In addition, women who are not afraid of the consequences of a possible business failure are also more likely to start a venture than otherwise comparable men.

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[5] More experienced business owners included in the data are excluded from the analysis via filtering ($y_{ci} = 0$). This is done to obtain unbiased estimates of the differences between nascent business owners and people who are not involved in any start up activity. According to the GEM definition, non-nascent business owners (or experienced business owners) are individuals who manage and own at least part of a business that has paid wages for more than 3 months.

[6] Implicitly, this controls for possible three way interaction effects of country, gender, and perceptions on entrepreneurial activity.

[7] The Chow test analyzes the null hypothesis that the coefficients in both regression models are equal. The restricted model is based on the pooled data with all 20,165 observations (model 2 in Table 2). The log-likelihood for the separate unrestricted models for men and women are -2,371 and –1,482, respectively (Table 3). The chi-squared statistic of the pooled model based on 18 co-variables is LR = 2 (-2,371 – 1,482 + 3,915) = 124. The 99% critical value from the chi-squared distribution with 17 df is 33.41. Hence, the null hypothesis can be rejected with more than 99% confidence.

Thus, the higher average level of self-confidence of men and their higher tolerance for failures explain a large part of the observed gender gap in entrepreneurial activity.[8] However, those women who are self-confident and are not afraid of failing have a *greater* probability to start a new business than men with otherwise similar characteristics.[9]

The results in Table 2 and Table 3 report the average effects of the explanatory variables across countries. In addition, we also estimate ordinary logit models separately for each country in the sample to identify country-specific differences that are not observable in the pooled regressions. For each country, we estimate one model that only included socio-demographic explanatory variables (equivalent to model 1 in Table 2) and a second model that also included perceptual factors (equivalent to model 2 in Table 2). Table 4 shows the country-specific effects of gender on entrepreneurial propensity.

With the exception of Italy, men are significantly more likely to start a business in all countries included in the sample (Figure 1). After controlling for socio-economic asymmetries, the gender difference in start up propensity becomes insignificant only in New Zealand, Japan, and South Korea. The remaining 14 countries, instead, still exhibit a significantly lower start-up propensity of women. Noticeably, when the perceptual variables are added to the models, the remaining differences across genders disappear in 10 of these 14 countries. Thus, our results suggest that socio-economic and perceptual differences together explain the difference in the rates of start up activity between genders in 14 out of 17 countries in the sample. Only in Russia, Argentina and Finland, a significant gender gap remains that is not explained by the variables in our data. In particular, controlling for individual perceptions even slightly accentuates the gender gap in Finland. Some unobserved country-specific factors not captured by our socio-economic and perceptual variables are probably responsible for the remaining gender gap in these three

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[8] In our sample, the share of women trying to start a business is lower in mining and construction, transportation, communication, utilities, whole sale, finance, insurance, and real estate, and higher in retail, hotels, restaurants, health, education, and social and consumer services (see Table A1 in the Appendix). Although sectoral differences influence perceptions, a significant difference across genders remains (see Table A4 in the Appendix).

[9] Interestingly, higher education has a reverse impact on the probability of starting a business for both men and women: Having a post-secondary degree or some graduate school experience increases significantly the chances that men will start a business but has an insignificant and negative effect on women.

countries. For example, they could be related to differences in labor-market opportunities for men and women in these countries.

VI. Conclusion and implications

The number of women's owned businesses is significantly lower than that of men. This is due, at least in part, to the fact that the start up propensity of women is lower than that of men. To our knowledge, the issue of gender differences in start-up propensity has not been studied before. Several studies, however, have been conducted on various aspects of the gender gap in the labor market. Those studies can be roughly divided into two groups: Studies that focus on differences in human capital and or preferences [for example, Polacheck, 1981], and studies that focused on discrimination [Goldin and Rouse, 2000]. Only recently, with the application of experimental economics to this type of questions, some studies [Frederick, 2005; Gneezy and Rustichini, 2003; and Gneezy et al., 2003] have suggested that differences in perceptions, attitudes, or preferences may provide an explanation for at least part of the observed difference in labor market behavior between men and women.

We complement these works by providing some evidence that, ceteris paribus, men and women see the world with 'different eyes,' and perceive the existence of opportunities and their ability to exploit them successfully in very different ways. In other words, our results suggest that men and women perceive and interpret information differently and that, as a result, they make different choices. Across all countries in our sample, and consistently with previous studies, men tend to be more optimistic, self-confident and less deterred by fear of failure than women. We also find some evidence that women who are more self-confident and undeterred by fear of failure have a greater probability to start a business than men with similar characteristics. Our results show that socio-economic and perceptual differences together explain the differences in prevalence rates of business start ups across genders in 14 of the 17 country samples included in our data. In other words, we find some evidence that perceptual differences may be universally true and independent from cultural factors although culture seems to amplify or reduce them. The existence of some interaction between gender differences and countries suggests that cultural differences do have some influence on gender-specific perceptions.

However, the persistence of perceptual differences between genders across countries makes it hard to believe that such differences are entirely the result of culture, up-bringing and socialization. Rather, our results may suggest that at least a part of the perceptual distinctions between men and women may be inherited rather than learnt as suggested by recent works on cognition and neuroscience [Connellan et al., 2001; Kimura, 1992]. If women perceive, even if incorrectly, not having sufficient skills, knowledge and ability to start a business, the results will be analogous to those of a situation in which these beliefs are based on actual differences [Gneezy et al., 2003]. For example, confidence in one's ability and optimism has been shown to be significantly related to academic performance [Chemers et al., 2001].

Overall, we interpret our results to suggest that perceptions have important economic effects and explain a very significant portion of the observed gender difference in start up behavior. Our results are important because the role of subjective individual perceptions has largely been ignored in the economic literature so far. We suggest that people who are facing the same choices might behave differently even if they should have symmetric information and identical preferences simply because they *perceive* the situation differently. Our results show that subjective perceptions may be a relevant part of decision processes and can have real economic consequences, such as a significantly higher rate of men versus women start up rates across countries. If men and women see the world with 'different eyes', they are likely to make different economic decisions.

Appendix - Data Description

The GEM 2001 adult population survey includes a representative sample of at least two thousand adults in each of 29 countries. Included in the survey were:

- Those older than the normal school leaving age (age varying from 14 to 18 years of age depending on the country)
- Those up to 64 years of age (a sample including those older than 64 was acceptable)
- Urban and rural areas
- All geographic regions of the country

Classification of entrepreneurs :
1) Nascent entrepreneurs (nascent)

All respondents were asked three basic questions:

1a. Are you, alone or with others, currently trying to start a new business, including any type of self-employment? (yes, no, don't know, refuse)

1b. Are you, alone or with others, trying to start a new business or a new venture with your employer - an effort that is part of your normal work? (yes, no, don't know, refuse)

Respondents who answered "yes" to items 1a or 1b, were then asked:

2a. You mentioned that you are trying to start a new business. Over the past twelve months have you done anything to help start this new business, such as looking for equipment or a location, organizing a start-up team, working on a business plan, beginning to save money, or any other activity that would help launch a business? (yes, no, don't know, refuse)

2b. Will you personally own all, part, or none of this business? (all, part, none, don't know, refuse)

2c. Has the new business paid any salaries, wages, or payments in kind, including your own, for more than three months? (yes, no, don't know, refused)

Respondents were coded as "nascent entrepreneur" (*nascent=1*) if, in addition to 1a and 1b, they answered "yes" to 2a and 2b, and "no" to 2c. In the original GEM dataset, this variable is abbreviated as "*suboanw*".

2) New entrepreneurs (newentr)

In order to make the distinction between individuals involved in starting a new business (nascent entrepreneurs) and those involved in managing a very young business (new entrepreneurs), respondents who answered "yes" to question 1c were asked:

3a. You said you were the owner or manager of a company. Do you personally own all, part, or none of this business? (all, part, none, don't know, refuse)

3c. What was the first year the owners received wages, profits, or payments in kind? (4 digit year, or no profits yet, don't know, refuse)

Respondents who classify as full or part owners of the business and had received wages or salaries paid up to 42 months were coded as "new entrepreneurs" (*newentr=1*).

3) Established entrepreneurs (establ)

This variable is not part of the original GEM survey data and was computed by the authors for the purposes of this paper. *Establ* includes all individuals who own all or part of a business they help to manage, and have paid wages or received profits for more than 42 months.

Sectorial distribution of nascent entrepreneurial activity

In order to analyze the sectors in which people attempt to start businesses, GEM codes activity according to the International Standard Industry Codes (ISIC)[10]. These codes identify more than five hundred different types of activity, which GEM consolidates under ten main headings for

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10 ISIC is an international statistical standard to classify firms according to the main activity they carry out. ISIC is supported by members of the United Nations and widely adopted and used across countries. It also corresponds with the Statistical Classification of Economic Activities in the European Community (NACE Rev 1.1).

ease of analysis. The following table shows the sectorial distribution of nascent entrepreneurial activity by gender.

Table A1: Variable definition and un-weighted descriptive statistics, GEM 2001 data

Sector of nascent entrepreneurial activity	Male		Female	
	% of total	N	% of total	N
Argriculture, forest, hunting, fishing	4.57	78	2.99	51
Mining, construction	4.27	73	1.64	28
Manufacturing	6.38	109	4.57	78
Transport, communication, utilities	4.98	85	1.29	22
Whole sale, mv sale, repair	6.56	112	2.17	37
Retail, hotel, restaurants	13.17	225	10.36	177
Finance, insurance, real estate	2.46	42	0.88	15
Business services	12.35	211	6.26	107
Health, educadtion, social services	3.1	53	3.22	55
Consumer services	4.92	84	3.86	66
Total	62.76	1,072	37.24	636
Test for gender differences in sectorial distribution: Pearson chi2(9) = 52.5416 Pr = 0.000				

Independent Variables

All independent variables used in the analysis are described in Table A1. All items were part of the GEM adult population survey questionnaire and were asked to all respondents, independently from whether they were involved in entrepreneurial activities. The socio-demographic variables *gemwork*, *gemhhinc*, and *gemeduc* were not explicitly part of the questionnaire. They were collected as background information for the surveys in 18 of the 29 countries included in GEM 2001. These items were then recoded following uniform scales.

Table A2: Variable definition and un-weighted descriptive statistics, GEM 2001 data

Variable (corresponding survey question)	Value	Relative Frequency
Gender	Man	48.4%
	Woman	51.6%
Opport (In the next six months there will be good opportunities for starting a business in the area where you live.)	Yes	23.2%
	No	60.9%
	Refused	15.9%
Suskill (You have the knowledge, skill and experience required to start a new business.)	Yes	38.3%
	No	56.7%
	Refused	5%
Fearfail (Fear of failure would prevent you from starting a new business.)	Yes	34.1%
	No	59.3%
	Refused	6.6%
	Same	38.1%
	Better	24.8%
	Missing	12%
Gemwork (Present working status of the individual)	Full / Full or part time	57.4%
	Part time only	7.7%
	Retired / disabled	5.3%
	Homemaker	9.9%
	Student	5.3%
	Not working: other	13.7%
	Missing	.6%
Gemhhinc (Household income of the individual recoded into thirds relative to country income distribution.)	Lowest 33%	24.3%
	Middle 33%	32.1%
	Upper 33%	22.6%
	Missing	20.9%
Gemeduc (Educational attainment of the individual.)	Some second. schooling	24.8%
	Secondary degree	35.5%
	Post secondary degree	34.9%
	Grad exp	1.5%
	Missing	3.3%
Age – in 5 categories (What year were you born?)	18-24 yrs old	15.1%
	24-34 yrs old	22.2%
	35-44 yrs old	24.9%
	45-54 yrs old	21%
	55-64 yrs old	16.8%

Base: AR, CA, D, DK, FIN, HU, IN, IL, IT, JP, KR, NZ, P, PL, RU, S, SG, US.   N = 36,328

Table A3: Logit estimates for perceptual variables, all observations

Variable	Y = suskill		Y = fearfail		Y = opport	
	Odds	P>|z|	Odds	P>|z|	Odds	P>|z|
Female	0.546*	0	1.258*	0	0.745*	0
gemhhinc(middle 33% income)	1.235*	0	0.893*	0	1.137*	0.001
gemhhinc(upper 33% income)	1.575*	0	0.788*	0	1.456*	0
gemeduc(secondary degree)	1.388*	0	0.957	0.232	1.032	0.474
gemeduc(post-secondary degree)	1.722*	0	0.888*	0.003	1.104*	0.03
gemeduc(grad exp)	1.766*	0	0.860	0.243	1.053	0.675
gemwork(part-time job only)	0.871*	0.02	1.186*	0.002	1.116	0.091
gemwork(retired/disabled)	0.629*	0	0.910	0.168	0.793*	0.008
gemwork(homemaker)	0.707*	0	0.932	0.173	1.024	0.722
gemwork(student)	0.843*	0.029	0.765*	0	1.109	0.236
gemwork(not working: other)	0.905*	0.03	1.024	0.577	1.005	0.916
age18-24	0.726*	0	0.793*	0	1.106	0.071
age35-44	1.035	0.395	1.070	0.074	0.894*	0.013
age45-54	0.981	0.657	1.017	0.682	0.912	0.053
age55-64	0.861*	0.003	0.861*	0.001	0.899	0.052
Nascent entrepreneur	6.897*	0	0.491*	0	3.298*	0
New entrepreneur	7.180*	0	0.578*	0	2.110*	0
Established entrepreneur	6.264*	0	0.509*	0	1.708*	0
Model diagnostics						
Number of observations	26,474		26,016		23,517	
Loglikelihood	-14,941		-16,335		-12,382	
LR chi2(15)	5,877		1,826		2,865	
Prob > chi2	0		0		0	

*: Significant variables at the 95% confidence level or above.
Reference categories: Male, age 25-34, household income (lowest 33%), education (some secondary schooling), no entrepreneur.
Note: Estimation also controlled for country effects.

Table A4: Logit estimates for perceptual variables of nascent entrepreneurs

Variable	Y = suskill		Y = fearfail		Y = opport	
	Odds	P>|z|	Odds	P>|z|	Odds	P>|z|
Female	0.737*	0.079	0.767*	0.091	0.720**	0.021
gemhhinc(middle 33% income)	2.181**	0	0.777	0.145	1.168	0.344
gemhhinc(upper 33% income)	2.621**	0	0.675**	0.039	1.358*	0.084
gemeduc(secondary degree)	1.209	0.396	0.918	0.663	0.781	0.169
gemeduc(post-secondary degree)	1.524*	0.092	0.851	0.45	0.616**	0.012
gemeduc(grad exp)	2.237	0.303	0.464	0.188	0.740	0.49
gemwork(part-time job only)	0.670	0.162	0.828	0.49	0.739	0.196
gemwork(retired/disabled)	0.187**	0.001	1.367	0.542	1.291	0.619
gemwork(homemaker)	0.693	0.295	1.589	0.162	0.459**	0.023
gemwork(student)	0.401**	0.035	0.718	0.469	0.639	0.26
gemwork(not working: other)	0.690	0.177	1.019	0.939	1.161	0.508
age18-24	0.772	0.343	0.992	0.973	1.237	0.307
age35-44	0.636**	0.04	1.231	0.254	0.858	0.367
age45-54	0.660*	0.082	0.969	0.878	0.871	0.456
age55-64	0.753	0.355	1.063	0.819	0.701	0.141
Sector:						
Mining, construction	1.760	0.229	0.695	0.356	1.325	0.449
Manufacturing	1.688	0.137	0.676	0.219	1.493	0.191
Trans, comm, util	3.471**	0.013	0.480*	0.06	0.579	0.11
Whole, mv sale, repair	1.560	0.244	0.727	0.344	1.076	0.82
Retail, hotel, restaurant	1.475	0.23	0.772	0.371	1.404	0.228
Finance, insurance, real estate	1.791	0.281	0.398*	0.073	2.242*	0.058
Business services	1.681	0.129	0.911	0.755	1.084	0.779
Health, educ, social services	1.757	0.202	0.886	0.747	1.211	0.588
Consumer services	1.921*	0.093	0.573	0.114	1.063	0.849
Model diagnostics						
Number of observations	1,329		1,343		1,242	
Loglikelihood	-534		-682		-767	
LR chi2(15)	168		77		182	
Prob > chi2	0		0		0	

*: Significant variables at the 90% confidence level or above.
**: Significant variables at the 95% confidence level or above.
Reference categories: Male, age 25-34, household income (lowest 33%), education (some secondary schooling), Sector: Agriculture, forest, hunting, fishing.
Note: Estimation also controlled for country effects. Only observations that count exclusively as nascent entrepreneurs (and no other category) are included.

References

Andreoni, James, and Lise Vesterlund, "Which is the Fair Sex? Gender Differences in Altruism," *Quarterly Journal of Economics*, CXVI (2001), 293-312.

Arnheim, Rudolf. *Art and Visual Perception: A Psychology of the Creative Eye,* 50th edition. (Berkeley, CA: University of California Press, 2004).

Baltagi, Badi and Young-Jae Chang, "Incomplete Panels – A Comparative Study of Alternative Estimators for the Unbalanced One-Way Error Component Regression Model," *Journal of Econometrics*, LXII (1994), 67-89.

Barber, Brad and Terrance Odean, "Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment," *Quarterly Journal of Economics*, CXLI (2001), 261-292.

Bengtsson, Claes, Mats Persson and Peter Willenhag, "Gender and Overconfidence," *Economics Letters*, LXXXVI (2005), 199-203.

Bertrand, Marianne and Kevin Hallock, "The Gender Gap in Top Corporate Jobs," *Industrial and Labor Relations Review*, LV (2001), 3-21.

Beyer, Sylvia, "Gender Differences in Self-Perceptions and Negative Recall Biases," *Sex Roles*, XXXVIII (1998), 103-133.

Blanchflower, David, "Self-Employment: More May Not Be Better," *Swedish Economic Policy Review*, XI (2004), 15-74.

Blanchflower, David and Andrew Oswald. "What Makes an Entrepreneur?" *Journal of Labor Economics*, XVI (1998), 26-60.

Busenitz, Lowell and Jay Barney, "Differences Between Entrepreneurs and Managers in Large Organizations: Biases and Heuristics in Strategic Decision-Making," *Journal of Business Venturing*, XII (1997), 9-30.

Camerer, Colin and Dan Lovallo, "Overconfidence and Excess Entry: An Experimental Approach," *American Economic Review*, LXXXIX (1999), 306-318.

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

Chamberlain, Gary, "Analysis of Covariance with Qualitative Data," *Review of Economic Studies*, XLVII (1980), 225-238.

Chemers, Martin, Li-tze Hu and Ben Garcia, "Academic Self-Efficacy and First-Year College Student Performance and Adjustment," *Journal of Educational Psychology* XCIII (2001), 55-64.

Connellana, Jennifer, Simon Baron-Cohen, Sally Wheelwrighta, Anna Batkia and Jag Ahluwalia, "Sex differences in human neonatal social perception," *Infant Behavior and Development*, 23-1(2000), 113-118.

Cooper, Arnold, Carolyn Woo and William Dunkelberg, "Entrepreneurs' Perceived Chances for Success," *Journal of Business Venturing*, III (1988), 97-108.

Correll, Shelley, "Gender and the Career Choice Process: The Role of Biased Self-Assessments," *American Journal of Sociology* CVI (2001), 1691–1730.

Croson, Rachel and Nancy Buchan, "Gender and Culture: International Experimental Evidence from Trust Games," *American Economic Review Papers and Proceedings*, LXXXIX (1999), 386-391.

Deaux, Kay, and Elizabeth Farris, "Attributing Causes for One's Own Performance: The Effects of Sex, Norms, and Outcome," *Journal of Research in Personality*, XI (1977), 59-72.

Eckel, Catherine and Philip Grossman, "Are Women Less Selfish Than Men? Evidence from Dictator Experiments," *The Economic Journal*, CVIII (1998), 726-735.

Edwards, Linda and Elizabeth Field-Hendrey, "Home-Based Work and Women's Labor Force Decisions," *Journal of Labor Economics* XX (2002), 170-200.

Ellsberg, Daniel, "Risk, Ambiguity, and the Savage Axioms," *Quarterly Journal of Economics*, LXXV (1961), 643-669.

Frederick, Shane, "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives*, XIX (2005), 25–42.

Georgellis, Yannis and Howard Wall, "Gender Differences in Self-Employment," *International Review of Applied Economics*, XIX (2005), 321-337.

Gneezy, Uri and Aldo Rustichini, "Gender and Competition at a Young Age," *American Economic Review Papers and Proceedings*, XCIV (2004), 377-381.

Gneezy, Uri, Muriel Niederle and Aldo Rustichini, "Performance in Competitive Environments: Gender Differences," *Quarterly Journal of Economics*, CXVIII (2003), 1049-1074.

Goldin, Claudia and Cecilia Rouse, "Orchestrating Impartiality: The Impact of "Blind" Auditions on Female Musicians," *American Economic Review* XC (2000), 715-741.

Greene, William, *Econometric Analysis* (Upper Saddle River, NJ: Prentice Hall, 2003).

Harville, David, "Maximum Likelihood Approaches to Variance Component Estimation and to Related Problems," *Journal of the American Statistical Association*, LXXII (1977), 320-340.

Jianakoplos, Nancy and Alexandra Bernasek, "Are Women More Risk Averse?" *Economic Inquiry*, XXXVI (1998), 620-630.

Kepler, Erin and Scott Shane, "Are male and female entrepreneurs really that different?" *The Office of Advocacy Small Business Working Papers*, 07ekss (2007), http://www.sba.gov/.

Kimura, Doreen, "Sex Differences in the Brain", *Scientific American*, 267-3 (1992), 119-125.

Kimura, Doreen and Elizabeth Hampson, "Cognitive Pattern in Men and Women is Influenced by Fluctuations in Sex Hormones," *Current Directions in Psychological Science*, III (1994), 57.

Knight, Frank, *Risk, Uncertainty, and Profit* (New York: Augustus Kelly, 1921).

Koellinger, Philipp, Minniti, Maria and Schade, Christian, "'I think I can, I think I can': Overconfidence and entrepreneurial behavior," *Journal of Economic Psychology*, 28(2007), 502-527.

Lombard, Karen, "Female Self-Employment and Demand for Flexible, Nonstandard Work Schedules," *Economic Inquiry*, XXXIX (2001), 214-237.

Neave, Nick, Myrav Menaged and David Weightman, "Sex Differences in Cognition: The Role of Testosterone and Sexual Orientation," *Brain and Cognition*, XLI (1999), 245-262.

Neumark, David and Michele McLennan, "Sex Discrimination and Women's Labor Market Outcomes," *The Journal of Human Resources*, XXX (1995), 713-740.

Perry, Stephen, "A Comparison of Failed and Non-Failed Small Businesses in the United States," *Journal of Developmental Entrepreneurship*, VII (2002), 415-428.

Polachek, Solomon William, "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure," *Review of Economics and Statistics*, LXIII (1981), 60-69.

Polachek, Solomon William, "Potential Biases in Measuring Male-Female Discrimination," *The Journal of Human Resources*, X (1975), 205-229.

Reynolds, Paul, Niels Bosma, Erkko Autio, Steve Hunt, Natalie de Bono, Isabel Servais, Paloma Lopez-Garcia and Nancy Chin, "Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998-2003," *Small Business Economics* XXIV (2005), 205-231.

Schubert, Renate, Martin Brown, Matthias Gysler and Hans Wolfgang Brachinger, "Financial Decision-Making: Are Women Really More Risk-Adverse?" *American Economic Review Papers and Proceedings*, LXXXIX (1999), 381-385.

Stigler, George and Gary Becker, "De Gustibus Non Est Disputandum," *The American Economic Review*, LXVII (1977), 76-90.

Thaler, Richard, "From Homo Economicus to Homo Sapiens," *Journal of Economic Perspectives*, XIV (2000), 133-141.

Thaler, Richard and Johnson, Eric. "Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice," *Management Science*, XXXVI (1990), 643-660.

Tversky, Amos and Daniel Kahneman, "Judgment under Uncertainty – Heuristics and Biases," *Science*, CLXXXV (1974), 1124-1131.

Weiss, Elisabeth, Georg Kemmler, Eberhard Deisenhammer, Wolfgang Fleischhacker and Margarete Delazer, „Sex Differences in Cognitive Functions," *Personality and Individual Differences*, XXXV (2003), 863-875.

Table 1: Gender differences in perceptions

Variable	Group	N	Mean (% of "yes")	Significance of Chi-squared test for homogeneity (2-sided)
Opport	Female	15,544	24	0
	Male	15,001	31	
Suskill	Female	17,834	32	0
	Male	16,690	50	
Fearfail	Female	17,406	40	0
	Male	16,529	33	

Table 2: Conditional fixed-effects logit regression for nascent business owners

FE logit for nascent	A1 – without perceptions		A2 – with perceptions	
Variable	Odds	P>|z|	Odds	P>|z|
Female	0.561*	0	0.753*	0
gemhhinc(middle 33% income)	0.938	0.356	0.869	0.079
gemhhinc(upper 33% income)	1.269*	0.002	1.025	0.774
gemeduc(secondary degree)	1.392*	0	1.252*	0.011
gemeduc(post-secondary degree)	1.551*	0	1.264*	0.011
gemeduc(grad exp)	1.576*	0.014	1.332	0.163
gemwork(part-time job only)	1.394*	0.001	1.415*	0.002
gemwork(retired/disabled)	0.317*	0	0.426*	0
gemwork(homemaker)	0.417*	0	0.492*	0
gemwork(student)	0.386*	0	0.344*	0
gemwork(not working: other)	0.744*	0.002	0.744*	0.005
age18-24	0.927	0.414	1.054	0.613
age35-44	1.009	0.902	1.017	0.838
age45-54	1.021	0.796	1.017	0.852
age55-64	0.724*	0.002	0.738*	0.010
Fearfail			0.582*	0
Suskill			5.929*	0
Opport			2.626*	0
Model diagnostics				
Number of observations	25,596		20,165	
Number of groups	18		18	
Obs per group min	892		644	
Obs per group max	3,605		3,171	
Obs per group avg	1,422		1,120	
Loglikelihood	-5,357		-3,915	
LR chi2(15)	485.54		1,530	
Prob > chi2	0		0	

*: Significant variables at the 95% confidence level or above.
Reference categories: Male, age 25-34, household income (lowest 33%), education (some secondary schooling).
Note: Data grouped by country. Both models contrast individuals involved in starting a business (nascent) against individuals not involved in start ups – observations that are coded as more experienced business owners are dropped.

Table 3: Conditional fixed-effects logit regression for nascent business owners by gender

FE logit for nascent	A1 – Females		A2 – Males	
Variable	Odds	P>|z|	Odds	P>|z|
gemhhinc(middle 33% income)	0.957	0.737	0.831	0.068
gemhhinc(upper 33% income)	1.275	0.088	0.905	0.371
gemeduc(secondary degree)	1.184	0.253	1.265	0.034
gemeduc(post-secondary degree)	0.966	0.828	1.474*	0.001
gemeduc(grad exp)	0.749	0.449	1.780*	0.020
gemwork(part-time job only)	1.454*	0.016	1.265	0.165
gemwork(retired/disabled)	0.438*	0.014	0.431*	0.004
gemwork(homemaker)	0.442*	0	1.074	0.880
gemwork(student)	0.387*	0.006	0.316*	0
gemwork(not working: other)	0.671*	0.017	0.779	0.072
age18-24	0.910	0.599	1.127	0.354
age35-44	0.949	0.704	1.053	0.622
age45-54	1.013	0.931	0.983	0.881
age55-64	0.692	0.062	0.740	0.041
Fearfail	0.485*	0	0.653*	0
Suskill	6.560*	0	5.476*	0
Opport	2.622*	0	2.643*	0
Model diagnostics				
Number of observations	10,528		9,637	
Number of groups	18		18	
Obs per group min	3223		300	
Obs per group max	1,780		1,391	
Obs per group avg	585		535	
Loglikelihood	-1,482		-2,371	
LR chi2(15)	618.34		761.85	
Prob > chi2	0		0	

*: Significant variables at the 95% confidence level or above.

Reference categories: age 25-34, household income(lowest 33%), education(some secondary schooling)

Note: Data grouped by country. Both models contrast individuals involved in starting a business (nascent) against individuals not involved in start ups – observations that are coded as more experienced business owners are dropped.

**Table 4: Country-specific gender effects on start up propensity (*nascent*)**

	Model 1: socio-economic factors only		Model 2: socio-economic & perceptual factors	
	Female odds	**P>|z|**	**Female odds**	**P>|z|**
US	0.715**	0.050	0.949	0.789
RUSSIA	0.291***	0.000	0.296**	0.017
HUNGARY	0.457***	0.001	0.661	0.146
ITALY	1.530	0.105	1.700	0.147
DENMARK	0.344***	0.001	0.794	0.577
SWEDEN	0.321***	0.005	0.520	0.118
POLAND	0.550**	0.023	0.652	0.215
GERMANY	0.502***	0.000	0.735	0.104
ARGENTINA	0.484***	0.002	0.623*	0.068
NEW ZEALAND	0.895	0.597	1.216	0.404
SINGAPORE	0.504**	0.025	0.563*	0.091
JAPAN	0.683	0.475	1.310	0.681
KOREA	0.731	0.189	0.963	0.898
INDIA	0.651*	0.087	0.729	0.254
CANADA	0.643*	0.058	0.798	0.389
PORTUGAL	0.305***	0.004	0.614	0.323
FINLAND	0.465**	0.030	0.392**	0.029
ISRAEL	0.100**	0.030	0.276	0.267
	Dependent variable: nascent Control variables: gender, gemhhinc, gemwork, age8c, constant		Dependent variable: nascent Control variables: gender, gemhhinc, gemwork, age8c, fearfail, suskill, opport, constant	
	Logistic regression results. Both models contrast individuals involved in starting a business (nascent) against individuals not involved in start ups – observations that are coded as more experienced business owners are dropped. *: Significance at 90% confidence. **: Significance at 95% confidence. ***: Significance at 99% confidence.			

Figure 1: Individuals currently involved in start-up activities by gender and country
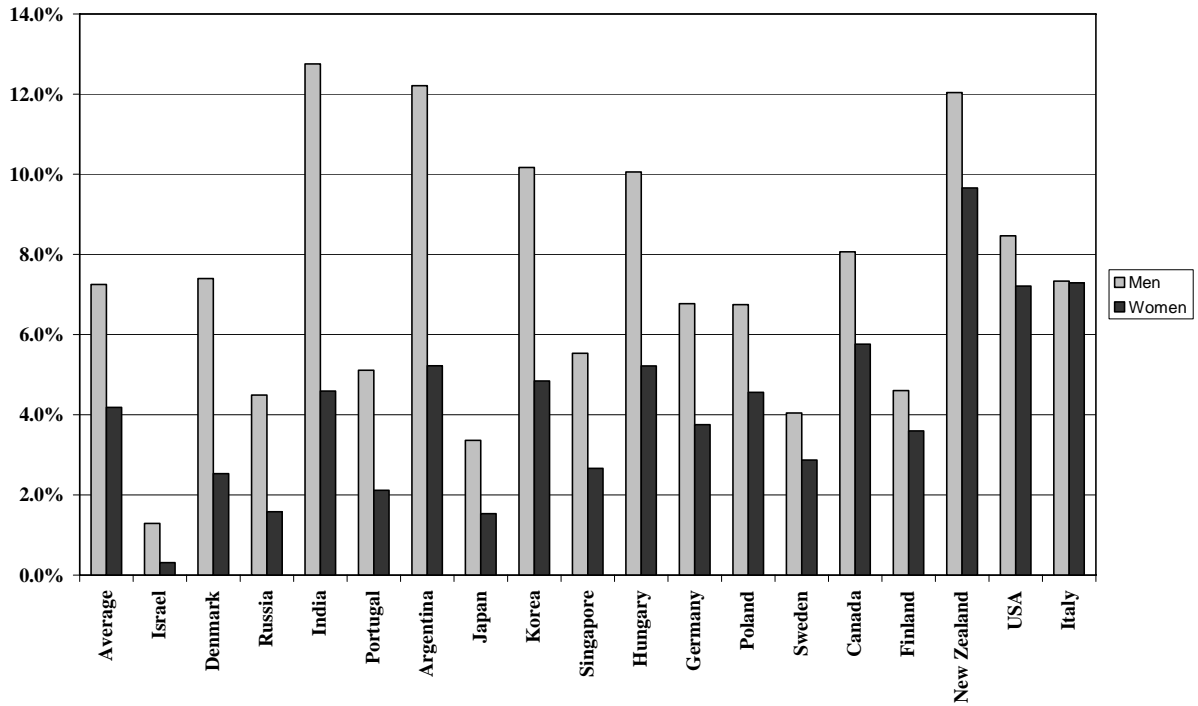
Source: GEM 2001 adult population survey for people 18-64 years old, unweighted sample frequencies for individuals involved in starting a business (nascent). Countries are ordered according to ratio of men to women involved in start up activity, the gender gap decreases from left to right.

Figure 2: *Suskill* **perception across countries by gender**
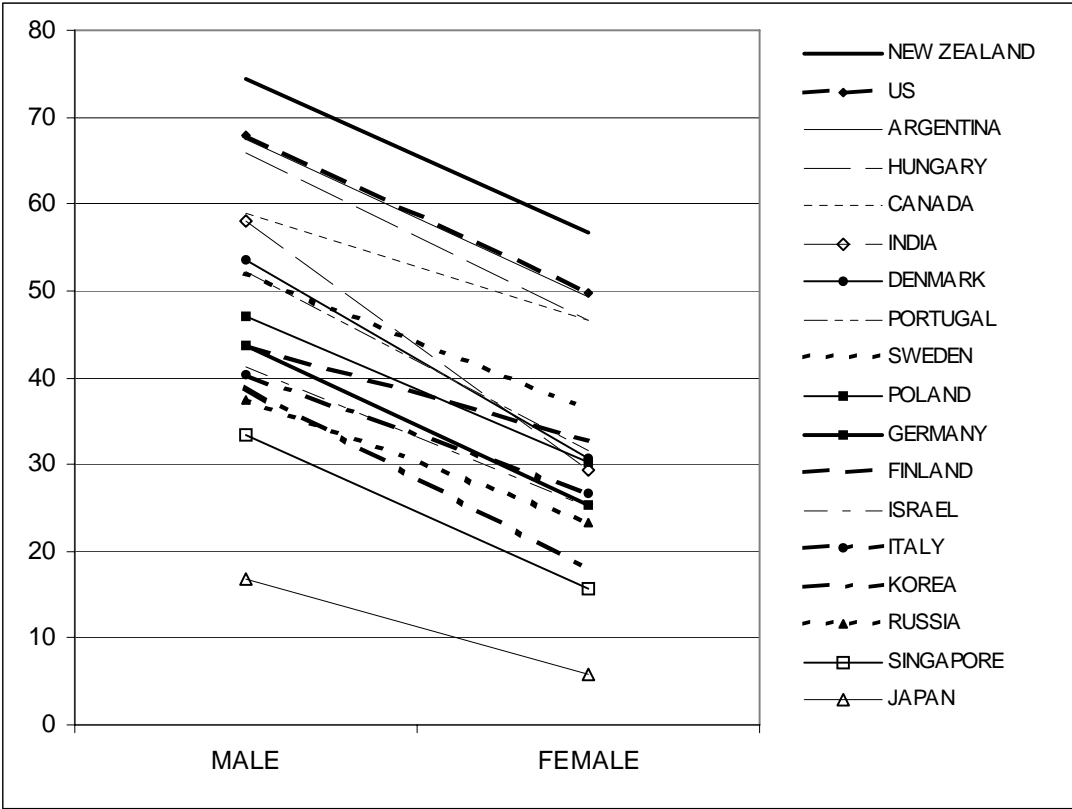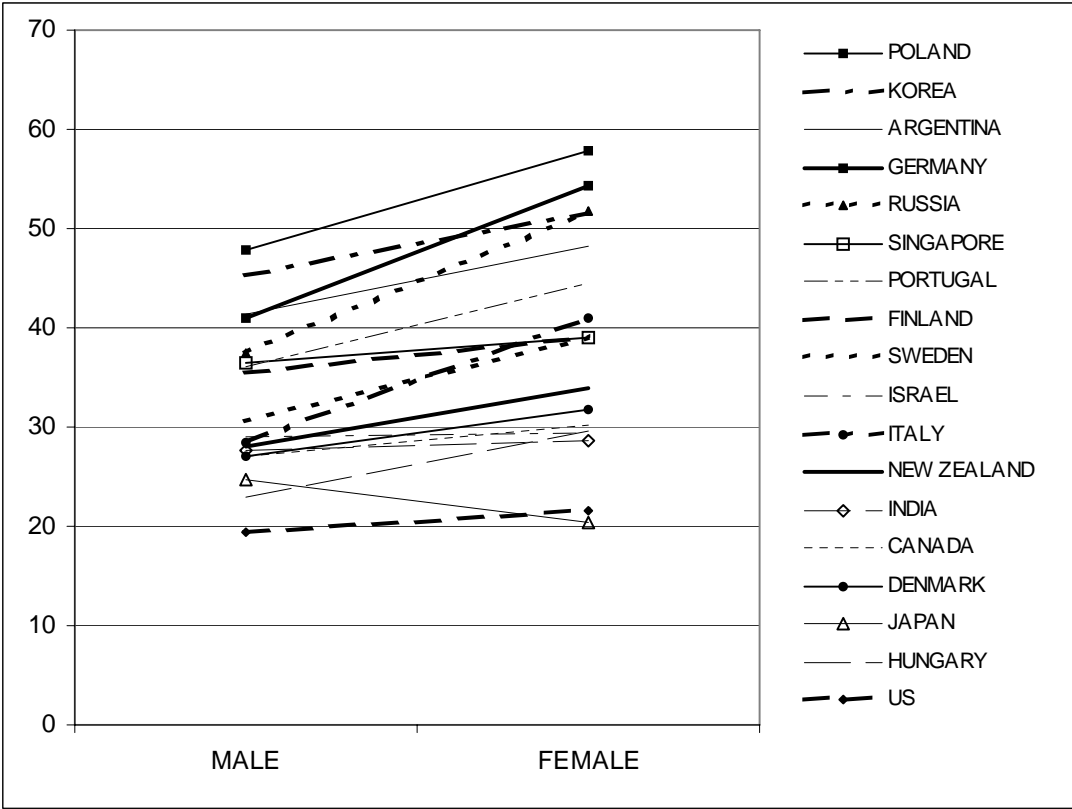
Figure 3: *Fearfail* **across countries and gender**

Figure 4: *Opport yes* **across countries by gender in %**