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Across 29 Countries**

by

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Explaining female and male entrepreneurship across 29 countries

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ABSTRACT: The present study aims at explaining female and male entrepreneurship from a country perspective. Explanatory variables are derived from three streams of literature, including the literature on the determinants of entrepreneurship in general, on female labor force participation, and on female entrepreneurship. To test hypotheses we make use of Global Entrepreneurship Monitor data, including total entrepreneurial activity rates for both women and men for 2002, as well as a range of possible determinants from standardized national statistics. We find that female and male entrepreneurship are largely influenced by the same factors in the same direction. A remarkable exception is life satisfaction for which we find a positive impact on female entrepreneurship and no impact on male entrepreneurship. The paper pays explicit attention to several methodological aspects of investigating determinants of female and male entrepreneurship.

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1. INTRODUCTION

Increasingly, female entrepreneurs are considered important for economic development. Not only do they contribute to employment creation and economic growth through their increasing numbers, they also make a contribution to the diversity of entrepreneurship in the economic process (Verheul and Thurik, 2001). Female and male entrepreneurs differ with respect to their personal and business profile: they start and run businesses in different sectors, develop different products, pursue different goals and structure their businesses in a different fashion (e.g., Fischer et al., 1993; Brush, 1992; Chaganti and Parasuraman, 1996; Verheul and Thurik, 2001; Verheul, 2003; Carter et al., 1997). Diversity in terms of products, processes, forms of organization and targeted markets is input for a selection process where customers are at liberty to choose according to their preferences and

where entrepreneurs learn about what is technological and organizational viable. This, in turn, may lead to a higher quality of entrepreneurship.

Despite the economic importance of female entrepreneurs, their number still lags behind that of male entrepreneurs. According to Reynolds et al. (2002) men are about twice as likely involved in entrepreneurial activity than women. However, there is substantial variation between countries. Table 1 presents *female*, *male*, and *total* entrepreneurial activity rates for 29 countries participating in the 2002 Global Entrepreneurship Monitor (GEM), ordered by female entrepreneurial activity rate¹. We observe that female entrepreneurship rates are high in some countries (e.g., India, Argentina, Brazil) and low in others (e.g., Japan, Belgium, Russia). Moreover, countries with high female entrepreneurial activity rates are also characterized by high total entrepreneurial activity rates². According to Delmar (2003, p. 6): “*women entrepreneurship is therefore closely related to the general framework conditions for entrepreneurship in a specific economy*”.

Table 1: Female, male, and total entrepreneurial activity rates for 29 GEM countries (2002)^a

Country	Female	Male	Total	Country	Female	Male	Total
India	14.1	21.4	17.9	Denmark	4.2	8.8	6.5
Argentina	11.5	16.8	14.2	Italy	4.1	7.8	5.9
Brazil	11.1	16.0	13.5	Poland	3.6	5.3	4.4
Mexico	10.3	14.6	12.4	Netherlands	3.5	5.7	4.6
Chile	9.5	21.9	15.7	Finland	3.5	5.6	4.6
Korea	8.6	20.3	14.5	Germany	3.4	6.9	5.2
United States	8.1	12.9	10.5	United Kingdom	3.3	7.4	5.4
Iceland	7.9	14.8	11.3	Slovenia	2.9	6.4	4.6
Canada	6.0	11.7	8.8	Sweden	2.6	5.4	4.0
South Africa	5.8	7.3	6.5	Spain	2.6	6.6	4.6
Australia	5.6	11.7	8.7	France	2.1	4.3	3.2
Ireland	5.5	12.4	9.1	Russia	1.6	3.5	2.5
Switzerland	4.8	9.4	7.1	Belgium	1.5	4.4	3.0
Norway	4.7	12.6	8.7	Japan	0.6	3.0	1.8
Hungary	4.4	8.9	6.6				

^a Female, male, and total entrepreneurial activity rates refer to the share of adults in the *female*, *male* and *total* population of 18 to 64 years old who are either actively involved in starting a new business or in managing a business less than 42 months old (Reynolds et al., 2002, p.5).

In Table 1 female entrepreneurship is measured in *absolute* terms (i.e., counting numbers, scaled on population). However, as mentioned, female entrepreneurs are not only important because of their numbers, but also because of their contribution to the diversity of entrepreneurship in economies. In Table 2 female entrepreneurship is measured in *relative* terms (i.e., the share of women in the total number of entrepreneurs). This variable may be seen as a measure of entrepreneurial diversity, as it measures the contribution of women to a country’s total stock of entrepreneurs (independent of the size of this stock). There are different countries at the higher end of the ranking in Table 2, as compared to Table 1. This indicates that it is important to make a distinction between measuring female entrepreneurship in absolute and relative terms³. Factors that contribute to a higher *number* of female entrepreneurs in a country may be different from those contributing to a higher *diversity* of entrepreneurship in the economy (as measured by the share of women in the stock of

¹ In 2002, there were 37 countries participating in GEM. For eight of these countries there was no information available for several of the explanatory variables that we use in this study. Therefore, the analysis in the current paper is restricted to 29 countries.

² Indeed, for the 29 countries the Spearman rank correlation coefficient between the female and total entrepreneurial activity rate is 0.96, which is significant at 0.01-level.

³ Although the Spearman rank correlation coefficient between the female entrepreneurial activity rate and the female share in entrepreneurship is significant, its value is only 0.53, confirming that the two concepts are indeed different.

entrepreneurs)⁴. Depending on the target pursued by policy makers, e.g., increasing absolute numbers or increasing diversity, different policy measures may be used. Hence, it is important to investigate female entrepreneurship both in absolute terms (as a share of the population) and in relative terms (as a share of the total number of entrepreneurs). This paper makes a distinction between these two measures of female entrepreneurship, investigating them separately. More specifically, we try to explain the variation between countries using both measures of female entrepreneurship. A variety of possible determinants will be considered.

Table 2: Female share in total entrepreneurial activity for 29 GEM countries (2002)^a

Country	Female share in entrepreneurship	Country	Female share in entrepreneurship
South Africa	44.3	France	32.6
Mexico	41.5	Sweden	32.5
Brazil	41.2	Denmark	32.5
Poland	40.8	Australia	32.1
Argentina	40.8	Russia	31.6
India	39.4	Slovenia	30.9
United States	38.8	United Kingdom	30.4
Finland	38.7	Chile	30.3
Netherlands	38.3	Ireland	30.2
Iceland	34.8	Korea	29.5
Italy	34.3	Spain	28.1
Switzerland	33.8	Norway	26.9
Canada	33.8	Belgium	25.5
Hungary	33.3	Japan	17.5
Germany	32.7		

^a The female share in entrepreneurship is calculated from Table 1 as the female entrepreneurial activity rate divided by twice the total entrepreneurial activity rate.

Entrepreneurial activity in the present study corresponds with the Total Entrepreneurial Activity (TEA) rate as proposed in the Global Entrepreneurship Monitor (GEM). TEA is defined as the share of adults in the population of 18 to 64 years old who are either actively involved in starting a new business or in managing a business less than 42 months old (Reynolds et al., 2002, p. 5). Hence, this definition incorporates both nascent entrepreneurs and owner-managers of new firms. An individual is considered a 'nascent entrepreneur' under three conditions. *First*, an individual has taken action to create a new business in the past year. *Second*, the individual expects to share ownership of the new firm and, *third*, the firm has not yet paid salaries and wages for more than three months. A firm is considered a new firm in case salaries and wages are paid for more than three months but less than 42 months (Reynolds et al., 2002, p.38). In this study entrepreneurial activity of women and men is represented by TEA for females and males, respectively. Entrepreneurial activity rates as well as macro-level determinants are derived from the GEM data set for 2002. We aim to draw conclusions from the way in which macro-level factors explain female and male entrepreneurial activity rates.

Relatively few studies have investigated female entrepreneurship at the macro level, not to mention the difference in determinants of female and male entrepreneurial activity. The present study builds upon Kovalainen et al. (2002), who use GEM 2001 data for 29 countries, and Reynolds et al. (2002, p. 25: *Women and Entrepreneurship*), who use GEM 2002 data for 37 countries. Although these studies provide some insights into the determinants of female and male entrepreneurial activity at the macro level, the present study develops a full model, explaining female and male

⁴ A factor that has a positive impact on the absolute number of female entrepreneurs may at the same time have a negative impact on the female *share* in total entrepreneurship if its influence on the number of male entrepreneurs is relatively larger than that on the number of female entrepreneurs.

entrepreneurial activity rates as well as the female share in entrepreneurship, and in which the interplay of economic, technological, demographic, institutional and cultural variables is accounted for.

The explanatory variables are derived from three streams of literature. *First*, there is the literature on the determinants of entrepreneurship in general. A limitation of this literature (from the viewpoint of the present study) is that it only outlines general determinants of entrepreneurship. As we have argued, female entrepreneurship contributes to the diversity in entrepreneurship and this may imply that there are different factors explaining the share or number of female and male entrepreneurs in a country. Indeed, investigating the involvement of the Swedish population in new venture creation, Delmar and Davidsson (2000) find that the factors explaining the nascent entrepreneurship rate of men have limited value in explaining the nascent entrepreneur status of women. Moreover, investigating differences in the reasons for firm start-up across country and gender, Shane et al. (1991) find that it is difficult to identify start-up reasons that equally apply to both genders and across countries. These studies show there is a need for country-level studies investigating the factors influencing female and male entrepreneurship in general, and their start-up rates in particular.

A *second* stream of literature investigates female participation in the labor force. Female participation in employment has increased considerably in the last decades, reflecting both changes in the labor supply behavior of women and the demand for female workers. Although the gender gap in employment is narrowing, employment rates (either in number of jobs or in number of hours worked) are still lower for women than for men in most OECD countries (OECD, 2002). Studies on female labor force participation create insight into the characteristics of women in the labor market. For instance, “What determines the decision of women to (re)enter the labor market?” “And to what extent do characteristics of the labor market, or the economic structure of a country, accommodate, i.e., offer opportunities for, female workers?”

The *third* literature is that on female entrepreneurship (or gender and entrepreneurship). Because the share of women in total entrepreneurial activity still lags behind the share of women in the labor force, and since female entrepreneurship may be influenced by different factors than male entrepreneurship, it is important to also pay attention to specific female entrepreneurship literature (in addition to literature on female labor force participation and entrepreneurship in general). There may be specific gender-related barriers to starting and running a business; and/or women may prefer to be wage-employed rather than self-employed. Hence, women may have specific entrepreneurial capabilities and preferences as compared to men.

The literature on female entrepreneurship mainly consists of studies at the micro level, focusing on the distinctive characteristics of female and male entrepreneurs (e.g., motivations, personality traits, experience) or the features of their firms (e.g., size, goals and strategy, management, performance). Other studies have included environmental characteristics, such as financial constraints or other challenges, women face in the start-up or development of their businesses. With the exception of Reynolds et al. (2002) and Kovalainen et al. (2002), few studies have investigated the influence of macro-level factors on female and male entrepreneurship. The present study aims at extending this stream of literature.

The structure of this paper is as follows. In Section 2, based on a review of the literature, a list of determinants of entrepreneurship is proposed, making a distinction between technological development, economic factors, demographic factors, institutional (or policy) and cultural factors. These factors influence either the demand for entrepreneurship, through the number and type of entrepreneurial opportunities available, or the supply of entrepreneurship, through preferences and capabilities of individuals to become self-employed (Verheul et al., 2002). The influence of these factors on entrepreneurship in general will be discussed and we will give an a priori idea whether these factors have a differential impact on female and male entrepreneurship.

In Section 3, for the factors that are expected to have a differential impact on female and male entrepreneurship, these a priori ideas are presented as research hypotheses. Hypotheses are formulated in pairs, presenting (1) the influence of a factor on entrepreneurship in general, and (2) the differential impact of a factor on female and male entrepreneurship. This section also contains a description of the variables used in the empirical analysis, including their sources. The main source is the Global Entrepreneurship Monitor database for 2002.

In Section 4 the hypotheses are tested using multiple regression analysis. For each pair of hypotheses, the total entrepreneurial activity rate is the variable to be explained in the first (general) part of the hypothesis, while the female *share* in entrepreneurship is the variable to be explained in the second (gender) part. As an additional methodological exercise we compute regressions using *gender-specific* independent variables and compare the results with analyses using *general* variables (applying to both women and men). This exercise underlines the importance of systematic data collection by gender throughout the world. The paper concludes with recommendations for further research and a discussion of policy implications.

2. DETERMINANTS OF ENTREPRENEURSHIP AND GENDER

In this section we will deal with a number of determinants of entrepreneurship categorized according to the following five groups: technological development, economic factors, demographic factors, institutional factors and government intervention, and cultural factors.

Technological development

New technologies have the potential to develop new products and services, creating opportunities for the start-ups of new firms (Casson, 1995; Wennekers et al., 2002). In addition, new information and communication technologies lead to diminished transaction costs and lower minimum efficient scales in many industries, enabling small firms to compete in both new and 'old' industries. Hence, it may be argued that small firms benefit from technological development, either directly (producing new products) or indirectly (making use of new production or communication techniques). Because women are less likely than men to operate businesses in high-technology sectors (Loscocco and Robinson, 1991; Anna et al., 1999), it may be expected that technological development is of less influence on female entrepreneurship than it is on male entrepreneurship.

Economic Factors

Per capita income

The influence of per capita income on entrepreneurship is complex. For instance, rising real wages raise the opportunity costs of self-employment making wage employment more attractive (Lucas, 1978; EIM/ENSR, 1996). Indeed, several studies show a negative effect of economic development on self-employment (Kuznetz, 1966; Schultz, 1990; Bregger, 1996). However, these studies tend to be dated and per capita income levels used are relatively low. The negative effect may reflect the exploitation of economies of scale in the post-World War II-period. Other, more recent studies report a positive relation between per capita income and entrepreneurship since the 1970s (Storey, 1999; Carree et al., 2002). From a certain level of economic development, an increase in wealth tends to be accompanied by technological development and an increase in the service sector, developments that – in turn – positively influence entrepreneurship. Combining the negative and positive effects results in a U-shaped relationship between per capita income (economic development) and entrepreneurship. Using several data sources on entrepreneurship, Carree et al. (2002) and Van Stel et al. (2003) provide empirical evidence for this U-shaped relationship. Both female and male entrepreneurial activities are expected to show a U-shaped relationship with per capita income.

Income disparity

In addition to the income level, income disparity can influence entrepreneurship. On the supply side income disparity pushes low wage earners into self-employment and provides people at the other end of the income distribution with the financial means to cover the risks associated with self-employment. Also, income disparity is an indicator of variety in consumer demand (Verheul et al., 2002). A differentiation of demand favors small and new firms over large and incumbent firms because of diminishing scale economies. Studies by Ilmakunnas et al. (1999) and Bosma et al. (2000) provide evidence of a positive influence of income inequality on the self-employment rate. Whether there is a differential effect of income disparity on female and male entrepreneurship may be related to motives of women and men to become self-employed: are they push or pull factors? At the demand side it may be that women are in a better position to serve niche markets, focusing on specific consumer needs and producing custom-made goods and services. However, overall, we have no assumption as to whether income disparity differentially influences female and male entrepreneurship.

Unemployment

Unemployment has consequences for both the valuation of different types of employment and the number of entrepreneurial opportunities created at the demand side. At the macro level a high rate of unemployment can negatively impact the level of entrepreneurship through a decrease in the number of available business opportunities, induced by a depressed economy. At the micro level (the risk) of unemployment is likely to have a positive effect on the level of entrepreneurship through reducing the opportunity costs of self-employment. When there is little chance of finding paid employment, unemployed people are 'pushed' into self-employment (EIM/ENSR, 1996). Audretsch et al. (2001) refer to a 'Schumpeter' and 'refugee' effect. Kovalainen et al. (2002) find a negative association between female unemployment and business start-ups by women. We expect that the negative effect of limited opportunities will dominate the positive 'push' effect of unemployment. The general unemployment level may be more likely to (negatively) affect female than male employment as women are often involved in service-type and part-time jobs and, accordingly, may be particularly vulnerable to the effects of unemployment.

Share of service sector

An expansion of the service sector tends to positively influence entrepreneurship. The service sector is characterized by low initial capital requirements, leading to low barriers to entry and facilitating start-up. Most services are characterized by a relatively small average firm size (EIM/ENSR, 1997). The growth of service industries has also been a major factor in increasing female labor force participation (Oppenheimer, 1970; Ward and Pampel, 1985). Because women are over-represented in the service sector, a higher share of services may be more likely to influence female than male entrepreneurship. On the other hand, as women already occupy more than half of the employment in services, and men increasingly enter service jobs, the differential effect of growth in the number of service jobs on female and male entrepreneurship may be diminishing.

Informal sector

The informal sector (i.e., shadow or underground economy) represents business activity that takes place without knowledge of the government. The informal sector has been referred to as economic activities that are not registered in the national accounts and are not subject to formal rules of contract, licensing, labor inspection, reporting and taxation (ILO, 1984). People may engage in informal activity because of different factors, such as poverty, unemployment, or tax evasion. The reason to engage in informal activity is likely to show differences between developed and underdeveloped economies.

The size of the informal sector may negatively influence entrepreneurial activity as people operating in the informal sector absorb (entrepreneurial) opportunities otherwise available for

individuals starting a business in the formal sector. As the present study attempts to explain entrepreneurial activity in the formal sector, it may be argued that the size of the informal sector negatively impacts entrepreneurial activity. The size of the informal sector may differentially impact female and male entrepreneurship. For instance, informal sector activity may appeal to women since it is a relatively easy, often 'close-to-home' manner to earn an additional income, especially when there are no part-time jobs available. Because women still take on the bulk of activities within the household, women have to divide their time between household and work activities. Hence, informal activity and (formal) entrepreneurial activity may be alternative ways for women to realize greater flexibility to combine work and household activities.

Labor market segregation

There is no clear relationship between labor market segregation and entrepreneurship. However, as the distribution of employment across occupations, sectors and organizational hierarchies is still gender-segmented (OECD, 2002), this may influence female entrepreneurship. Horizontal and vertical labor market segregation influence the number and type of labor opportunities for women. Women mainly occupy the service sector and are over-represented in clerical occupations, sales jobs and life-science/health and teaching professions⁵. From a vertical job segregation perspective women are less likely to occupy top administrative and managerial occupations (OECD, 2002)⁶. In addition, women tend to be in jobs with fewer opportunities for promotion (OECD, 2002). If women are dissatisfied with their career opportunities (either due to vertical or horizontal segregation), they are motivated to start a business (Moore and Buttner, 1997; Maume, 1999). Labor market segregation is more likely to affect female than male entrepreneurship.

Female labor force participation

A higher share of women in the labor force is likely to be accompanied by a lower level of self-employment (as a percentage of labor force), as women are less likely than men to become self-employed. Delmar and Davidsson (2000) find that gender is a strong predictor of nascent entrepreneurship at the micro-level, with men being more likely to have the intention to start a business than women. Uhlaner et al. (2002) find that countries with a higher female share in the labor force are characterized by a lower level of self-employment. Uhlaner et al. (2002) measure self-employment as a percentage of the labor force. However, the entrepreneurial activity rate used in the present paper is scaled on population. As a higher female labor share (share of women in total labor force) is generally associated with a higher female labor force participation (female labor force as a share of female population), a *positive* impact of female labor share on the female entrepreneurial activity rate may be expected⁷. Hence, even though women tend to be wage-employed rather than self-employed, higher female labor shares are expected to be associated with higher female entrepreneurial activity rates, simply because the supply of female workers is larger. We do not expect female labor force participation to influence male entrepreneurship. As the total entrepreneurial activity rate is an average of female and male entrepreneurial activity, the general effect may be expected to be positive but stronger for female entrepreneurial activity.

Economic transition

The economic structure of (former) communist countries differs from that of countries with a democratic regime. Centrally planned economies emphasize economies of scale, neglecting the potential of small businesses - for both economic and political considerations (Roman, 1990). Although in the former communist or transition countries we see a shift away from unskilled, labor-

⁵ Occupational gender segregation may be explained by supply side or human capital factors, such as differences in endowments, constraints and preferences, and demand side factors, such as employers' preferences (OECD, 2002).

⁶ The under-representation of women in higher jobs may be explained by a relative lack of promotional opportunities for women, due to, for instance, social attitudes or the time constraint women face when combining work and family responsibilities.

⁷ In the present paper we use the share of women in the labor force as an indicator of female labor force participation.

intensive production towards capital-, technology- and skill-intensive production (Brunner, 1993), the potential of small and medium-sized businesses remains largely untapped. This is the case especially for women who – as compared to men – are twice as less likely to become entrepreneurs (UNECE, 2002). Although self-employment, in the form of cross-border trade, street trade or subcontracting work at home, is often the only avenue of paid employment for women in (former) communist countries, at the same time they experience gender-related barriers in access to information, networks and collateral (Ruminska-Zimny, 2002). Hence, communism or transition is expected to negatively affect entrepreneurship, with a possibly larger influence on female than on male entrepreneurship.

Demographic Factors

Demographic factors also play an important role at the supply side of entrepreneurship. Several linkages have been identified between self-employment and demographic factors, including age, ethnicity, education level, gender and previous experience in self-employment (Cooper and Dunkelberg, 1987; Evans and Leighton, 1989; Delmar and Davidsson, 2000; Storey, 1994; Erutku and Vallée, 1997, Reynolds, 1997)⁸.

Education level

Education level influences self-employment. Research indicates that both nascent entrepreneurship (Delmar and Davidsson, 2000; Davidsson and Honig, 2003) and self-employment⁹ (Robinson and Sexton, 1994; Cooper and Dunkelberg, 1987) are influenced by educational attainment. However, a study at the macro level by Uhlaner et al. (2002) shows that a higher level of education in a country is accompanied by a lower self-employment rate. The education level of women is an important factor explaining female participation in the labor market (Schettkat and Yocarini, 2001). Employment rates are higher for women with tertiary education, than for women with lower education (OECD, 2002). Labor force participation rises with educational attainment because potential earnings may increase in response to the possession of greater human capital and possession of higher education increases the desire to use the skills acquired (Coleman and Pencavel, 1993). Hence, higher education gives women access to more interesting and better paid occupations, also increasing the opportunity costs of the decision to take care of the household and the children instead of undertaking paid employment (OECD, 2002, p. 71). Indeed, Kovalainen et al. (2002) find a positive relationship between women's nascent and new business start-up rate and the educational attainment of women. Education level is likely to influence both entrepreneurship rates of women and men. Although the education level of women (men) is likely to influence female (male) entrepreneurship, we do not have an assumption whether the general education level in a country influences male and female entrepreneurship differently. However, the general level of education in a country may be a development indicator, where a higher level of education is accompanied by a higher level of integration of women in the economic structure of a country, and, accordingly, a higher level of female self-employment.

Age structure

The likelihood of becoming self-employed varies with age. Many business owners are within the age category of 25 to 45 years old (Storey, 1994; Reynolds et al., 1999). *Nascent* entrepreneurship rates are highest in the age category of 25 to 34 years old, although some studies suggest that people increasingly start businesses at a younger age (van Gelderen, 1999; Delmar and Davidsson, 2000). If there are more people within the age category where the likelihood of becoming self-employed is high(est), a country will have more (future) entrepreneurs. However, female entrepreneurs may

⁸ Relatively few studies have been able to systematically link demographic factors to business start-ups at the macro-level (Delmar and Davidsson, 2000).

⁹ Self-employed people here refer to people who have moved beyond the nascent entrepreneurship stage.

have a different age profile than male entrepreneurs¹⁰. Women are more likely to withdraw from employment after they get married, or when they reach the child-rearing age. Charles et al. (2001) find that marriage and the presence of children (e.g., infants, toddlers and school-age children) negatively affect the probability of employment for women. Married women and mothers tend to withdraw from employment, either permanently or temporarily. Due to the process of gender mainstreaming (i.e., emancipation) later generations of working women are expected to have a more similar age profile (as compared to their male counterparts). Hence, when there are more individuals within the age group of 25 to 45 years old, there tend to be more (male) entrepreneurs, and less female entrepreneurs (as they are likely to be married and involved in child-rearing activities).

Immigration

The rate of entrepreneurship varies between different immigrant populations within countries (van den Tillaart, 2001; Jansen et al., 2003). Hence, immigration will have consequences for the level of entrepreneurial activity within a country. The tendency and/or ability to become self-employed differs between native people and immigrants (Borooah and Hart, 1999; Bates, 1997). As a result of adjustment problems immigrants have more difficulties finding a job than native people (SER, 1998) and starting a business can be a good alternative for wage-employment. Moreover, immigrants may be more prone to take risks as the decision to leave their native country is a proxy for a low level of risk aversion. However, Clark and Drinkwater (2000) argue that because of language problems immigrants are less likely to be self-employed¹¹. Labor force participation of women tends to differ between immigrant populations.¹² Immigrant groups with the highest shares of married couples have the lowest share of women in the labor force (SCP, 1998). Moreover, for women marriage reduces the likelihood of being an entrepreneur because married men tend to employ their wives in their company to reduce shirking behavior of employees (Portes and Zhou, 1998). In addition, in some cultures it is less accepted that women are employed. Hence, ethnicity may differentially impact the entrepreneurship of women and men, where immigrant women are less likely to be self-employed than immigrant men.

Family situation

The role of the family within society has changed dramatically with fewer women getting married, postponed marriages, an increasing divorce rate and lower birth rates. As put forward by Mincer (1985) declines in family size and in duration of marriage provide an increased scope and motivation for female labor force participation (Mincer, 1985)¹³. Although women are increasingly entering the work force, they are still more likely to be the “primary parent, emotional nurturer and housekeeper” (Unger and Crawford, 1992, p. 474; OECD, 2001; Breedveld, 2000). The presence of children influences the employment rates of women and men in opposite directions (OECD, 2002). Parenthood negatively influences female employment, while positively influencing male employment. Mothers are less likely to be full-time employed than women without children. Hence, family situation (e.g., marriage and children) is likely to be of differential influence on the entrepreneurship of women and men. As for the impact of family on entrepreneurship in general, it may be argued that if the head of the household is responsible for maintaining the family, he or she is more likely to choose for a wage-employment than self-employment, because the former involves fewer risks.

¹⁰ According to OECD (2002) the age profile of working women largely varies between countries (OECD, 2002).

¹¹ Usually immigrants are not familiar with start-up procedures and there is a lack of trust on the part of other business parties, such as investors and suppliers, who consider a lack of knowledge of the home market, language and customs an important handicap for doing business.

¹² In the Netherlands the labor participation rate of women from Suriname and the Antilles is higher than that of the native Dutch, whereas that of women from Turkey and Morocco are lower (SCP, 1999).

¹³ Note that this is not a unidirectional relationship.

Institutional Factors and Government Intervention

Verheul et al. (2002) distinguish between different ways in which the government can intervene in the economic process to influence the rate of entrepreneurship. On the demand side the government can influence both the number and accessibility of entrepreneurial opportunities through investments in R&D, privatization, income policy (*number*), competition policy, (de)regulation, fiscal incentives, labor market regulation, and establishment and bankruptcy policy (*accessibility*). On the supply side the government can influence capabilities and preferences of individuals through financial support schemes or development of the venture capital market; information provision and introducing aspects of entrepreneurship¹⁴ in the educational system. The government can also create the mindset for entrepreneurship through paying attention to entrepreneurship in the media.

Social security

Social security schemes influence the risk-reward profile of entrepreneurship versus other types of employment, and, accordingly, the willingness of people to give up their present state of (un)employment to become self-employed. The possible loss of entitlements to social security when becoming self-employed can constrain entrepreneurial activity¹⁵. When entrepreneurship means giving up benefits, such as health care coverage, retirement pensions, disability or unemployment insurance, the opportunity costs of self-employment increase, thereby enhancing the preference for salaried employment or unemployment (Verheul et al., 2002). Reynolds et al. (2002, p. 27) report a negative relationship between social security and female entrepreneurial activity. Reimers and Honig (1995) find that the effect of the social security system on labor force participation differs between men and women. It appears that women and men have different time horizons when making labor supply decisions. Women take into account their social security 'wealth' rather than their current earnings, while men are more likely to respond to current earnings rather than to (changes in) future benefits. Hence, higher social security benefits may be more likely to reduce female entrepreneurship than male entrepreneurship.

Taxation

High tax rates reduce the returns on entrepreneurship and can impede the start-up of new firms. Tax payments are at the expense of retained earnings and negatively affect the liquidity position of businesses. As a consequence, high tax rates induce tax avoidance and evasion, for example through moonlighting, thereby reducing the opportunities for legitimate entrepreneurship.¹⁶ Specific taxes can also influence entrepreneurship. For instance, capital tax on new equity can discourage equity financing and high payroll taxes make it difficult for entrepreneurs to hire labor at a price that corresponds with the value of the employee to the entrepreneur (Verheul et al., 2002). From a gender perspective, family-based tax systems (i.e., joint taxation of spouses) induce income splitting among spouses and leads to a decrease in employment. A shift from family-based taxes to individual taxation encourages employment entry of wives, especially at high marginal tax rates (Mincer, 1985). In addition, tax-credits to compensate one-earner households will also impact the supply of female labor. Taxes that stimulate women to (re)enter the labor market, may have a positive effect on female entrepreneurship, when women choose to start up their own business. We do not have an a priori idea whether these taxes influence male entrepreneurship.

¹⁴ Entrepreneurial aspects here include both business qualities, such as management, financing and marketing knowledge, and more inherent entrepreneurial qualities, such as creativity, independence and perseverance. The latter qualities should be introduced in an early stage of education (Van der Kuip and Verheul, 2003).

¹⁵ See Henrekson and Johansson (1999) for a discussion of the influence of labor security legislation on firms of different sizes.

¹⁶ On the other hand, it has been hypothesized that self-employment offers better opportunities to evade or avoid tax liabilities than wage-employment (Parker, 1996, p. 466). However, in a recent study Parker (2003) finds that the occupational choice between self-employment and wage-employment is not related to pecuniary factors in general, and tax-related ones in specific. See also Parker and Robson (2004).

Flexible work arrangements

A flexible labor market is important for entrepreneurship. Heavy unionization in a country, resulting in a strong regulation of 'hire and fire', increases the risks of self-employment because of the difficulty adjusting the workforce in correspondence with market fluctuations. In recent years the deregulation of labor markets has made wage-employment more insecure and stimulated entrepreneurial activity in many countries (OECD, 2002). In addition, flexible work arrangements may stimulate specific groups to enter the labor force. According to OECD (2002) part-time employment plays an important role determining female employment. Flexibility in work schedules relaxes a demand constraint on female employment. Flexible work arrangements (e.g., part-time work) stimulate female participation in the economy through the possibility of combining work and household responsibilities¹⁷. The availability of flexible work arrangements provides a strong incentive for women to become wage-employed, and, accordingly, may negatively affect female entrepreneurship. The need for women to start their own business to be better able to combine work and family responsibilities is lower. Kovalainen et al. (2002) find a positive relationship between the percentage of women working part-time and female business start-up activity. Although flexible work arrangements are important for (male) entrepreneurship as it enables business owners to adequately adapt their workforce to market circumstances, it may negatively affect female entrepreneurship when part-time arrangements in wage-employment sufficiently satisfies the need of women to combine responsibilities.

Child care facilities and parental leave

Because women are still responsible for the major part of the child-rearing activities, the availability and price of child-care facilities influence female, or maternal, employment. When quality child-care is unavailable or costly, more women are likely to discontinue employment or refrain from re-entering the labor market when they become mothers¹⁸. An increase in the supply of publicly provided day care may lead to a higher employment continuity of women. The government can further stimulate female labor force participation through the distribution of subsidies for child-care as well as arranging for subsidized parental leaves. Gustafsson and Jacobsson (1985) argue that in countries with less generous parental leave schemes, more working mothers give up their jobs. From an employers' perspective, Kovalainen et al. (2002) argue that when wage-employment related support mechanisms are well developed, this may negatively influence female entrepreneurship, as they have to make payments to employee support schemes¹⁹.

We expect the positive influence of the support mechanisms on female entrepreneurship to outweigh the negative effect of employers' contributions. Although self-employment offers women more flexible work schedules, enabling the combination of work and family activities, child care facilities and parental leave are important as self-employment is usually accompanied by more working hours than wage-employment. However, as parental leave schemes usually are available for wage-employed people, they are not always available to the self-employed. The availability of child-care facilities and parental leave schemes is more likely to (positively) influence female entrepreneurship than male entrepreneurship, as child-rearing activities are a gender-specific constraint for working women.

¹⁷ On the other hand, higher female participation augments the demand for institutional changes in the labor market, e.g., in particular those favoring part-time employment (OECD, 2002).

¹⁸ Also, the structure of the primary schooling system is important in determining female employment. If primary school schedules are irregular and offering lunch breaks with no possibility of remaining during the midday pause this may be a barrier for working women (Charles et al., 2001).

¹⁹ Kovalainen et al. (2002) find a negative relationship between the statutory maternity leave in days and the rate at which women start new businesses, as well as a negative relationship between the statutory support payment scheme as a percentage of wages and the new business rate of women.

Business licensing

Business licensing may be a barrier for (potential) entrepreneurs as it raises the costs of starting or running a business. These costs can take different forms. A distinction can be made between the amount of money necessary to comply with the establishment legislation, the length of time necessary to complete the legislation procedures and the complexity of the procedures in the establishment process. These costs may lead potential entrepreneurs to shy away from risk-taking (OECD, 1998). As women usually have less previous experience with starting up a business, they may have less knowledge of government legislation and how to comply with it, posing particular problems or even discouraging them to start a business. Hence, business licensing may pose more problems for female than for male entrepreneurs, differentially affecting entrepreneurship of women and men.

Availability of capital

The availability of capital is important for entrepreneurship as it lays the foundation for the business (Cressy, 2002). In principle there is no difference in (the importance of) the availability of capital for female and male entrepreneurs. However, there may be specific barriers for specific entrepreneurs to acquire the capital available in the market. Financial institutions usually are reluctant to lend money to early-stage and seed businesses because of the high risks involved and the lack of a track record. From a gender perspective women may have more problems securing finance through the regular channels as the business profile of women usually is less favorable for investors than that of men, with women starting smaller business, in services and often working part-time in the business (Verheul and Thurik, 2001). Several studies suggest that acquiring capital is more difficult for women than for men and that women have more difficulty in convincing (potential) investors (Schwartz, 1976; Hisrich and Brush, 1986; Brush, 1992; Carter and Cannon, 1992; Carter, 2000)²⁰. Hence, the availability of capital is more likely to affect female entrepreneurship than male entrepreneurship. In addition to the availability of capital in the market, the government can provide female entrepreneurs with special loans, subsidies and funds (see *Policy targeted at female entrepreneurs*).

Policy targeted at female entrepreneurs

The government can stimulate female entrepreneurship through a range of measures. Stevenson and Lundström (2001, p. 46) distinguish between different ways in which the government can stimulate entrepreneurship of under-represented groups, such as women, the better educated, certain age categories, youth, immigrants and unemployed people. Policy measures to stimulate these target groups include enterprise centers, promotion activities, entrepreneurship awards, counseling, training and advisory support, special micro-loan (or venture capital) programs, peer group networks and associations, information products, Web portals, marketing efforts and Mini-Enterprise policy²¹. Despite these target group measures under-represented groups may still have problems starting and running a business if the entrepreneurial culture in a country is weak (Stevenson and Lundström, 2001). It is expected that specific measures targeting female entrepreneurs will stimulate female entrepreneurship. On the whole, male entrepreneurs are not a target group, but benefit from more generic measures.

Cultural Factors

Cultural values play a role in shaping the institutions in a country. Values and beliefs shape behavior and, accordingly, may be assumed also to influence the decision to become self-employed

²⁰ Other studies do not find significant gender differences (Buttner and Rosen, 1989; Riding and Swift, 1990).

²¹ For a detailed description of the Mini-Society approach to teaching entrepreneurship we refer to the work of Marilyn Kourilsky (e.g., Kourilsky, 1974; 1990; 1996; Kourilsky and Ballard-Campbell, 1984; Kourilsky, and Carlson, 1997; Kourilsky and Walstad, 1998).

(Mueller and Thomas, 2000)²². Entrepreneurial culture is a complex concept, comprising many aspects, including – for instance – how entrepreneurship is perceived in a country, the recognition that is given to entrepreneurs and the prevailing attitudes towards success and failure. Particularly important for the level of entrepreneurial activity is the extent to which people in a country consider the pursuit of opportunities as socially legitimate (Reynolds et al., 1999). An entrepreneurial culture may be expressed through stories about successful entrepreneurs in the media, respect for those who start a business and the absence of stigma attached to those whose entrepreneurial activities fail. Entrepreneurial culture is expected to positively influence entrepreneurial activity rates of both men and women. We do not consider it likely that entrepreneurial culture differentially impacts female and male entrepreneurs, although women are less likely to become self-employed, even if entrepreneurship in general is stimulated in a country.

More deeply rooted cultural values can also be linked to entrepreneurship. Hofstede (1980, 2001) distinguishes between several cultural indicators, including power distance, individualism, masculinity, uncertainty avoidance and long-term versus short-term orientation²³. Hypotheses on the relationship between these cultural indicators and entrepreneurship are dependent upon whether you choose to view the relationship from the *aggregate psychological traits* perspective or the *social legitimation* (or *dissatisfaction*) perspective (Davidsson, 1995; Wennekers et al., 2002; Hofstede et al., 2004).

The *aggregate psychological trait* explanation of entrepreneurship is based on the view that if there are more people with entrepreneurial values in a country, there are also more entrepreneurs. In this view we may expect that low power distance, low uncertainty avoidance, high masculinity and high individualism stimulate entrepreneurship (Shane, 1992, 1993). According to the *social legitimation* perspective entrepreneurship is determined by the difference in values and beliefs between the population as a whole and potential entrepreneurs. When entrepreneurial individuals are dissatisfied with existing structures (which do not offer them entrepreneurial opportunities), they leave the mainstream organizations and start their own business. Based on the dissatisfaction hypothesis, the assumed relationship between the cultural indicators and entrepreneurship is reverse: countries with high power distance, high uncertainty avoidance, low masculinity and low individualism may be characterized by more entrepreneurship (see Baum et al., 1993; Etzioni, 1987; Noorderhaven et al., 2003). Research is inconclusive as to which relationship(s) between the cultural indicators and entrepreneurship will prevail. Moreover, different relationships may exist between the cultural indicators and female and male entrepreneurship. From an aggregate psychological traits perspective it may be argued that women are less likely to possess entrepreneurial traits. From a social legitimation perspective, both women and men are confronted with social and organizational structures that do (not) offer entrepreneurial opportunities. Vroom (1982) shows that life-dissatisfaction is often positively related to job-dissatisfaction. Hence, people who are dissatisfied with their job may also be expected to be dissatisfied with life. Brayfield et al. (1957), as cited in Vroom (1982), argue that men who are dissatisfied with their jobs, are more likely to be dissatisfied with life in general than women who are experiencing job dissatisfaction. This may imply that, if men are dissatisfied with their jobs, they may be more likely to start their own business than women who experience job-dissatisfaction. However, as women may be more likely to experience gender-related barriers in their market careers, it may be argued that dissatisfaction is a more important factor influencing female entrepreneurship than male entrepreneurship.

²² Several studies have focused upon explaining entrepreneurship from a cultural perspective (McGrath and MacMillan, 1992; McGrath et al., 1992; Davidsson, 1995; Mueller and Thomas, 2000; Busenitz et al., 2000; Hofstede et al., 2004; Uhlaner et al., 2002, Noorderhaven et al., 2003).

²³ Of these dimensions, in particular power distance, individualism and uncertainty avoidance have been studied in relationship to entrepreneurship (Wennekers et al., 2002).

3. HYPOTHESES AND VARIABLES USED

Combining insights from the three different streams of literature on the determinants of entrepreneurship in general, female labor force participation and the characteristics of female entrepreneurship, we will formulate hypotheses on macro level determinants of female entrepreneurship. Hypotheses are formulated for those factors that are considered (most) important in explaining female entrepreneurship (as opposed to male entrepreneurship). For each group of determinants, i.e., technological, economic, demographic, institutional and cultural factors, one or more factors are selected limiting the number of explanatory variables in the empirical analysis to ten. This is necessary as the number of observations (i.e., countries) with a full set of measurements for all variables is limited, i.e., 29 countries.

Technological factors:

H1: Technological development has a positive influence on entrepreneurial activity.²⁴

H1a: Technological development has a larger influence on male entrepreneurship than on female entrepreneurship.

Economic factors:

H2: Income level has a U-shaped relationship with entrepreneurial activity.

H2a: Income level has a U-shaped relationship with both female and male entrepreneurial activity.

H3: Unemployment has a negative influence on entrepreneurial activity (at the macro level).

H3a: Unemployment has a larger influence on female entrepreneurship than on male entrepreneurship.

H4: The share of service sector employment has a positive influence on entrepreneurial activity.

H4a: The share of service sector employment has a larger influence on female entrepreneurship than on male entrepreneurship.

H5: The size of the informal sector has a negative influence on formal entrepreneurial activity.

H5a: The size of the informal sector has a larger influence on female than on male entrepreneurship.

H6: Female labor force participation has a positive influence on entrepreneurial activity.²⁵

H6a: Female labor force participation has a positive influence on female entrepreneurship and no influence on male entrepreneurship.

H7²⁶: (Former) communist countries are characterized by lower levels of entrepreneurial activity than other countries.

H7a: Communism or economic transition has a larger influence on female than on male entrepreneurship.

Demographic factors:

H8: The importance of family has a negative influence on entrepreneurship.

H8a: The importance of family has a larger influence on female than on male entrepreneurship.

Institutional (policy) factors:

H9: The availability of maternity leave schemes (for the self-employed) positively influences entrepreneurship.

H9a: The availability of maternity leave schemes (for the self-employed) has a larger influence on female than on male entrepreneurship.

²⁴ In this paper technological development is operationalized as R&D investments per capita.

²⁵ The fact that the entrepreneurial activity rate for GEM is scaled on population and not on labor force (or total employment) is crucial for this hypothesis.

²⁶ Communism (as represented by Hypothesis 7) may also be regarded as a cultural (or political) factor, especially since the economic structure was a result of the political and socio-cultural ideology.

Cultural factors:

H10: Dissatisfaction positively influences entrepreneurship.²⁷

H10a: Dissatisfaction has a larger influence on female than on male entrepreneurship.

In our regression analyses, we will apply the following criteria to accept hypotheses. For the *general* hypotheses, the impact of a variable on the *entrepreneurial activity rate* should be significant at the 10 percent level (two-tailed test), with the predicted sign. For the *gender* hypotheses two conditions have to be met. First, the impact of a variable on the *female share in entrepreneurship* has to be significant at the 10 percent level, with the predicted sign. Second, the sign of the effect should correspond with that in the general hypothesis (i.e., the effect on TEA).

Table 3 presents a list of both dependent and independent variables used in this study, including their sources. The independent variables correspond to the hypotheses formulated above. The information on maternity leave coverage largely applies to wage-employed women, and no information is available for self-employed women across the 29 countries.²⁸ Therefore Hypothesis 9 should be reformulated as it can be expected that when generous maternity leave schemes are available for wage earners, wage-employment is more attractive vis-à-vis self-employment and less women are willing to give up their wage jobs to start a business. Hence, we expect to find a negative effect of maternity leave coverage on (female) entrepreneurship.

Table 3: Description of variables

Dependent variables	Variable description
total entrepreneurial activity	Share of people in age group of 18 to 64 years who are actively engaged in the start-up process or managing a business less than 42 months old in 2002 (expressed in %). <i>Source: Global Entrepreneurship Monitor</i>
female entrepreneurial activity	Share of women in age group of 18 to 64 years who are actively engaged in the start-up process or managing a business less than 42 months old in 2002 (expressed in %). <i>Source: Global Entrepreneurship Monitor</i>
male entrepreneurial activity	Share of men in age group of 18 to 64 years who are actively engaged in the start-up process or managing a business less than 42 months old in 2002 (expressed in %). <i>Source: Global Entrepreneurship Monitor</i>
female share in total entrepreneurial activity	Share of female entrepreneurs in total number of entrepreneurs, derived from female and male entrepreneurial activity rates described above (expressed in %). <i>Source: Global Entrepreneurship Monitor</i>
Independent variables	Variable description
R&D expenditure	Total R&D expenditure per capita in 2000 (per 1000 US\$), <i>Source: World Competitiveness Yearbook.</i>
Per capita income (squared)	Gross national income per capita in 2001 in purchasing power parities per 1000 US Dollars, 2002. <i>Source: World Development Indicators (World Bank)</i>
Unemployment	Unemployment rate for 2001, <i>Source: World Competitiveness Yearbook 2002.</i>
Service employment	Employment in the service sector as percentage of total employment in 2000, <i>Source: World Competitiveness Yearbook 2001.</i>
Informal sector	Expert question: "What percentage of businesses in your country would you guess are unofficial or not registered?" (1=less than 5%; 2=6-10%; 3=11-20%; 4=21-30%;; 8=61-70%; 9=more than 70%). <i>Source: Global Competitiveness Report 2001-2002.</i>
Female labor share	Female employment as a percentage of the total labor force in 2001, <i>Source: World Competitiveness Yearbook 2002.</i>

²⁷ This is in line with the social legitimation perspective.

²⁸ For some countries (e.g., Brazil, Denmark, Finland, Hungary, Iceland, Norway, Sweden) maternity leave coverage schemes are also available for the self-employed. In other countries (e.g., Belgium, Spain, United States) special systems have been developed for the self-employed.

(Former) communist country	Dummy variable for (former) communist country. The variable has value '1' for Russia, Hungary, Poland, and Slovenia, and value '0' for all other countries.
Importance family	Average country score to following question: "How important is family in your life?" (1=very important; 2=rather important; 3=not very important; 4=not at all important). <i>Source: World Values Surveys and European Values Surveys, cumulative data: 1981-1984; 1990-1993; 1995-1997.</i> Note that this variable has descending values. In the present paper we have used this variable with a reverse ordering, i.e., ascending values, to enable straightforward interpretation of the empirical results.
Maternity leave coverage	{Maternity leave benefits (share of wages paid covered)} * (i.e., times) {time during which maternity benefits are paid (in weeks)} / divided by 100. <i>Source(s): World Development Indicators (World Bank) & Social Security Worldwide 2003.</i>
Life satisfaction	Average country score to the question: "All things considered, how satisfied are you with your life as a whole these days?", using a 10-point Likert scale from '1' dissatisfied, to '10' satisfied. <i>Source: World Values Surveys and European Values Surveys, cumulative data: 1981-1984; 1990-1993; 1995-1997.</i>

4. EMPIRICAL ANALYSIS

In this section the hypotheses formulated in Section 3 are tested. We start with a simple correlation analysis. Subsequently, to test the *general* hypotheses, we estimate regression models explaining total entrepreneurial activity rates of women and men (Regression Analysis I). This is followed by a regression analysis explaining the female *share* in entrepreneurship, to test the specific *gender* hypotheses (Regression Analysis II). Finally, as a separate methodological exercise we investigate the extent to which using gender-specific or general independent variables influences estimation results (Regression Analysis III).

Correlation Analysis

Correlation between dependent and independent variables

Table 4 reports the means, standard deviations and correlation coefficients of the major variables in this study. From Table 4 we see that a large number of the selected independent variables in this study are significantly related to the major dependent variable, i.e., female entrepreneurial activity. In particular, the following variables are significantly correlated with female entrepreneurship: female labor share ($r=-0.59$, $p<0.01$), per capita income ($r=-0.48$, $p<0.01$), informal sector ($r=0.48$, $p<0.01$), importance of family ($r=0.40$, $p<0.05$), R&D investments ($r=-0.39$, $p<0.05$), and squared per capita income ($r=-0.38$, $p<0.05$).

Considering the hypotheses formulated earlier, there are two striking observations: both the size of the informal sector and the female labor share have a highly significant correlation with the female entrepreneurial activity rate with a sign opposite to what is expected in the hypotheses. For the informal sector we find a positive sign (where we expected a negative one), and for female labor share we find a negative sign (where we expected a positive one). Closer inspection of the data reveals that a small number of countries (India, Argentina, Brazil and Mexico) is responsible for these counterintuitive correlations. These four countries have the highest female entrepreneurial activity rates (see Table 1) and combine these high rates with both a relatively large informal sector (together with Russia these four countries form the top five)²⁹ and a low share of women in the labor force. Excluding the four countries (i.e., using 25 observations), the partial correlation of the female

²⁹ The values for the informal sector variable range from 3.8 to 4.8 for the four countries and this corresponds with an estimated size of the informal sector of approximately 20 to 35 percent of the economy (see Table 3). Note that 'informal' is not the same as 'illegal'.

entrepreneurship rate with both the size of the informal sector and the female labor share is -0.18, and both correlations are not significant.

The four countries also score high on the female *share* in entrepreneurship: they are among the six countries with the highest female share in entrepreneurship (see Table 2). This observation is consistent with the argument that particularly women may be involved in informal activities³⁰, as was discussed in Section 2³¹. In fact, the four countries are the only ones in our data set for which the share of women in the number of entrepreneurs is higher than the share of women in the labor force. As the latter variable is taken from official statistics (from national bureaus of statistics), it is not inconceivable that (female) entrepreneurs in the informal sector are not counted in the labor force measure, but are counted in the TEA measure of GEM³².

Given the specific pattern for India, Argentina, Brazil, and Mexico (i.e., high entrepreneurial activity rates, large informal sector, low female labor share), we consider it likely that for these countries a substantial number of entrepreneurs measured in the Total Entrepreneurial Activity (TEA) rate of the Global Entrepreneurship Monitor (GEM) are owner-managers of unofficial businesses, i.e., they are part of the informal sector. Hence, the above observations should define an important topic for the Global Entrepreneurship Monitor research agenda that has been largely unexplored up to now: just how many ‘informal’ entrepreneurs are included in the entrepreneurship measures of the Adult Population Survey, and how does this affect empirical analyses that make use of the GEM data base? This issue is of major importance, especially for studies focusing on GEM countries with large informal sectors.

Correlations among independent variables

With respect to the independent variables, we observe high correlations between R&D investments, per capita income (squared), and informal sector. The high positive correlation between R&D investments and per capita income ($r=0.81$, $p<0.01$) implies that, *ceteris paribus*, rich countries invest more in R&D than poor countries, i.e., rich countries have the means to make these investments. The high negative correlation between per capita income and informal sector ($r=-0.81$, $p<0.01$) may be explained by the fact that poorer countries are more likely to be characterized by a large informal sector, where people without a formal job search other (informal) means to earn a living. Also, life satisfaction is correlated with several of the other explanatory variables, including per capita income ($r=0.64$, $p<0.01$), service sector employment ($r=0.57$, $p<0.01$), R&D investments ($r=0.56$, $p<0.01$), economic transition or communism ($r=-0.56$, $p<0.01$), unemployment ($r=-0.50$, $p<0.01$), and informal sector ($r=-0.49$, $p<0.01$). Hence, *ceteris paribus*, in richer, more stable countries people are more satisfied. The finding that unemployment is negatively related to life satisfaction is in accordance with Vroom (1982). In the remainder of this section these correlations between the explanatory variables are carefully considered and taken into account, making use of multiple regression analysis. The results of this correlation analysis may be interpreted as preliminary findings.

³⁰ Note that the correlation between female share in entrepreneurial activity and the size of the informal sector is positive and highly significant ($r=0.54$, $p<0.01$). See Table 4. Remarkably, the other country from Latin America in our data set, Chile, scores *low* on both variables, thereby contributing to the positive relationship. Chile combines a score of only 1.7 on the informal sector index, with a low share of women in total entrepreneurship (30.3 percent). See Table 2. Apparently, informal entrepreneurship by women occurs less often in Chile as compared to other Latin American countries like Argentina and Brazil.

³¹ Note that the negative hypothesis 5 relates to *official* or *formal* entrepreneurial activity.

³² Indeed, the questions asked in the GEM Adult Population Survey are not led to believe that owner-managers of unofficial businesses would be excluded. Specifically, respondents who indicate that they “sell any goods or services to others” are included in the TEA count. The fact that the Adult Population Survey is a survey among *randomly selected* adults does also not give reason to assume that unofficial entrepreneurs are excluded from the TEA count.

Table 4: Pearson correlation between dependent and independent variables (N=29)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. total entrepreneurial activity	1														
2. female entrepreneurial activity	0.97**	1													
3. male entrepreneurial activity	0.99**	0.92**	1												
4. female <i>share</i> in total entrepreneurial activity	0.37*	0.55**	0.26	1											
5. R&D investments	-0.36	-0.39*	-0.33	-0.38*	1										
6. per capita income	-0.40*	-0.48**	-0.34	-0.45*	0.81**	1									
7. per capita income squared	-0.31	-0.38*	-0.27	-0.39*	0.83**	0.98**	1								
8. unemployment	0.01	0.12	-0.06	0.45*	-0.51**	-0.54**	-0.55**	1							
9. service sector employment	-0.29	-0.33	-0.25	-0.15	0.50**	0.69**	0.64**	-0.13	1						
10. informal sector	0.33	0.48**	0.24	0.54**	-0.67**	-0.81**	-0.77**	0.45*	-0.52**	1					
11. female labor share	-0.60**	-0.59**	-0.58**	-0.07	0.40*	0.48**	0.44*	-0.14	0.40*	-0.33	1				
12. (former) communist country	-0.31	-0.28	-0.31	0.03	-0.38*	-0.39*	-0.42*	0.13	-0.45*	0.23	0.25	1			
13. importance family	0.44*	0.40*	0.45*	0.17	-0.04	-0.01	0.04	0.17	0.17	-0.01	0.02	-0.14	1		
14. maternity leave coverage	-0.09	-0.10	-0.08	-0.05	0.09	0.06	0.04	-0.19	0.01	-0.03	0.30	0.18	0.02	1	
15. life satisfaction	0.07	0.05	0.08	0.01	0.56**	0.64**	0.66**	-0.50**	0.57**	-0.49**	0.13	-0.56**	0.11	0.22	1
MEAN	7.79	5.43	10.13	33.69	0.40	20.80	510.30	7.90	64.27	2.38	42.95	0.14 ^a	-1.16	19.79	7.17
STANDARD DEVIATION	4.32	3.38	5.43	5.72	0.37	8.96	339.60	5.85	11.58	1.04	4.39	0.35	0.06	14.68	0.79

Note: * Correlation is significant at the 0.05-level (2-tailed); ** Correlation is significant at the 0.01-level (2-tailed).

^a(Former) communist country is a dummy variable, with value '1' for four countries, and value '0' for the other 25 countries. See Table 3.

Regression Analysis I: Explaining Entrepreneurial Activity Rates

To investigate the determinants of the number of entrepreneurs in a country, regression analyses are performed explaining total, female and male entrepreneurial activity (i.e., nascent entrepreneurs and new firms as a percentage of adult population). Corresponding with the hypotheses, eleven explanatory variables are included. Results are presented in Table 5.

From Table 5 it can be seen that total, female and male entrepreneurial activity are largely influenced by the same factors in the same direction, although for several factors the effects seem to be less strong for female entrepreneurial activity. We will discuss the (difference in) size of the effects later.

Table 5: Regression analysis explaining entrepreneurial activity

	Entrepreneurial activity					
	Total		Female		Male	
	<i>B</i> -value	<i>t</i> -value	<i>B</i> -value	<i>t</i> -value	<i>B</i> -value	<i>t</i> -value
Constant	57.91	4.06	33.24	3.09	81.58	4.39
R&D investments	-4.57	-1.87*	-2.42	-1.31	-6.65	-2.09*
per capita income	-1.00	-2.37	-0.80	-2.51	-1.21	-2.22
per capita income squared	0.019	1.98*	0.016	2.18	0.023	1.79*
unemployment	-0.28	-2.43	-0.13	-1.46	-0.44	-2.88
service sector employment	-0.001	-0.02	-0.01	-0.20	0.02	0.16
informal sector	-0.67	-0.77	0.24	0.36	-1.55	-1.36
female labor share	-0.15	-0.87	-0.10	-0.76	-0.19	-0.86
(former) communist country	-4.95	-2.28	-3.13	-1.90*	-6.70	-2.37
importance family	26.17	2.84	17.04	2.44	35.00	2.91
maternity leave coverage	0.001	0.04	-0.01	-0.23	0.01	0.19
life satisfaction	0.53	0.51	1.01	1.28	0.06	0.05
<i>R</i> -square	0.803		0.817		0.788	
<i>N</i>	29		29		29	

Note: *t*-values in bold represent a significance level of 0.05 and * represents a significance level of 0.10.

From Table 5 we see that several variables influence total entrepreneurial activity in a country, including R&D investments, (squared) per capita income, unemployment, (former) communist country, and importance of family.³³ The negative effect of R&D investments on total entrepreneurial activity is in contradiction with Hypothesis 1. Maybe (high) investments in R&D are an indicator of the presence of large firms, which usually invest more in R&D than small businesses and tend to be more aware of their R&D investments and more willing to report on them. Also, R&D investments may be considered an input variable, which does not guarantee innovative output. Finally, the relationship between technological development and entrepreneurship may be non-linear. Assuming a U-shaped relationship³⁴, it may be argued that many of the less developed countries included in the empirical study are still in the ‘Schumpeter II’ phase (declining end of the

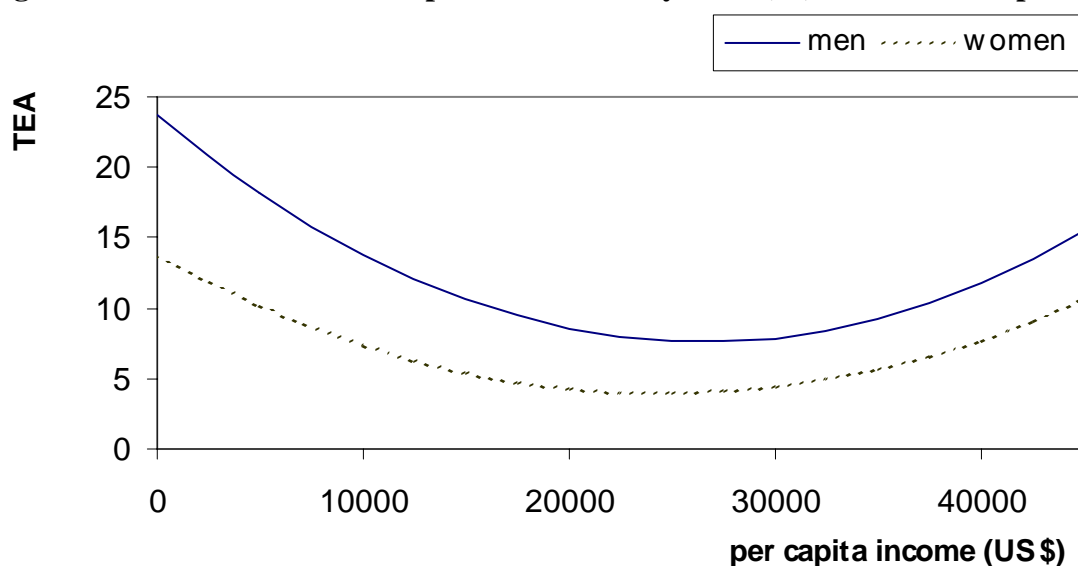
³³ The number of explanatory variables (eleven) is relatively large, given the number of observations (29). However, the results for the six variables mentioned have been tested to be robust. In a regression excluding the non-significant variables, the estimated effects are fairly similar to those reported in Table 5.

³⁴ Van Stel et al. (2003) provide empirical support for a U-shaped relation between the ‘innovative capacity index’ (developed in the World Economic Forum’s *Global Competitiveness Report*) and the nascent entrepreneurship rate in the Global Entrepreneurship Monitor. The downward part of the curve reflects the Schumpeter II regime (creative accumulation), where the innovative advantage lies with large, established enterprises. The upward part of the curve reflects the Schumpeter I regime (creative destruction), where the technological regime is more favorable to innovative entry.

U-shape), where the technological regime fosters economies of scale and scope, thereby reducing opportunities for small firms.

In conformity with Hypothesis 2, we find that the relationship between income level and entrepreneurship is U-shaped: per capita income negatively influences entrepreneurship and per capita squared positively influences entrepreneurship, indicating a downward and upward slope of the relationship, respectively. Hence, from a certain level of economic development onwards the negative impact of per capita income turns into a positive effect. Both the linear and the squared per capita income terms are significant. The estimated curves for female and male entrepreneurship are depicted in Figure 1³⁵. We can see that the shape of these curves is quite similar for female and male entrepreneurial activity and that it is mainly the level of entrepreneurial activity that differs, in accordance with the figures in Table 1. Hypothesis 2a is supported.

Figure 1: Male and female entrepreneurial activity rates (%) as function of per capita income



The level of unemployment has a negative effect on entrepreneurial activity, outweighing the positive ‘refugee’ effect of unemployment. Hence, at the macro level unemployment is accompanied by a decrease in the number of entrepreneurial opportunities, canceling out the positive impact of unemployment as a push factor on entrepreneurship at the macro level. This is in support of Hypothesis 3. (Former) communist countries (i.e., countries in economic transition) are characterized by relatively low levels of entrepreneurial activities. Although the importance of economies of scale is rapidly decreasing in these countries, adopting more democratic and liberal political and economic structures, it seems that entrepreneurship is still relatively underdeveloped as compared to other countries that are not experiencing this economic transition. Hypothesis 7 is supported. Moreover, as opposed to what is predicted in Hypothesis 8, the importance of family (i.e., high family values) positively influences entrepreneurial activity. Because entrepreneurship (i.e., self-employment) involves high risk and time investments, it is often assumed that entrepreneurship is not a ‘viable’ option for people who run a household and have high family values. However, self-employment may also enable household members to adjust time schedules to family needs as it usually involves more flexible working hours. Moreover, family support and the possibility to work from the home may also play a role. We do not find evidence of effects of size of the service sector, the informal sector, female share in labor force, maternity leave coverage and life satisfaction on entrepreneurial activity. Hence, Hypotheses 4, 5, 6, 9 and 10 are not supported.

³⁵ The intercept term is calculated on the basis of mean values of the explanatory variables in Table 5 (excluding per capita income (squared)). Hence the y-axis is not crossed at the estimated constant terms from Table 5. Also note that the most right part of the curves are out-of-sample predictions as the highest value of per capita income in our data set is 35,000 US\$.

Regression Analysis II: Explaining the Female Share in Entrepreneurship

In the previous section we investigated determinants of the *number* of female and male entrepreneurs in a country (scaled on population). However, we are also interested whether certain variables influence female and male entrepreneurship differently. In other words, what determines the *composition* or *diversity* of entrepreneurship in a country? Using the outcomes in Table 5 is not appropriate for investigating the determinants of the diversity of entrepreneurship as the coefficients in this table refer to absolute numbers of entrepreneurs. The coefficients in regressions explaining the number of male entrepreneurs are generally larger than those in regressions explaining the number of female entrepreneurs (see Table 5). This can be attributed simply to the fact that there are more male entrepreneurs than female entrepreneurs (see Table 1). Accordingly, from Table 5 we cannot read whether the *relative* impact of variables is different for female and male entrepreneurship, i.e., whether the composition or diversity of entrepreneurship is influenced. To investigate differential effects on female and male entrepreneurship, we propose a regression explaining the female *share* in the total number of entrepreneurs using the same set of explanatory variables as in Table 5³⁶. Results are presented in Table 6. Note that to correctly interpret and understand the differential effects, the results in Table 6 should be studied alongside the findings in Table 5. More specifically, a positive effect on the female share of entrepreneurs may be interpreted in two different ways: a variable may either have a (relatively) *larger positive* or a (relatively) *smaller negative* effect on female entrepreneurship (as compared to male entrepreneurship). Which of these two effects is valid can be deduced from Table 5.

Table 6: Regression analysis explaining female share in total number of entrepreneurs

	<i>B</i> -value	<i>t</i> -value
constant	-20.4	-0.8
R&D investments	-2.4	-0.6
per capita income	-1.2	-1.6
per capita income squared	0.02	1.3
unemployment	0.36	1.75*
service sector employment	0.013	0.1
informal sector	1.5	1.0
female labor share	0.46	1.55
(former) communist country	1.0	0.3
importance family	-4.0	-0.2
maternity leave coverage	-0.074	-1.1
life satisfaction	5.2	2.9**
<i>R</i> -square	0.656	
<i>N</i>	29	

* and ** represent significance levels of 0.10 and 0.01, respectively.

From Table 6 we see that only two factors (unemployment and life satisfaction) significantly influence the female share in entrepreneurship. The effect of unemployment is positive. This means that the negative effect of unemployment on entrepreneurial activity is (significantly) smaller for women than for men (see Table 5). This is opposite to what was predicted in Hypothesis 3a. It may be that the positive (push) effect of unemployment is larger for women than for men, i.e., that women are more likely to start a business out of necessity in a situation of economic recession than men. Indeed, Reynolds et al. (2002) find that – although men are more likely to be involved in entrepreneurial activity – the difference in the entrepreneurial activity rate of men and women is smaller for ‘necessity’ entrepreneurship than for ‘opportunity’ entrepreneurship.

³⁶ An alternative way to investigate this is to write the model in natural logarithms. However, the occurrence of various zero values in our data set makes this method infeasible.

We also find a positive effect of life satisfaction. This has to be interpreted as a positive effect of life satisfaction on female entrepreneurship, while such an effect is non-existent for male entrepreneurship (see Table 5). Note that this is in contradiction with Hypothesis 10a. Maybe this result can be explained by the fact that, as compared to men, women tend to be more driven by emotions, i.e., they make more intuitive decisions. Accordingly, for women it may be more important that they feel confident (about themselves and the environment) before they decide to start a business. For men the decision to start a business may be less dependent on their emotional wellbeing.³⁷

No effects on the female share in entrepreneurship are found for the remaining variables, although – given the small number of observations – the t -value of 1.55 for the effect of the share of women in the labor force may be considered high. Hypotheses 1a, and 4a through 9a, are not formally supported.³⁸

The significant effect of life satisfaction in Table 6 again demonstrates that studying the *number* of entrepreneurs and studying the *composition* or *diversity* of entrepreneurship is not comparable, as Tables 5 and 6 report different t -values. Whereas in Table 6 the coefficient of life satisfaction is highly significant, in Table 5 the coefficients of life satisfaction have low t -values³⁹. It also demonstrates the importance of applying a full model where the interplay of variables is accounted for. Note that in Table 4 the direct correlation coefficient between female share in total entrepreneurial activity and life satisfaction is only 0.01. In this respect, we also refer to the positive (and intuitive) effect of the share of women in the *labor force* on the share of women in the *stock of entrepreneurs*. In Table 6 the t -value is 1.55, whereas the direct correlation is -0.07 (see Table 4).

Size of the effects

In the previous sections we focused mainly on the significance and the sign of the estimated coefficients in the various regressions. However, we are also interested in the *size* of the effects. How much does total entrepreneurial activity (TEA) – for women and men – or the female share in entrepreneurship change if one of the explanatory variables changes with a given amount? And which variables have the largest impact? This should not be investigated by merely comparing the coefficients of the various explanatory variables as the measurement units are different. For instance, some variables are measured in percentages, while others are measured as a score on a Likert scale (see Table 3). To make the effects comparable, and to obtain an impression of the extent to which TEA or the female share in TEA can be influenced by a *plausible* change of an explanatory variable, we computed the *ceteris paribus* effect of an increase of one standard deviation for each explanatory variable. An exception is made for per capita income. As there is high variation in per capita income between the countries in our data set, ranging from 2,450 US\$ for India to 34,870 US\$ for the United States, an impulse of one standard deviation (or 8,960 US\$, see Table 4) can hardly be considered plausible. It takes at least a decade for an average country to achieve such a large increase in per capita income. Therefore we compute the effect for an impulse in per capita income of 2,000 US\$. Results are presented in Table 7.

³⁷ Reversed causality (i.e., a positive effect of self-employment on satisfaction of women), is not an issue here as entrepreneurial activity refers only to a *part* of population (20 percent at most, see Table 1), while the life satisfaction variable is an average country score (see Table 3), i.e., it refers to the *whole* population. So, even if (female) entrepreneurs report to be more satisfied with their life as compared to (female) wage earners, it is unlikely that this has a large impact on the life satisfaction variable as this refers to the *whole* population of a country.

³⁸ However, it should be born in mind that we apply rather strict criteria for accepting a hypothesis.

³⁹ Note that the *absolute* effect of life satisfaction is larger for women (see Table 5). Hence, given the smaller number of female entrepreneurs the significant effect on the female *share* of entrepreneurs is not surprising.

Table 7: Effects of one standard deviation change on TEA & female entrepreneurship share

	TEA female (% of female adults)	TEA male (% of male adults)	Female <i>share</i> in TEA (% of total number of entrepreneurs)
R&D investments	-0.9	-2.4	-0.9
per capita income	-1.5	-2.3	-2.2
unemployment	-0.7	-2.6	2.1
service sector employment	-0.1	0.2	0.1
informal sector	0.2	-1.6	1.6
female labor share	-0.4	-0.8	2.0
(former) communist country	-1.1	-2.4	0.3
importance family	1.0	2.0	-0.2
maternity leave coverage	-0.1	0.1	-1.1
life satisfaction	0.8	0.0	4.1

Note: the effects are computed on the basis of the estimation results from Table 5 (second and third column) and Table 6 (fourth column). For per capita income the combined effect of the linear and the squared term is given for a per capita income change of 2,000 US\$.

From Table 7 we can read that a *ceteris paribus* increase of one standard deviation in R&D investments has a negative effect of 0.9 percent point on the female TEA rate and of 2.4 percent point on the male TEA rate. Furthermore the percentage of women in the total stock of entrepreneurs decreases with 0.9 percent point. Likewise a one standard deviation increase of a country's score on life satisfaction has a positive effect of 0.8 percent point on female TEA, while it has no effect on the number of male entrepreneurs. Given the larger number of male entrepreneurs, this implies a considerable effect on the female share in entrepreneurship. Indeed, from the last column in Table 7 we see that the effect is 4.1 percent point⁴⁰.

Regression Analysis III: Introducing gender-specific independent variables in the analysis

The analyses presented above make use of explanatory variables that are similar for women and men. However, it may be argued that the explanation of female and male entrepreneurial prevalence rates can be improved by using gender-specific independent variables. For instance, when explaining variation in female entrepreneurial activity rates between countries, the *female* unemployment rate is more relevant than the *general* unemployment rate (aggregate of women and men). However, variables that are separately available for women and men among a large array of countries are scarce. Nevertheless, in this section we attempt to explain female and male entrepreneurship rates by way of gender-specific independent variables. Again we present both a correlation analysis and a regression analysis.

Gender-specific data for the 29 countries are available for unemployment, service sector employment, importance of family and life satisfaction. These gender-specific variables will be included in the regression analysis, in addition to the general variables used in previous analyses (see Table 3). Female and male unemployment rates for 2001 and data on the employment levels of women and men in the service sector for 2000 are obtained from the ILO LABORSTA database (<http://laborsta.ilo.org>).⁴¹ Female (male) employment in the service sector is scaled on total female

⁴⁰ Comparing Tables 5, 6 and 7, we see that, by and large, the ordering of variables based on the size of the effects is quite similar to the ordering based on the significance (t-values) of the effects. We feel that this increases the credibility of our estimation results.

⁴¹ No gender-specific unemployment data are available for India. Instead, we make use of the general unemployment rate (aggregate of women and men) in India to enable comparisons between the different analyses in this paper using either general or gender-specific variables. For the same reason, we use the general service employment rate for South Africa.

(male) employment.⁴² Gender-specific data for importance of family and life satisfaction are obtained from the World Values Surveys and European Values Surveys. Gender-specific data for these variables are available for all 29 countries. Average country scores for women and men are used. Measurement and rating categories are in accordance with the general variables used in previous analyses (see Table 3).

Table 8 presents the correlations among the gender-specific variables, also including total entrepreneurial activity rates of women and men (i.e., TEA female and TEA male). Moreover, the means and standard deviations of the gender-specific variables are presented.

Table 8: Pearson correlation between gender-specific variables and TEA (female/male)

	1	2	3	4	5	6	7	8	9	10
1. female unemployment rate	1									
2. male unemployment rate	0.94**	1								
3. female service employment	-0.34	-0.36	1							
4. male service employment	0.13	0.18	0.54**	1						
5. importance family for women	0.13	0.16	0.22	0.23	1					
6. importance family for men	0.18	0.22	-0.06	0.16	-0.86**	1				
7. life satisfaction for women	-0.50**	-0.54**	0.69**	0.22	0.20	-0.01	1			
8. life satisfaction for men	-0.46*	-0.53**	0.70**	0.20	0.24	0.04	0.98**	1		
9. TEA female	0.07	0.13	-0.25	0.06	0.28	0.51**	0.03	0.05	1	
10. TEA male	-0.12	-0.05	-0.12	0.04	0.34	0.54**	0.07	0.10	0.92**	1
MEAN	8.23	7.16	76.88	56.30	-1.13	-1.19	7.16	7.15	5.43	10.13
STANDARD DEVIATION	6.29	5.15	8.99	7.12	0.06	0.07	0.83	0.77	3.38	5.43

Note: * Correlation is significant at the 0.05-level (2-tailed); ** Correlation is significant at the 0.01-level (2-tailed).

From Table 8 it can be seen that the only variable related to TEA female and TEA male is the importance of family for *men*. Importance of family for *women* is not significantly related to entrepreneurial activity. In Table 4 we see that importance of family is correlated with both TEA female ($r=-0.40$, $p<0.05$) and TEA male ($r=-0.45$, $p<0.05$), (erroneously) suggesting that the relationship is valid for both women and men. Hence, using gender-specific variables is important for adequate interpretation of the relationships.

The correlation of importance of family for men with both TEA female and TEA male suggests that when men consider family to be more important, this leads to an increase in *both* female and male entrepreneurial activity rates. There is no such crosswise effect for the importance of family for women. It may be argued that if men regard family as important, they become self-employed (enabling them to work flexible hours and/or from home) and their wives also start working in the business as unpaid family worker. This may not be true for women who become self-employed, i.e., husbands may be more likely to keep their own job instead of contributing or assisting in the spouse's firm, explaining the absence of an effect of importance of family for women on male entrepreneurial activity.

⁴² Employment refers to people of 15 years and over in most countries, except for Brazil and Argentina (> 10 years), and Mexico (> 12 years). In some countries employment refers to 15 or 16 years and over (Australia, Belgium, Canada, Chile, Germany, Ireland, Italy, Japan, Korea, Poland, Slovenia, Spain, Switzerland, United Kingdom, United States), while in other countries it refers to certain time or age spans: 15 to 74 years in Finland, Germany, Iceland, Norway; 15 to 72 years in Russia; 15 to 66 years in Denmark; 15 to 64 years in the Netherlands and Sweden. For India employment refers to the public sector and non-agricultural private sector with more than 10 people employed. Service employment is measured including the following economic activity categories: 'wholesale and retail trade', 'hotels and restaurants', 'transport, storage and communications', 'financial intermediation', 'real estate, renting and business activities', 'public administration and defence', 'education', 'health and social work' and 'other community, social and personal service activities'. The gender-specific service employment data refer to 2000. However, data for Brazil and Russia are for 2001 and 1999, respectively, as no data are available for 2000.

Results of the regression analyses explaining both TEA female and TEA male, using both general and gender-specific data, are presented in Tables 9a and 9b. The gender-specific independent variables are presented in bold. For ease of comparison we also present the results from Table 5 (including only general explanatory variables) in both tables.

Table 9a: Regression analysis explaining TEA female (including female-specific variables)

	TEA female (general variables only, see Table 5)		TEA female (including female- specific variables)	
	<i>B</i> -value	<i>t</i> -value	<i>B</i> -value	<i>t</i> -value
Constant	33.24	3.09	41.21	3.97
R&D investments	-2.42	-1.31	-3.01	-1.81*
per capita income	-0.80	-2.51	-0.96	-4.10
per capita income squared	0.016	2.18	0.020	3.41
female unemployment	-0.13	-1.46	-0.15	-2.20
female service sector employment	-0.01	-0.20	-0.12	-1.76*
informal sector	0.24	0.36	-0.19	-0.31
female labor share	-0.10	-0.76	-0.03	-0.25
(former) communist country	-3.13	-1.90*	-4.71	-3.02
importance family for women	17.04	2.44	17.62	2.85
maternity leave coverage	-0.01	-0.23	-0.003	-0.12
life satisfaction for women	1.01	1.28	1.06	1.65
<i>R</i> -square	0.817		0.859	
N	29		29	

Note: variables for which gender-specific information is used in right part of the table are indicated in bold. Moreover, *t*-values in bold represent a significance level of 0.05 and * represents a significance level of 0.10.

Table 9b: Regression analysis explaining TEA male (including male-specific variables)

	TEA male, (general variables only, see Table 5)		TEA male including male- specific variables	
	<i>B</i> -value	<i>t</i> -value	<i>B</i> -value	<i>t</i> -value
Constant	81.58	4.39	72.06	3.33
R&D investments	-6.65	-2.09*	-6.35	-1.91*
per capita income	-1.21	-2.22	-1.20	-2.44
per capita income squared	0.023	1.79*	0.023	1.91*
male unemployment	-0.44	-2.88	-0.43	-2.22
male service sector employment	0.02	0.16	0.05	0.37
informal sector	-1.55	-1.36	-1.74	-1.47
female labor share	-0.19	-0.86	-0.18	-0.77
(former) communist country	-6.70	-2.37	-5.09	-1.54
importance family for men	35.00	2.91	30.98	2.82
maternity leave coverage	0.01	0.19	0.000	0.24
life satisfaction for men	0.06	0.05	0.43	0.29
<i>R</i> -square	0.788		0.763	
N	29		29	

Note: variables for which gender-specific information is used in right part of the table are indicated in bold. Moreover, *t*-values in bold represent a significance level of 0.05 and * represents a significance level of 0.10.

Comparing the results in Tables 9a and 9b (including gender-specific explanatory variables) to those in Table 5 (including only general explanatory variables) we see that the explanatory value of the model (measured by R^2) increases for TEA female (from 0.817 to 0.859, or an increase of explained variation of 4.2 percent point) while it decreases marginally for TEA male. Hence, it appears that including gender-specific variables is important for understanding female entrepreneurial activity, while it does not create additional insight in the origin of male entrepreneurial activity.

Including gender-specific variables strengthens the effects of various explanatory variables on female entrepreneurial activity (TEA female). In particular, the U-shaped relationship of per capita income with TEA female has become more pronounced and the negative effect of R&D has become stronger. The per capita income effect can be explained by the fact that modern economies (with a higher per capita income) are generally characterized by a higher share of service and (given their higher prevalence in services) by more female entrepreneurs. This is consistent with the steeper upward part of the curve, as expressed by the larger coefficient for squared per capita income in the analysis with gender-specific variables. The larger negative effect of R&D for female entrepreneurs may be related to the lower propensity of women to start innovative firms, as hypothesized in Section 3. From Table 9a we also see that the significance of life satisfaction has increased, i.e., when including female-specific variables the positive effect is nearly significant at the 10 percent level. This is consistent with the strong effect of life satisfaction on the female share in entrepreneurship in Table 6. Hence, for these variables including gender-specific variables contributes to our understanding of female entrepreneurship. Furthermore, the negative effects of (female) unemployment and the (former) communist country dummy have become (more) significant (vis-à-vis the analysis including general variables only).

Perhaps the most striking finding is that female service employment has a significant negative effect on female entrepreneurial activity, while service employment in general does not have an effect on TEA female. This counterintuitive finding may be related to the different denominator, i.e., scaling on total *female* employment instead of on total employment (including men and women). The negative effect suggests that if the share of women working in services (scaled on total female employment) increases, it may well be that this increase largely accrues to wage-employment in services instead of to self-employment, possibly signaling an increase in average firm size in services in modern economies (e.g., with more female personnel in super stores as compared to self-employed women in local grocery shops).

Remarkably, the results for male entrepreneurial activity (TEA male) are influenced less by including gender-specific variables in the model, as the small change in R^2 suggests. Only the effect of the communist country dummy has decreased somewhat.

The analysis presented above clearly illustrates the importance of using gender-specific economic and non-economic variables in empirical (regression) analyses explaining the (differences between) female and male entrepreneurship. Including gender-specific variables does not only alter coefficients of (some of) these gender-specific variables, but also those of several general variables. The influence on the effect of the general variables is due to the interplay between explanatory variables in multiple regression models. Furthermore, from the correlation analysis we have seen that there may also be crosswise effects, i.e., a specific *male* variable influencing the number of *female* entrepreneurs, or vice versa. More gender-specific data are required to further explore these crosswise effects. In sum, more systematic collection of gender-specific data may have an important contribution to our understanding of the (differences between) determinants of male and female entrepreneurship.

5. DISCUSSION AND CONCLUSION

The aim of the present paper is to investigate the factors influencing female and male entrepreneurship at the country-level. The variation in female and male entrepreneurial activity rates has given rise to the question what their determinants are. Using Global Entrepreneurship Monitor data for 29 countries we test hypotheses concerning the impact of several determinants on female and male entrepreneurship. We derive these determinants from three streams of literature, including that on entrepreneurship in general, on female labor force participation and on female entrepreneurship. We use two measures of female entrepreneurship: the *number* of female entrepreneurs and the *share* of women in the total number of entrepreneurs. The first measure is used to investigate whether variables have an impact on entrepreneurship in general (influencing the number of both female and male entrepreneurs). The second measure is used to investigate whether factors have a differential relative impact on female and male entrepreneurship, i.e., whether they influence the *diversity* or *gender composition* of entrepreneurship. Factors that contribute to a higher number of female entrepreneurs may be different from those contributing to a higher diversity of entrepreneurship in a country.

We find that – by and large – female and male entrepreneurial activity rates are influenced by the same factors in the same direction. Hence, conditions for female entrepreneurship in a country tend to be similar to those for entrepreneurship in general (Delmar, 2003, p. 6). However, for some factors we find a significant differential impact on female and male entrepreneurship.

Regarding the determinants of entrepreneurship in general, we find negative effects of investments in R&D, the unemployment level and economic transition, and a positive effect of the importance of family. Moreover, we find evidence for a U-shaped relationship between entrepreneurial activity and per capita income. With respect to the differential impact of factors on female and male entrepreneurial activity, we find significant positive impacts of unemployment and life satisfaction on the share of women in the total number of entrepreneurs. More specifically, the negative effect of unemployment is smaller for women and the effect of life satisfaction on entrepreneurial activity is positive for women and non-existent for men.

The present paper has an important conceptual and empirical contribution, in particular since there have been relatively few studies focusing upon the determinants of female and male entrepreneurial activity at the country level. From a conceptual perspective the present paper brings together several streams of literature, discussing the (possible) influence on (female) entrepreneurship of a large range of factors, classified into five focal areas (i.e., technological, economic, demographic, institutional and cultural factors). From an empirical standpoint this study shows the methodological implications of studying the determinants of female and male entrepreneurial activity. When studying female entrepreneurship from a macro perspective, there are different ways to measure female entrepreneurship (i.e., in absolute or relative terms) and a distinction can be made between including general or gender-specific explanatory variables in the analysis. Moreover, developing a full regression model where the interplay of variables is accounted for may be more suitable for understanding the origin of female and male entrepreneurship than merely investigating direct correlations.⁴³

Future research should focus on including more countries in the analysis and investigating more explanatory factors. Cultural and also political factors should be included to rule out country differences in these areas. Moreover, future research should include institutional factors, such as support for entrepreneurship, availability of capital and regulatory factors (e.g., taxation, social security).

⁴³ For instance, we find that the direct correlation between female share in the labor force share and the female share in entrepreneurship is not significant, whereas there appears to be an effect of female labor share on female entrepreneurship share in the regression analyses.

Findings in the present study also indicate that there may be a considerable share of (particularly female) entrepreneurs active in the informal sector, in particular in poorer countries. Future research may explore this matter further. For instance, what is the effect of working in the informal sector on the general wellbeing of people? Another promising line of research is the investigation of crosswise effects, i.e., the extent to which certain *male*-specific developments also impact *female* entrepreneurship and vice versa. In the present paper we merely investigated this issue using correlation analysis. Follow-up research should also test for the existence of crosswise effects in regression analyses.

From a policy perspective it may be argued that before selecting and activating policy instruments, governments should have a clear idea what they want to accomplish: do they want to stimulate the number of female entrepreneurs or the female share in entrepreneurship (i.e., the diversity of entrepreneurship)? The analyses in this study point out that there may be different factors involved. Considering that diversity of entrepreneurship is important from an economic perspective – in view of the extended and more diverse supply of goods and services consumers can choose from – it may be important for governments to focus upon stimulating the share of women in entrepreneurship. To this end, government policy should aim at influencing those factors that have a relatively stronger impact on female entrepreneurship than on male entrepreneurship. Moreover, for governments to have a clear understanding of the role of female entrepreneurship in the economic process and the relationships between entrepreneurship and other factors (whether economic, technological, demographic, institutional or cultural) more systematic data collection is of vital importance. Knowledge of the number and share of female entrepreneurs in different countries fosters large-scale research in the area of female entrepreneurship both within countries and across countries. Past and contemporary research on female entrepreneurship has mainly focused upon small groups of female entrepreneurs (in qualitative research) within countries and there are few large-scale studies investigating female entrepreneurship across countries.

One of the most consistent influences on both female and male entrepreneurship throughout this study is the importance of family. For both women and men the importance of family (i.e., family values) has a positive impact on self-employment. Two factors probably play a role here. First, family can be supportive of the firm giving the entrepreneur a helping hand. Second, self-employment enables flexible working hours and working from home. Accordingly, self-employment can be geared to family needs. It is interesting to see that importance of family for men, in addition to entrepreneurial activity of men, also influences the entrepreneurial activity of women. Hence, if men become entrepreneurs their wives probably also contribute as unpaid family workers. Our correlation analysis suggests that this does not work the other way around, i.e., if women become self-employed their husbands are not more likely to become involved in their firms. This gives rise to question how far the (global) gender mainstreaming process has advanced, i.e., to what extent do women and men throughout the world have equal access to economic opportunities and are intra-household relations emancipatory?

Another striking result of this study is the positive effect of life satisfaction on the number of female entrepreneurs, which is contrary to what is argued in the ‘social legitimation’ perspective. Hence, life satisfaction may be an important policy issue for governments aiming to stimulate female entrepreneurship. Although life satisfaction is largely dependent upon factors that are difficult to influence, such as personal happiness and the economic climate, governments may be able to create higher levels of satisfaction among its female population by targeting problem areas and important issues for women, such as child care issues and gender mainstreaming. These are issues that may impact female entrepreneurship directly, but also indirectly – through satisfaction. Though it may be a long shot for governments to influence female entrepreneurship through satisfaction, awareness of this relationship is important.

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