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DOES GENDER INEQUALITY MATTER FOR FEMALE ENTREPRENEURIAL ACTIVITIES? AN INVESTIGATION OF SELECTED OECD COUNTRIES

Author Info

Dennis Barber III,
East Carolina University

Yassaman Saadatmand
Georgia Southern University

Jonathan Pierce
East Carolina University

Abstract

This paper evaluates empirically the effects of gender inequalities on female entrepreneurship activities in selected OECD countries over a 14-year span. The study evaluates the impacts on of gender inequality on female entrepreneurial activities. The high-income countries (as determined by the World Bank) were investigated separately from the low- and middle-income countries. Gender specific education, labor participation and inequality variables are included in the model. Overall, the findings suggest that higher gender inequality is associated with lower levels of female entrepreneurial activities. The pooled data results were the same.

Keywords: Female entrepreneurship, Macroeconomics, Gender inequality, OECD

Introduction

In recent years there has been a rising trend in female participation in the labor force associated with increase in female entrepreneurial activities in OECD countries. Despite this increase women are trailing behind men in entrepreneurial activities. According to OECD, "The Missing Entrepreneurs 2017", women in OECD countries were less likely than men to be self-employed (OECD/EU, 2017). The self-employment rate for women in 2015 was 10.1% and the rate for men was 17.0%. Similarly, women are less likely than men to be active in attempting to start a business. Over the period 2012-16, 4.9% of women in OECD were actively working to start a business, relative to 7.4% of men. Those women who do go on to successfully start a business typically operate smaller businesses.

Such disparity is not unique to the OECD countries, in almost all countries around the world such phenomenon persists. Scholars have cited many reasons for explaining such disparity, at micro level cultural and institutional factors are prominent among them (Thebaud, Sarah 2015; Elam, Amanda & Terjesen, Siri 2010). At macro level, the country level of development and technological advances are often considered as contributing factors (Verheul et al., 2006). The purpose of this study is to identify the effects of gender inequality on female entrepreneurship activities in OECD countries. OECD countries have a prevalence of data and the principal goal of this organization is to "Build better policies for better lives," and has placed gender equality at the top of its agenda. Gender inequality is measured using the Gender Inequality Index (GII),

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developed by the United Nations, as the prominent variable to see how gender inequality affects female entrepreneurship activities.

Across OECD countries, not only are fewer women self-employed, but they are less likely than self-employed men to have hired additional employees to work for their businesses, i.e. women tend to operate smaller businesses than men. 31.8% of self-employed men in OECD countries had employees and 21.8% of self-employed women did. The OECD countries with the highest proportion of self-employed women with employees were in the European Union, plus Switzerland. Australia was the only OECD country where self-employed men and women were equally as likely to have employees.

On average, self-employed women work more hours per week than women who work as employees. According to the same source, women face several barriers to entrepreneurship. Data from the 2012-16 period indicate that women are less likely than men to report that they have the knowledge and skills to start a business. Only 36.8% of women in the OECD countries felt that they had the knowledge and skills for entrepreneurship, relative to half of men. Furthermore, women were more likely to report a fear of failure. Between 2012 and 2016, 43.7% of women in the OECD countries reported this barrier.

Literature Review

The literature often simply focuses on various negative, "push", "out of necessity" factors, and positive, "pull" factors which are associated with a desire for entrepreneurial activities (Alstetec, 2003; Fosic et al., 2017). The push and pull factors are normally used as a framework for why someone starts a business. Pull factors are associated with psychological and personal considerations that influence one's decision to undertake entrepreneurial activities. Examples of pull factors are self-fulfillment, the need for independence, improving self-status, and risk tolerance. These elements are important in the decision to undertake entrepreneurial activities. There are divergent explanations on effects of pull and push factors on gender. On the one hand, it is believed that men start their businesses primarily because of "pull" factors (Jyoti et al., 2011; Kirkwood 2009). On the other hand, there are those who argue that "pull" factors that motivate men also influence women in undertaking entrepreneurial activities (Pandey, 2013; Verheul et al., 2006; Carland er al., 1991). At the same time, some argue that "pull" factors affecting men are different than those of women. They maintain that men are mainly pulled to entrepreneurship by factors such as: opportunity for independence, the need to be in control, and higher income. On the other hand, women are driven to entrepreneurship by such factors as opportunity for independence, self-fulfillment, being one's own boss and enjoying one's own work (Fosic et al., 2017). Some studies conclude that a predominant "pull" factor for women is their altruistic desire to create a better environment for their family and society. (McClelland et al., 2005)

Push factors are related mainly to economic necessity. They include loss of job, decrease in family income, and considerations such as divorce and job dissatisfaction. Push factors may be a more important influence for women than for men, as worldwide, women are much more likely than men to be driven by necessity when starting a business (Jyoti et al., 2011). This is the case of women in developing countries (Vossenberg, 2013; Tambunan, 2007). Many women are pushed to adopt entrepreneurial activities due to the need to earn a reasonable living with flexible work hours because of family expectations and demand (Alstete, 2003; Duberley et al.2012; McClelland

et al., 2005). The main problem that women entrepreneurs face is a potential conflict between work and private life, the balance between family responsibilities and organizational requirements (Kirkwood et al., 2007; Vossenberg, 2013). Some additional push motivators for women to become entrepreneurs are the fact that some women consider work environments in large organizations to be hostile, along with the perception of the existence of a glass ceiling (Sullivan et al., 1997; Jyoti et al., 2011).

Another element often studied by scholars that influences entrepreneurial activities is the cultural factor (Gnyawali et al., 1994). Culture's effect on entrepreneurship was highlighted at the beginning of the 20th century by Max Weber. Weber focused on Protestantism as a source of cultural influence on entrepreneurship in terms of individualism, self-reliance, achievement motivation, and rationality (Weber, 1905). A favorable attitude toward entrepreneurial activities is important to motivate people to start a new business. Differences in culture manifested in one's social class, language, gender, and ethnicity all have effects on entrepreneurial initiative (Abzari et al., 2005). The influence of socio-cultural factors might be even greater on women. The discrimination faced by women is typically due to inherent beliefs about gender within a culture (Minniti et al., 2003). The norms that govern a woman's role in society can limit their perceptions about what they may achieve in the workplace (Field et al., 2010; Tlaiss, 2015). Fear of failure, lack of confidence, and absence of role models prevent women in many societies from creating a business. In some countries, such fears are compounded by the belief that women's responsibilities are limited to childbearing and maintaining the household. (Pandey, 2013; Tlaiss, 2015) In fact, such socialization practices and family roles are disadvantages that result in high failure rates and low growth rates for women's businesses (Minniti, et al., 2010).

Institutional factors are another consideration that are often cited as influencing the entrepreneurial activities. Institutional factors refer to the environment within which businesses operate. Government policies and procedures are some of the most important considerations. The laws to protect property rights, provision of bankruptcy laws, restrictions on trade, and the requirements for registration and licensing, are among a few elements that are believed to influence the environment of business (Gnyawali et al., 1994). The process by which institutional and regulatory factors affect female entrepreneurship is important to understand for the facilitation of policies that would produce more entrepreneurial activity among females.

In many instances gender impacts women entrepreneurs when they attempt to find appropriate sources of finance for their businesses (Marlow et al., 2005). Women often cannot rely on established financial institutions for financial support, which is important for startups. In general, women entrepreneurs have less access to formal funding sources and often must rely on internal resources and informal financing for financing their businesses (Perez et al., 2016; Vossenberg, 2013; Pandey, 2013). Reliance on the use of informal financing, in turn, contributes to a slow growth rate in female-headed firms (Minniti et al., 2010). Added to women's difficulty to secure financial capital is their lack of access to financial assistance, including tax incentives and exemptions. Moreover, some countries uphold minimum rules and regulations and some even offer training and other support to start-ups. However, as on the average female entrepreneurs tend to have less previous experience, they have difficulties in navigating these business regulations or in taking advantage of training, which in turn, affects the number of women who start a business (Verheul et al., 2006). Perez et al. (2016) also stress that women's lack of social networks and knowledge of other entrepreneurs are hindrances to their self-employment, as these elements play

a crucial role, especially at the early stages of the creation of a business. In some countries, women have fewer inheritance rights than men, and in many countries, the legal rights of women decline with marriage. Such restrictions reduce women's economic opportunities and limit their entrepreneurial activities (Vossenberg, 2013).

The last broad category that is often considered to affect entrepreneurial activities is Socio-Economic factors. The economic conditions of a country and the individual status within society influence the level of self-employment (Kobeissi, 2010). The level of economic development, economic growth, unemployment rate, economic instability, education, labor market structure, and employment discrimination are often cited as affecting entrepreneurship. The influence of per capita income on the level of entrepreneurship activities is complex. The increase in the per capita income is associated with higher wages which raises the opportunity cost of self-employment. However, there are those who maintain that the increase in level of per capita income is associated with the technological development and the growth of service sector which positively influence self-employment (Verheul et al., 2006).

The unemployment rate is considered by some to play an important role in influencing the level of entrepreneurial activities. According to Lasch et al., "In contrast to the widespread assumption in the academic field … that 'entrepreneurs are born', the reality we experience is that environmental circumstances play a much higher role than genetics in explaining different levels of entrepreneurship across regions or countries." (Lasch, et al., 2007) In their study of all new firms created between 1993 and 2001 in 348 French labor market areas (2.8 million firms), they show that the unemployment rate, more than any other variable considered affected entrepreneurship activities.

It is argued that as unemployment increases so do entrepreneurship activities, as the opportunity cost associated with self-employment declines and the need for the necessity entrepreneurship activities increases (push factor, discussed earlier). Tambunan (2007), for instance, posits that in the Nusa Tenggara (NT) region of Indonesia, there are more female than male entrepreneurs. NT is a region with a very high unemployment rate. The major economic activities such as mining and the manufacturing industry are stagnated on this island. Most men are involved in low income generating activities. "Therefore, the high participation rate of females as entrepreneurs in NT is most likely to be a reflection of a family survival strategy rather than a spirit of entrepreneurship." (Tambunan, 2007: pp.150). Conversely, one might argue that a high rate of unemployment might be associated with the decrease in the level of opportunity entrepreneurship activities associated with a depressed economy (Verheul et al., 2006). It seems the consensus is that limited employment opportunities, high rates of unemployment, and labor market discrimination against women, are contributing factors to the level of women's entrepreneurship (Kobeissi, 2010).

Historically, due to limited access to educational attainment, illiteracy rates have been higher among females than males worldwide. However, in recent years, the educational gaps have been closing due to better access to education for females (Minniti et al., 2003). There are those who suggest that higher levels of education among women leads them to search for higher rewarding salary jobs as opposed to searching for entrepreneurial opportunities. In addition, the education effect that separates wage employment and self-employment is stronger for women than it is for men (van der Sluis et al., 2005). One major challenge faced by women, especially in developing countries, is a relatively low level of education and training that adversely effects their self-

employment. (Kobeissi, 2010; Vossenberg, 2013). The same argument pertains to females in developed countries. Oliver Masakure (2014) in his study of education and entrepreneurship in Canada concludes that: "All results show that lower education significantly reduces the likelihood of self-employment for the total sample and females but is positive and statistically insignificant for men" (Masakure, 2014: pp.704).

Gender Inequality

Although the literature consistently reports the existence of gender inequality in entrepreneurship, female business owners have been found to talk about it in gender-neutral terms and try to avoid being identified as different from the masculine norm of entrepreneurship (Lewis, 2006). It is valid to argue both a positive and negative relationship between gender inequality and female entrepreneurial activities. The relationship would be positive if females used self-employment as a mechanism to overcome discrimination in formal labor markets. On the other hand, if gender inequality exists in access to capital and business networks, then the relationship would be negative. In the face of higher inequality, women may perceive the lack of support through private and public infrastructure as a barrier to pursuing entrepreneurship. Shinnar et al. (2012) found that women in the U.S., China and Belgium perceive the lack of support barrier as more important than men did. This difference in perception was not shaped by culture but by gender. Therefore, following their findings, one expects to see that gender inequality influences women more than men. For this study, GII is the variable of prominent importance to investigate the effects of gender inequality on female entrepreneurship activities. As mentioned earlier, previous studies have investigated gender inequality by looking at several other factors. These factors include, Fertility Rates, Female Educational attainment, Female Labor Participation rates and Unemployment ratio. Therefore, those variables are included in the model.

H1: Higher level of gender inequality will be negatively related to female entrepreneurial activities.

Fertility Rates

Common metrics for measuring the relationship between fertility and entrepreneurship is the number of children and self-employment. Most of the studies that use these metrics do not differentiate between whether the entrepreneur or self-employed individual is a female or if they are male. There are two divergent explanations of the relationship between the number of children and the level of self-employment. On one hand, if someone has a family to support, then they may be less likely to take the risk of starting a business. Alternatively, self-employment may offer flexibility that wage-earning does not and this could provide an individual with more time to care for his or her children. Barber III &Moffett (2015) find a positive and significant relationship between the number of children and the likelihood of self-employment. Often, the flexibility of entrepreneurship and increased job satisfaction are considered motivations for females to enter self-employment (Brush, 1992). Boden (1996) finds that the self-employment entry rates for women with young children are about fifty percent greater than for women without young children. This was not the case with men's choice to enter self-employment. This supports the argument that women are more likely to enter self-employment because of the flexibility of working hours. Noseleit (2014) finds that women are more likely to become self-employed when they have multiple children. However, women that are self-employed are not more likely to have additional

children. Therefore, the relationship between fertility and self-employment is based on unilateral causality. This was even more prevalent among younger women. Kobeissi (2010) conducted a longitudinal study of developed and developing countries. The findings suggest an overall positive relationship between fertility rate and female self-employment. However, these results were dependent on whether the countries were developed or developing. Only in developing countries was this relationship statistically significant. Contrary to many of the previous findings, Saridakis et al. (2014) find that fertility does not raise self-employment rates for women.

H2: The fertility rate will be negatively related to female entrepreneurial activities.

Female Educational Attainment

The relationship between educational attainment and entrepreneurship can be viewed through various lenses. One view is that lower educated individuals may have access to less desirable employment opportunities in the formal labor market. If this is the case, then there will be a negative relationship between educational attainment and self-employment or entrepreneurship. This is sometimes related to unemployment. If there is low confidence in wage-earning opportunities, then individuals pursue entrepreneurship out of necessity. Another view is that more educated people have more information about access to capital and possibly have accumulated capital which leads them to be more attractive to outside funding. Access to capital is an important part of the process of entrepreneurship, especially opportunity-based entrepreneurship. This would lead to a positive relationship between education and entrepreneurship. Barber III & Moffett (2015) find that higher educational attainment is positively and significantly related to the likelihood of self-employment. Although, higher levels of educational attainment are not necessarily related to profitability or success of a new venture. (Davidsson & Benson, 2013)

Female entrepreneurs have been found to be more educated than the average female (DeCarlo & Lyons, 1979). This could be the case due to their ability to communicate more effectively which would allow for better relationship building and a better understanding of financial information. The empirical evidence is unclear about the relationship between educational attainment and business ownership for females. Some studies have found a positive and statistically significant relationship (Carr, 1996) while others have not (Renzulli et al., 2009). Women are more likely to rely on advanced education and experience to lay the framework for self-employment and men rely more on personal wealth (Bates, 1995). Not only are higher levels of education related to higher levels of self-employment for women, but it is also associated with longevity and multiple instances of business ownership for females (Dolinsky et al., 1993).

H3: Female educational attainment will be positively related to female entrepreneurial activities.

Female Labor Participation

Encouraging labor participation among women is one of the four pillars that the OECD has established as a policy focus to combat income inequality. Offering support and education for female entrepreneurs can lead to more women joining the labor force. This is especially true if there are fewer formal employment opportunities for women and high rates of wage inequality. Women can take more control of their earnings and allow themselves more flexibility to balance

work and family responsibilities. Previous studies have investigated gender inequality in OECD by looking at the differences in labor participation rates and differences in wages. Relative hourly earnings are useful indicators of gender inequality in labor markers since quality of earnings would imply not only equal pay, but equal access to overtime and bonuses, and equal distribution throughout occupational hierarchies (Whitehouse, 1992). Whitehouse found that, on average, women earned only 73.2 percent of what men earned in manufacturing. The OECD developed a database specifically to determine and analyze the obstacles to women's economic development to inform policy to combat longstanding discriminatory practices (Jütting et al., 2006).

In most OECD countries, there is a continued trend of rising female labor participation rates, except in the U.S., specifically since 2000 (Black et al., 2017). The rise in female labor participation rates are driven by the increased supply of women joining the labor force and the increased demand for female workers. Though the share of women joining the labor force has increased, there has been a lag in the share of women-led entrepreneurial ventures (Verheul et al., 2005). Policymakers have taken note and some countries have developed programs to specifically encourage female business ownership as a mechanism to increase female labor participation rates. The New Opportunities for Women program in Germany is an example that supports female entrepreneurs with elements such as mentoring and increased financial support (Welter, 2004).

Many of the industries in which women are typically clustered, at least when looking at OECD countries, are low-paying jobs in the service sector. Women tend to concentrate their participation in sales, health and teaching professions. Many of these industries have a lower likelihood of leading to high income growth and fewer opportunities for advancement. Over time, this leads to job dissatisfaction and can motivate women to become self-employed (Maume Jr, 1999) Participation in the labor force is likely to facilitate female entrepreneurial activities (Kobeissi, 2010). Female entrepreneurial activities provide a way for women to potentially avoid lower income jobs and to reduce the likelihood of remaining or becoming unemployed (Minniti, et al., 2003). Even though women are less likely to be entrepreneurs than men, higher participation in the labor force is expected to be associated with more female entrepreneurial activities simply because there is an increase in the supply of female workers.

H4: Female labor participation rates will be positively related to female entrepreneurial activities.

Data

This study analyzes the effects of gender inequality on female entrepreneurial activities in thirty-six OECD countries from 2001-2015. For demonstration purposes the data was divided into two categories based on the GDP per capita. The World Bank considers high income countries as those with a GDP per capita greater than US$40,040. The primary variable of interest is Gender Inequality Index (GII). This index is produced by the United Nations as part of Human Development Reports. It measures gender inequalities in three important aspects of human development: reproductive health, empowerment and economic status. Reproductive health is measured by "maternal mortality ratio and adolescent birth rates". Empowerment is measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education. The economic status is expressed as "labour market participation and measured by labor force participation rate of female and male

populations aged 15 years and older". There are several other important variables that could have an impact on female entrepreneurial activities. These variables are fertility rates, female's secondary educational attainment, female's years of schooling, unemployment ratio of females to males and female labor participation. These variables each contribute to gender inequality that will put women in a disadvantaged position relative to men in any society. These variables have been studied in previous research, but this is one of the few studies which highlights their impact on female entrepreneurial activities along with GII in the same model.

Data came from various sources. Most of the data pertaining to a country's economic activities were collected from the World Bank, The Human Development Index, The Global Entrepreneurship Monitor (GEM) and The Index for Economic Freedom (IEF). The World Bank (WB) gathers its data from two different categories of sources: reports gathered from the World Bank's country management units and officially recognized international data sources. They report time-series, geospatial, micro data and other forms of data. The Human Development Index (HDI) was developed in 1990 for the United Nations Development Program (UNDP). HDI is a composite statistic of life expectancy, education, and income per capita indicators. HDI is considered one of the best tools to keep track of the level of development of a country.

The GEM, started in 1999, is an organization specializing in entrepreneurship research. Currently, GEM is the most expansive resource for entrepreneurial information in the world with over 60 countries covered. The data are gathered from each participating country mainly using interviews. In each country GEM looks at two different categories relating to entrepreneurship: entrepreneurial behaviors and attitudes and national context. This data is analyzed first at the local level for quality assurance before it is transferred to the central GEM database.

Table 1 briefly describes the variables and lists the sources for each variable. The dependent variable, *Female Activity*, is a result of the percentage of females that reported to be a nascent entrepreneur or an owner-manager of a new business. Exhibit 1 in the Appendix shows the countries and years in which there were data for the dependent variable. An X in the table represents that the data is available for the year and country. The countries included in the data are Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The data includes the years from 2001 – 2015. Only a subset of countries was chosen due to insufficient data.

For our independent variables, we have employed two sets of variables: Gender variables and Control variables. Gender variables are our primary focus, and with Gender Inequality Index as of main variable of importance. The *Gender Inequality Index (GII)* measures gender inequalities in three important aspects of human development—reproductive health, measured by maternal mortality ratio and adolescent birth rates, empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education, and economic status, expressed as labor market participation and measured by labor force participation rate of female and male populations aged 15 years and older. The higher the GII value the more disparities between females and males. Other variables of interest are Fertility, Female Education, Secondary Education and Female Labor Participation. *Fertility* is the fertility rate measured as the total births per woman. *Female Education* is the

average number of years of education received by females ages 25 and older, converted from education attainment levels using official durations of each level. *Secondary Education* refers to the percentage of the population ages 25 and older that reached at least a secondary level of education. *Labor Participation* is the percentage of a country's female working-age population that engages actively in the labor market, either by working or looking for work. It provides an indication of the relative size of the supply of labor available to engage in the production of goods and services.

Table 1 Variable Descriptions and Sources

Variable	Description	Source
Dependent		
Female Activity	The percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a new business.	GEM
Control		
Informal Investment	Informal personal business investment	GEM
Log GDP per Capita	Log of GDP per capita (constant = 2010 US$)	WB
Domestic Credit	Domestic credit provided by financial sector (% of GDP)	WB
Property Rights	Measures property rights using five sub-factors.	IEF
Unemployment Ratio	Ratio of the percentage of the female labor force population to the percentage of the male labor force population.	HDI
Gender Variables		
Fertility	Fertility rate, total (births per woman)	WB
Female Years of Schooling	Average number of years of education for females	HDI
Female Secondary Education	Percentage of the female population ages 25 and older that has reached (but not necessarily completed) a secondary level of education.	HDI
Labor Participation	Percentage of a country's female working-age population that engages actively in the labor market.	HDI
GII	Gender development index: Measures gender inequalities in three important aspects of human development. (Reproductive health, empowerment and labor market participation)	HDI

Control Variables are those variables that our macro level influence female entrepreneurial activities. They include, informal investment, GDP per capita, Domestic credit, Property Rights and Unemployment Ratio. *Informal Investment* variables, more specifically, is the percentage of individuals that answered yes to the following question: "Have you, in the past three years, personally provided funds for a new business started by someone else, excluding any purchases of stocks or mutual funds." *Domestic Credit* refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of no equity securities, and trade

credits and other accounts receivable that establish a claim for repayment. *Property Rights* is the average of five sub-factors: physical property rights, intellectual property rights, strength of investor protection, risk of expropriation, and quality of land administration. *Unemployment Ratio* is the ratio of the percentage of the female labor force population ages 15 and older that is not in paid employment or self-employed but is available for work and is actively seeking paid employment or self-employment, to the percentage of the male labor force population ages 15 and older that is not in paid employment or self-employed but is available for work and is actively seeking paid employment or self-employment. Therefore, the higher the value for this variable, the higher the percentage of females which are unemployed compared to males.

Methodology

Several econometric approaches were considered to analyze the panel of data. Pooled Ordinary Least Squares is essentially an ordinary least squares approach to analyzing panel data. To allow for panel data, one can cluster the data around a certain variable. For this study, the panel variable would be the countries. However, this approach violates many assumptions including orthogonality, and the pooled model does not distinguish between the period and cross section. It also does not correct for autocorrelation. A Generalized Method of Models estimation technique was also considered since it would be a more dynamic approach and would allow for the current values of the dependent variable to be impacted by past ones. But with a lack of instruments and the possibility of improperly identifying the model, this approach was not chosen. This method would not have violated the assumption of orthogonality. Also, a one-year lag of the dependent variable was included in the model and it did not have a statistically significant relationship with the dependent variable, and it did not improve the explanatory power of the model.

Finally, the model chosen was a fixed effects approach with robust standard errors. The robust standard errors were estimated to correct for heterogeneity and/or autocorrelation in the data. The results from robust standard errors and clustering were nearly the same, however the robust approach was chosen. Since there may be country-specific effects, the fixed effects estimation allows for a random variable to be correlated with the explanatory variables. A Hausman test revealed that the fixed effects approach was preferred to the random effects. The random effects estimations were not consistent.

$$Y = \mathrm{A} + \Gamma + BX + \Theta Z + \mathrm{E},$$

where Y is a matrix of the dependent variable, female entrepreneurship activities. A is the intercept, Γ is the unobserved effect, the matrix X includes informal investment, log of GDP per capita, domestic credit, property rights and the unemployment ratio. The matrix Z includes the gender inequality index (GII), female labor force participation rates, female years of schooling, secondary education for females and fertility rate.

Results

Table 2 presents the summary statistics overall and for each group of countries. Breaking down the data into income groups did highlight the differences between countries at different income levels. Between the high- and low/middle-income countries, the only variables which were not statistically significant ($p < 0.05$) were Informal Investment and Fertility Rate.

Table 2 Summary Statistics

	Overall		High-Income		Lower- and Middle-Income	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Female Activity	5.423	3.391	4.874[a]	2.429	5.981	4.078
Informal Investment	3.965	2.476	3.599	1.568	4.337	3.102
Log GDP per Capita	10.334	0.640	10.880[a]	0.259	9.879	0.492
Fertility Rate	1.686	0.383	1.734	0.223	1.646	0.473
Domestic Credit	99.218	49.164	122.619[a]	45.480	80.581	43.783
Years of School (F)	11.363	1.632	11.966[a]	1.053	10.802	1.864
Secondary Education (F)	85.244	16.518	91.911[a]	7.862	79.102	19.749
Labor Participation (F)	52.868	7.621	56.585[a]	5.694	49.415	7.577
Unemployment Ratio	1.039	0.215	0.960[a]	0.160	1.111	0.233
GII	0.144	0.089	0.099[a]	0.048	0.185	0.098
Property Rights	76.752	15.589	88.180[a]	4.908	67.2028	15.022

[a] p-value < 0.05

Pairwise correlations were calculated for all the variables in the data. This approach allows for missing values to not be used in calculating the coefficient. As is often the case with correlations in panel data, the coefficients are inflated and with the opposite sign of what the regressions results showed. Table 3 presents the correlation results. The many instances of statistically significant correlations between the independent variables was worth further investigation even if they may be inflated. The presence of multicollinearity could lead to unstable coefficient estimates and inflated standard errors. One of the methods employed to test for the severity of multicollinearity was by calculating the Variance Inflation Factor (VIF). The VIF results can be seen in Table 4. A general rule of thumb is a VIF value greater than 10 would warrant further testing or correction. Using this rule, multicollinearity is not an issue with the data.

As a final test, the condition indexes were calculated. A condition index is a function of the eigenvalues of the data matrix. The results are not shown here, but the highest condition index was 8.96, and as a rule, a value greater than 10 represents a moderate problem with the data. Therefore, considering the further testing of the data, multicollinearity was not an issue.

Table 5 includes the fixed-effects regression results. For this study, the primary variable of interest is GII. H1 posited that higher level of gender inequality will be negatively related to female entrepreneurial activities. Most papers frame gender inequality in terms of wage differentials and differences in female versus male participation in certain industries or types of positions. If gender inequality exists in access to capital, as is suggested, then the relationship between gender inequality and female entrepreneurial activities would be positive. One explanation for a negative relationship is that women may choose to pursue entrepreneurial ventures to avoid discrimination

in the formal labor market. This paper is one of the few papers that includes a measure of inequality as an explanatory variable in the model. As a reminder, GII is a measure of inequality published in the Human Development Index. The higher the GII value the more disparities between females and males. The results suggest that there is a statistically significant and negative relationship between gender inequality and the level of female entrepreneurial activities. This negative relationship is true for each high, middle/low income countries and for the pooled data.

H2 supposed the fertility rate will be negatively related to female entrepreneurial activities since self-employment creates more flexibility for women to balance professional and personal obligations. Boden (1996) finds that the self-employment entry rates were greater for women with young children. Additionally, Noseleit (2014) finds that having additional children led to more female self-employment. The results here suggest a negative and statistically significant relationship between fertility rates and the level of female entrepreneurial activities. Kobeissi (2010) found an overall positive relationship between fertility rate and female self-employment but this was only the case in developing countries. When looking only at data from the UK, Saridakis et al. (2014) find that fertility does not raise self-employment rates for women. Since the data in this study focused primarily on data from OECD countries, it is no surprise that the results support the Saridakis et al. findings. In the OECD countries, females may be less likely to choose entrepreneurship out of necessity and only pursue opportunities when they are attractive. Most women which choose entrepreneurship do so to pursue an opportunity (Langowitz et al., 2005).

Table 3 Pairwise Correlation Results for Independent Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Informal Investment	1.000									
(2) Log GDP per Capita	-0.299*	1.000								
	0.000									
(3) Fertility Rate	0.243*	0.070	1.000							
	0.000	0.122								
(4) Domestic Credit	-0.097	0.575*	-0.007	1.000						
	0.066	0.000	0.880							
(5) Years of Schooling	-0.157*	0.478*	0.003	0.271*	1.000					
	0.031	0.000	0.965	0.000						
(6) Labor Force Participation	-0.070	0.556*	0.162*	0.457*	0.661*	1.000				
	0.337	0.000	0.019	0.000	0.000					
(7) Unemployment Ratio	0.173*	-0.177*	-0.138*	-0.205*	-0.332*	-0.376*	1.000			
	0.017	0.005	0.046	0.002	0.000	0.000				
(8) GII	0.516*	-0.696*	0.266*	-0.349*	-0.511*	-0.569*	0.192*	1.000		
	0.000	0.000	0.000	0.000	0.000	0.000	0.003			
(9) Property Rights	-0.017	0.710*	0.169*	0.525*	0.484*	0.671*	-0.287*	-0.431*	1.000	
	0.740	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
(10) Secondary Education	-0.042	0.424*	-0.129	0.100	0.818*	0.620*	-0.346*	-0.483*	0.475*	1.000
	0.570	0.000	0.064	0.132	0.000	0.000	0.000	0.000	0.000	

* shows significance at the .05 level; *p-value* shown below coefficients

H3 hypothesized a positive relationship between female educational attainment and female entrepreneurial activities. The average female entrepreneur is more educated than their male counterparts. And the average female entrepreneur is more educated than a typical female non-entrepreneur (DeCarlo & Lyons, 1979). Women are more likely to build stronger networks and learn more about accessing capital through formal education channels. Women are less likely to use external financing as a source of capital for their small businesses (Coleman, 2000). Overall, there was no support for this hypothesis. It could be that in OECD countries, the education level of females is not as important as in developing countries. Kobeissi (2010), using the years of schooling variable, found a positive and significant relationship with female entrepreneurial activities. However, this contrasted with previous findings by Minniti & Arenius (2003) that found a negative relationship between female education levels and female entrepreneurial activity. The findings here found neither a significant positive nor negative relationship. The World Bank has noted that the research on the effects of education and entrepreneurship has been disappointing. If you just look at the sign of the variables, it is suggestive that there is a trade-off between secondary education and entrepreneurial activities. This is intuitive and demonstrates that women may choose to pursue entrepreneurial ventures rather than attend secondary educational institutions.

Table 4 Variance Inflation Factor

Variable	VIF	Tolerance	R-Squared
Informal Investment	2.84	0.3515	0.6485
Log of GDP per Capita	7.17	0.1395	0.8605
Fertility Rate	2.28	0.4391	0.5609
Domestic Credit	2.77	0.3613	0.6387
Property Rights	3.32	0.3009	0.6991
Years of School	4.00	0.2500	0.7500
Secondary Education	4.97	0.2010	0.7990
Labor Participation	5.09	0.1965	0.8035
Unemployment Ratio	1.57	0.6371	0.3629
GII	6.78	0.1475	0.8525
Mean VIF			4.05

Female labor participation rates will be positively related to female entrepreneurial activities was the supposition for H4. Since women who are already in the workforce may not hold higher ranking and managerial positions, they may be more likely to turn to self-employment rather than leave the labor force. Women also cluster in industries which are generally lower paying and therefore the opportunity cost of choosing self-employment is lower than for their male counterparts. The lower ranking positions and lower pay are also associated with job dissatisfaction that would encourage females to pursue self-employment. When female labor force participation is relatively high, they have more opportunities to observe role models, network and learn more about the requirements for pursuing entrepreneurship which would lead to a higher likelihood of engaging in entrepreneurial activities (Kobeissi, 2010). The results in Table 5 shows an overall positive and statistically significant relationship between female labor participation rates

and female entrepreneurial activities. These findings support those of Kobeissi (2010) and suggest that one road to female entrepreneurship is in part facilitated by participation in the labor force.

Table 5 Fixed Effects Regression Results

	All Data	High-Income	Low- and Middle-Income
Variables	Female Activity	Female Activity	Female Activity
Informal Investment	0.154	0.120	0.145
	(0.118)	(0.176)	(0.144)
Log of GDP per Capita	11.23***	12.70**	20.35***
	(4.001)	(5.796)	(5.328)
Fertility Rate	-7.991***	-3.230	-10.07**
	(2.526)	(3.590)	(3.618)
Domestic Credit	0.00160	-0.000809	-0.00990
	(0.0129)	(0.0129)	(0.0211)
Property Rights	0.0188	0.0367	0.00431
	(0.0386)	(0.0623)	(0.0568)
Years of School (F)	0.0357	0.140	1.043
	(0.389)	(0.365)	(0.604)
Secondary Education (F)	-0.0105	-0.115	-0.0446
	(0.0418)	(0.0684)	(0.0436)
Labor Participation (F)	0.380**	0.443**	0.204
	(0.183)	(0.198)	(0.312)
Unemployment Ratio	0.257	1.342	-1.700
	(1.490)	(2.736)	(1.722)
GII	-30.67***	-37.72**	-25.89*
	(10.14)	(16.29)	(13.16)
Constant	-114.0***	-143.8**	-188.6***
	(37.25)	(56.88)	(41.40)
Observations	155	75	80
R-squared	0.586	0.482	0.673

Robust Standard Errors in Parentheses
* p<0.10; ** p<0.05; ***p<0.10

Discussion

The primary variable of interest was Gender Inequality Index. Previous studies also suggested that fertility rates, female educational attainment, and female labor participation rates were related to female entrepreneurial activities. These four focused variables have been studied in previous research, but this is one of the few studies which highlights their impact on female entrepreneurial activities in the same model. This study had primary interest in the relationship between gender inequality and female entrepreneurial activities. The findings indicated that a higher GII score at aggregate and each tercile is negatively associated with female self-employment and suggesting a potential loss in human development. Furthermore, results here suggest a negative and statistically

significant relationship between fertility rates and the level of female entrepreneurial activities. The results did not demonstrate a relationship between female education levels and female entrepreneurial activities. The results show an overall positive and statistically significant relationship between female labor participation rates and female entrepreneurial activities except in middle/low income countries.

Female entrepreneurship is on the rise in globally. Policy environments have become more supportive of this activity because of the implications for economic growth and the impact on poverty. Cross-country panel analysis of female entrepreneurial activity is limited, and especially so when examining developing countries. This study attempts to add to the discussion and offers a look at gender inequality. Kobeissi (2010) does a good job at investigating gender related variables and many of the findings in this paper supported those earlier results. However, there is a lack of papers that has a focus on gender inequality and its impacts on female entrepreneurship. This is an importance nuance particularly when it comes to policymaking and design support programs for female entrepreneurs. Not only is it important to create an economic, social and political environment which supports entrepreneurship in general, but an intentional effort to reduce gender inequality may lead to a more robust entrepreneurial and small business environment. Gender inequality was an impediment to female entrepreneurial activities no matter the income level of the countries.

Female entrepreneurs are adept at identifying and pursuing entrepreneurial opportunities. Policies or environments which make aim to create access to capital, provide training programs, create tax incentives and reduce the bureaucracy for entering self-employment are an important component for economic growth and development. As these results suggest, a higher percentage of females in lower/middle income countries pursue entrepreneurial activities. This could be a result of better formal labor market opportunities or a tendency to not join the labor market at all in higher income countries. Regardless, this suggests that there is a variation in female entrepreneurial activities and policy makers should take the stage of economic development into account when determining incentive programs to encourage female participation in entrepreneurship. Wennekers et al. (2005) find a U-shaped relationship between entrepreneurial dynamics and its level of economic development. Their results suggest that low-income nations should create policies to support scale environment through foreign direct investment and growth of young businesses. Meanwhile, more economically advanced nations should invest in research and development, stimulate entrepreneurial education and support a well-functioning venture capital market.

As discussed in the introduction, female entrepreneurship is influenced by either “push” or “pull” factors. Unequal pay for similar work may push females into creating their own business to avoid the discrimination. Women may also be opportunity seeking and are pulled into self-employment to exploit this. Policies will have to be designed that will factor in the motivation for female entrepreneurial activities in each country. Necessity driven entrepreneurs are more prevalent in lower income countries and opportunity often drives entrepreneurship in higher income countries. Further research could be designed to explore these differences within different country contexts.

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Appendix

Exhibit 1

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australia	X	X	X	X	X	X				X	X	X	X	X	X
Austria					X		X					X		X	
Belgium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Canada	X	X	X	X	X	X							X	X	X
Chile		X	X		X	X	X	X	X	X	X	X	X	X	X
Czech Republic						X					X		X		
Denmark	X	X	X	X	X	X	X	X	X	X	X	X		X	
Estonia												X	X	X	
Finland	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
France	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Germany	X	X	X	X	X	X		X	X	X	X	X	X	X	X
Greece			X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Iceland		X	X	X	X	X	X	X	X	X					
Ireland	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Israel	X	X		X			X	X	X	X		X	X		X
Italy	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Japan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Latvia					X	X	X	X	X	X	X	X	X		X
Luxembourg													X	X	X
Mexico	X	X			X	X		X		X	X	X	X	X	X
Netherlands	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New Zealand	X	X	X	X	X										
Norway	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	X	X		X							X	X	X	X	X

Portugal	X			X			X			X	X	X	X	X	X
Slovak Republic											X	X	X	X	X
Slovenia		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spain	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sweden	X	X	X	X	X	X	X			X	X	X	X	X	X
Switzerland		X	X		X	X	X		X	X	X	X	X	X	X
Turkey						X	X	X		X	X	X	X		
United Kingdom	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
United States	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X