

# The Effect of Gender and Resources on Entrepreneurial Activity

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**Abstract**—In this paper, we examine the relationship between human capital, personal wealth and social capital to explain the differences in start-up rates between female and male entrepreneurs. Since our dependent variable is dichotomous, we examine the determinants of these using a maximum likelihood logit estimator. We used the Global Entrepreneurship Monitor database covering the period 2006 to 2009 with 421 usable cases drawn from the Lower Layer Super Output Areas in East Midlands in the United Kingdom. We found evidence indicating that a female positively moderates the positive relationships between indicators of human capital and personal wealth with start-up activity. The findings have implications for programs, policies, and practices to encourage more females to engage in start-up activity.

**Keywords**—Entrepreneurship, Global Entrepreneurship Monitor, gender gap, women's entrepreneurship.

## I. INTRODUCTION

CREATION of new firms has been important, both during periods of economic downturn, and in times of prosperity. New firms can be a source of economic growth, innovation and employment opportunities, and they apply competitive pressure on incumbent firms which enhances efficiency and favours consumers [1]-[3]. Hence, engagement in start-up activities is considered to be a method of promoting upward social mobility which is one of the key outcomes of entrepreneurial success [4], [5]. Thus, promotion of new business creation has remained a key agenda item for the economic development policy of most developed and developing nations around the globe [6], [7].

Prior studies suggest that potential entrepreneurs possess unique capabilities that help in recognising new business opportunities in the environment and assembling of appropriate resources that facilitate in the creation of new businesses especially if they can manage the resources effectively [8]-[11]. However, this literature has paid little attention to individual level characteristics that may influence how they manage their resources and succeed in starting a new business. To our best knowledge, a limited number of studies have investigated why certain individuals were more effective than others in leveraging their financial, human and social capital to succeed in creating a new firm. Given the importance of small businesses, the significant growth in the numbers of females engaged in entrepreneurship, the rising scholarly interest in gender and existing evidence showing that

female and male entrepreneurs manage their resources differently and often achieve different economic outcomes [12], [13], it is important to understand the distinctiveness of female start-ups.

Evidence from 43 countries participating in Global Entrepreneurship Monitor (GEM) surveys indicate that over 252 million women were actively engaged in the process of starting a new business and 153 million women were owners of established businesses [14]. However, the literature indicates that there are significant variations on the rate of entrepreneurial activity between countries [14], [15]. For example, within high income economies, the gender gap of the adult working population between 18-64 engaged in early stage entrepreneurial activity varied significantly from 9% for male and 6.1% female in the United Kingdom (UK), 5.1% male and 4.4% female in Germany and 17.3% male and 13.6% female in United States (US). The literature has identified some of the possible factors affecting these cross-country differences in start-up rates [16]-[18]. Moreover, we posit that the effect of the context is best understood at the neighbourhood level, yet, to our best knowledge, the start-ups have not yet been investigated in that way. It is also important to explain the gaps in detail since how we intend to explore them will define our contribution.

The first gap in the literature is that country level studies distinguish between environmental and individual effects [19], [20]. There is limited evidence of this approach being applied at the local or neighbourhood level. Since there is significant variation in entrepreneurship rates between and within countries such an analysis at the neighbourhood level may help in enriching our understanding of the role of the individual level attributes, resource endowments and neighbourhood level resources combine to influence entry into entrepreneurial activity [21], [22]. Therefore, the first objective of this study is to examine whether, and to which extent, both the individual level resource endowments and the resources in the neighbourhood environment combine to influence an individual's decision to engage in the start-up activity. To this effect, we draw on the resource-based theory (RBT) [23]. Studies based on RBT emphasise on the different dimensions of the components without considering coherence and interactions between them [98], [56], [106]. The goal of this research is to apply the RBT, not only comparing their relative strengths but also elucidating their reciprocal interactions in an analytical framework.

Second, making a distinction between the individual level and the neighbourhood characteristics enables us to precisely define the neighbourhood environment using the Lower Layer

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Super Output Areas (LSOA) as the appropriate spatial units where people live and interact in a socio-economic sense [24]. Focusing on variations in social networks at the neighbourhood level and to reduce extraneous spatial variations, East Midlands region was chosen as representative of the UK assuming that at the regional level, cultural and historical dimensions remain similar [25]-[27].

In the next section we provide a discussion about our theoretical framework and how it may help in explaining why some but not all individuals engage in start-up present hypotheses. This is followed by a discussion relating to the database we have used and the methods employed. We present the results of the logistic regressions. Finally, this is followed by a discussion of the findings including managerial and policy implications.

## II. THEORETICAL FRAMEWORK, PREVIOUS LITERATURE AND HYPOTHESES

Over time, heterogeneous distribution of resources and capabilities among individuals living in the same environment resulted in entrepreneurship being implicitly associated with men and characterised as masculinity. This self-reinforcing nature of the process of entrepreneurial activity was defined by [28] as the outcome of a hierarchal system in which a dominant group maintains control over the distribution of resources and considered as more legitimate. These resources and capabilities possessed by this group of individuals are considered to be inimitable, rare and valuable and are not traded freely on the market [29], [9]-[11]. This conceptualisation forms the basis of the RBT of entrepreneurship which explains why some individuals but not all engage in entrepreneurship [23]. It assumes that potential entrepreneurs have unique capabilities that enable them to identify new business opportunities and also facilitate in assembling appropriate resources required for creating a new business [30], [31]. Hence, this perspective assumes that entrepreneurs can increase the value of their resources through effective management to reduce the cost of resources utilised in the entrepreneurial process [32]-[34]. Thus, recent studies suggest that individual differences among entrepreneurs are likely to influence the effect of resource endowments on their propensity to engage in entrepreneurial activity [35]-[37].

Although this study employs the RBT, it acknowledges that minimal attention has been paid to the role that gender play in the decision to engage in entrepreneurial activity. Even those studies that succeed in including women in their sample usually use a dummy variable to determine gender differences without considering the gender-based interactions [38]-[40]. Such interactions might have implications for how male and female entrepreneurs employ their financial, human and social capital to achieve the desired entrepreneurial outcomes. The objective of this study is not only to examine the influence of resources and capabilities on entrepreneurial activity but also to elucidate their reciprocal interactions with gender in the analytical framework.

This study has several significant advantages over previous studies. A more relevant definition of entrepreneurial activity

was implemented using the information available in the GEM database used. Thus, individuals are defined entrepreneurs if they have started a business which employs one or more people (start-up) at the time of survey as opposed to the conventional self-employment. From this base, the study demonstrates that using start-up as an outcome measure reduces or eliminate selection bias and over or underestimation of the combined effect of gender, resources and capabilities on entrepreneurial activity. In addition to the correction of biases, the analysis enabled a close assessment of the effect of resources by employing detailed information on personal and family wealth.

### *A Financial Capital*

Financial capital can increase the propensity to become an entrepreneur (or self-employed) but this effect may differ between male and female entrepreneurs. This section focuses on the importance of the financial markets as providers of financial capital [41], [39], [17], because of the growing entrepreneurship literature on personal and family wealth [42]-[44] and the inconclusive findings concerning whether and under what conditions would access to financial capital and wealth influence entrepreneurial activity. The seminal work by [39] was among the first to recognise the importance of wealth for entrepreneurship. The subsequent literature expanded this work from different perspectives and this study focuses on two streams of literature [17], [20], [42].

The first stream of the literature focused on understanding the influence of financial markets on entrepreneurship [38]-[40]. A well-developed financial market ensures that entrepreneurs have good access to the market and are able to get the required capital. It is also assumed that lower levels of personal wealth restricted access to credit making it difficult for entrepreneurs to cover start-up costs and reduced their chances of starting a new business. In developed economies with well-developed financial markets it is less likely that financial constraints will apply. However, it appears as if, even in developed economies, entrepreneurs often have idiosyncratic knowledge about the market potential of their entrepreneurial projects and that made it difficult to be assessed by external providers of finance such as banks. This may also lead to an increase in the cost of borrowing or constraints in financing the entrepreneurial activities [45]. Therefore, individuals with lower levels of wealth are less likely to be able to compensate for the lack of external capital with their own resources and this may limit their chances of starting a new venture or result in undercapitalisation [46], [47].

The second stream of studies focused on the importance of individual or family wealth for entrepreneurial activity [42], [43], [48]. These studies have shown that the positive association between wealth and the propensity to start a new business was much stronger for the wealthy individuals and/or households. They argued that borrowing constrains were less likely to have an impact on entrepreneurial activities of the low-wealthy individuals and/or households. Since individuals or households at the top end of the wealth distribution are less

likely to have their entrepreneurial activities affected by financial constraints, they infer the positive relationship between wealth and entrepreneurial activity as extremely wealthy individuals having stronger preferences for becoming entrepreneurs than those with lower levels of wealth. This group is drawn by non-pecuniary perks such as greater need for personal autonomy and flexible working conditions resulting in entrepreneurship being viewed as an appealing occupational choice [42].

Consistent with the discussion above, it has been shown that liquidity constraints differ by gender. It has been shown that an increase in wealth had a strong positive effect on the propensity of women to start a business in Germany [17]. A similar result has also been found for the UK [18]. These findings suggest that females might have specific advantages in managing financial capital. The literature teaches us that females are more disciplined, less over-confident and adhere to stricter ethical practices than males [12], [49], [50]. It has been recognised that females are more likely to judge questionable business practices unethical [51] and this was supported by [52] which shows that females tend to assess their investment opportunities more accurately and males often overestimate theirs.

Taken together, the arguments suggest that financial capital should be positively associated with entrepreneurial activity and this relationship should be stronger for females. Drawing on the above discussion we propose the following hypothesis:

H1. An entrepreneur's gender positively moderates the relationship between financial capital and the probability of becoming an entrepreneur and this positive relationship should be much stronger for female entrepreneurs.

### *B. Human Capital and Entrepreneurship*

Human capital refers to the knowledge, skills and perceptions that increase an individual's effectiveness in performing his/her duties and can be purchased at a cost [18], [53]. These are often acquired through formal education and work experience; however, an entrepreneur's human capital can be a critical differentiator among the male and female entrepreneurs. For this reason, the RBT considers human capital as a critical resource that entrepreneurs possess because when new business opportunities emerge, individuals with higher levels of human are, on average, more likely to identify and exploit them than those with lower levels of human capital [23], [54]. Formal education and work experience are the main components of human capital which may or may not represent knowledge and skills required to undertake tasks related to the starting a new business [53]. Evidence suggests that high levels of human capital are positively associated with entry into entrepreneurship [55]-[57]. Others drew on GEM data from 41 countries and examined a range of human capital variables and find that prior experience, formal education and self-efficacy (defined as perceived knowledge and skills required to start a business) is positively associated with engagement in entrepreneurial activity [58]. Thus, human capital can represent objective elements that can be observed such as formal education or

subjective elements that are internal such as perceived knowledge and skills. Based on the discussion above, this study focuses on three key components of human capital relevant to new business start-up: formal education, work experience and self-efficacy.

Prior studies provide several theoretical and empirical arguments about how education might influence entry into entrepreneurship. Evidence suggests that individuals who are highly educated often have a strong knowledge base and cognitive skills which allow them to solve complex problems [59], [53] and increases their effectiveness in performing entrepreneurial tasks [60], [61], [55]. Others suggest that education increases curiosity, openness to new ideas, receptive to innovation and change [62]-[64]. These attributes can increase their willingness to engage in entrepreneurial activity, ability to identify, understand and to act on information relating to new opportunities. Knowledge can also help to compensate for the lack of financial resources [40] or acquire other resources such as physical and financial capital [65]. Several studies find that high levels of education were positively associated with the likelihood to start a new business [43], [56], [55]. Likewise, work experience can offer learning opportunities that facilitate entrepreneurs in developing routines and heuristics to identify and evaluate new business opportunities, assemble resources to exploit opportunities and enable them to act quickly [66]. Evidence suggests that unemployed people are more likely to engage in entrepreneurial activity due to lack of suitable employment opportunities [66]. This is linked to the push motive which can be defined as negative circumstances which force individuals to start businesses [67]. Therefore, transition into entrepreneurship is more likely to be higher for those who are not in employment and they can be in a hurry to start their business because of lack of suitable employment opportunities in the labour market [40]. In contrast, individuals attempt to get compensation for their investment in human capital [68]. Thus, highly educated individuals may find entrepreneurship less appealing if it leads to reduced income compared to that from current employment. But, if those with higher levels of human capital engage in entrepreneurship, they are more likely to be successful [69].

Although formal education and prior experience can be considered as generic resources required when starting a new business, entrepreneurial specific skills matter too [56]. Entrepreneurial specific human capital is defined as the knowledge and skills that facilitate in setting up a new business [70]. It has been recognised that perceptions of one's capabilities and skills influence action in such a way that the more an individual believes that he/she has the required knowledge and skills required to start a business the more likely he/she is to choose entrepreneurship as a viable career choice [71]. Evidence suggests that higher levels of confidence in beliefs about an individual's ability to pursue entrepreneurial career can influence start-up activities [72]. Moreover, perceived capabilities are correlated with beliefs relating to the attractiveness of the business opportunity may or may not be acquired through formal education [73].

The literature that examined gendered start up rates show mixed results of the various socialisation experience such as affiliation with social network and work experience. In support, studies demonstrate that when education and work experience are homogeneously distributed among men and women, there would not be a significant gender difference among entrepreneurs [74]. This suggests that gender equality in education and work experience is associated with equality in entrepreneurship rates. Evidence suggests that education, in particular entrepreneurial education, plays a major role in the development of entrepreneurial self-efficacy for women than men [16], [75], [76] but we have limited understanding about whether the impact of self-efficacy on start-up rates differs by gender.

In line with the arguments presented above, we argue that female entrepreneurs might have some attributes that facilitate in managing human capital. Evidence suggests that females possess more transformational leadership attributes and higher rates of empowering management [77]. Therefore, we argue that a relational perspective may help female entrepreneurs to develop more collaborative relationships with various stakeholders and better relationships facilitate their ability to leverage human capital by promoting smoother information flow. Moreover, evidence suggests that transformational leadership plays an important role in increasing commitment, interpersonal interactions, fosters innovation and enhances performance [78]-[80]. Therefore, human capital should facilitate entrepreneurs in identifying, evaluating and exploiting new opportunities and female entrepreneurs might have superior ability to gather the knowledge, skills and talent required to create a new firm. Based on this discussion, the arguments suggest that an individual's human capital measured by education, prior experience and perceptions of ability are positively related to the probability of becoming an entrepreneur and this relationship is stronger for female entrepreneurs than male entrepreneurs. As a result, the following hypotheses are proposed:

- H2a. An entrepreneur's gender positively moderates the relationship between education and the probability of becoming an entrepreneur and this positive relationship should be much stronger for female entrepreneurs.
- H2b. An entrepreneur's gender positively moderates the relationship between individuals who are employed and the probability of becoming an entrepreneur and this relationship should be much stronger for male entrepreneurs.
- H2c. An entrepreneur's gender positively moderates the relationship between individuals with higher levels of entrepreneurial specific knowledge and skills, and the probability of becoming an entrepreneur and this positive relationship should be much stronger for female entrepreneurs.

### C. Social Capital and Entrepreneurship

The discussion above focused on the individual characteristics of would-be entrepreneurs. However, the neighbourhood social environment may also have a significant

influence on an individual's decision to engage in start-up activities. The social environment is often considered as social network relationships. Thus, social capital can be defined as networks of relationships where personal and organisational contacts are often closely embedded. These relationships are considered as means through which members gain access to a wide range of resources possessed by other actors [24], [81]. Notably, the networks are more likely to enhance the entrepreneur's human capital by facilitating individuals in identifying opportunities, acquiring resources and development of an entrepreneurial spirit. This social network approach to understanding the role of social capital in entrepreneurship is based on [82] that made a distinction between strong and weak ties [83]. Literature suggests that networks characterised by frequently repeated homogeneous social interactions are labelled as 'strong ties' [84]. But if entrepreneurs are weakly connected to others and have little emotional engagement, these relationships can be defined as 'weak ties' [82]. These offer different benefits and expect them to play different roles in an individual's decision to become an entrepreneur. However, weak ties may provide access to wider and diverse knowledge base that may facilitate entrepreneurial activity. If the profile of the neighbourhood exhibits entrepreneurial traits, they determine the opportunities for individuals to form entrepreneurship specific weak ties that may enhance their chances to engage in entrepreneurship. From this perspective the term entrepreneurship capital was used to define a "specific type of social capital as a regional milieu of agents that explicitly generates" entry into entrepreneurial activity by making the neighbourhood environment rich with explicit or implicit knowledge and entrepreneurship specific resources [21], [22]. It is assumed that such a milieu creates both role models and network opportunities based on weak ties that are important for entrepreneurship. Previous studies suggest that weak ties are strongly associated with entrepreneurship relevant information and tangible capital [85], [86]. Likewise, others argued that regions with a higher density of entrepreneurship facilitate the creation of new firms [21]. Both weak and strong ties were found to be good predictors for male and female entry into entrepreneurial activity [87]. Evidence suggests that there should be no difference on the effect of strong ties on an individual's decision to become an entrepreneur between the male and female entrepreneurs [88]. In contrast, [89] provided evidence which shows that female entrepreneurs had lower rates of weak ties than the male counterparts. Based on this line of thought we propose the following hypotheses:

- H3a. An entrepreneur's gender positively moderates the relationship between the density of established owner-managers of businesses in the local neighbourhood and the probability of becoming an entrepreneur and this positive relationship should be much stronger for male entrepreneurs.
- H3b. An entrepreneur's gender positively moderates the relationship between the density of individual who know successful entrepreneurs in the local neighbourhood and the probability of becoming an entrepreneur and this

positive relationship should be much stronger for male entrepreneurs.

### III. METHODOLOGY

#### A. Databases

In this study, the combined 2007 English Index of Multiple Deprivation database and the 2006 to 2009 UK GEM East Midlands region databases was used to test the hypotheses. The individual level data were drawn from the GEM database which consists of random samples, stratified by region, of the working age population contacted by telephone random dialling techniques by a professional marketing company [90]. After cleaning the data and accounting for missing observations in the variables we use, we were left with a sample size of 421 usable cases (see Table III).

#### B. Dependent Variable

The dependent variable is actual engagement in nascent entrepreneurial activity [90], which we use as a proxy for entry into entrepreneurship. It includes individuals who have been involved creating a new business during the previous year, expect to own the whole of a share of the new firm and have paid wages and salaries for a period not exceeding 42 months. The focus is two alternative methods of entry into entrepreneurship available to entrepreneurs: self-employment or start-up. Start-up is when an individual creates a new business which employs one or more people excluding the owner. Self-employed are individuals who start a firm which does not employ other people (often referred to as solo-traders). Thus, the dependent variable takes the value of 1 if an individual starts a business which employs others and 0 if she or he is self-employed.

#### C. Individual Level Predictors and Controls

Our first predictor variable, *wealth* (H1), is a categorical variable and is divided into five quintiles. *Wealth: Q1* represents the lowest level of wealth and *Wealth: Q5* is the highest level of wealth. Following [91], this study uses the residential address of the participant as a measure of wealth which is closely related to an individual's financial position, observable and requires no input from them. Several studies have used housing as a predictor variable to investigate the impact of wealth on entry into entrepreneurship [92]-[94] or on labour mobility [91]. Evidence suggests that there is a very strong correlation between housing and income [91]. The residential address also sets the basis for UK official survey data relating to mortgage repayments and rents. Moreover, it has been recognised that individuals or households with higher levels of income spend more on housing and the same applies when property is rented due to the close relationship between ranking of the asset value and rental costs. The official measure of the community's level of socio-economic development in England is the English Index of Multiple Deprivation (IMD) which includes component indicators for 2,732 Lower Super Output Areas (LSOAs). A LSOA can be defined as community with an average population of 1,500

people [95]. To link the IMD to residential addresses, we were able to classify each respondent in the East Midlands into their LSOA, by inputting postcode data into the Geo-Convert facility. Then, we ranked each respondent according to their local community's level of socio-economic development which is expressed in quintiles from 1 being the most deprived to 5 as the least deprived areas. By grouping the sample into quintiles, we defined deprived areas as those LSOA located in the lowest 20% of all the LSOAs.

The second predictor variable, *highest educational attainment* (H2a), is measured by a categorical variable denoting, 1 as individuals with no formal education to 6 as individuals with a master and doctorate qualification. The third predictor variable, *prior work experience* (H2b), is a dummy variable and is equal to 1 if an individual is in employment and 0 otherwise. The fourth predictor variable is also a dummy variable, *self-assessed knowledge and skills specific to entrepreneurship* (H2c), is equal to 1 if an individual believes that he/she has the relevant knowledge and skills required to start a new firm and 0 otherwise. In addition, our moderator variable, *gender*, is equal to 1 if the individual is female and 0 if male. Prior studies have shown that females possess some attributes which facilitate them to leverage their human, financial and social capital to achieve economic outcomes or engage in entrepreneurship [12], [17], [96].

Finally, we included a number of controls at the individual level: age, fear of failure, good opportunities in the local area, business premises, being an owner manager of an already existing business, and personally knowing other entrepreneurs which have all been shown to affect an individual's propensity to engage in entrepreneurial activity [94], [97], [98].

#### D. Neighbourhood Level Predictors and Controls

Several studies have shown that the local environment matters for entrepreneurship [99]-[101]. Others have indicated that deprived areas have social networks related to bonding capital and strong ties limit access to both tangible and intangible resources [102]. Therefore, in our specifications we include two dimensions neighbourhood level predictors. These variables relate to our hypotheses including *the share of owner managers of established businesses more than 42 months old in the local neighbourhood* (H3a) and *the share of individuals who personally know other successful entrepreneurs in the neighbourhood* (H3b). In addition, we include fixed effects related to the higher-level territorial units, which are East Midlands Counties, and an indicator variable representing urban versus rural areas (at LSOA level). Tables I A and B provide the description of the variables used in this study. We present the correlation coefficients for the variables used in the regressions in Table II. The coefficients are relatively low, thus, issues related to multicollinearity which may require further analysis are not anticipated.

TABLE I A  
DESCRIPTION OF CATEGORICAL VARIABLES (AT THE INDIVIDUAL LEVEL)

Variable	Description	Percentage
Dependent variable (Early stage entrepreneurial activity)		
Start-up	1 if respondent is an entrepreneur and employs one or more people	32.78
	0 if self employed and no employees	67.22
Predictors		
Female	1 if female	59.35
	0 otherwise	40.65
Wealth	Categorical variable: based on individual's postcode.	
	Wealth: Q1, Lowest value assets (base category)	11.82
	Wealth: Q2	17.16
	Wealth: Q3	20.62
	Wealth: Q4	22.19
Education	Categorical variable for educational attainment	
	1 if respondent has no formal qualifications (base category)	15.91
	2 if respondent has GCSE qualification	25.82
	3 if respondent has A level qualification	19.41
	4 if respondent has Vocational and others qualifications	12.30
	5 if respondent has Bachelor degree qualification	19.55
Knowledge & skills	6 if respondent has Post graduate qualification	7.01
	1 if individual believe that he/she has the necessary knowledge and skills required in starting a new business	31.83
In Employment	0 Otherwise	68.17
	1 if respondent was employed	74.07
	0 otherwise	25.93
Controls		
Age	The exact age at the time of interview	
	0 if respondent is over 45 years old	52.85
Knowing entrepreneurs	1 If respondent's age is below 46 years	47.15
	1 if respondent personally knows someone who started a business in the past 2 years	14.72
Business owners	0 otherwise	85.28
	1 if owner-manager of an existing business	8.65
Fear of failure	0 otherwise	91.35
	1 if respondent was afraid to start a business in case it might fail	20.08
Business angels	0 otherwise	79.92
	1 if respondent was a business angel in past 3 years	1.19
Good opportunities	0 otherwise	98.81
	1 if respondent sees good opportunities in his/her local area	15.90
Urban areas	0 otherwise	84.10
	1 if LSOA is in an urban area	67.22
	0 if Lower LSOA is in a rural area	32.78
Categorical variable for East Midlands Counties		
Counties	1. Derbyshire	24.24
	2. Leicestershire	21.17
	3. Lincolnshire	17.28
	4. Northamptonshire	14.63
	5. Nottinghamshire	22.69

TABLE I B  
DESCRIPTION OF CONTINUOUS VARIABLES (AT THE LSOA LEVEL)

Variable	Description	Mean	St.dev.	Range
Predictors				
Share of knowing entrepreneurs	Prevalence rate of respondents who personally knew nascent entrepreneurs, in last 2 years: rate based on LSOA mean	0.240	0.228	0 - 1
Share of business owners	Prevalence rate of owner-managers of established businesses over 42 months old: rate based LSOA mean	0.239	0.240	0 - 1

TABLE II  
 CORRELATIONS: SPEARMAN RHO CORRELATION COEFFICIENTS FOR INDIVIDUAL LEVEL AND NEIGHBOURHOOD CHARACTERISTICS

	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1. Start-up	0	1	1														
2. Gender: Female	0	1	-0.06	1													
3. Wealth	1	5	0.09	-0.09	1												
4. Education	1	6	0.04	-0.03	-0.10	1											
5. Knowledge and skills	0	1	0.03	-0.14	-0.03	0.03	1										
6. In employment	0	1	-0.14	-0.05	0.03	0.01	0.06	1									
7. Age	0	1	0.08	0.05	0.20	-0.05	-0.01	0.07	1								
8. Knowing entrepreneurs	0	1	0.13	-0.14	0.03	0.09	0.09	0.09	0.08	1							
9. Business owners	0	1	-0.32	-0.16	-0.02	0.06	0.12	0.20	-0.02	-0.01	1						
10. Fear of failure	0	1	0.01	0.09	0.03	0.01	-0.17	0.04	0.04	-0.07	-0.01	1					
11. Business premise	0	1	0.32	-0.06	-0.01	-0.02	0.03	0.03	0.11	0.08	-0.17	-0.06	1				
12. Good opportunities	0	1	0.23	0.03	0.06	0.13	0.06	-0.02	0.14	0.17	-0.12	-0.15	0.05	1			
13. Urban areas	0	1	0.08	-0.09	0.44	-0.07	-0.07	0.03	0.12	0.06	-0.04	0.03	0.00		1		
14. East Midlands counties	1	5	0.06	0.13	0.07	-0.02	-0.01	0.02	0.07	0.01	0.06	0.01	-0.01		0.04	-0.00	1

E. Estimation Strategy

We apply a maximum likelihood logit estimator to predict the probability of an individual to engage in entrepreneurial activity. Following prior work [103] our model is constructed as:

$$y_{ij}^* = \gamma x_{ij} + \varepsilon_i,$$

$$y_{ij} = 1 \text{ if } y_{ij}^* > 0, \text{ and } 0 \text{ otherwise.}$$

where  $i$  relates to individual characteristics and  $j$  refers to neighbourhood characteristics. In turn  $y$  is referring to observed entry into entrepreneurial activity which is a dummy variable where 1 represents actual engagement in starting a new firm. In contrast,  $y^*$  represents the unobserved utility of entrepreneurial activity with a mean at zero. Here the predictors and control variables are shown by matrix  $x$  with a vector of coefficients  $\gamma$  and we use all the variables listed in Tables I A and B. In turn,  $\varepsilon$  refers to unobserved, individual specific heterogeneity, which is assumed to be unrelated to  $x$ . By assuming that a cumulative distribution of the error term is logistic, it delivers the maximum likelihood logit estimator that we employed in this study. Finally, in the results section, we will present odds ratios instead of coefficients since they are easier to interpret.

Since our dependent variable is dichotomous, a logistic regression is appropriate. To account for the non-independence of observations within the same neighbourhood, we cluster the standard errors by LSOA. This deals with the issue relating to the possibility that individuals residing in the same neighbourhood are more likely to have similar characteristics, resources and capabilities that may differentiate them from others residing in other neighbourhoods. If such correlations are not addressed, it may result in a violation of one of the key classical assumptions of regression models. In addition, multicollinearity was found not to be an issue since the minimum tolerance is 0.5430 and the highest VIF is 2.07, indicating a weak relationship among the variables. Since all the variables do not have a tolerance below 0.1 and a VIF > 10, there would be no need for further investigation [104].

IV. RESULTS

The maximum likelihood estimations are used to calculate the logit coefficients which we exponentiate to obtain odd ratios to facilitate interpretation. More precisely, an odd ratio above one indicates that the risk of the outcome falling in the comparison group, relative to the risk of the outcome falling in the reference group, increases as the variable increases. However, if the odd ratio is less than one, it indicates that the risk of the outcome falling in the comparison group relative to the outcome falling in the reference group decreases as the variable increases. The results are presented in Table III. We supplement these results by reporting results of additional tests, comparing coefficients across different outcomes and with some graphic illustration of the results.

Before we present the results, some measures of the explanatory power and diagnostics of our models are presented in Table III. Table III reports the results of logistic regression for our models assessing entry into start-up activity. Model 1 reports the effects of all the control variables and in Model 2, we added all the predictor variables. Models 3 to 5 we add the interactions between *gender* with *wealth*, *highest educational attainment*, *prior work experience*, *knowledge and skills specific to entrepreneurship*, *share of owner managers of established businesses more than 42 months old in the local neighbourhood* and *share of individuals who personally know other successful entrepreneurs in the neighbourhood respectively*. Finally, Model 6 presents our full model, reports the main effects including interactions. We supplement these by reporting results of additional tests; we present visual illustration of the hypothesised effects and interpret the marginal effects.

Based on Model 2, the results indicate that most categories' higher levels of wealth increase the probability of female to start a new business which employ one or more employees. The coefficient for all the categories of formal education including entrepreneurial specific knowledge and skills is not statistically significant. Being in employment is negative and significant at 1%. The coefficient for the share of business owners in the neighbourhood is positive and significant at 5% level. However, the coefficient for the share of individuals

who know entrepreneurs in their neighbourhood is negative and significant at 5% level. Perhaps the most interesting is the coefficient for female which is negative and significant at 5% level indicating that female are less likely to start a new business than their male counterparts.

In Hypothesis 1, we argue that female entrepreneur positively moderates the effect of financial capital on becoming an entrepreneur. The results indicate that the interaction of higher levels of wealth in both Model 3 and Model 6 are positive and statistically significant. Although higher levels of wealth increase the probability of females to start a new firm, the magnitude of the effects vary from 5 percent for Q2 and Q4, and 1% for Q3 and Q5 in both models. We also examined the marginal effects of wealth on start-up activities. Likewise, Fig. 1 shows that at the lowest level of wealth, female probability of starting a new business is around 3% while male probability is around 39%. Moreover, the lower limit of each 95% confidence interval is clearly above zero, therefore, both effects are statistically significant; and the clear separation of the two confidence intervals (CIs) establishes that the difference between the male and female effects is statistically significant. However, the gap between the male and female propensity to start a business diminishes steadily at higher levels of wealth (Q2), eventually disappearing (Q3, displaying no significant difference) and

possibly, even being reversed at the highest level of wealth. Q5 increases the probability start-up by 34% for men and 46% for female entrepreneurs, even though in this case the greater female propensity is not significantly different from the male propensity at the conventional 5% level. Therefore, the result supports Hypothesis 1.

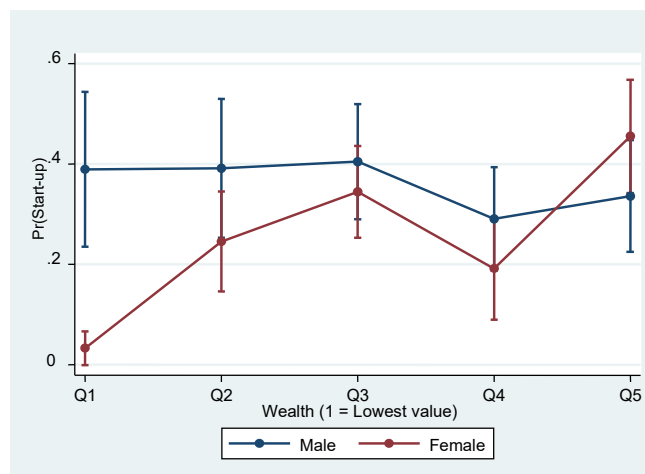


Fig. 1 Marginal effect of wealth and female interaction

TABLE III  
 LOGISTIC REGRESSION MODELS EXPLAINING LIKELIHOOD OF START-UP

	Dependent variable: Start-up					
	(1)	(2)	(3)	(4)	(5)	(6)
Female		0.752*	0.154***	0.418	1.062	0.0114**
		(0.0960)	(0.0693)	(0.285)	(0.203)	(0.0195)
Wealth: Q2		1.406+	1.032		1.312	1.004
		(0.271)	(0.238)		(0.257)	(0.247)
Wealth: Q3		1.777**	1.133		1.680*	1.041
		(0.377)	(0.274)		(0.368)	(0.275)
Wealth: Q4		1.176	0.792		1.085	0.751
		(0.270)	(0.207)		(0.257)	(0.203)
Wealth: Q5		1.776*	0.900		1.699*	0.851
		(0.459)	(0.266)		(0.446)	(0.263)
GCSE		0.913		0.599+	0.894	0.516*
		(0.236)		(0.171)	(0.234)	(0.162)
'A' level		0.995		0.702	0.970	0.599+
		(0.230)		(0.189)	(0.227)	(0.177)
Vocational & others		0.918		0.624*	0.922	0.576*
		(0.180)		(0.144)	(0.184)	(0.144)
Bachelor		0.960		0.606+	0.985	0.510*
		(0.225)		(0.176)	(0.232)	(0.165)
Masters & doctorate		1.070		0.866	1.035	0.766
		(0.165)		(0.153)	(0.164)	(0.147)
Knowledge and skills		1.174	1.169	1.594	1.145	1.638
		(0.221)	(0.226)	(0.542)	(0.221)	(0.630)
In employment		0.612**	0.548***	0.674+	0.581**	0.599*
		(0.110)	(0.0971)	(0.154)	(0.110)	(0.140)
Knowing entrepreneurs: LSOA mean		0.724*	0.698*	0.740*	0.803	0.763+
		(0.0993)	(0.104)	(0.101)	(0.119)	(0.120)
Business owners: LSOA mean		1.327*	1.430*	1.248	1.678**	1.704**
		(0.167)	(0.199)	(0.176)	(0.289)	(0.327)
Age	1.045	1.157	1.126	1.222	1.130	1.148



	(0.278)	(0.333)	(0.338)	(0.350)	(0.331)	(0.368)
Knowing entrepreneurs	1.154+	1.361*	1.386*	1.325*	1.387*	1.439*
	(0.0995)	(0.172)	(0.182)	(0.162)	(0.180)	(0.207)
Business owners	0.678***	0.647***	0.635***	0.658***	0.643***	0.625***
	(0.0467)	(0.0513)	(0.0509)	(0.0522)	(0.0530)	(0.0537)
Fear of failure	0.866	0.765*	0.768*	0.749*	0.754*	0.723*
	(0.102)	(0.0938)	(0.100)	(0.0985)	(0.0931)	(0.103)
Good opportunities	1.419***	1.470***	1.495***	1.508***	1.470***	1.588***
	(0.131)	(0.151)	(0.151)	(0.155)	(0.151)	(0.179)
Business premises	1.171***	1.192***	1.229***	1.210***	1.188***	1.265***
	(0.0384)	(0.0460)	(0.0546)	(0.0500)	(0.0450)	(0.0647)
Urban areas	1.284	0.955	1.162	1.298	0.951	1.154
	(0.327)	(0.281)	(0.369)	(0.369)	(0.283)	(0.405)
Leicestershire	1.138	1.036	1.159	1.023	1.037	1.086
	(0.392)	(0.418)	(0.464)	(0.395)	(0.419)	(0.445)
Lincolnshire	0.635	0.577	0.627	0.635	0.566	0.645
	(0.273)	(0.284)	(0.299)	(0.307)	(0.279)	(0.330)
Northamptonshire	1.584	1.723	1.763	1.860	1.620	1.805
	(0.620)	(0.697)	(0.738)	(0.755)	(0.661)	(0.816)
Nottinghamshire	1.871+	1.896+	1.827	2.261*	1.810	1.790
	(0.642)	(0.737)	(0.727)	(0.816)	(0.702)	(0.745)
Wealth: Q2 * Female			2.448**			3.077**
			(0.770)			(1.097)
Wealth: Q3 * Female			3.177***			4.329***
			(1.073)			(1.676)
Wealth: Q4 * Female			2.692**			3.636**
			(1.017)			(1.569)
Wealth: Q5 * Female			5.719***			8.017***
			(2.238)			(3.524)
GCSE * Female				2.898*		3.082*
				(1.201)		(1.372)
'A' level * Female				2.443*		2.613**
				(0.848)		(0.974)
Vocational * Female				2.447**		2.390**
				(0.704)		(0.712)
Bachelor * Female				2.782**		3.780***
				(1.032)		(1.519)
Masters & doctorate * Female				1.649*		1.705*
				(0.350)		(0.398)
Knowledge & skills * Female				0.396		0.325
				(0.362)		(0.317)
In employment * Female				0.430		0.181*
				(0.353)		(0.157)
Share of knowing entrepreneurs * Female					0.170	0.0809*
					(0.207)	(0.102)
Share of business owners * Female					0.585*	0.597*
					(0.125)	(0.128)
Constant	0.291***	0.275*	0.240**	0.295*	0.353*	8.949*
	(0.108)	(0.139)	(0.125)	(0.177)	(0.181)	(9.988)
Observations	421	421	421	421	421	421
Log Likelihood	-213.3	-195.6	-185.5	-196.1	-191.8	-173.5
Wald's chi-square	78.11	90.67	95.89	81.30	94.48	98.25
DF	11	25	24	28	27	38
Pseudo R--squared	0.199	0.266	0.304	0.264	0.280	0.349
Number of LSOA	379	379	379	379	379	379

Notes: Fixed effects logit estimator. We report odd ratios. Robust standard errors are in parentheses. Asterisks indicate significant level: where +  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

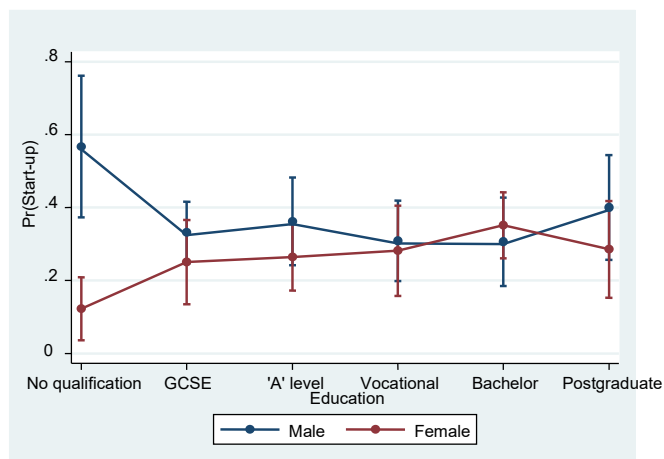


Fig. 2 Marginal effects of education and female interaction

Hypothesis 2a posits that a female positively moderates the relationship between education and the probability of becoming an entrepreneur. Both Model 4 and Model 6 show that the coefficients of the interaction of higher levels of education and female are positive and statistically significant. Moreover, Fig. 2 shows that at the lowest level of education (no formal qualification), female probability of engaging in starting a new business is around 12% while male probability is around 57%. The gap between the male and female propensity to start a business diminishes quickly as we get to the General Certificate of Secondary Education (GCSE) level, it eventually disappears, displaying a no significant difference and this effect is reversed at the bachelor's degree level of education. However, the highest level – Postgraduate, increases the probability of start-up by 40% for male and 29% for female entrepreneurs, even though in this case the greater male propensity is not significantly different from the female propensity at the conventional 5% level. Therefore, the result supports Hypothesis 2a.

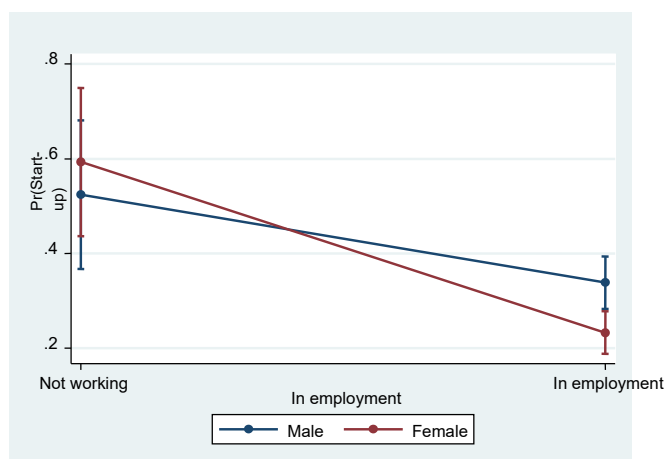


Fig. 3 Marginal effects of in employment and female interaction

Hypothesis 2b posits that gender positively moderates the relationship between in employment and the probability of becoming an entrepreneur and this relationship should be

much stronger for male entrepreneurs. However, in Model 4, the coefficient for the interactions of work experience (in employment) with female is negative and is not statistically significant. But in Model 6 the interactions of work experience (in employment) with female turns out to be negative and statistically significant implying that the propensity to engage in start-up will be lower for females than the males. In line with this, Fig. 3 shows that being in employment increases the likelihood of starting a new firm by 34% for male and 23% for female. Here, we also see that there is a clear separation of the two CIs indicating that the difference between the male and female effects is statistically significant. Thus, Hypothesis 2b is supported.

The argument proposed in Hypothesis 2c is that gender positively moderates the relationship between individuals with entrepreneurial specific knowledge and skills, and the probability of becoming an entrepreneur and this relationship should be much stronger for female entrepreneurs. However, the coefficient for the interaction of entrepreneurial specific knowledge and skills and female is not significant in both Model 4 and Model 6 but this does not mean that this variable is not important. Here, we also observe some movement on the effect of the gender variable (female) which turns out to be negative and insignificant. A similar result is shown in Fig. 4 which indicates that there is equality on male and female entry rate into entrepreneurial activity. Therefore, we cannot officially confirm Hypothesis 2c.

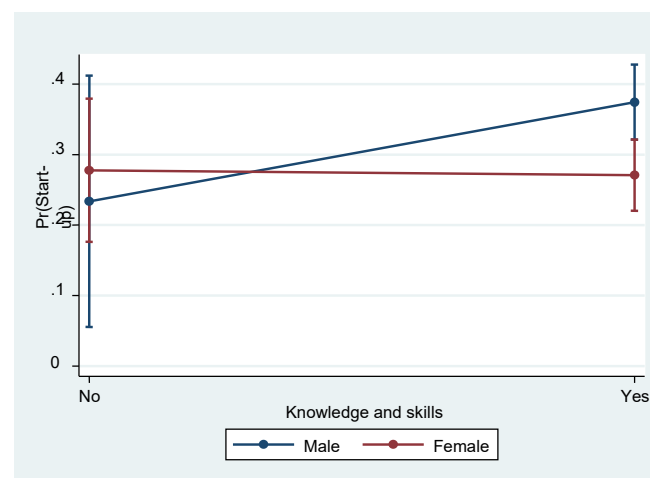


Fig. 4 Marginal effects of perceived knowledge and skill and female

Hypothesis 3a posits that gender positively moderates the relationship between the density of established owner-managers of businesses in the neighbourhood and the probability of becoming an entrepreneur and this positive relationship should be much stronger for male entrepreneurs. Indeed, Models 4 and 6 show that the coefficients of interactions between share of business owners in the neighbourhood with female is negative and significant. Consistent with our theoretical prediction, Fig. 5 shows that the magnitude of the interaction of share of business owners and female is much stronger for male than female. The gap

between the male and female propensity to start a business widens as the share of business owners increases. At the highest level the probability of start-up increased from 26 to 96% for male and decreased from 13 to 4% for female entrepreneurs and in this case the greater male propensity is statistically significant at the conventional 5% level. Therefore, we can officially confirm H2a.

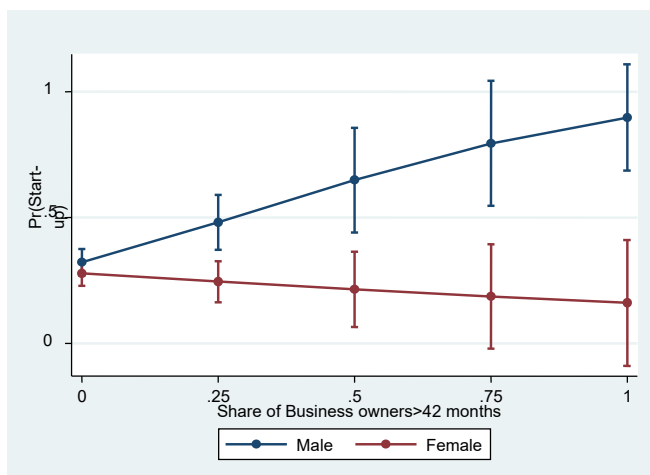


Fig. 5 Marginal effects of share of business owners and female interactions

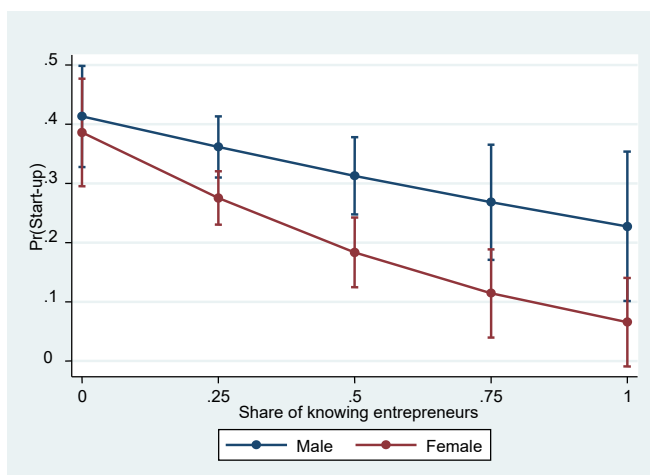


Fig. 6 Marginal effects of share of knowing entrepreneurs and gender interaction

Hypothesis 3b argues that gender positively moderates the relationship between the density of individual who know successful entrepreneurs in the local neighbourhood and the probability of becoming an entrepreneur and this positive relationship should be much stronger for male entrepreneurs. Based on Model 5, the coefficient of the interaction of knowing other entrepreneurs with female if negative and is not statistically significant, but in Model 6 the coefficient become negative and statistically significant. However, Fig. 6 shows that the magnitude of marginal effects of share of knowing entrepreneurs and female decreases for both male and female as the share of individuals who know other entrepreneurs in

the neighbourhood increases. However, we could not confirm H3b: we did not find that gender positively moderates the relationship between the shares of knowing successful entrepreneurs in the local neighbourhood with male.

#### Limitations

This study has some limitations that might have influenced the results which should be addressed by future research. The GEM dataset does not contain information on personal income and wealth; therefore, an individual's address was used as a measure of wealth, which could imply measurement errors. We were unable to measure entrepreneurs' motivations directly. Male and female entrepreneurs might have different motivations for starting a business; for example, females are more likely to start a new business in order to achieve work-life balance [105]. Moreover, the GEM dataset does not include information that is relevant for understanding financial bootstrapping strategies used by entrepreneurs and little has been done to link bootstrapping to RBT. We might have omitted some important variables such as those related to detailed representation of work experience that could be helpful in understanding how individual level resource affect the probability of entry into entrepreneurial activity. Here again, we cast doubt about the GEM measure of entrepreneurial specific skills, which is self-reported and not based on objective information. Due to the cross-sectional nature of the dataset, we have addressed the probability of engaging in entrepreneurial activity purely from a static point of view, and surely this is inferior to a dynamic analysis. Finally, another limitation we should bear in mind is that various types of resources are related. Specifically financial resources often correlate with human capital; therefore, the two effects may become confounded and attenuated. If that happens, there is potential attenuation bias: which could have worked against our tests.

#### V. DISCUSSION AND CONCLUSION

This study sought to enhance our understanding of how the entrepreneurs' gender influences entry into entrepreneurship. We investigated how personal wealth, human capital and social capital affect the likelihood of starting a new business and how the relationship differs among female and male entrepreneurs. Prior studies that have examined start-ups have implicitly assumed the entrepreneurial occupation as homogenous despite the fact that small business owners are a diverse group [38], [42], [93]. Likewise, previous studies considered entry as a homogenous outcome yet it is more difficult to enter some industries than the others [12], [107], [108]. The novelty of this study is to investigate the impact of an individual's resource endowments on entry into entrepreneurial activity making a distinction between entry into self-employment and start-up (businesses that employ others). Herein, entry into self-employment may require small amount of financial capital and very little in terms of formal education. Yet when starting a business that employs others, entrepreneurs need to assemble substantial capital and the relevant skills required to operate successfully. Moreover, the

characteristics of potential entrepreneurs draw them toward certain types of new firms and discourage them from others. Consistent with this, our results provide evidence that financial and human capital is positively related to start-up and the relationship is stronger for female entrepreneurs than male entrepreneurs. In particular, we emphasize that educational levels predict entry into start-up activity but not in the manner suggested by the existing conventional wisdom. Higher levels of educational attainment strongly predict entry into start-up and lower levels of education predicts self-employment. Moreover, skills possessed by highly educated people can be helpful in overcoming some of the entry barriers into business that employs others and less educated people may not be able to start a business in some sectors even if they want to.

Our results provide evidence that wealth is positively related to start-up and the relationship is stronger for female entrepreneurs than male entrepreneurs but the relationship is non-linear. Thus, across the five quintiles, financial constraints do not seem to be an obstacle to entry into start-up [42]-[44], [58].

Evidence suggests that entrepreneurial prior work experience and training in entrepreneurial specific skills plays an important role in developing self-confidence which may facilitate entry into entrepreneurial activity [106]. In line with this, it has been recognised that perceived knowledge and skills can be related to self-image, at the same time females may be less likely to perceive themselves as entrepreneurs resulting in lower confidence in relevant skills resulting in lower start-up rates. Given that work experience may be effective in developing perceived knowledge and skills and self confidence in female entrepreneurs what is needed is a deeper understanding of how women develop confidence about entrepreneurial capabilities [76]. In terms of public policy, policymakers need to develop programs that address female entrepreneurs' needs, in particular, focusing on developing skills, experiences relevant to entrepreneurship through activities that enhances their confidence. Likewise, women participation in economic activities has a strong effect on removing some barriers for women participation, empowering them to participate in all sectors of the economy including entrepreneurship. Policies that promote equal participation in the economy for women may be effective in reducing the gender gap across different types of entrepreneurship.

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