Examining the dynamics of innovative entrepreneurship: A comparative analysis of gender and financial depth

Abstract

This study explores the relationship between gender and financial depth development in innovative entrepreneurship, by analysing a multi-source dataset of individual- and country-level characteristics. Our findings indicate that female entrepreneurs are more likely than male entrepreneurs to pursue innovative entrepreneurship, and a country's financial depth influences the likelihood of introducing novelties into markets. Specifically, higher financial institution development—an indirect type of intermediation—reduces the likelihood of innovation, while high market-based financing development—a direct type of intermediation—fosters innovation. Nevertheless, less favourable financing conditions for female entrepreneurs are mitigated when they introduce innovations in contexts with higher levels of financial development. These findings can inform policy decisions aimed at promoting innovative entrepreneurship, particularly with respect to gender and financial development.

Keywords: Innovative entrepreneurship · female entrepreneurship · financial development · mixed-effects logistic regression

JEL Classification: O31· L26 · G24 · O16

Examining the dynamics of innovative entrepreneurship: A comparative analysis of gender and financial depth

1. Introduction

Since portrayed as "creative destructors" by Schumpeter (1942), entrepreneurship and innovation have become intertwined concepts in the prevalent mindset (Autio et al., 2014; Darnihamedani et al., 2018). Innovative entrepreneurship refers to introducing novelty to markets (Baumol, 2010), such as new products, services, production methods, or business models (Agarwal et al., 2007). Innovative entrepreneurs take risks, make new combinations in their local markets, and access resources to turn their ideas into innovations (Malerba and McKelvey, 2020), differentiating themselves from pure imitative entrepreneurs (Koellinger, 2008). This type of entrepreneurship is crucial for long-term economic growth (Davidsson et al., 2006; Mayhew et al., 2016) and national innovation performance (Chung et al., 2022), but literature exploring this subject is still evolving, and the intersection between innovative and gender entrepreneurship receives less academic attention (Alsos et al., 2013; Strawser et al., 2021).

Innovative entrepreneurs' ability to reach the necessary resources (Cainelli et al., 2020), including financial resources, is essential to materialize any innovation, and the country's financial configuration (Canh and Thanh, 2020) is a critical driver in transferring funds and providing financial services to economic activities (Block et al., 2017; Shane, 2003). However, the inherent risk associated with innovative entrepreneurship further increases the complexity of this consideration (Hall, 2002; Kleinert et al., 2020), positioning innovative ventures in a more difficult category to assess when attempting to compete for funding in an economy (Carpenter and Petersen, 2002).

This article aims to investigate if innovative entrepreneurship is a gendered phenomenon (Cowling et al., 2020; Hechavarria et al., 2019; Wu et al., 2021) and explore the effect of higher levels of financial development (Botev et al., 2019) on innovative entrepreneurship, understood by its two interaction channels: direct (financial market development) and indirect (financial institutions development) (Bats and Houben, 2020). This article also aims to study how contextualizing innovative entrepreneurship as a gendered phenomenon can have implications when exploring its interactions with its financial context, according to the depth of development attained by its financial markets and financial institutions (Zhu et al., 2020).

Our findings are supported by a multi-level logistic regression, combining the individual-level observations from the Global Entrepreneurship Monitor (GEM), the country-level data from the International Monetary Fund (IMF) and World Bank (World Development Indicators), evaluating a dataset of 81,545 new ventures (that is new firms paying salaries or wages between three and forty-two months). Our analysis covers 105 countries for the 2005-2020 period. While our analysis spans a wide range of economies, the findings offer insights into the financial and gender-related challenges that may be particularly relevant for high-cost economies.

The research structure organizes as follows: A theoretical framework develops the understanding of innovative entrepreneurship, entrepreneurial gender roles, a country's financial depth development, and its interactions, which support the hypotheses tested. Then, a more practical section provides the reader with descriptive data analysis and the methodology used. A third section presents the results and findings, while a final section provides some conclusions and a space for discussion.

2. Theory and hypotheses

This research investigates innovative entrepreneurship, which is considered to be a key driver of long-term economic growth and societal well-being (Davidsson et al., 2006; Mayhew et al., 2016). The theoretical foundations of this research are based on innovative entrepreneurship (Baumol, 2010; Darnihamedani et al., 2018; McKelvie et al., 2017), as well as social feminist theory (Carter and Williams, 2003; Johnsen and McMahon, 2005), which emphasizes the importance of gender differences in entrepreneurship, and entrepreneurial finance (Cumming et al., 2019).

2.1 Innovative entrepreneurship

High-impact entrepreneurship analyses individuals who respond to market opportunities by introducing innovative solutions, leading their ventures into higher growth in terms of employment and turnover returns (Acs, 2008; Covin and Wales, 2019). Subsequently, innovative entrepreneurship applies to ventures that create new products, services, production methods, or business models (Agarwal et al., 2007; Ganbaatar and Douglas, 2019; McKelvie et al., 2017). However, only few firms can achieve extraordinary growth (Tracy, 2011), usually by following either innovative, export-oriented strategies (Estrin et al., 2019; Hessels and Van Stel, 2011; Love and Roper, 2015).

Different factors contribute to firms' innovation, mainly categorized as the entrepreneurs' characteristics and environment (Koellinger, 2008; Venkataraman and Shane, 2000). Findings suggest the entrepreneurs' education increases their probability of identifying opportunities to innovate (Samuelsson and Davidsson, 2009), especially when attained in a specialized technical domain (Kuschel et al., 2020). Others include previous entrepreneurial experience (Lahiri and Wadhwa, 2021; Robson et al., 2012), while their household income and self-confidence (Elliott et al., 2020; Koellinger, 2008) positively affect their innovativeness. Connecting to people through social networks is another enabling resource for innovation (Elliott et al., 2020). Likewise, the firm's characteristics play an essential role in encouraging innovative entrepreneurship, like adopting high technology (Low and Isserman, 2015), employing high-skilled personnel (Feser, 2003), or having a patenting orientation and rapid adaptation to market changes (Low and Isserman, 2015). Similarly, their context provides the channels that enable or discourage innovation, whether from formal or informal institutions (Ali et al., 2020; North, 1990), by promoting the generation of knowledge stock in an environment, producing the appropriate setting for disseminating knowledge spillovers and configuring the conditions for entrepreneurial activity (Aparicio et al., 2016; Bjørnskov and Foss, 2013; Malerba and McKelvey, 2020).

2.2 The role of gender

Various studies have raised the relevance of better understanding the gender dimension as a critical determinant of individual entrepreneurial performance (Brush et al., 2019; Bullough et al., 2022; Dawson and Henley, 2015; Hechavarria et al., 2019). Evidence suggests that the start-up rate between men and women bends into higher figures for men, and this finding is consistent across different countries, with few exceptions (Kelley et al., 2017). These differences are also related to the start-up motivation reasons (Strawser et al., 2021), where women are more likely than men to mention necessity-based as the cause for starting a business, despite having similar levels of education. In addition, entrepreneurial literature portrays women as motivated to pursue entrepreneurial activities to balance their work/life necessities better (Humbert and Drew, 2010). Although, recent research indicates that favourable contextual conditions related to motherhood enable women to pursue entrepreneurship as a desired career (Markowska et al., 2022). However, many other findings portray gender-related entrepreneurial patterns, supporting the idea of male entrepreneurs being more assertive and dominant and female entrepreneurs expected to behave by

displaying feminine characteristics linked to warm feelings and emotional expressiveness (Balachandra et al., 2019).

So far, entrepreneurial literature has elucidated that female-owned firms tend to be smaller and employ fewer people (Kelley et al., 2017). In addition, their self-efficacy perceptions tend to be lower than male entrepreneurs (Brush et al., 2004); they also have less entrepreneurial experience and lower levels of personal income and wealth (Marlow and McAdam, 2012). Furthermore, the figures emerging for university spin-offs show female underrepresentation (Crane, 2022); likewise, for patent activity (Link and van Hasselt, 2020) and female entrepreneurs face more complex difficulties than male entrepreneurs when seeking financing (Brush et al., 2019). The differences could also be noticeable in sector preferences, where female entrepreneurs mainly concentrate on the service sector (Yacus et al., 2019). The areas chosen are traditionally related to "female roles" in beauty, food, and cloth related (Bates, 2003; Du Rietz and Henrekson, 2000; Hallward-Driemeier, 2011). These services are characterized by having lower labour productivity, partially explaining the income gap difference in entrepreneurship (World Bank, 2011).

Regardless of these diverse outcomes between female and male entrepreneurship, a preceding discussion should approach understanding the nature of these differences. First, many academics posit that gender differentiation analysis is a social construction rather than a biological one (Bettio and Verashchagina, 2008). In this sense, gender would explain an individual's state of possessing masculine or feminine characteristics (Muehlenhard and Peterson, 2011). One of the roots of this argument originates in how cultural values influence what is considered acceptable work for women and their role in society (Griffiths et al., 2013). For example, in contexts characterized for being extremely hostile toward women, females leading a business portray a way of breaking the norms of females' acceptable behaviour (Ogundana et al., 2021; Welter and Smallbone, 2010). In less extreme environments, this social construction is also present, where the percentages of companies led by men represent the majority, while women taking high executive roles are the minority (Henry et al., 2015; Muehlenhard and Peterson, 2011).

Accordingly, the feminist theory (Carter and Williams, 2003; Johnsen and McMahon, 2005) assists in understanding the inherent differences between men and women. This theory states that none is superior or inferior but somewhat different due to distinct socio-cultural values construction, yet developing equally effective traits (Fischer et al., 1993). Entrepreneurial literature has advanced in exploring that these differential gaps do not represent something that needs to be "fixed" in women but instead calls for a more

comprehensive analysis which should include the whole entrepreneurial ecosystem (Ahl and Marlow, 2012; Foss et al., 2019).

Exploring innovative entrepreneurship provides an opportunity to include gendered perspectives in the discussion (Cowling et al., 2020). The question to investigate is not if female entrepreneurs are more innovative than male entrepreneurs but if differences exist, understand the roots of these differences and the implications. For example, firms whose corporate innovation is led by female Chief Technical Officers predominantly evidence a transformational leadership style which has proven to have a positive effect on the innovative culture of a corporation by encouraging creativity, communication, collaboration, and cooperation (Wu et al., 2021). However, these technical positions tend to be male-dominated, mainly derived from an initial underrepresentation of women emerging from the science, technology, engineering, and mathematics fields (Kuschel et al., 2020). Not surprisingly, these results are a consequence of industry-related masculine structures, where a female in this sector navigate their way to "fit in" (Marlow and McAdam, 2015), in many cases overcoming these challenges by becoming an "honorary man" (Martin et al., 2015) and to cope with an specific industry structure (Marlow and McAdam, 2012).

This underrepresentation is also present in innovative entrepreneurial role models. The predominant female role model portrays a hard-working superwoman capable of overcoming all obstacles. This depiction highlights a meritocratic and individualistic view of entrepreneurship (Byrne et al., 2019). This high-achieving role model might inspire and resonate more with a specific, privileged group rather than a broader range of female entrepreneurs, especially those who come from low-skilled and low-paid occupations (Ahl and Nelson, 2015). This role model portrayal might also endure the idea of "fixing" to correct their deficits (Ely and Meyerson, 2000). In this way, many entrepreneurial role models fail to embrace diversity (Welter et al., 2017) and diminish existing gender barriers derived from formal and informal institutions (Byrne et al., 2019).

However, these limitations might provide insight into how some female entrepreneurial features lead to innovative ventures. A clue to this understanding emerges from a recent study exploring bank lending dynamics after the financial crisis (Cowling et al., 2020). In this case, many female entrepreneurs modified their financial strategies in order to obtain external credit for expanding their ventures. They did so by presenting a more conservative financial profile to the bank, aiming to be perceived as a safer alternative (Cowling et al., 2020). Their finding suggests that although existing gendered ascriptions limit women's opportunities (Marlow and McAdam, 2015) when they manage to develop

innovative ventures, they might be more successful than male entrepreneurs in accessing the required resources and conquering their objectives (Audretsch et al., 2022). For this reason, we focus on female leaded new ventures since they have survived the initial start-up phase and are manoeuvring their way to continue.

The previous arguments enlighten how female entrepreneurs use their managerial and leadership styles to overcome challenges that might enable innovation (Foss et al., 2022; Wu et al., 2021). In this sense, a feminine entrepreneurial leadership style is more oriented toward relations and collaborative decision-making, facilitating more opportunities for innovation to emerge by leveraging knowledge and financial resources from people inside and outside the firm (Devine et al., 2019). Similarly, the ability of female entrepreneurs to balance their private and work life enhances their effectiveness to commit to different roles when needed, facilitating learning-oriented strategies (Foss et al., 2022). Lastly, female entrepreneurial role models clearly demonstrate a persistent tendency to exceed expectations in order to overcome existing limitations. This persistent type of entrepreneur influences other female entrepreneurs by tracing a path to follow, which encourages an overachiever behaviour, despite all circumstances.

Consequently, we aim to investigate how certain ventures, particularly those led by female entrepreneurs, can distinguish themselves from purely innovative ventures. The entrepreneurs in these ventures are often characterized by possessing a transformative leadership style, a managerial orientation that leverages available resources, and being inspired by highly accomplished entrepreneurial role models. Based on these observations, we hypothesize that new ventures led by female entrepreneurs are more likely to exhibit some level of innovation. Taking these factors into account, we formulate the following:

> **Hypothesis 1.** Female-led new ventures are more inclined to exhibit innovative entrepreneurship compared to male-led new ventures.

2.3 The influence of external financing

At the starting point of opportunity recognition, a series of factors and resources should get together where innovative entrepreneurship is being orchestrated (Shane, 2003). Their alignment facilitates the emergence of new products/services, allowing the materialization of innovations. Some include human capital requirements, capital resources to finance innovation, and knowledge generation (Block et al., 2017).

To finance their endeavours, firms can choose from internal and external sources (Nguyen and Canh, 2021). Financing theorems propose that internal and external financing alternatives are substitutes for perfect markets (Modigliani and Miller, 1958). However, external financing for new ventures developing innovative entrepreneurship involves a higher analysis complexity due to information asymmetries, and the principles of perfect markets do not apply (Damodaran, 2010). In this sense, entrepreneurs find additional challenges when seeking external financial resources from their financial system (Brown et al., 2022; De Clercq et al., 2013).

Innovative new firms are often categorized as high-risk ventures because of the uncertain outcomes derived from the innovation process. At the same time, these firms face more obstacles than pure imitative firms when searching for external financial resources to pursue their idea (Kleinert et al., 2020; Schneider and Veugelers, 2010). From the lender's perspective, innovative new ventures often lack collaterals to support the loan, from the fact that their novel developments are reliant on intangible assets and rest on one or very few projects since they are still small (Block et al., 2019; Cainelli et al., 2020; Freel, 2007). Additionally, failure rates in innovation are relatively high. In contrast, the predictive returns on innovation are uncertain (Hall, 2002). Findings show that only a small number of innovative firms succeed in achieving substantial gains, while most have relatively small returns (Coad and Rao, 2008). The challenge in financing innovative new ventures increases with the asymmetry of information by the parties involved (Gompers, 1995; Jensen and Meckling, 1976; O'Sullivan, 2005; Santos and Cincera, 2022; Stiglitz and Weiss, 1981). Most breakthrough innovations require a specialist valuation, similar to the financial intermediation work of venture capitalists (VC) (Gompers and Lerner, 2001; Hogan et al., 2017).

Economies structure their financial resource allocation based on the certainty of the returns, the associated risks, the transaction costs, and the levels of asymmetric information (Allen and Santomero, 1997; Brealey, 2001). The financial transactions can be direct or indirect depending on the interaction closeness between the financial resource seekers and providers.

In a direct resource allocation (Wurgler, 2000), resource seekers (in this case, entrepreneurs with innovative business ideas) meet investors interested in financing their project in a market. This type of interaction is understood as market-based or through financial markets because these are the places that generate all the necessary conditions for resource seekers and investors to meet.

The depth of a country's financial development considers financial structures in size and liquidity (Svirydzenka, 2016). Direct interaction among its participants—market-based—considers data on stock market capitalization to its GDP, stocks traded, international debt securities, and corporative securities. Some examples of financial markets include stock markets and debt securities of financial and non-financial corporations. More recent developments include crowdfunding platforms (Estrin et al., 2018; Kleinert et al., 2020), peer-to-peer transactions (Chen et al., 2019), and stock markets specialized in small and riskier firms (Block et al., 2021; Colombelli, 2010) such as junior stock markets (Honjo and Kurihara, 2022).

The second mechanism for financial resource allocation is indirect, where an intermediary matches the necessities of both sides. A country's financial institutions' depth compiles information regarding bank credit allocations in the private sector to their GDP. Other activities developed by financial institutions include pension funds, mutual funds and insurance funds (Svirydzenka, 2016). Economies need these intermediaries because of their specialization. They act as facilitators of risk transfer and for their knowledge of financial instruments and markets (Allen and Santomero, 1997).

The development degree of each type of these financial approaches will vary across countries, some having more dynamism than others (Svirydzenka, 2016). Differences are also evident within countries, usually having more robust development in their financial institutions than in their financial markets (Ball et al., 2008; Zhu et al., 2020).

Research investigating an adequate financing alternative depending on their business life cycle, size, and information availability suggests that innovative new ventures are better suited to be financed by equity, such as the investment done by business angels (Berger and Udell, 1998). The same authors indicate that the natural order of financing firm innovation follows a path of public equity funding, typically subscribed by an initial public offer (IPO) commonly encountered in financial markets. In most cases, the process of financing innovative new ventures aligns with a sequence of steps (Hellmann et al., 2021; Myers and Majluf, 1984), starting with personal savings, support from friends and family, then angel investors, and lastly, an initial public offering (IPO) at an equity market (Cosh et al., 2009). Debt financing, on the other hand, in the form of bank credits or similar, represents a less appropriate source of financing innovative new ventures (Carpenter and Petersen, 2002) due to different reasons, such as moral hazards, the complexity in evaluating the associate risks and the potential gains, the lack of collaterals, and the less flexible configuration in adjusting the financial intermediaries necessities with the firm's, in terms of interest payments and

general debt conditions. Despite this, credit is still the most relevant source of financing for small ventures (Kanze et al., 2020). Studies comparing market and credit alternatives as external financial mechanisms confirmed the differences among these approaches and found that market alternatives enhance innovation among specific industries. In contrast, credit-based alternatives constrain them (Ho et al., 2018).

The prevailing number of credits among new ventures allocated by banks (Hirsch and Walz, 2019; Kanze et al., 2020) evidences the banking alternative as the most significant source of external financing for small firms emerging from financial institutions. Alternatively, venture capitalists develop a role as financial intermediaries but only concentrate on a few industries, cover a small portion of new firms (Davis, 2003) and is very sensitive to economic shocks (Bellavitis et al., 2022). Nevertheless, there are some reasons why banking financing is the preferred alternative; first, because of the assumption that the funds are available (De Bettignies and Brander, 2007) by simply approaching a bank. Additionally, because of the intangible nature of intellectual property rights, innovative firms might not be required to disclose their novel ideas to banks (Alimov, 2019). Moreover, depending on their regulatory system, new ventures might be subject to stricter or more forgiving bankruptcy regimes (Estrin et al., 2017). Finally, by acquiring debt, firms maintain complete control and ownership of their venture (Colombo et al., 2014). However, these apparent advantages come with a cost, the interest rate, which tends to be higher for new and innovative firms than other types of firms (Alimov, 2019).

The downside resulting from banks dominating the institutional financing mechanism manifests in the supply role they have in deciding the firms to receive funding. Especially evident after the global financial crisis of 2008 and noticeable during any economic contraction, the banking regulation requires banks to control their risk exposure. To achieve this, they lower the credit supply to riskier alternatives, such as innovative entrepreneurship (Doerr, 2021). Intentionally or unintentionally, the bank industry designs the entrepreneurial landscape of countries, hampering innovation from small ventures. As a result, we expect countries with high levels of financial institutions' depth development to discourage innovative entrepreneurship. Accordingly, we formulate the following:

> **Hypothesis 2.** New ventures in countries with greater financial institution depth development exhibit lower levels of innovative entrepreneurship.

Complementary but not substitutable, financial markets and financial institutions provide solutions to allocate financial resources in economies. Financial institutions guarantee the

transactional process to the parties involved by complying with established regulations of their sector (World Bank, 2019). Financial markets must also provide an environment that assures the transactions among their participants; to accomplish this, they set participants' rules and requirements to fulfil. However, new ventures often perceive them as very strict, difficult to achieve and costly (Carpentier and Suret, 2012), discouraging their participation in financial markets.

Notwithstanding difficult participation in traditional stock markets, recent financial developments consider second-tier listings; these are financial markets for small and medium enterprises. These alternative markets create better matching financing opportunities for innovative new ventures (Knyazeva, 2019). In addition, they improve their current financing options and align new ventures with better future financing options (Nguyen et al., 2020). Moreover, technological advances have created multiple market-based financing alternatives (Brown et al., 2018). For example, crowdfunding enables a platform with lower costs, facilitates information diffusion (Farrell et al., 2022) and reduces barrier entry related to information. Like this, many more developments could adequately finance the needs of small ventures and match the ones of the investors, for example, business angels syndicates interacting directly with new firms or more binding solutions such as accelerators, combining technical assistance with financing (Cumming et al., 2019).

Innovative entrepreneurs face additional challenges by the assumption of belonging to a riskier type of investment. While it is difficult for new ventures to transition from opaque information release in their early stage to a more transparent one (Hirsch and Walz, 2019), market developments capable of capturing this information would enable more financing opportunities for innovative entrepreneurs. The continuous development of market-based financial solutions will create the conditions for entrepreneurs to find adequate financial conditions that match their innovation needs. Higher levels of financial market development should be associated with generating better alternatives to finance innovative entrepreneurship since they could stimulate better matches between investors and innovative ventures. We test this formulation with the following hypothesis:

> **Hypothesis 3.** New ventures in countries with greater financial market depth development exhibit higher levels of innovative entrepreneurship.

2.4 The joint role of gender and external financing

In the previous sections we explore gender roles in determining innovative entrepreneurship at the level of the entrepreneurs' characteristics. Then, at the context level, we explore the role of a country's financial development in facilitating innovative entrepreneurship. Subsequently, this section explores the interaction between these two levels of analysis.

At an individual level, the literature suggests that one of the constraints limiting female entrepreneurs from getting involved in innovative entrepreneurship is their unfavourable position in attaining financing (Dawson and Henley, 2015; Hallward-Driemeier, 2011; Sabharwal and Corley, 2009). Hence the importance of exploring the role of financial structures (De Clercq et al., 2013; Foss et al., 2019) facilitating/hampering innovative entrepreneurship.

Research in this field suggest that entrepreneurship is not gender-neutral (Jennings and Brush, 2013), stating that female entrepreneurs are affected differently by the cultural and institutional environments surrounding them (Griffiths et al., 2013). Consequently, policies fostering gender-neutral objectives might not have the expected results from the inherent differences between male and female entrepreneurs (Aidis and Weeks, 2016). These considerations expand on the underlying assumptions, suggesting that all entrepreneurs have equal access to resources, which is only sometimes true (Isenberg, 2011). Different studies demonstrate that, on average, men initiate a business with an estimated double amount of capital as women (Coleman and Robb, 2012). However, female entrepreneurs are just as willing as men to finance their ventures with debt but receive less favourable conditions (Brush et al., 2019). The differences are even more notorious when attempting to attain financing from venture capital (VC) alternatives (Guzman and Kacperczyk, 2019), portraying VC financing attainment as a more masculine behaviour (Brush et al., 2019; Gupta et al., 2009). These restrictions denote female entrepreneurs' limitations in accessing financial resources (Kanze et al., 2018, 2020).

Previous studies on this topic identify gender differences in access to financing vanish with higher levels of financial development (Muravyev et al., 2009). In the banking industry, technological developments assist in reducing biases toward women and gender discrimination, as exemplified by adopting algorithms along the loan process (Cowling et al., 2020). Furthermore, developments among venture capital investors will expand the number of expert investors. These investors are desirable in an entrepreneurial ecosystem since they are most interested in identifying business opportunities and do not fall easily for gender-

stereotyped behaviours (Balachandra et al., 2019). Finally, financial institutions' development assists in creating more inclusive financing solutions, as in microfinance. Worldwide examples prove that microfinance positively affects female entrepreneurs (Chen et al., 2017; Quigley and Patel, 2022).

Therefore, it would be reasonable to consider that countries with higher development in financial institutions would favour female entrepreneurs' conditions and indirectly enhance their innovative entrepreneurship opportunities. We test this formulation with the following hypothesis:

> **Hypothesis 4.** A country's financial institution depth development enhances innovative entrepreneurship more for female entrepreneurs than for male entrepreneurs.

Financial markets set up a place for direct interaction between resource seekers and investors, creating a space to find financial solutions that adjust to each participant's needs. In the case of firms, they benefit from flexible financing terms according to their possibilities, whether they finance through debt or equity (Parra and Winter, 2022). Despite these clear advantages, for most innovative new ventures participating in financial markets is challenging given their lack of transparency, their early stage formation and their hardship to generate enough cash flows (Hirsch and Walz, 2019) to pay interest rates or dividends.

Higher financial market-based development might reduce these asymmetries (Block et al., 2021), which are particularly counter towards female-led innovative new ventures. In addition, creating a market space to include a wider diversity of financial participants would benefit everyone involved instead of creating opportunities only for the usual beneficiaries, such as large firms from specific industries (Canh and Thanh, 2020).

Some ways deeper financial markets could benefit female-led innovative entrepreneurs become noticeable by understanding their entrepreneurial behaviour. For example, female's lower levels of entrepreneurial self-efficacy translate to higher risk aversion behaviours, marked by the preference for equity financing over debt (Block et al., 2019). Similarly, a more profound financial depth could enable financial solutions that allow lower leverage levels in their capital structure (Faccio et al., 2016). In the case of debt financing, long-term debt possibilities in the form of bonds and similar could adjust better to their risk tolerance over short-term debt such as credit (Datta et al., 2021).

The relational mechanisms of female entrepreneurs also provide evidence of financial resource-seeking managerial skills. The best example arises from credits without collateral,

based on the reputation of solid social capital knots. Relational managerial styles highlight women's success in crowdfunding alternatives (Prokop and Wang, 2022). Furthermore, their capability of leveraging internal/external resources from the firm could also provide opportunities to get financing from non-traditional origins. For example, markets that enable paths for grants to reach innovative entrepreneurship or promote public support initiatives through financial markets (Harrison et al., 2020).

The relevance of attaining higher market-based depth development resides in channelling all these potential financing solutions that foster fitted financing conditions for female-led innovative entrepreneurs. As such, more profound market-based financing alternatives enhance female-led innovative new ventures.

Recent developments in market-based financing, such as crowdfunding, provide financing solutions to discouraged borrowers leading riskier firms (Brown et al., 2018). Therefore, it would be reasonable to consider that countries with higher development financial markets would favour female entrepreneurs' conditions and indirectly enhance their innovative entrepreneurship opportunities. We test this formulation with the following hypothesis:

> **Hypothesis 5**. A country's financial market depth development enhances innovative entrepreneurship more for female entrepreneurs than for male entrepreneurs.

Figure 1 summarizes our conceptual model and hypotheses.

----- Insert Figure 1 about here -----

3.Methods

3.1Data and sample description

Research studying female entrepreneurship has increased thanks to the availability of entrepreneurial comparable sex-disaggregated datasets (Aidis and Weeks, 2016). One of these sources is the Global Entrepreneurship Monitor (GEM) (Reynolds et al., 1999). We test innovative entrepreneurship with cross-sectional data compiled from GEM's Adult Population Survey (APS). The study comprehends data collected from the year 2005 to the year 2020. After excluding all the missing observations and the filter for new ventures, the model used to test the hypotheses accounts for 106 countries under examination. These ventures are in an early stage of entrepreneurial activity or young firms where salaries have

been paid between three and forty-two months. These firms are relevant since most of a firm's growth obtained from innovative entrepreneurship happens at this early stage (Bradley et al., 2021).

At a country level, two dataset sources assist in analysing the context where entrepreneurs develop their activities. First, the recent compilation of the IMF's time-series information regarding a country's financial development (International Monetary Fund, 2020; Svirydzenka, 2016) offers an insightful dataset reflecting a country's indexed figures on the depth of development of its financial institutions and financial markets. Secondly, data from the World Bank development indicators (The World Bank, 2020) supports the model to control country differences, including per capita GDP, GDP growth, and population growth. The final model accounts for 81,545 observations after omitting missing values and non-valid answers.

3.2Variables

3.2.1Dependent variable

The study explores innovative entrepreneurship. We test this individual-level dependent variable with APS GEM data, from the responses to three different questions differentiating between pure imitative entrepreneurs and those who have introduced some innovation (Fuentelsaz et al., 2018; Hessels et al., 2008; Koellinger, 2008). This dummy variable takes zero value for pure imitative new ventures with many competitors. The technologies they use have been available more than a year ago, and none of their customers perceives they provide a new product or service to the market. On the contrary, it takes the value of one for any other combination with some degree of innovation. The combination includes none or few competitors, the use of the latest technology or if their products and services are perceived as new by some or all their customers.

3.2.2 Individual-level predictor

Individual data from GEM, taking a sample of new venture entrepreneurs between the ages of eighteen and sixty-four years. Available in the dataset, the gender variable differentiates the entrepreneurs with one if the answer corresponds to a female entrepreneur and zero if the answer is male (Estrin and Mickiewicz, 2011).

3.2.3 Country-level predictors

IMF's Financial Development Index (FD) constitutes the source for the country-level predictors considered in this research. This index is generated based on the depth, which is the size and liquidity of the markets (Svirydzenka, 2016). Financial institutions represent an index aggregation from data related to a country's private credit contribution to the GDP and pension funds, mutual funds, and insurances contribution. Financial markets represent an index aggregation from data related to a country's depth in terms of its stock market capitalization, the number of stocks traded, international debt securities, financial and non-financial corporate debt securities (International Monetary Fund, 2020).

Financial institutions and financial markets comprise an aggregate of the depth dimension, constructed as a weighted average index, with continuous variables from zero to one (Svirydzenka, 2016). The information related to financial institutions and financial markets has been extracted from the index elaborated by the International Monetary Fund, which complies with information assessing a country's overall development financial development.

3.2.4 Cross-level interactions

The moderating effect of financial institutions and financial markets (country-level predictors), depending on whether the entrepreneur is female or male (individual-level), combines a two-level analysis, exploring the interaction of these variables, implying that the effect of a variable depends on the value of the other (Rabe-Hesketh and Skrondal, 2008).

3.2.5 Individual-level controls

At an individual level, some variables were introduced to control for differences among entrepreneurs. First, the entrepreneurs' *age* and *age squared* are considered. According to each country's grouping, the analysis also considered the *household income*, classified into three categories, low, medium and high income. Controlling for the entrepreneurs' general human capital attainment, we consider a categorical variable for the differences between some secondary *education* (one), a secondary degree (two), post-secondary education (three), and graduate education (four). Achieving a higher education would be related to having more resources to identify innovative opportunities (Samuelsson and Davidsson, 2009). Specific human capital was also taken from GEM, where we assessed the two types of entrepreneurial experience. The first one is "*serial entrepreneurial experience*" obtained from the

individuals' answers to the GEM question on whether they have sold, shut down, discontinued, or quit a business in the past twelve months that they owned-managed, and if that business continued to exist after their departure (Estrin et al., 2016). If the individuals' response was "yes", it is interpreted as having previous serial experience and thus assigned the value one; those answering "no" were assigned the value zero. *Portfolio experience* was measured using a binary variable that takes the value one if, according to GEM data, the entrepreneur is already the owner-manager of another established existing firm and zero otherwise (Capelleras et al., 2019).

Financing innovative new ventures imply higher risk exposure given the uncertainty of the outcomes (Hall, 2002). So it is relevant to differentiate if the entrepreneurs have experience acting as informal investors or *business angels.* If the answer was affirmative, it is coded with one, otherwise zero. The question measuring their entrepreneurial network asks if they *know someone* who recently started a business, assigning one for affirmative and zero for negative responses. Their sense of optimism measured with the question of perceived *alertness to opportunities* is included, where it is asked if they consider that there will be good opportunities to start a business in the next six months. Again, an affirmative response is coded with one or zero if negative. The attitudes towards optimism are relevant for innovation, suggesting that optimistic entrepreneurs create more extensive networks and cluster involvement as a facilitating resource. In contrast, pessimistic entrepreneurs work isolated (Alventosa et al., 2016). Their perceived *self-efficacy* was measured by questioning whether they think they have the required knowledge, skill and experience to start a business, decoded as a binary variable (Boudreaux et al., 2019).

Additionally, given that entrepreneurial activities are highly related to uncertainty and risk-taking, the model includes information reporting their *fear of failure* as an inhibitor of entrepreneurial activity (Wennberg et al., 2013), where one stands for a positive response toward fear of failure. Finally, the *size of their new venture* was included in the model, controlling for the number of current employees.

3.2.6 Country-level controls

Some variables were introduced to control for differences among countries. One is the national level of development, captured by the logarithmic GDP per capita based on purchasing power parity (PPP) in 2017 constant USD (GDP Per Capita PPP). We also introduced annual GDP Growth (expressed as the percentage variation from one year to the

next) to reflect each country's economic performance cycles, given that economic recession is expected to lower growth aspirations (Koellinger, 2009). The third country-level control variable is Population Growth (also expressed as the percentage variation) to capture information reflecting long-term economic growth (Strulik, 2005).

Finally, we added time dummies to enable controlling for *years* in the sample period while excluding one as a reference category (Hair et al., 2014). *Industry* controls are also included in all our specifications to account for sectoral differences (Devine et al., 2019; Estrin et al., 2013) (see Table 1).

3.3. Empirical strategy

Innovative entrepreneurship is measured as a binary variable, determined by some entrepreneurs' characteristics at the first level of analysis and contextual variables at a second level, assembling a two-level hierarchical structure. The specification of the hypotheses stated in previous sections could be better analysed by the specification of a multi-level logistic regression, also known as a mixed-effects logistic regression (Rabe-Hesketh and Skrondal, 2008). Studies using a similar methodology present the results as an odds ratio (Guerrero et al., 2021; Mickiewicz et al., 2019). However, given that gender is expressed as a dichotomous variable, it facilitates interpreting the outcome in the form of coefficients. We select a multi-level logistic model for the analysis since the entrepreneurs' responses are nested in clusters from the countries where they live. So, in this cross-sectional research, entrepreneurs (represented by i) are nested in a country (j). Each individual's dependence on their country can be analysed by splitting the residual results into two components that are not correlated.

The model for this research is presented in a combined equation at the two levels:

Level 1 Individual-level

$$Logit(Pr(Inn.E_{ij}=1)) = \beta_{0j} + \beta_{1j}X_{ij} + \beta_{3j}(X_{ij}*W_j) + \beta_{4j}Z_{ij} + \varepsilon_{ij}$$

Level 2 Country-level

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + \gamma_{02}V_j + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}V_j + \mu_{1j}$$

where:

- $Inn.E_{ij}$ is the likelihood of exhibiting innovative entrepreneurship for the i_{th} individual in the j_{th} group.
- X_{ij} is the level 1 predictor (*gender*) for the i_{th} individual in the j_{th} group.

-β_{0j} is the level 1 intercept for the j_{th} group

-β_{1j} is the slope for X_{ij}, for the j_{th} group

-ε_{ij} is the level 1 residual for the i_{th} individual in the j_{th} group

-W_j is the level 2 predictor for the j_{th} group, "*financial depth development*"

-γ_{00} is the grand mean intercept

-γ_{01} and γ_{10} are the level 2 regression coefficients

-μ_{0j}, μ_{1j} are the level 2 random effects for the intercept and slopes, respectively.

-β_{3j} is the slope for the interaction term ($X1_{ij}$* W_j)

-Z_{ij} are the control variables for the i_{th} individual in the j_{th} group, and β_{4j} are the corresponding level 1 regression coefficients.

V_j are the level 2 control variables for the j_{th} group, and γ_{02}, γ_{11} are the corresponding level 2 regression coefficients. To further examine the relationships between the key variables, we conduct a comprehensive analysis following methodologies outlined in the relevant literature (Hair et al., 2014). We interpret the effect sizes using standardized coefficients, which reflect the percentage change in the likelihood of innovative entrepreneurship. Wald tests are used to assess the statistical significance of both the coefficients and interaction effects. Specifically, we employ Wald tests to evaluate the individual and combined impacts of gender and the moderators.

4. Results

4.1. Descriptive statistics

We present two descriptive tables, Table 1 containing detailed information about variable definitions and Table 2 showing descriptive statistics and the correlation matrix. The study only includes firms that are no more than three and a half years old and have paid salaries or wages for a period of three to forty-two months. The final sample consists of data from 81,545 entrepreneurs across 106 different countries.

--- Insert Tables 2 and 3 about here ---

Out of this sample, 60% of *new venture* owners worldwide reported introducing some *innovation*. This high percentage is explained by their perception of the local market,

considering factors such as whether their product or service is new to all or some customers, if they have few competitors in their market, or if they use the latest technology.

Gender is considered an individual predictor for innovative entrepreneurship, with 43% of female entrepreneurs and 57% of male entrepreneurs represented in the sample. This ratio is consistent with previous studies using this data (Simmons et al., 2019). The distribution is similar among innovative entrepreneurs, with 42% female and 58% male. The correlation between gender and innovative entrepreneurship is negative and significant, supporting previous findings that female entrepreneurs are underrepresented in entrepreneurial activity. Without controlling for complementary individual features and traits, being a woman negatively correlates with innovative entrepreneurship, highlighting their disadvantaged position in entrepreneurship. In Figure 2, we observe yearly information on the share of innovative male and female entrepreneurs. The graph portrays this negative relation, remarkably evident during the COVID-19 crisis in 2020, where women entrepreneurs reported a lower likelihood of introducing some innovation. However, we propose that some traits among female entrepreneurs, could change this negative relation, which we capture in the model with complementary data on the entrepreneur. A clue of this is evident in the same figure, where the spike in innovative entrepreneurial activities after the financial crisis of 2008 is more pronounced for female entrepreneurs than for male entrepreneurs.

--- Insert Figure 2 about here ---

The entrepreneurs' average age is 38 years. Providing funds for a new business, if they know other entrepreneurs, believing in having the skills and knowledge to start a business, and higher levels of education, portfolio and serial experience are positively and significantly related to innovative entrepreneurship. Entrepreneurs with previous experience as informal investors or business angels represent 12 percent of the total, while 67 percent personally know another entrepreneur and 84 percent trust their entrepreneurial self-efficacy. The sentiment of fear of failure is present in 29 percent of the entrepreneurs in the sample. Similarly, only 8 percent have attained higher education, and 29 percent attaining post-secondary education. In comparison, 51 percent have lower education levels with some secondary education or a secondary degree. The figures are lower for previous entrepreneurial experience, with 4 percent for serial entrepreneurial experience and 2 percent for portfolio entrepreneurial experience. Of the total, 43 percent of them locate themselves in

the 33 percent upper high-income tile. The entrepreneurs generally share a positive attitude towards good opportunities for starting a new business in the upcoming months, representing 61 percent.

For sectoral preferences, 67 percent of the female entrepreneurs categorize their industry as "consumer-oriented" while for male entrepreneurs, the preference for this sector is only 46 percent.

At a country level, a positive but low correlation between financial markets depth and the introduction of some innovation, and a similar relation for financial institutions depth. From the sample taken understudy, the mean of the variable *financial institutions* is 0.41, while the mean for *financial markets* is 0.42. While the mean for these indicators appears similar, there are significant differences in the development depth among economies, as marked by Figure 3 (International Monetary Fund, 2020). In Figure 3, we present the depth development by region and selected countries of the analysis for the year 2020. We illustrate differences from country to country, some with similar and high development among institutions and markets, such as the case of Switzerland, the United Kingdom, the United States, Sweden, and Canada. However, in other countries, the gap in development is notorious, as is the case of Saudi Arabia and Qatar, where most of their financial development is on the side of their markets. Conversely, Chile, Israel, and Croatia primarily developed their financial institutions.

Regarding country control variables, GDP growth, GDP per capita and population growth are positively and significantly correlated to the dependent variable. Data employed in this study suggests that income differences from country to country are well accounted for. Having, on average, a GDP per capita of $24,832 (this variable is expressed in the model in logarithms to normalize its distribution). From the total sample, countries grow on average at a rate of 2.78 percent, and 1.17 percent for population growth.

--- Insert Figure 3 about here ---

4.2. Multi-level model results

Table 3 reports the mixed-effects logistic regression models predicting innovative entrepreneurship. Model (1) estimates all the control variables at the individual and country levels. Under this specification, the entrepreneur's age is significant, and its effect is

negative, meaning that the older the entrepreneur is, the fewer probability of developing innovative entrepreneurship. The entrepreneurs' characteristics are also relevant; having experience as a business angel, a positive perception of their context, and trusting in an individual's self-efficacy are all characteristics that enhance the probabilities of choosing innovative entrepreneurship. Higher human capital attainment is also a desirable characteristic that encourages innovative entrepreneurship; each educational achievement increases the likelihood of introducing innovation, while serial and portfolio entrepreneurial experience are essential factors for determining innovative entrepreneurship. However, the entrepreneurs' income is significant and negatively related to innovative entrepreneurship, observing that innovation might be a key business strategy among the entrepreneurs with lower income levels. The entrepreneurs' fear of failure is negatively related, associated with reducing innovative entrepreneurship. At the firm level, controlling for firms' size is positively related to a higher likelihood of innovative entrepreneurship. The country-level controls, GDP per capita, GDP growth and population growth are also significant and positively related to predicting innovative entrepreneurship. These findings agree with the theoretical framework presented in previous sections.

Model (2) introduces the predicting variable gender into the analysis. Hypothesis 1 formulates that female entrepreneurs leading new ventures would be more likely to introduce innovative entrepreneurship in their ventures. When testing the model specification on a sample that includes entrepreneurs in 106 countries worldwide, the results fail to reject hypothesis 1, indicating a higher likelihood of female entrepreneurs introducing innovative entrepreneurship. To assess the effect of gender on innovation, we refer to the results of this model. The findings indicate that new ventures led by female entrepreneurs are associated with a 4.6% higher likelihood of engaging in innovative entrepreneurship compared to those led by male entrepreneurs. Wald tests confirm the significance of this relation. The test for gender yields a chi-square value of 3419.82 ($p = 0.0000$), this means that being female (gender = 1) has a statistically significant effect on the likelihood of innovation.

The preceding discussion on entrepreneurial gender roles highlights equal entrepreneurial effectiveness when assessed by gender. As a result, a female entrepreneurial orientation that commonly involves a transformational leadership style, high communicational skills, constant gender-related challenges, and inspired by high-achieving role models might trace a path that leads them to achieve higher innovation. In addition, these characteristically female traits allow them to leverage knowledge and resources that facilitate innovative entrepreneurship.

Model (3), under this specification, the country-level variable finance institutions' depth development, accompanied by the control variables, are the focus of analysis. The results confirm hypothesis 2; countries with high financial institutions development might discourage innovative entrepreneurship; this relation is strongly negative and significant. Entrepreneurial innovation requires financial investment. Resources obtained as a loan from a bank—the most available source of financing from financial institutions—would hamper innovative initiatives since this is not the most suitable financing mechanism, given the loathsome requirements for credit. Difficulties financing innovative entrepreneurship relate to the application process, higher interest rates, payment inflexibility not according to business cycles, the complexity in assessing the risk related to the innovative idea and many other issues connected to the asymmetry of information involved in this type of financial transaction.

In the opposite direction, Model (4) shows all the control variables and financial markets depth development at the country level. This specification tests hypothesis 3 and fails to reject it. It evaluates if new venture innovation increases in countries with more developed financial markets. The main reason behind the positive effect of developing more evolved financial markets is that this direct intermediation process allows more flexibility in generating financial solutions that match the needs of the financial resource providers and the financial seekers, in this case, innovative new ventures.

To better understand the direct effects of the financial development variables, we examine the results from Models (3) and (4) using standardized variables. The findings show that a one standard deviation increase in financial institutions development (0.41) is associated with a 23.82% decrease in the likelihood of engaging in innovative entrepreneurship. In contrast, a one standard deviation increase in financial markets development (0.42) is linked to an 16.17% increase in the likelihood of innovative entrepreneurship. Wald tests confirm the significance of these effects. The test for financial institutions development yields a chi-square value of 9.93 ($p = 0.0016$), and for financial market development, a chi-square value of 10.81 ($p = 0.0010$).

Model (5) test hypothesis 4 and the interaction between an entrepreneur's gender and the development of financial institutions in the analysis. Consistent with Model (3), the direct effect of highly developed financial institutions negatively affects innovative entrepreneurship; however, this contextual variable enhances innovative female entrepreneurs. This result indicates that female entrepreneurs in countries with higher financial institutions development, their likelihood of presenting innovative entrepreneurship

is increased by 14%. To test this result, we perform Wald tests and confirm the significance of this interaction effect. The interaction of gender with financial institutions development yields a chi-square value of 5.97 ($p = 0.0145$). Since this p-value is less than the conventional significance level of 0.05, it provides strong evidence of the statistically significance of this interaction in predicting innovative entrepreneurship.

--- Insert Table 3 about here ---

Microfinance illustrates this apparent contradictory situation. In microfinance, different financial institutions allocate financial resources to often marginalized participants, such as low-income female entrepreneurs from emerging economies. Under this alternative, the lack of individual financial collateral to get a loan is covered by a rotating savings and credit association formed by a group of female entrepreneurs. Forming part of one of these solidarity groups acts as a mechanism of reputation and support in case one of the members fails to pay the credit, the rest of the group members will cover it (Lindvert et al., 2019). This kind of financial development facilitates access to financial resources for a group excluded from most financial institutions' resources.

Model (6) evaluates hypothesis 5 and the interaction between innovative female entrepreneurship and financial market depth development. The positive coefficient is explained as female entrepreneurs in countries with higher financial market development, present a 15% increase in their likelihood of presenting innovative entrepreneurship. Wald test indicates that the interaction effect between gender and financial market development on innovative entrepreneurship is statistically significant, with a chi-squared value of 9.60 and a p-value of 0.0019. The results insist on working on further developing financial mechanisms to foster innovation. In this sense, the direct relation is positive, and the interaction is also positive and significant. Therefore, enhancing financial markets should not be distant from the needs of female entrepreneurs. Furthermore, countries that have developed larger financial market structures have reduced the barriers to this predominantly male domain (Brush et al., 2019). This finding supports the findings of Model (4), financial markets development facilitates female access to financial resources, given that it could stimulate the match between investors and innovative ventures.

Model (7) contains all the control variables, the predictive variables explored, and the interactions among them. The results are consistent with the previous models except for the

interaction between the development of financial institutions and female entrepreneurs tested in hypothesis 4. From this, it can be highlighted that the alternative to enhancing innovative female entrepreneurship is more market development rather than more financial institutions.

Next, we plot the predicted margins of innovative entrepreneurship. In Figure 4, we illustrate the interaction effect of financial institutions' depth of development on the relationship between gender and innovative entrepreneurship. In Figure 5, we present the moderating effect of financial markets' depth of development on the same relationship.

--- Insert Figures 4 and 5 about here ---

4.3. Robustness check

We developed several additional tests to assess the robustness of our results. First, we decomposed the dependent variable, originally measured by jointly including three elements that indicate a level of innovation: the introduction of new products to the market, having few competitors, and utilizing the latest technology (Fuentelsaz et al., 2018; Hessels et al., 2008; Koellinger, 2008). We created three separate models to test these constructs independently. After running the multilevel models, we found that the results were consistent and supported all the stated hypotheses.

Second, we run the model without disaggregating the data of financial depth development into the variables "financial institutions" and "financial markets" but instead as a consolidated index indicator of a country's "financial development". The results show opposite effects of this variable acting as a direct dependent variable and a moderator. This contradictory effect confirms the relevance of analysing financial depth development from the two approaches, "financial institutions" and "financial markets", given that more developed financial institutions are negatively related to innovative entrepreneurship. In contrast, the opposite happens with financial markets. These results have been explained in this research, where high levels of financial institutions' depth development discourage innovative entrepreneurship, while high levels of financial market development enhance the likelihood of innovative entrepreneurship for female entrepreneurs. Therefore, each has a different effect on innovative entrepreneurship, an important finding when analysing a country's financial development. Similarly, we explore the relationship between financial institutions and financial market development, expressing them as a relational ratio. The regression results show that this ratio is negatively related to innovative entrepreneurship and

the moderating effect is also negative, signaling that significant gaps in the depth development of these two mechanisms counter innovative entrepreneurship.

Third, we also run the model on the different components of financial institutions and financial markets captured by the IMF, its development measures (Svirydzenka, 2016) in terms of depth, access, efficiency and an aggregated of the three. The results show the relevance of exploring financial depth development and its relationship with new venture innovation over a similar relation with financial access or financial efficiency.

Finally, we run a logit model to evaluate the consistency of the findings, which are the same for gender, financial institutions and financial markets. However, this type of modelling does not account for embedded factors entrepreneurs share for developing their activities in a specific country. All robustness tests are available upon request.

5. Discussion

5.1 Contributions and implications

Innovative entrepreneurs are desirable individuals for an economy because of the disruptive breakthroughs they introduce to markets (Acs, 2008; Baumol, 2010; Darnihamedani et al., 2018). Furthermore, innovation is essential because it acts as the engine that fosters long-term economic growth and improvements in a society's welfare (Davidsson et al., 2006; Mayhew et al., 2016).

We began this study by including gender in the analysis of innovative entrepreneurship. Then, we attend academic remarks for more analysis of gender interaction with their context (Ahl and Marlow, 2012; Marlow and Martinez Dy, 2018) by considering the direct and indirect effects of financial depth development. Results suggest a higher likelihood of introducing some innovation by female entrepreneurs than male entrepreneurs. Furthermore, at the country level, contexts with a higher market depth development encourage innovative entrepreneurship, while deepened financial institutions weaken the likelihood of developing some novelty.

By exploring female-led innovative entrepreneurs, we find similarities with other studies analysing gender roles and innovation. Female entrepreneurs, or as examined in other studies, female technical officers, female managers, and female board directors add a higher likelihood of firms' achieving innovation (Cowling et al., 2020; Foss et al., 2022; Wu et al., 2021). Some of the explanations for this situation involve female gender role construction. A transformational leadership style (Wu et al., 2021), common among female entrepreneurs,

explains how by inspiring collaborative work and encouraging different perspectives analysis, female entrepreneurs prioritize transformation achievement that, in many cases, facilitates innovation. Not only that, by exploring entrepreneurs from different countries around the world, we capture information about diverse entrepreneurial backgrounds. However, existing literature outstands a universal type of female entrepreneurial role model. This portrayal might serve as a reference to other women entrepreneurs, indicating that the way to overcome existing gender-related obstacles is by trying their best, that successful female entrepreneurs have to be overachievers (Byrne et al., 2019). This depiction might inspire some women entrepreneurs to find ways to differentiate themselves from other businesses to achieve success. As a result, in their way of overcoming obstacles, some female entrepreneurs would define their track toward innovation. Gender-related constraints might also explain how searching for alternative resources (Devine et al., 2019; Foss et al., 2022) enhances their likelihood of discovering new developments to introduce in markets. This mechanism to face adversity might assist them in looking for new methods, products/services, and ways of doing things.

Although we find significant differences in the likelihood of introducing innovation between female and male entrepreneurs, we identify that these differences are slender but provide a glimpse into how some female characteristically behaviours could promote innovation. However, the financial context can substantially affect innovative entrepreneurship, directly and indirectly. We state the urgency for better-fitted financial alternatives for innovative ventures, and we find evidence that financial contexts development from its two intermediation mechanisms can provide some answers.

We identified that countries with more profound financial institutions configurations hamper innovative entrepreneurship. We do not suggest reducing this sector's participation but channelling the financial resources differently. Acting as risk transfer specialists, they could further specialize in bank credits that adjust better to innovative small firms. We also make a special call to venture capitalists since resources to firms are disproportionally channelled by bank credits and less by venture capital (Davis, 2003). Having more venture capital specialists evaluating riskier business opportunities to fund might impulse innovative new ventures while reducing gender-biased decisions (Balachandra et al., 2019).

On the market-based financing alternatives, we also identified that further developments could enhance innovative entrepreneurship and reduce gender biases. Some potential solutions we provided arise from bigger and more liquid financial contexts. In those, we observe developments such as second-tier listings for small businesses, a boost among

financial technologies like crowdfunding (Farrell et al., 2022), and business angels syndicates (Cumming et al., 2019), among other financial solutions.

The implications for further financial development to encourage innovative entrepreneurship and reduce constraints among its participants involve work from all its members. Policymakers' involvement requires their understanding of new venture financing needs to update or, when required, introduce regulations that foster financial development, whether directly or indirectly. Regulation can also assist in developing mechanisms that reduce any bias related to gender. We have also observed the importance of having a more congruous development balance between financial institutions and markets. These two complement each other, but when in a context, one of them has a more intense concentration, it might dominate the financial system (Canh and Thanh, 2020), negatively affecting the conditions for some of its participants, as is the case of innovative ventures. Policymakers can also encourage participation in a less developed financial market by setting incentives and reducing entry costs for small firms. They can also create stimulating conditions for investors' interest in small firms.

On the side of the financial specialists, we highlight their role in continuously working on engineering financial developments that adjust better to small firms and generate more inclusion among the participants. Moreover, some advances in this field highlight the critical task of new technologies merging with finance (Cumming et al., 2019).

A financial context with more experienced investors is also critical for reducing gender biases and fostering innovative entrepreneurship. Savvy investors equipped with the skills to identify and support innovative opportunities can help drive the proliferation of successful firms. These investors play a crucial role in demanding a broader range of financing alternatives, moving beyond traditional bank credit to include equity-based financing and venture capital. In high-cost economies, this is especially important, as lending criteria and risk-aversion tendencies in financial institutions often favour established firms over new ventures, inadvertently stifling innovation, particularly for female entrepreneurs.

Moreover, enhancing financial market depth in high-cost economies can support the development of secondary markets for innovative ventures, such as second-tier stock exchanges, which provide liquidity and growth opportunities for smaller, innovation-driven firms. By fostering these markets, the financial burden on traditional institutions is reduced, and the entrepreneurial ecosystem is strengthened through broader access to capital. This environment allows for more experimentation and risk-taking, which are essential for fostering innovation.

Entrepreneurs themselves have a significant role to play in this ecosystem. To improve their chances of securing better financing options, they should engage in thorough financial planning, including clear business plans, transparent financial statements, and a solid understanding of their firm's valuation. This proactive approach will not only help them present themselves more effectively to investors but also increase their likelihood of accessing the financial products that best suit their needs.

Finally, researchers should continue exploring how tailored financial solutions can alleviate gender-specific barriers and promote a more inclusive entrepreneurial ecosystem. Expanding financial development to accommodate riskier, innovative firms can create a more dynamic and supportive environment for entrepreneurship, which is particularly crucial in high-cost economies where innovation is a key driver of economic growth.

5.2 Limitations and further research

An essential part of the study insisted on considering entrepreneurial gender differences as a social construction (Bettio and Verashchagina, 2008) to better understand certain female behaviours in innovative entrepreneurship; therefore, we encourage further research contrasting information related to leadership styles, managerial styles, entrepreneurial role models and firms' internal innovative processes. In addition, it could be beneficial to analyse further the type of technology employed by the innovative venture.

It is also relevant to highlight that innovation was measured by the entrepreneurs' responses to innovation-related questions. Thus, combining the analysis with other innovation metrics unrelated to the entrepreneurs' responses could broaden the findings.

Throughout the study, it has been observed that credit obtained from financial institutions is not considered the most suitable financing mechanism for promoting innovative projects. A deeper study on this area would assist in getting a better understanding of the debt financial sector as a determinant of new venture innovation. With the negative relation identified, it would be helpful to recognise financial institutions' elements that reduce innovative entrepreneurship and how they could be improved to enhance it (Miglo, 2022). For example, it would be interesting to test if commercial credits have the same effect as policy-driven credits fostering entrepreneurship, such as productive state loans. A cross-country analysis investigating venture capital enhancement could confirm their role in promoting innovative ventures.

The indirect effect of financial markets over gender as predictors of innovative entrepreneurship could also be further explored and amplified. Policymakers could benefit from specific actions to facilitate female entrepreneurs' immersion into financial markets. In this sense, recent developments in financial markets could be analysed, such as crowdfunding (Estrin et al., 2018; Kleinert et al., 2020), alternative stock markets especially designed for small businesses (Colombelli, 2010), and other financial engineering mechanisms that could facilitate the match between investors and innovative new ventures.

5.3 Conclusion

This study highlights how female traits might increase the likelihood of innovative entrepreneurship. It also emphasizes the importance of improving financial development structures for innovative ventures. The study contributes by including gender in the discussion of innovative entrepreneurship while insisting on developing financial structures that better fit innovative new ventures. The findings suggest that financial development should consider the characteristics of innovative entrepreneurship since many of the current structures limit it. However, the study proposes that creating an environment that nurtures innovative entrepreneurship is possible by implementing tailored financial support through financial institutions or market-based mechanisms. These developments are particularly significant for individuals traditionally facing greater financing challenges, such as innovative female entrepreneurs.

References

Acs ZJ (2008) Foundations of high impact entrepreneurship. *Foundations and Trends in Entrepreneurship* 4(6). Now Publishers Inc: 535–620. DOI: 10.1561/0300000025.

Agarwal R, Audretsch D and Sarkar MB (2007) The process of creative construction: knowledge spillovers, entrepreneurship, and economic growth. *Strategic Entrepreneurship Journal* 1(3–4). Wiley Online Library: 263–286. DOI: 10.1002/sej.36.

Ahl H and Marlow S (2012) Exploring the dynamics of gender, feminism and entrepreneurship: advancing debate to escape a dead end? *Organization* 19(5). Sage Publications Sage UK: London, England: 543–562. DOI: 10.1177/1350508412448695.

Ahl H and Nelson T (2015) How policy positions women entrepreneurs: A comparative analysis of state discourse in Sweden and the United States. *Journal of Business Venturing* 30(2). Elsevier: 273–291. DOI: 10.1016/j.jbusvent.2014.08.002.

Aidis R and Weeks J (2016) Mapping the gendered ecosystem: The evolution of measurement tools for comparative high-impact female entrepreneur development. *International Journal of Gender and Entrepreneurship*. Emerald Group Publishing Limited. DOI: 10.1108/IJGE-12-2015-0044.

Ali A, Kelley DJ and Levie J (2020) Market-driven entrepreneurship and institutions. *Journal of Business Research* 113. Elsevier: 117–128. DOI: 10.1016/j.jbusres.2019.03.010.

Alimov A (2019) Intellectual property rights reform and the cost of corporate debt. *Journal of International Money and Finance* 91. Elsevier: 195–211. DOI: 10.1016/j.jimonfin.2018.12.004.

Allen F and Santomero AM (1997) The theory of financial intermediation. *Journal of banking & finance* 21(11–12). Citeseer: 1461–1485. DOI: 10.1016/S0378-4266(97)00032-0.

Alsos GA, Ljunggren E and Hytti U (2013) Gender and innovation: state of the art and a research agenda. *International Journal of gender and Entrepreneurship* 5(3). Emerald Group Publishing Limited: 236–256. DOI: 10.1108/IJGE-06-2013-0049.

Alventosa A, Gómez Y, Martinez-Molés V, et al. (2016) Location and innovation optimism: a behavioral-experimental approach. *Journal of the Knowledge Economy* 7(4). Springer: 890–904. DOI: 10.1007/s13132-015-0291-2.

Aparicio S, Urbano D and Audretsch D (2016) Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological forecasting and social change* 102. Elsevier: 45–61. DOI: 10.1016/j.techfore.2015.04.006.

Audretsch DB, Belitski M and Brush C (2022) Innovation in women-led firms: an empirical analysis. *Economics of Innovation and New Technology* 31(1–2). Taylor & Francis: 90–110. DOI: 10.1080/10438599.2020.1843992.

Autio E, Kenney M, Mustar P, et al. (2014) Entrepreneurial innovation: The importance of context. *Research Policy* 43(7). Elsevier: 1097–1108. DOI: 10.1016/j.respol.2014.01.015.

Balachandra L, Briggs T, Eddleston K, et al. (2019) Don't pitch like a girl!: How gender stereotypes influence investor decisions. *Entrepreneurship Theory and Practice* 43(1). SAGE Publications Sage CA: Los Angeles, CA: 116–137. DOI:

10.1177/1042258717728028.

Ball R, Robin A and Sadka G (2008) Is financial reporting shaped by equity markets or by debt markets? An international study of timeliness and conservatism. *Review of accounting studies* 13(2–3). Springer: 168–205. DOI: 10.1007/s11142-007-9064-x.

Bates T (2003) Restricted access to markets characterizes women-owned businesses. *Journal of Business Venturing* 17(4). Elsevier: 313–324. DOI: 10.1016/S0883-9026(00)00066-5.

Bats J V and Houben ACFJ (2020) Bank-based versus market-based financing: implications for systemic risk. *Journal of Banking & Finance* 114. Elsevier: 105776. DOI: 10.1016/j.jbankfin.2020.105776.

Baumol WJ (2010) *The Microtheory of Innovative Entrepreneurship*. Princeton University Press. DOI: 10.1515/9781400835225.

Bellavitis C, Fisch C and McNaughton RB (2022) COVID-19 and the global venture capital landscape. *Small Business Economics* 59(3): 781–805. DOI: 10.1007/s11187-021-00547-9.

Berger AN and Udell GF (1998) The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of banking & finance* 22(6–8). Elsevier: 613–673. DOI: 10.1016/S0378-4266(98)00038-7.

Bettio F and Verashchagina A (2008) *Frontiers in the Economics of Gender*. Routledge.

Bjørnskov C and Foss N (2013) How strategic entrepreneurship and the institutional context drive economic growth. *Strategic Entrepreneurship Journal* 7(1). Wiley Online Library: 50–69. Available at: https://doi.org/10.1002/sej.1148.

Block JH, Fisch CO and Van Praag M (2017) The Schumpeterian entrepreneur: a review of the empirical evidence on the antecedents, behaviour and consequences of innovative entrepreneurship. *Industry and Innovation* 24(1). Taylor & Francis: 61–95. DOI: 10.1080/13662716.2016.1216397.

Block JH, Fisch CO, Obschonka M, et al. (2019) A personality perspective on business angel syndication☆. *Journal of Banking & Finance* 100. Elsevier: 306–327. DOI: 10.1016/j.jbankfin.2018.10.006.

Block JH, Groh A, Hornuf L, et al. (2021) The entrepreneurial finance markets of the future: a comparison of crowdfunding and initial coin offerings. *Small Business Economics* 57(2). Springer: 865–882. DOI: 10.1007/s11187-020-00330-2.

Botev J, Égert B and Jawadi F (2019) The nonlinear relationship between economic growth and financial development: Evidence from developing, emerging and advanced economies. *International Economics* 160. Elsevier: 3–13. DOI: 10.1016/j.inteco.2019.06.004.

Boudreaux CJ, Nikolaev BN and Klein P (2019) Socio-cognitive traits and entrepreneurship: The moderating role of economic institutions. *Journal of Business Venturing* 34(1): 178–196. DOI: 10.1016/j.jbusvent.2018.08.003.

Bradley SW, Kim PH, Klein PG, et al. (2021) Policy for Innovative Entrepreneurship: Institutions, interventions, and societal challenges. *Strategic Entrepreneurship Journal* 15(2). Wiley Online Library: 167–184. DOI: 10.1002/sej.1395.

Brealey RA (2001) *Fundamentals of Corporate Finance*. McGraw Hill.

Brown R, Mawson S, Rowe A, et al. (2018) Working the crowd: Improvisational entrepreneurship and equity crowdfunding in nascent entrepreneurial ventures.

International Small Business Journal 36(2). SAGE Publications Sage UK: London, England: 169–193. DOI: 10.1177/0266242617729743.

Brown R, Liñares-Zegarra JM and Wilson JOS (2022) Innovation and borrower discouragement in SMEs. *Small Business Economics* 59(4): 1489–1517. DOI: 10.1007/s11187-021-00587-1.

Brush C, Carter N, Gatewood E, et al. (2004) *Clearing the Hurdles: Women Building High-Growth Businesses*. Prentice-Hall, Upper Saddle River, NJ.

Brush C, Edelman LF, Manolova T, et al. (2019) A gendered look at entrepreneurship ecosystems. *Small Business Economics* 53(2). Springer: 393–408. DOI: 10.1007/s11187-018-9992-9.

Bullough A, Guelich U, Manolova TS, et al. (2022) Women's entrepreneurship and culture: gender role expectations and identities, societal culture, and the entrepreneurial environment. *Small Business Economics* 58. Springer: 958–996. DOI: 10.1007/s11187-020-00429-6.

Byrne J, Fattoum S and Diaz Garcia MC (2019) Role models and women entrepreneurs: Entrepreneurial superwoman has her say. *Journal of Small Business Management* 57(1). Wiley Online Library: 154–184. DOI: 10.1111/jsbm.12426.

Cainelli G, Giannini V and Iacobucci D (2020) Small firms and bank financing in bad times. *Small Business Economics* 55(4). Springer: 943–953. DOI: 10.1007/s11187-019-00164-7.

Canh NP and Thanh SD (2020) Financial development and the shadow economy: A multi-dimensional analysis. *Economic Analysis and Policy* 67. Elsevier: 37–54. DOI: 10.1016/j.eap.2020.05.002.

Capelleras JL, Contin-Pilart I, Larraza-Kintana M and Martin-Sanchez, V. (2019) Entrepreneurs' human capital and growth aspirations: The moderating role of regional entrepreneurial culture. *Small Business Economics* 52(1). Springer: 3–25. DOI: 10.1007/s11187-017-9985-0.

Carpenter RE and Petersen BC (2002) Capital market imperfections, high-tech investment, and new equity financing. *The Economic Journal* 112(477). Oxford University Press Oxford, UK: F54--F72. DOI: 10.1111/1468-0297.00683.

Carpentier C and Suret J-M (2012) Entrepreneurial equity financing and securities regulation: An empirical analysis. *International Small Business Journal* 30(1). Sage Publications Sage UK: London, England: 41–64. DOI: 10.1177/0266242610383790.

Carter NM and Williams ML (2003) Comparing social feminism and liberal feminism: The case of new firm growth. *New perspectives on women entrepreneurs*. Information Age Publishing Greenwich, CT: 25–50.

Chen J, Chang AY and Bruton G (2017) Microfinance: Where are we today and where should the research go in the future? *International Small Business Journal* 35(7). SAGE Publications Sage UK: London, England: 793–802. DOI: 10.1177/0266242617717380.

Chen MA, Wu Q and Yang B (2019) How valuable is FinTech innovation? *The Review of Financial Studies* 32(5). Oxford University Press: 2062–2106. DOI: 10.1093/rfs/hhy130.

Chung, D., Jung, H., and Lee, Y. (2022). Investigating the relationship of high-tech entrepreneurship and innovation efficacy: The moderating role of absorptive capacity. *Technovation, 111,* 102393.

Coad A and Rao R (2008) Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research policy* 37(4). Elsevier: 633–648. DOI: 10.1016/j.respol.2008.01.003.

Coleman S and Robb A (2012) Gender-based firm performance differences in the United States: Examining the roles of financial capital and motivations. In: *Global Women's Entrepreneurship Research*. Edward Elgar Publishing.

Colombelli A (2010) Alternative investment market: a way to promote entrepreneurship. *Journal of Industry, Competition and Trade* 10(3). Springer: 253–274. DOI: 10.1007/s10842-010-0079-9.

Colombo MG, Croce A and Murtinu S (2014) Ownership structure, horizontal agency costs and the performance of high-tech entrepreneurial firms. *Small Business Economics* 42(2). Springer: 265–282. DOI: 10.1007/s11187-013-9483-y.

Cosh A, Cumming D and Hughes A (2009) Outside enterpreneurial capital. *The Economic Journal* 119(540). Oxford University Press Oxford, UK: 1494–1533. DOI: 10.1111/j.1468-0297.2009.02270.x.

Covin JG and Wales WJ (2019) Crafting high-impact entrepreneurial orientation research: Some suggested guidelines. *Entrepreneurship theory and practice* 43(1). SAGE Publications Sage CA: Los Angeles, CA: 3–18. DOI: 10.1177/1042258718773181.

Cowling M, Marlow S, and Liu W (2020) Gender and bank lending after the global financial crisis: are women entrepreneurs safer bets? *Small Business Economics* 55(4). Springer: 853–880. DOI: 10.1007/s11187-019-00168-3.

Crane SR (2022) Entrepreneurship and economic growth: does gender matter? *International Journal of Gender and Entrepreneurship* 14(1). Emerald Publishing Limited: 3–25. DOI: 10.1108/IJGE-04-2021-0056.

Cumming D, Deloof M, Manigart S, et al. (2019) New directions in entrepreneurial finance. *Journal of Banking & Finance* 100. Elsevier: 252–260. DOI: 10.1016/j.jbankfin.2019.02.008.

Damodaran A (2010) *Applied Corporate Finance*. John Wiley & Sons.

Darnihamedani P, Block JH, Hessels J, et al. (2018) Taxes, start-up costs, and innovative entrepreneurship. *Small Business Economics* 51(2). Springer: 355–369. DOI: 10.1007/s11187-018-0005-9.

Datta S, Doan T and Toscano F (2021) Top executive gender, board gender diversity, and financing decisions: Evidence from debt structure choice. *Journal of Banking \& Finance* 125. Elsevier: 106070. DOI: 10.1016/j.jbankfin.2021.106070.

Davidsson P, Delmar F and Wiklund J (2006) *Entrepreneurship and the Growth of Firms*. Cheltenham: Cheltenham: Edward Elgar Publishing. DOI: 10.4337/9781781009949.

Davis C (2003) Venture capital in Canada. In: *The Growth of Venture Capital: A Cross-Cultural Comparison*, pp. 175–206.

Dawson C and Henley A (2015) Gender, risk, and venture creation intentions. *Journal of Small Business Management* 53(2). Taylor \& Francis: 501–515. DOI: 10.1111/jsbm.12080.

De Bettignies J-E and Brander JA (2007) Financing entrepreneurship: Bank finance versus venture capital. *Journal of Business Venturing* 22(6): 808–832. DOI: 10.1016/j.jbusvent.2006.07.005.

De Clercq D, Lim DSK and Oh CH (2013) Individual-level resources and new business activity: The contingent role of institutional context. *Entrepreneurship Theory and Practice* 37(2). SAGE Publications Sage CA: Los Angeles, CA: 303–330. DOI: 10.1111/j.1540-6520.2011.00470.x.

Devine RA, Molina-Sieiro G, Holmes Jr. RM, et al. (2019) Female-Led high-growth: Examining the role of human and financial resource management. *Journal of Small Business Management* 57(1). Taylor \& Francis: 81–109. DOI: 10.1111/jsbm.12492.

Doerr S (2021) Stress tests, entrepreneurship, and innovation. *Review of Finance* 25(5). Oxford University Press: 1609–1637. DOI: 10.1093/rof/rfab007.

Du Rietz A and Henrekson M (2000) Testing the female underperformance hypothesis. *Small Business Economics* 14(1). Springer: 1–10. DOI: 10.1023/A:1008106215480.

Elliott C, Mavriplis C and Anis H (2020) An entrepreneurship education and peer mentoring program for women in STEM: mentors' experiences and perceptions of entrepreneurial self-efficacy and intent. *International Entrepreneurship and Management Journal* 16(1). Springer: 43–67. DOI: 10.1007/s11365-019-00624-2.

Ely RJ and Meyerson DE (2000) Advancing gender equity in organizations: The challenge and importance of maintaining a gender narrative. *Organization* 7(4). Sage Publications Sage CA: Thousand Oaks, CA: 589–608.

Estrin S and Mickiewicz T (2011) Institutions and female entrepreneurship. *Small business economics* 37(4). Springer: 397. DOI: 10.1007/s11187-011-9373-0.

Estrin S, Korosteleva J and Mickiewicz T (2013) Which institutions encourage entrepreneurial growth aspirations? *Journal of business venturing* 28(4). Elsevier: 564–580. DOI: 10.1016/j.jbusvent.2012.05.001.

Estrin S, Mickiewicz T and Stephan U (2016) Human capital in social and commercial entrepreneurship. *Journal of Business Venturing* 31(4). Elsevier: 449–467. DOI: 10.1016/j.jbusvent.2016.05.003.

Estrin S, Mickiewicz T and Rebmann A (2017) Prospect theory and the effects of bankruptcy laws on entrepreneurial aspirations. *Small Business Economics* 48(4). Springer: 977–997. DOI: 10.1007/s11187-016-9810-1.

Estrin S, Gozman D and Khavul S (2018) The evolution and adoption of equity crowdfunding: entrepreneur and investor entry into a new market. *Small Business Economics* 51(2). Springer: 425–439. DOI: 10.1007/s11187-018-0009-5.

Estrin S, Korosteleva J and Mickiewicz TM (2019) Schumpeterian entry: innovation, exporting, and growth aspirations of entrepreneurs. In: *Academy of Management Proceedings*, 2019, p. 17308. DOI: 10.5465/AMBPP.2019.149.

Faccio M, Marchica M-T and Mura R (2016) CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of corporate finance* 39. Elsevier: 193–209. DOI: 10.1016/j.jcorpfin.2016.02.008.

Farrell M, Green TC, Jame R, et al. (2022) The democratization of investment research and the informativeness of retail investor trading. *Journal of Financial Economics* 145(2). Elsevier: 616–641. DOI: 10.1016/j.jfineco.2021.07.018.

Feser EJ (2003) What regions do rather than make: A proposed set of knowledge-based occupation clusters. *Urban Studies* 40(10). Sage Publications Sage UK: London, England: 1937–1958. DOI: 10.1080/0042098032000116059.

Fischer EM, Reuber AR and Dyke LS (1993) A theoretical overview and extension of research on sex, gender, and entrepreneurship. *Journal of business venturing* 8(2). Elsevier: 151–168. DOI: 10.1016/0883-9026(93)90017-Y.

Foss L, Henry C, Ahl H, et al. (2019) Women's entrepreneurship policy research: a 30-year review of the evidence. *Small Business Economics* 53(2). Springer: 409–429. DOI: 10.1007/s11187-018-9993-8.

Foss N, Lee PM, Murtinu S, et al. (2022) The XX factor: Female managers and innovation in a cross-country setting. *The Leadership Quarterly* 33(3). Elsevier: 101537. DOI: 10.1016/j.leaqua.2021.101537.

Freel MS (2007) Are small innovators credit rationed? *Small Business Economics* 28(1). Springer: 23–35. DOI: 10.1007/s11187-005-6058-6.

Fuentelsaz L, Maicas JP and Montero J (2018) Entrepreneurs and innovation: The contingent role of institutional factors. *International Small Business Journal* 36(6): 686–711. DOI: 10.1177/0266242618766235.

Ganbaatar B and Douglas EJ (2019) Developing a Valid and Reliable Measure of Product Innovativeness for Entrepreneurship Research. *Journal of Small Business Management* 57((S2)). Wiley Online Library: 530–554. DOI: 10.1111/jsbm.12504.

Gompers P (1995) Optimal investment, monitoring, and the staging of venture capital. *The journal of finance* 50(5). Wiley Online Library: 1461–1489. DOI: 10.2307/2329323.

Gompers P and Lerner J (2001) The venture capital revolution. *Journal of economic perspectives* 15(2): 145–168. DOI: 10.1257/jep.15.2.145.

Griffiths MD, Gundry LK and Kickul JR (2013) The socio-political, economic, and cultural determinants of social entrepreneurship activity: An empirical examination. *Journal of Small Business and Enterprise Development* 20(2). Emerald Group Publishing Limited: 341–357. DOI: 10.1108/14626001311326761.

Guerrero M, Amorós JE and Urbano D (2021) Do employees' generational cohorts influence corporate venturing? A multilevel analysis. *Small Business Economics* 57(1): 47–74. DOI: 10.1007/s11187-019-00304-z.

Gupta VK, Turban DB, Wasti SA, et al. (2009) The role of gender stereotypes in perceptions of entrepreneurs and intentions to become an entrepreneur. *Entrepreneurship theory and practice* 33(2). SAGE Publications Sage CA: Los Angeles, CA: 397–417. DOI: 10.1111/j.1540-6520.2009.00296.x.

Guzman J and Kacperczyk AO (2019) Gender gap in entrepreneurship. *Research Policy* 48(7). Elsevier: 1666–1680. DOI: 10.1016/j.respol.2019.03.012.

Hair JF, Black WC, Babin BJ, et al. (2014) *Multivariate Data Analysis*. 7th ed. Essex: Pearson Education Limited.

Hall BH (2002) The financing of research and development. *Oxford review of economic policy* 18(1). Oxford University Press: 35–51. DOI: 10.1093/oxrep/18.1.35.

Hallward-Driemeier M (2011) *Strengthening women's entrepreneurship*. *Africa Competitiveness Report*.

Harrison RT, Botelho T and Mason C (2020) Women on the edge of a breakthrough? A stereotype threat theory of women's angel investing. *International Small Business Journal* 38(8). Sage Publications Sage UK: London, England: 768–797. DOI: 10.1177/0266242620927312.

Hechavarria D, Bullough A, Brush C, et al. (2019) High-growth women's entrepreneurship: Fueling social and economic development. *Journal of Small Business Management* 57(1). Taylor \& Francis: 5–13. DOI: 10.1111/jsbm.12503.

Hellmann T, Schure P and Vo D (2021) Angels and venture capitalists: Substitutes or complements? *Journal of Financial econnomics* 141(2): 454–478. DOI: 10.1016/j.jfineco.2021.04.001.

Henry C, Foss L, Fayolle A, et al. (2015) Entrepreneurial leadership and gender: Exploring theory and practice in global contexts. *Journal of Small Business Management* 53(3). Taylor & Francis: 581–586. DOI: 10.1111/jsbm.12174.

Hessels J and Van Stel A (2011) Entrepreneurship, export orientation, and economic growth. *Small business economics* 37(2). Springer: 255–268. DOI: 10.1007/s11187-009-9233-3.

Hessels J, Van Gelderen M and Thurik R (2008) Entrepreneurial aspirations, motivations, and their drivers. *Small business economics* 31(3). Springer: 323–339.

Hirsch J and Walz U (2019) The financing dynamics of newly founded firms. *Journal of Banking & Finance* 100. Elsevier: 261–272. DOI: 10.1016/j.jbankfin.2018.11.009.

Ho C-Y, Huang S, Shi H, et al. (2018) Financial deepening and innovation: The role of political institutions. *World Development* 109. Elsevier: 1–13. DOI: 10.1016/j.worlddev.2018.02.022.

Hogan T, Hutson E and Drnevich P (2017) Drivers of external equity funding in small high-tech ventures. *Journal of Small Business Management* 55(2). Taylor \& Francis: 236–253. DOI: 10.1111/jsbm.12270.

Honjo Y and Kurihara K (2022) Graduation of initial public offering firms from junior stock markets: evidence from the Tokyo Stock Exchange. *Small Business Economics*. Springer: 1–29. DOI: 10.1007/s11187-022-00615-8.

Humbert AL and Drew E (2010) Gender, entrepreneurship and motivational factors in an Irish context. *International Journal of Gender and Entrepreneurship* 2(2). Emerald Group Publishing Limited: 173–196. DOI: 10.1108/17566261011051026.

International Monetary Fund (2020) Financial Development Index.

Isenberg D (2011) The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. *Presentation at the Institute of International and European Affairs* 1: 13.

Jennings J and Brush C (2013) Research on women entrepreneurs: challenges to (and from) the broader entrepreneurship literature? *Academy of Management Annals* 7(1). Routledge: 663–715. DOI: 10.1080/19416520.2013.782190.

Jensen MC and Meckling WH (1976) Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics* 3(4). Elsevier: 305–360. DOI: 10.1016/0304-405X(76)90026-X.

Johnsen GJ and McMahon RGP (2005) Owner-manager gender, financial performance and business growth amongst SMEs from Australia's business longitudinal survey. *International Small Business Journal* 23(2). Sage Publications: 115–142. DOI: 10.1177/0266242605050509.

Kanze D, Huang L, Conley MA, et al. (2018) We ask men to win and women not to lose: Closing the gender gap in startup funding. *Academy of Management Journal* 61(2). Academy of Management Briarcliff Manor, NY: 586–614. DOI:

10.5465/amj.2016.1215.

Kanze D, Conley MA, Okimoto TG, et al. (2020) Evidence that investors penalize female founders for lack of industry fit. *Science advances* 6(48). American Association for the Advancement of Science: 1–10. DOI: 10.1126/sciadv.abd7664.

Kelley DJ, Baumer BS, Brush C, et al. (2017) Women's entrepreneurship 2016/2017 report. *Global Entrepreneurship Research Association. Available online at http://gemconsortium. org/, checked on* 9(19): 2017.

Kleinert S, Volkmann C and Grünhagen M (2020) Third-party signals in equity crowdfunding: the role of prior financing. *Small Business Economics* 54(1). Springer: 341–365. DOI: 10.1007/s11187-018-0125-2.

Knyazeva A (2019) Financial innovation in microcap public offerings. *Journal of Banking & Finance* 100. Elsevier: 283–305. DOI: 10.1016/j.jbankfin.2018.06.012.

Koellinger P (2008) Why are some entrepreneurs more innovative than others? *Small Business Economics* 31(1). Springer: 21–37. DOI: 10.1007/s11187-008-9107-0.

Koellinger P (2009) Entrepreneurship and the Business Cycle. Tinbergen Institute Discussion Paper, TI 2009-032/3. Erasmus School of Economics, Erasmus University Rotterdam: EIM Business and Policy Research.

Kuschel K, Ettl K, Díaz-García C, et al. (2020) Stemming the gender gap in STEM entrepreneurship-insights into women's entrepreneurship in science, technology, engineering and mathematics. *International entrepreneurship and management journal* 16(1). Springer: 1–15. DOI: 10.1007/s11365-020-00642-5.

Lahiri A and Wadhwa A (2021) When do serial entrepreneurs found innovative ventures? Evidence from patent data. *Small Business Economics* 57(4). Springer: 1973–1993. DOI: 10.1007/s11187-020-00390-4.

Lindvert M, Patel PC, Smith C, et al. (2019) Microfinance traps and relational exchange norms: A field study of women entrepreneurs in Tanzania. *Journal of Small Business Management* 57(1). Wiley Online Library: 230–254. DOI: 10.1111/jsbm.12407.

Link AN and van Hasselt M (2020) Exploring the impact of R&D on patenting activity in small women-owned and minority-owned entrepreneurial firms. *Small Business Economics* 54(4). Springer: 1061–1066. DOI: 10.1007/s11187-018-00130-9.

Love JH and Roper S (2015) SME innovation, exporting and growth: A review of existing evidence. *International small business journal* 33(1). Sage Publications Sage UK: London, England: 28–48. DOI: 10.1177/0266242614550190.

Low SA and Isserman AM (2015) Where are the innovative entrepreneurs? Identifying innovative industries and measuring innovative entrepreneurship. *International Regional Science Review* 38(2). SAGE Publications Sage CA: Los Angeles, CA: 171–201. DOI: 10.1177/0160017613484926.

Malerba F and McKelvey M (2020) Knowledge-intensive innovative entrepreneurship integrating Schumpeter, evolutionary economics, and innovation systems. *Small Business Economics* 54(2). Springer: 503–522. DOI: 10.1007/s11187-018-0060-2.

Markowska M, Ahl H and Naldi L (2022) Timeout: The Role of Family-Friendly Policies in Business Start-Up Among Mothers. *Entrepreneurship Theory and Practice* 0(0). Sage Publications Sage CA: Los Angeles, CA. DOI: 10.1177/10422587221126493.

Marlow S and Martinez Dy A (2018) Annual review article: Is it time to rethink the gender

agenda in entrepreneurship research? *International Small Business Journal* 36(1). SAGE Publications Sage UK: London, England: 3–22. DOI: 10.1177/0266242617738321.

Marlow S and McAdam M (2012) Analyzing the influence of gender upon high-technology venturing within the context of business incubation. *Entrepreneurship Theory and Practice* 36(4). SAGE Publications Sage CA: Los Angeles, CA: 655–676. DOI: 10.1111/j.1540-6520.2010.00431.x.

Marlow S and McAdam M (2015) Incubation or induction? Gendered identity work in the context of technology business incubation. *Entrepreneurship theory and practice* 39(4). SAGE Publications Sage CA: Los Angeles, CA: 791–816. DOI: 10.1111/etap.12062.

Martin L, Wright L, Beaven Z, et al. (2015) An unusual job for a woman? Female entrepreneurs in scientific, engineering and technology sectors. *International Journal of Entrepreneurial Behavior \& Research* 21(4). Emerald Group Publishing Limited: 539–556. DOI: 10.1108/IJEBR-08-2011-0095.

Mayhew MJ, Simonoff JS, Baumol WJ, et al. (2016) Cultivating innovative entrepreneurs for the twenty-first century: A study of US and German students. *The Journal of Higher Education* 87(3). Taylor & Francis: 420–455. DOI: 10.1080/00221546.2016.11777408.

McKelvie A, Brattström A and Wennberg K (2017) How young firms achieve growth: reconciling the roles of growth motivation and innovative activities. *Small Business Economics* 49(2). Springer: 273–293. DOI: 10.1007/s11187-017-9847-9.

Mickiewicz T, Hart M, Nyakudya F, et al. (2019) Ethnic pluralism, immigration and entrepreneurship. *Regional Studies* 53(1). Routledge: 80–94. DOI: 10.1080/00343404.2017.1405157.

Miglo A (2022) Crowdfunding and bank financing: substitutes or complements? *Small Business Economics* 59(3): 1115–1142. DOI: 10.1007/s11187-021-00571-9.

Modigliani F and Miller MH (1958) The cost of capital, corporation finance and the theory of investment. *The American economic review* 48(3). JSTOR: 261–297. Available at: https://www.jstor.org/stable/1809766.

Muehlenhard CL and Peterson ZD (2011) Distinguishing between sex and gender: History, current conceptualizations, and implications. *Sex roles* 64(11). Springer: 791–803.

Muravyev A, Talavera O and Schäfer D (2009) Entrepreneurs' gender and financial constraints: Evidence from international data. *Journal of comparative economics* 37(2). Elsevier: 270–286. DOI: 10.1016/j.jce.2008.12.001.

Myers SC and Majluf NS (1984) Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics* 13(2). Elsevier: 187–221.

Nguyen B and Canh NP (2021) Formal and informal financing decisions of small businesses. *Small Business Economics* 57(3). Springer: 1545–1567. DOI: 10.1007/s11187-020-00361-9.

Nguyen T, Chaiechi T, Eagle L, et al. (2020) Dynamic transmissions between main stock markets and SME stock markets: Evidence from tropical economies. *The Quarterly Review of Economics and Finance* 75. Elsevier: 308–324. DOI: 10.1016/j.qref.2019.02.004.

North D (1990) Institutions, institutional change and economic performance. *Cambridge:Cambridge University Press*. DOI: 10.1017/CBO9780511808678.

O'Sullivan M (2005) Finance and innovation. In: *The Oxford Handbook of Innovation*. DOI: 10.1093/oxfordhb/9780199286805.003.0009.

Ogundana OM, Simba A, Dana L-P, et al. (2021) Women entrepreneurship in developing economies: A gender-based growth model. *Journal of Small Business Management* 59(sup1). Taylor \& Francis: S42--S72. DOI: 10.1080/00472778.2021.1938098.

Parra Á and Winter RA (2022) Early-stage venture financing. *Journal of Corporate Finance* 77: 102291. DOI: 10.1016/j.jcorpfin.2022.102291.

Prokop J and Wang D (2022) Is there a gender gap in equity-based crowdfunding? *Small Business Economics* 59(3): 1219–1244. DOI: 10.1007/s11187-021-00574-6.

Quigley NR and Patel PC (2022) Reexamining the gender gap in microlending funding decisions: the role of borrower culture. *Small Business Economics* 59(4): 1661–1685. DOI: 10.1007/s11187-021-00593-3.

Rabe-Hesketh S and Skrondal A (2008) *Multilevel and Longitudinal Modeling Using Stata*. Texas: Texas: STATA press.

Reynolds P, Hay M and Camp SM (1999) Global entrepreneurship monitor. *Kansas City, MO: Kauffman Center for Entrepreneurial Leadership*.

Robson PJA, Akuetteh CK, Westhead P, et al. (2012) Exporting intensity, human capital and business ownership experience. *International Small Business Journal* 30(4). Sage Publications Sage UK: London, England: 367–387. DOI: 10.1177/0266242610364426.

Sabharwal M and Corley EA (2009) Faculty job satisfaction across gender and discipline. *The Social Science Journal* 46(3). Elsevier: 539–556. DOI: 10.1016/j.soscij.2009.04.015.

Samuelsson M and Davidsson P (2009) Does venture opportunity variation matter? Investigating systematic process differences between innovative and imitative new ventures. *Small Business Economics* 33(2). Springer: 229–255. DOI: 10.1007/s11187-007-9093-7.

Santos A and Cincera M (2022) Determinants of financing constraints. *Small Business Economics* 58. Springer: 1427–1439. DOI: 10.1007/s11187-021-00449-w.

Schneider C and Veugelers R (2010) On young highly innovative companies: why they matter and how (not) to policy support them. *Industrial and Corporate change* 19(4). Oxford University Press: 969–1007. DOI: 10.1093/icc/dtp052.

Schumpeter J (1942) Creative destruction. *Capitalism, socialism and democracy* 825: 82–85.

Shane S (2000) Prior knowledge and the discovery of entrepreneurial opportunities. *Organization science* 11(4). INFORMS: 448–469. DOI: 10.1287/orsc.11.4.448.14602.

Shane S (2003) *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*. Edward Elgar Publishing.

Simmons SA, Wiklund J, Levie J, et al. (2019) Gender gaps and reentry into entrepreneurial ecosystems after business failure. *Small Business Economics* 53(2): 517–531. DOI: 10.1007/s11187-018-9998-3.

Stiglitz JE and Weiss A (1981) Credit rationing in markets with imperfect information. *The American economic review* 71(3). JSTOR: 393–410. Available at: https://www.jstor.org/stable/1802787.

Strawser JA, Hechavarria DM and Passerini K (2021) Gender and entrepreneurship: Research frameworks, barriers and opportunities for women entrepreneurship worldwide. *Journal*

of Small Business Management 59(sup1). Taylor \& Francis: S1–S15. DOI: 10.1080/00472778.2021.1965615.

Strulik H (2005) The role of human capital and population growth in R&D-based models of economic growth. *Review of international Economics* 13(1). Wiley Online Library: 129–145. DOI: 10.1111/j.1467-9396.2005.00495.x.

Svirydzenka K (2016) *Introducing a new broad-based index of financial development*. 5 16. IMF working paper. DOI: 10.5089/9781513583709.001.

The World Bank (2020) World Developmnet Indicators. Washington, D.C.: The World Bank.

Tracy SL (2011) Accelerating job creation in America: The promise of high-impact companies. *US Small Business Administration, Office of Advocacy*.

Venkataraman S and Shane S (2000) The promise of entrepreneurship as a field of research. *Academy of management review* 25(1): 217–226. DOI: 10.5465/amr.2000.2791611.

Welter F and Smallbone D (2010) The embeddedness of women's entrepreneurship in a transition context. *Women entrepreneurs and the global environment for growth: A research perspective*. Edward Elgar Cheltenham and Northampton, MA: 96–117. DOI: 10.4337/9781849806633.00011.

Welter F, Baker T, Audretsch DB, et al. (2017) Everyday entrepreneurship—a call for entrepreneurship research to embrace entrepreneurial diversity. *Entrepreneurship Theory and Practice* 41(3). SAGE Publications Sage CA: Los Angeles, CA: 311–321. DOI: 10.1111/etap.12258.

Wennberg K, Pathak S and Autio E (2013) How culture moulds the effects of self-efficacy and fear of failure on entrepreneurship. *Entrepreneurship & Regional Development* 25(9–10). Taylor & Francis: 756–780. DOI: 10.1080/08985626.2013.862975.

World Bank (2011) *World Development Report 2012: Gender Equality and Development*. The World Bank.

World Bank (2019) *Global Financial Development Report 2019/2020: Bank Regulation and Supervision a Decade after the Global Financial Crisis* (World Banked.). The World Bank. DOI: 10.1596/978-1-4648-1447-1.

Wu Q, Dbouk W, Hasan I, et al. (2021) Does gender affect innovation? Evidence from female chief technology officers. *Research Policy* 50(9). Elsevier: 104327. DOI: 10.1016/j.respol.2021.104327.

Wurgler J (2000) Financial markets and the allocation of capital. *Journal of financial economics* 58(1–2). Elsevier: 187–214. DOI: 10.1016/S0304-405X(00)00070-2.

Yacus AM, Esposito SE and Yang Y (2019) The Influence of Funding Approaches, Growth Expectations, and Industry Gender Distribution on High-Growth Women Entrepreneurs. *Journal of Small Business Management* 57(1). Taylor & Francis: 59–80. DOI: 10.1111/jsbm.12491.

Zhu X, Asimakopoulos S and Kim J (2020) Financial development and innovation-led growth: Is too much finance better? *Journal of International Money and Finance* 100. Elsevier: 102083. DOI: 10.1016/j.jimonfin.2019.102083.

Figure 1 Conceptual framework and hypotheses

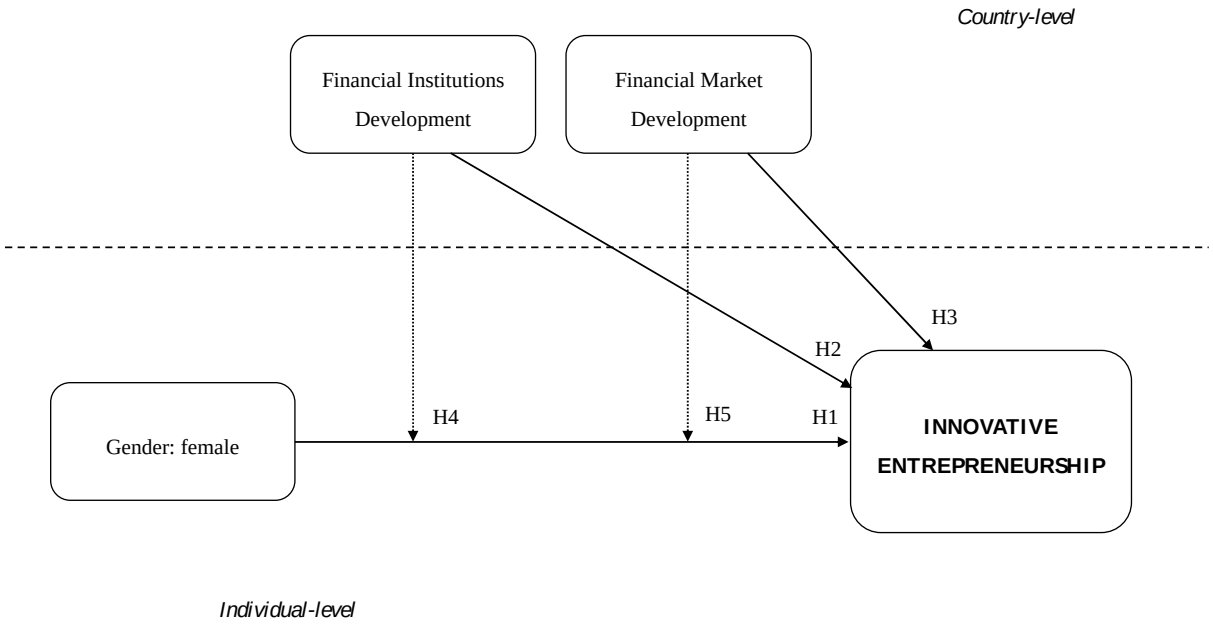


Table 1 Variables definitions and data sources

Variable	Definition	Source
Dependent Variable		
Innovative entrepreneurship	Dummy variable. Entrepreneurship of pure imitation takes value 0 if there are many competitors offering the same products, none of their customers considers their product new, and the technologies/procedures they use have been available for more than a year ago. Takes the value 1 for any kind of innovation resulting from combining if there are few or no competitors, if they use the latest technology/procedures available or if their product is new to some or all their customers.	GEM
Individual-level predictor		
Gender	Dummy: 1 =female, 0 = male	GEM
Country-level predictors		
Financial institutions development	Relative ranking of countries in respect to their financial institutions depth development. Represented as an index aggregation of continuous values from 0 to 1.	IMF
Financial markets development	Relative ranking of countries in respect to their financial markets depth development. Represented as an index aggregation of continuous values from 0 to 1.	IMF
Individual-level controls		
Age	Current age of participants in years	GEM
Household Income	Three categories based on the income categories by country. "Low income"; "Middle income"; "High income" A dummy variable corresponds to the category indicated by the entrepreneur."	GEM
Education level	Four categories, based on schooling years, "secondary education" = 1, "secondary degree" = 2, "post-secondary education" = 3, and "graduate education" = 4	GEM
Serial Experience	Has the entrepreneur sold, shut down, discontinued, or quit a business that they owned/managed in the past 12 months, and did that business continue to exist after their departure? Dummy: 1 = yes, 0 = no.	GEM
Portfolio Experience	If the entrepreneur currently owns/manages an existing business that is older than 42 months = 1, if not = 0	GEM
Investment Experience	In the past three years, has the entrepreneur personally provided funds for a new business? Dummy: 1 = yes, 0 = no.	GEM
Knows other entrepreneur	Does the participant know someone who started a business in the past two years? Dummy: 1 = yes, 0 = no.	GEM
Perceived Founding Opportunities	In the next six months, there will be good opportunities for starting a business. Dummy: 1 = yes, 0 = no	GEM
Self-efficacy	Does the participant think they have the knowledge, skills, and experience to start a new business? Dummy: 1 = yes, 0 = no	GEM
Fear of failure	Would fear of failure prevent the entrepreneur from starting a business? Dummy: 1 = yes, 0 = no	GEM
Venture Size	Logarithm of the current number of employees	GEM
Country-level controls		
GDP per capita PPP (ln)	Logarithmic GDP per capita based on purchasing power parity in 2017 constant USD.	WDI
GDP growth	Annual percentage growth in GDP.	WDI
Population growth	Annual population growth, expressed in percentage change.	WDI

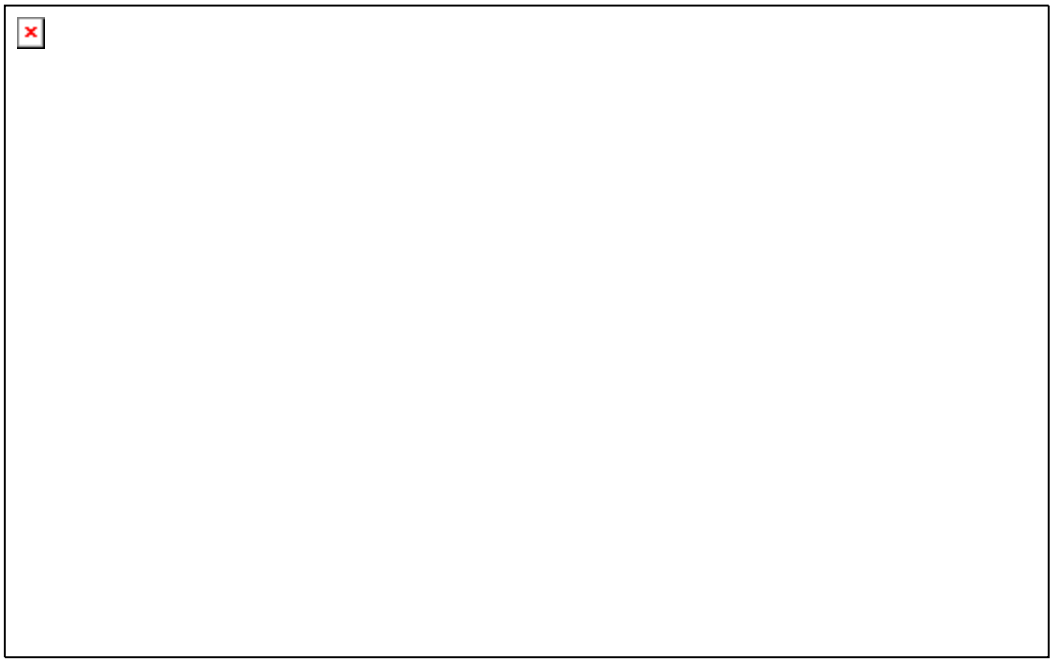
Notes: GEM – Global Entrepreneurship Monitor (https://www.gemconsortium.org); WDI – World Bank's World Development Indicators (https://data.worldbank.org/products/wdi); IMF – International Monetary Fund (https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b).

Table 2 Descriptive statistics and correlation matrix

Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Innovative entrepreneurship	0.60	0.49	1.00																	
(2) Gender	0.43	0.49	**-0.01**	1.00																
(4) Age	38	12	**-0.01**	0.00	1.00															
(6) Household income	2.16	0.81	**0.02**	**-0.11**	0.01	1.00														
(7) Education level	2.06	1.13	**0.06**	**-0.07**	-0.01	**0.25**	1.00													
(8) Serial experience	0.04	0.19	**0.04**	**-0.02**	**-0.02**	0.01	0.00	1.00												
(9) Portfolio experience	0.02	0.14	**0.03**	**-0.03**	**0.04**	**0.05**	**0.02**	**0.02**	1.00											
(10) Invest. experience	0.12	0.33	**0.05**	**-0.07**	**-0.03**	**0.09**	**0.05**	**0.14**	**0.06**	1.00										
(11) Knows entrepreneur	0.67	0.47	**0.03**	**-0.07**	**-0.08**	**0.12**	**0.13**	**0.04**	**0.03**	**0.11**	1.00									
(12) Perceived opportunity	0.61	0.49	**0.05**	**-0.02**	**-0.07**	**0.04**	**-0.01**	**0.03**	**0.02**	**0.06**	**0.17**	1.00								
(13) Self-efficacy	0.84	0.36	**0.02**	**-0.06**	0.00	**0.08**	**0.08**	**0.02**	**0.03**	**0.05**	**0.16**	**0.15**	1.00							
(14) Fear of failure	0.29	0.45	**-0.02**	**0.05**	**0.01**	**-0.07**	**-0.03**	**0.04**	**-0.01**	-0.01	**-0.04**	**-0.09**	**-0.17**	1.00						
(15) Venture Size	0.90	0.98	**0.08**	**-0.16**	0.00	**0.17**	**0.18**	**0.07**	**0.05**	**0.15**	**0.10**	**0.04**	**0.05**	**-0.02**	1.00					
(16) GDP per capita	24,832	18,519	0.01	**-0.09**	**0.18**	**0.06**	**0.40**	**-0.03**	0.01	**-0.04**	-0.01	**-0.09**	**0.02**	0.01	**0.15**	1.00				
(17) GDP growth	2.78	3.85	**0.12**	**0.02**	**-0.06**	**-0.02**	**-0.11**	**0.01**	0.01	**0.03**	0.00	**0.09**	**-0.05**	**-0.03**	**0.03**	**-0.30**	1.00			
(18) Population growth	1.17	1.11	**0.02**	0.01	**-0.11**	**-0.05**	**-0.20**	**0.06**	**0.02**	**0.08**	**0.04**	**0.13**	**0.03**	**-0.03**	**0.03**	**-0.38**	**0.19**	1.00		
(19) Financial institutions development	0.41	0.27	**0.01**	**-0.03**	**0.20**	**0.02**	**0.27**	**-0.04**	**0.01**	**-0.04**	**-0.03**	**-0.07**	0.00	0.00	-0.01	**0.67**	**-0.22**	**-0.33**	1.00	
(20) Financial markets development	0.42	0.32	**0.01**	**-0.04**	**0.18**	**0.02**	**0.28**	**-0.03**	**0.02**	**-0.05**	**-0.03**	**-0.08**	0.01	**0.02**	**0.05**	**0.70**	**-0.19**	**-0.26**	**0.85**	1.00

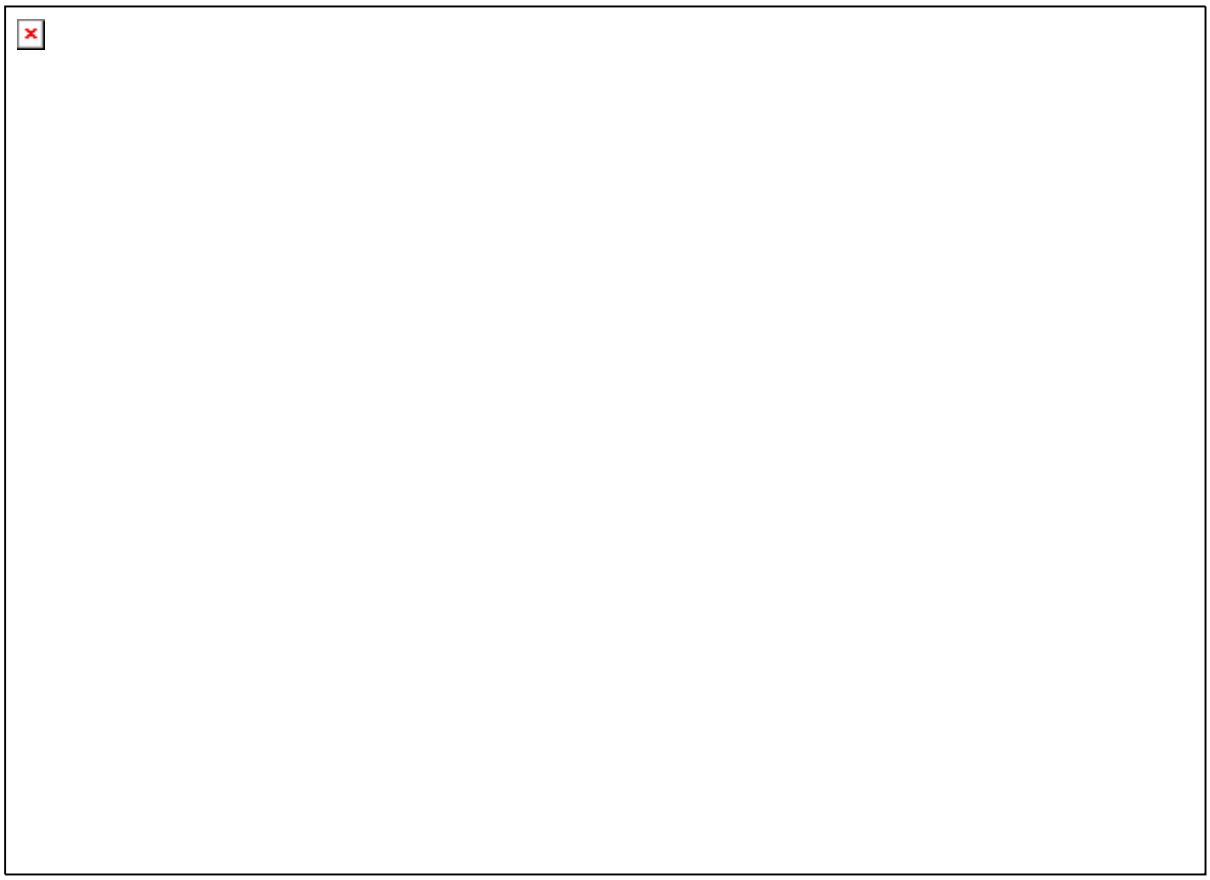
Note: Correlation coefficients displayed in bold are significant at the 0.1 %.

Figure 2 Innovative entrepreneurship share by gender and year – world average



Source: Authors with GEM data.

Figure 3 Financial institutions and market development by country, 2020



Source: Authors with data from IMF – International Monetary Fund https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b

Table 3 Multilevel logistic random intercept model predicting innovative entrepreneurship

Dep. Var.: Innovative entrepreneurship	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gender (H1)		0.046***	0.046***	0.046***	-0.010	-0.016	-0.011
		(0.016)	(0.016)	(0.016)	(0.029)	(0.026)	(0.029)
Financial Institutions FID (H2)			-0.581***		-0.639***		-1.028***
			(0.179)		(0.181)		(0.205)
Financial Markets FM (H3)				0.385***		0.325**	0.707***
				(0.132)		(0.134)	(0.157)
Gender*FID (H4)					0.139**		-0.044
					(0.060)		(0.113)
Gender*FMD (H5)						0.151***	0.183*
						(0.050)	(0.094)
Age	-0.027***	-0.027***	-0.027***	-0.027***	-0.028***	-0.027***	-0.027***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Age squared	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mid Income	-0.070***	-0.068***	-0.068***	-0.068***	-0.068***	-0.068***	-0.068***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
High Income	-0.096***	-0.092***	-0.094***	-0.092***	-0.092***	-0.092***	-0.093***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Secondary education	0.065**	0.065**	0.064**	0.066**	0.063**	0.065**	0.063**
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Secondary degree	0.095***	0.095***	0.094***	0.096***	0.092***	0.094***	0.092***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Post-secondary	0.202***	0.202***	0.201***	0.202***	0.199***	0.200***	0.198***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Education level	0.343***	0.342***	0.343***	0.343***	0.341***	0.340***	0.341***
	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)
Serial experience	0.289***	0.289***	0.289***	0.289***	0.289***	0.289***	0.287***
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
Portfolio experience	0.322***	0.324***	0.327***	0.323***	0.327***	0.323***	0.327***
	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)
Business Angel	0.167***	0.170***	0.170***	0.170***	0.170***	0.169***	0.170***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Know entrepreneur	0.085***	0.087***	0.087***	0.087***	0.087***	0.087***	0.087***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Business opportunity	0.136***	0.136***	0.136***	0.136***	0.136***	0.136***	0.135***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Self-efficacy	0.087***	0.089***	0.091***	0.088***	0.092***	0.089***	0.090***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Fear of Failure	-0.018	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Venture size (ln)	0.150***	0.153***	0.153***	0.153***	0.153***	0.152***	0.152***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
GDP PPP (ln)	0.091**	0.092**	0.192***	0.015	0.191***	0.014	0.116**
	(0.045)	(0.045)	(0.056)	(0.052)	(0.056)	(0.052)	(0.058)
GDP Growth	0.007*	0.007*	0.006*	0.007*	0.006*	0.007*	0.006
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Population growth	0.075***	0.075***	0.075***	0.076***	0.075***	0.076***	0.080***
	(0.018)	(0.018)	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)
Intercept	-0.733	-0.750*	-1.519***	-0.125	-1.486***	-0.088	-0.836
	(0.452)	(0.452)	(0.527)	(0.501)	(0.527)	(0.501)	(0.543)
Years Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	80,598	80,598	80,598	80,598	80,598	80,598	80,598
Number of groups	105	105	105	105	105	105	105

Notes: Robust standard errors are given in parentheses. $^{+}p < 0.10$, *p < 0.05, **p<0.01, ***p < 0.001; two-tailed significance.

Figure 4 Moderating effect of financial institutions depth development on the relationship between gender and innovative entrepreneurship

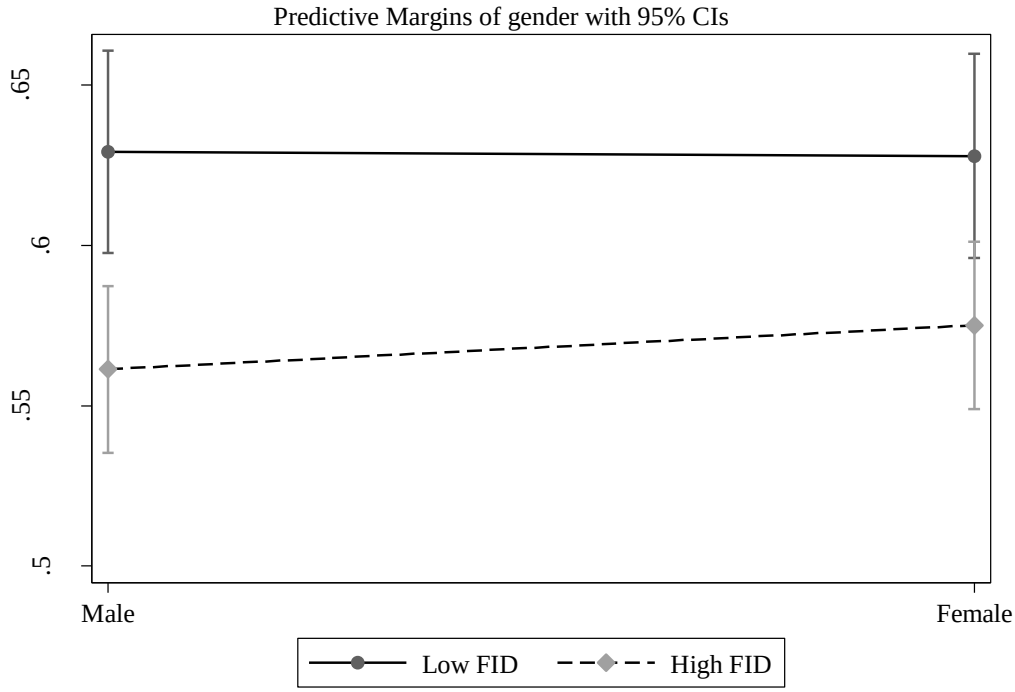
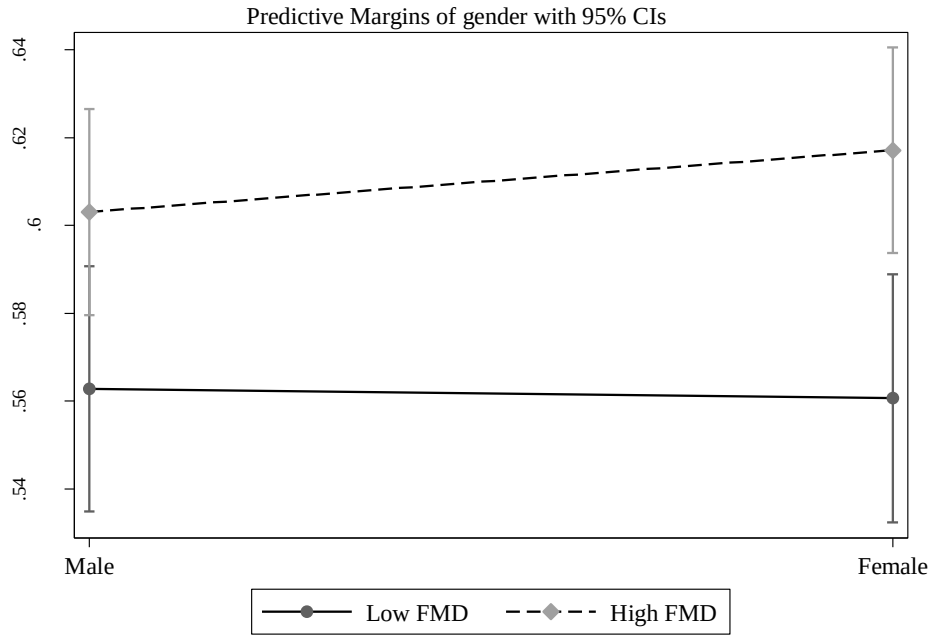


Figure 5 Moderating effect of financial markets depth development on the relationship between gender and innovative entrepreneurship



Appendix A

Table A1. Sample composition

No.	Country	Frequency	Innovative entrepreneurship	Gender	Financial Institutions Development	Financial Market Development
1	Algeria	269	0.647	0.268	0.052	0.002
2	Angola	1,247	0.633	0.442	0.054	0.084
3	Argentina	843	0.641	0.416	0.172	0.078
4	Armenia	92	0.293	0.413	0.130	0.030
5	Australia	546	0.579	0.429	0.923	0.934
6	Austria	369	0.626	0.344	0.612	0.461
7	Bangladesh	107	0.308	0.168	0.110	0.100
8	Barbados	268	0.549	0.437	0.700	0.443
9	Belarus	17	0.176	0.706	0.080	0.010
10	Belgium	205	0.644	0.317	0.566	0.680
11	Belize	218	0.849	0.468	0.238	0.010
12	Bolivia	619	0.622	0.559	0.259	0.010
13	Bosnia and Herzegovina	272	0.603	0.393	0.192	0.005
14	Botswana	607	0.552	0.509	0.395	0.120
15	Brazil	5,895	0.375	0.532	0.511	0.383
16	Bulgaria	75	0.400	0.480	0.240	0.109
17	Burkina Faso	665	0.483	0.471	0.084	0.000
18	Cameroon	433	0.427	0.497	0.064	0.010
19	Canada	698	0.623	0.380	0.944	0.992
20	Chile	5,893	0.808	0.426	0.629	0.462
21	China	2,736	0.746	0.464	0.409	0.580
22	Colombia	3,749	0.679	0.436	0.257	0.248
23	Costa Rica	198	0.525	0.495	0.233	0.050
24	Croatia	485	0.645	0.355	0.334	0.230
25	Cyprus	207	0.589	0.357	0.470	0.413
26	Czech Republic	160	0.644	0.338	0.288	0.205
27	Denmark	330	0.627	0.348	0.841	0.587
28	Dominican Republic	119	0.588	0.555	0.100	0.020
29	Ecuador	1,313	0.561	0.521	0.129	0.028
30	Egypt	681	0.568	0.232	0.093	0.168
31	El Salvador	251	0.614	0.614	0.322	0.033
32	Estonia	321	0.698	0.371	0.281	0.109
33	Ethiopia	190	0.721	0.468	0.050	0.040
34	Finland	361	0.620	0.338	0.721	0.849
35	France	213	0.676	0.343	0.755	0.838
36	Georgia	82	0.378	0.549	0.120	0.090
37	Germany	965	0.541	0.368	0.642	0.685
38	Ghana	586	0.454	0.553	0.080	0.055
39	Greece	624	0.590	0.389	0.297	0.494
40	Guatemala	1,998	0.634	0.485	0.104	0.022
41	Hong Kong	126	0.675	0.254	0.936	0.830
42	Hungary	387	0.514	0.315	0.315	0.231
43	Iceland	217	0.618	0.364	0.746	0.446
44	India	759	0.743	0.318	0.277	0.521
45	Indonesia	2,681	0.800	0.499	0.142	0.229
46	Iran	1,502	0.360	0.282	0.176	0.115
47	Ireland	529	0.665	0.367	0.846	0.584
48	Israel	405	0.578	0.373	0.612	0.402
49	Italy	210	0.676	0.343	0.544	0.647
50	Jamaica	936	0.612	0.464	0.312	0.361
51	Japan	225	0.547	0.324	0.728	0.763
52	Jordan	131	0.527	0.260	0.360	0.223
53	Kazakstan	207	0.478	0.531	0.174	0.270
54	Korea	957	0.612	0.325	0.773	0.781
55	Kuwait	128	0.336	0.242	0.190	0.420
56	Latvia	579	0.530	0.359	0.209	0.043
57	Lebanon	954	0.907	0.404	0.257	0.179
58	Libya	73	0.616	0.274	0.050	0.000
59	Lithuania	255	0.639	0.353	0.170	0.027
60	Luxembourg	132	0.826	0.364	0.637	0.727
61	Macedonia	301	0.625	0.322	0.168	0.013
62	Madagascar	509	0.365	0.564	0.053	0.010
63	Malawi	644	0.803	0.505	0.105	0.000
64	Malaysia	644	0.630	0.421	0.779	0.808

65	Mexico	943	0.628	0.487	0.232	0.295
66	Morocco	564	0.518	0.294	0.252	0.197
67	Namibia	64	0.870	0.469	0.770	0.030
68	Netherlands	992	0.557	0.386	0.860	0.921
69	New Zealand	40	0.575	0.425	0.460	0.300
70	Nigeria	884	0.580	0.538	0.060	0.054
71	Norway	482	0.531	0.293	0.561	0.704
72	Pakistan	135	0.459	0.141	0.070	0.103
73	Panama	1,090	0.496	0.438	0.239	0.268
74	Peru	1,087	0.659	0.478	0.226	0.218
75	Philippines	758	0.734	0.598	0.159	0.497
76	Poland	597	0.539	0.394	0.286	0.195
77	Portugal	370	0.543	0.335	0.539	0.611
78	Qatar	498	0.602	0.209	0.154	0.621
79	Romania	325	0.615	0.363	0.136	0.048
80	Russia	330	0.382	0.473	0.168	0.330
81	Saudi Arabia	1,104	0.466	0.325	0.157	0.550
82	Senegal	215	0.460	0.488	0.120	0.020
83	Serbia	64	0.516	0.391	0.125	0.135
84	Singapore	256	0.703	0.336	0.792	0.900
85	Slovakia	487	0.598	0.320	0.291	0.072
86	Slovenia	417	0.544	0.307	0.320	0.155
87	South Africa	892	0.751	0.437	0.858	0.732
88	Spain	6,551	0.522	0.405	0.580	0.872
89	Sudan	166	0.530	0.355	0.030	0.000
90	Suriname	21	0.619	0.286	0.151	0.020
91	Sweden	476	0.548	0.309	0.970	0.935
92	Switzerland	608	0.605	0.377	0.971	0.960
93	Thailand	2,566	0.698	0.544	0.559	0.657
94	Togo	152	0.132	0.480	0.130	0.240
95	Trinidad & Tobago	395	0.461	0.390	0.430	0.236
96	Tunisia	92	0.761	0.261	0.194	0.081
97	Turkey	1,609	0.845	0.187	0.164	0.291
98	Uganda	1,873	0.444	0.547	0.072	0.000
99	United Arab Emirates	571	0.601	0.212	0.207	0.562
100	United Kingdom	1,990	0.628	0.374	0.954	0.924
101	United States	1,251	0.574	0.411	0.824	0.982
102	Uruguay	692	0.584	0.340	0.232	0.050
103	Vanuatu	185	0.611	0.368	0.120	0.000
104	Vietnam	679	0.620	0.526	0.250	0.205
105	Zambia	676	0.528	0.488	0.076	0.062

Note: N= 81,545