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Coupling men-to-women: Promoting innovation in emerging markets

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Abstract

Motivated by calls to explore corporate outcomes of gender diversity-related dependencies in a firm's upper echelons, we examine whether gender diversity in manager-owner(s) teams shapes innovation. Using the context of emerging markets and a large surveydataset drawn from the Business Environment and Enterprise Performance Survey (BEEPS), we find robust evidence suggesting that gender-diverse manager-owner(s) teams are associated with higher odds of undertaking innovation. Specifically, women (men) owned firms managed by a male (female) top manager are associated with a higher likelihood of undertaking innovation relative to women (men) owned firms managed by women (men). Additionally, we find that female-owned firms run by male (female) top managers are the most (least) innovative and male-owned firms run by female (male) top managers are the second (third) innovative. Our findings indicate that heterophilic manager-owner(s) teams have the potential to foster innovation in emerging markets. More importantly, our results suggest that initiatives promoting manager-owner(s) team's gender diversity have the potential to overcome the social and structural barriers that impede innovation in emerging economies.

KEYWORDS

emerging markets, female-owned businesses, female top managers, firm innovation, gender diversity, heterophilic manager-owner(s) team

1 | INTRODUCTION

Research on the gender-innovation nexus has been rising recently as gender and innovation are becoming increasingly prominent features of policies for sustainable economic development (Arun et al., 2020; Azeem et al., 2022). However, prior studies provide mixed evidence regarding the interaction between gender diversity at ownership, board, management, and workforce levels and firm innovation.[1] Notwithstanding Østergaard et al. (2011), who recognize that the effectiveness of the interactions and communications within a firm's upper echelon is a gendered process and that it is instrumental in promoting corporate innovation, studies that examine the role of gender diversity in the manager-owner(s) team and firm-level innovation are scant (Azeem et al., 2022; Bednar et al., 2021). Considering the

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cruciality of both gender equality (Lemma et al., 2023) and corporate innovation (Greenhalgh & Rogers, 2010; Li et al., 2020) in unlocking economic development, it is important that we have a robust understanding of the role of gender dynamics between managers and owners and innovation at the firm-level.

Motivated by calls to explore the impact of gender diversity-related dependencies between and among individuals in the upper echelons of a firm (Dalton et al., 2007; Wu et al., 2022), we conceptualize the top manager and owner(s) of the firm as a strategic team responsible for charting corporate decisions and empirically examine whether gender diversity in this team underpins firm innovation. Drawing on the extant literature, we identify two contradicting views regarding the relationship between gender diversity in a firm's manager-owner(s) team and innovation. The first view, drawing on resource dependence theory, contends that diversity in the manager-owner(s) team would provide a non-redundant, broader range of knowledge, perspectives, and social network, enhancing creativity and improving problem-solving and corporate decision-making (Cox & Blake, 1991; Macaulay et al., 2019). Thus, this view posits a positive association between a manager-owner(s) team's gender diversity and innovation. The second view, based primarily on social identity theory, suggests that gender diversity in a firm's manger-owner(s) team would exacerbate gendered differences in terms of values and beliefs (Taifel & Turner, 1986), which might impede communication (Jehn et al., 1999) and result in a longer and slower decision-making process (Cox et al., 1991). Hence, this latter view suggests an inverse association between firms with gender-diverse manager-owner(s) teams and firm innovation. Nonetheless, whether gender diversity in manager-owner (s) teams of firms operating in emerging market countries would shape innovation remains an open empirical question, which we seek to address directly in this study.

This study investigates whether gender diversity in manager-owner(s) coupling impacts innovation activities in small and medium enterprises (SMEs) using a unique setting of emerging economies. Three considerations motivate our decision to situate the study in the emerging market setting. First, firm-level innovation is deemed critical for the survival and growth of SMEs and economic and social development, especially in emerging markets (Madison et al., 2022). Nonetheless, firm innovation in emerging economies remains lower than in advanced economies (Chkir et al., 2021). Thus, establishing whether gender-diverse manager-owner(s) teams could drive SME innovation is crucial in formulating policies that foster firm innovation.

Second, although women-owned businesses are the fastest-growing entrepreneurial ventures in the world (Kothari & Roldan, 2022), emerging markets are rife with gendered institutional constraints that severely stifle innovation activities by women-owned businesses more than their male-owned peers (Hechavarría & Ingram, 2019). Studies that explore the nexus between gender diversity in manager-owner(s) teams and innovation would inform gender-related policies and practices pertaining to the appointment of managers to women-owned enterprises in emerging economies.

Finally, the available empirical evidence indicates that the interaction between gender diversity and firm innovation is a function of the institutional setting within which the interactions occur (Attah-Boakye et al., 2020). Consistent with this observation, Azeem et al. (2022) contend that contextual variations underpin how the manager-owner(s) team's gender diversity interacts with firm-level innovation. However, the limited evidence on whether manager-owner(s) team's gender diversity shapes firm-level innovation is either a country study based on firms in the U.S (Bednar et al., 2021) or a multi-country research focused on developing, primarily African, countries (Azeem et al., 2022). Since formal and informal institutional settings which underpin firm-level innovation activities in emerging economies are unique (Chkir et al., 2021; Madison et al., 2022; Na & Shin, 2019), this cross-country study would provide an "out-of-sample" test for theories that underpin the interactions between gender dynamics in the upper echelons of a firm and its innovativeness.

Using firm-level data from 39 emerging economies obtained from the Business Environment and Enterprise Performance Survey (BEEPS), we find robust evidence that firms with gender-diverse manager-owner(s) teams are associated with higher odds of undertaking innovative activities. That is, women (men) owned firms managed by a male (female) top manager are associated with a higher likelihood of undertaking innovation than is the case with women (men) owned businesses managed by women (men). Our finding is consistent with the conjecture based on resource dependence theory which suggests that "mixing and matching" the gender of the manager-owner(s) team of a firm would increase the odds of the firm engaging in innovation activities (Macaulay et al., 2019). Nevertheless, it stands in contradistinction with the view that gender diversity in the manager-owner team would impede communication (Jehn et al., 1999) and, thus, lead to a slower decision-making process and corporate innovation (Wu et al., 2022). This finding implies that businesses and policymakers could use initiatives promoting manager-owner(s) gender diversity to overcome the social and structural barriers that impede corporate innovation in emerging economies.

The study makes three key contributions. First, it builds on and extends Azeem et al.'s (2022) and Bednar et al.'s (2021) studies by examining the interaction

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between every possible permutation of the manager-owner(s) team's gender diversity and firm innovation. Thus, it provides insights into the association between *all forms* of homophilic and heterophilic manager-owner (s) teams and innovation. Second, unlike Azeem et al.'s (2022) and Bednar et al.'s (2021) studies which focus respectively on predominantly African and U.S. firms, this study dwells on the emerging market context in which female-owned SMEs tend to employ more women than male-owned SMEs (Madison et al., 2022; Welter et al., 2003). Considering our finding that homophilic manager-owner(s) teams suppress innovation in emerging markets, the study casts doubt on female-owned firms' tendency to hire female top managers in these countries. Third, it builds on and extends Wu et al. (2022) and enhances our understanding of the interaction between gender diversity-related dependencies within the upper echelons of the firm and corporate outcomes, using the context of SMEs where the board of directors is not necessarily customary part of the "top-brass" of a firm.

The remainder of the paper is organized as follows. The second section reviews key studies and presents our hypotheses. The third section outlines the methods and materials used in the study. The fourth and fifth sections present discussions of the findings and conclusions, respectively.

2 | PRIOR STUDIES AND HYPOTHESIS DEVELOPMENT

2.1 | Prior studies

Corporate innovation is increasingly seen as a catalyst for economic development and a driver of social progress, economic recovery, and sustainability (Eriksson, 2014; Fagerberg, 2005; Garcia & Calantone, 2002; Verspagen, 2005). It is also crucial for technological development within industries and sectors (Malerba, 2002) and for firm-level productivity, competitiveness, growth, and survival (Genc et al., 2019; Krishnan & Jha, 2011; Ritter-Hayashi et al., 2019). In what appears to be a recognition of the gendered nature of corporate innovation (Marvel et al., 2015), recent years have witnessed rising research and policy interest in the interaction between gender and corporate innovation activities (Arun et al., 2020; Azeem et al., 2022; Dohse et al., 2019; Na & Shin, 2019; Ritter-Hayashi et al., 2019). Prior studies on the interactions between gender dynamics in the upper echelons of a firm and firm innovation focus on five critical issues.

The first strand of studies dwells on whether the gender of an entrepreneur influences a firm's innovation performance (Arun et al., 2020; Dohse et al., 2019; Farooq et al., 2019; Link & van Hasselt, 2020; Na & Shin, 2019; Strohmeyer et al., 2017; Zastempowski & Cyfert, 2021). This stream of studies reports mixed evidence on the association between an entrepreneur's gender and firm innovation. While some demonstrate a positive association between female-owned businesses and the tendency to undertake innovation (Arun et al., 2020; Farooq et al., 2019), others document an inverse association between the two variables (Link & Van Hasselt, 2020; Strohmeyer et al., 2017).

A second strand of the literature explores the role of a firm's top manager's gender in shaping firm-level innovation (Han et al., 2019; Javaid et al., 2021; Khushk et al., 2022; Prabowo & Setiawan, 2021). Like the first stream of studies, studies on the interaction between the gender of a firm's top manager and firm innovation document inconclusive evidence. For instance, in a study on the Shanghai and Shenzhen stock exchanges, Javaid et al. (2021) showed that firms with female Chief Executive Officers (CEOs) produce higher innovation outputs. Similarly, based on a systematic review of the apposite literature, Khushk et al. (2022) conclude that organizations with female CEOs are more likely to undertake innovation. In addition, Crowley and Bourke (2018) and Reutzel et al. (2018) demonstrate that female-led firms exhibit less investment in innovation than male-led firms.

A third strand of the literature focuses on the interplay between gender diversity in the board of directors and innovation (Chen et al., 2018; Griffin et al., 2021; Javaid et al., 2021). Most of the academic research on the association between gender diversity in the board of directors and firm innovation documents evidence that firms with more gender-diverse boards are associated with a higher probability of undertaking innovative activities (Ain et al., 2022; Attah-Boakye et al., 2020; Griffin et al., 2021).

A fourth strand of the literature explores whether gender diversity in a firm's workforce, including R&D teams, impacts the firm's innovation behaviour (e.g., Dai et al., 2019; Østergaard et al., 2011; Xie et al., 2020). Dai et al. (2019) and Østergaard et al. (2011) demonstrate that firms with gender-diverse workforces are positively associated with firm innovation. Finally, a more recent strand of research investigates the interplay between gender diversity in ownership and innovation (Arun et al., 2020; Dai et al., 2019; Farooq et al., 2019; Link & van Hasselt, 2020; Protogerou et al., 2017; Strohmeyer et al., 2017). While some studies provide evidence supporting a positive relationship between gender diversity in ownership and firm innovation (Dai et al., 2019; Link & van Hasselt, 2020; Strohmeyer et al., 2017), others reveal a negative relationship (Arun et al., 2020; Farooq et al., 2019; Protogerou et al., 2017).

A conspicuous limitation of the models tested in virtually all the five streams of studies identified above is

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the tendency to estimate the separate effects of a specific dimension of gender diversity (e.g., gender diversity in the board of directors) without controlling for the impact of other dimensions of gender diversity (e.g., gender diversity in ownership, in the workforce, or top management). As a result, studies that use such models are likely to have omitted variable problems; the findings in such studies are likely to conflate the effects of one dimension of gender diversity with another. In cognisance of the need to isolate the unique impact of a specific dimension of gender diversity on firm innovation, both Na and Shin (2019) and Ritter-Hayashi et al. (2019) condition the models in their studies for gender diversity in ownership, top management, and workforce. Likewise, Tonoyan and Boudreaux (2023) control for the impact of the gender of the firm's top manager while estimating the interaction between firm innovation and gender diversity in ownership. All three studies (Na & Shin, 2019; Ritter-Hayashi et al., 2019 and Tonoyan & Boudreaux, 2023) advanced our understanding of the nexus between gender diversity and firm innovation, especially with respect to isolating the unique firm innovation effects of gender diversity in ownership, management, and workforce level. However, they neglect the role of the inherently gendered interaction between a firm's top manager and its owner(s) on a firm's innovative behaviour (Østergaard et al., 2011).

In cognisance of the gendered nature of the interactions and communications within a firm's upper echelons and in recognition of the importance of these interactions and communications in promoting firm innovation, an emerging strand of studies explores the association between female-owned businesses managed by a female top manager and innovation (see Azeem et al., 2022; Bednar et al., 2021). Using data obtained respectively from the U.S. and developing (primarily African) countries, Azeem et al. (2022) and Bednar et al. (2021) demonstrate that matching female owners with female top managers would promote firm innovation. However, although both Azeem et al. (2022) and Bednar et al. (2021) report that female-owned businesses that female managers run are associated with greater odds of undertaking innovation, we do not know whether their findings could be extrapolated to, say, for example, a male-owned business that a male top manager manages, male-owned businesses that a female top manager manages, or female-owned enterprise managed by a male top manager. These are all important but overlooked issues with enormous implications for corporate gender diversity and innovation policies and practices. The present study attempts to answer these issues by examining the association between all permutations of manager-owner(s) team gender diversity and firm-level innovation undertakings using the emerging markets setting.

2.2 | Hypothesis development

The theoretical literature on the interaction between gender diversity in organizations and firm innovation draws on several theories that suggest contradicting predictions (Wu et al., 2022). Social feminist conceptions of gender contend that "differences in early socialisation" and "upbringing" between men and women result in the two genders having "different traits, attitudes, interests, and values," implying the existence of gendered differences in worldview (Arráiz, 2018, p. 57, see also, Chodorow, 1971, Gilligan, 1977). Furthermore, available empirical evidence indicates the existence of gendered differential in networking strategies. At the same time, men tend to be more integrated into "weak tie" networks (Duck & Silver, 1990), and women tend to be more integrated into "strong tie" networks (Sassen, 1995). Relatedly, both social networking (Granovetter, 1973) as well as self-categorisation (Turner et al., 1987) theories suggest that people often categorize themselves and network with individuals with similar demographics (Ritter-Hayashi et al., 2019), suggesting the existence of gendered disparity in group networking strategies (Zhang & Hou, 2012).

Because of the gendered differences in perspectives, networking strategies, experiences, and career trajectories (see, for instance, Terjesen & Singh, 2008), we surmise that women and men are likely to bring different resources or skill sets to a team (Burgess & Tharenou, 2002). The resource dependence theory suggests that gender diversity in manager-owner(s) coupling is likely to result in an expansion of the social and human capital, network resources, and the knowledge repertoire available to a firm, which would otherwise be inaccessible to the firm (Hillman et al., 2002; Maurer & Ebers, 2006; Pfeffer & Salancik, 1978). As such, the diversity in knowledge repertoire and perspective that would be at the disposal of a firm with a gender-diverse manager-owner (s) team could enhance the quality of interactions, communications, problem-solving, and decision-making within the firm (Cox & Blake, 1991; Ibarra, 1992; Ibarra, 1993; Macaulay et al., 2019; Østergaard et al., 2011; Wu et al., 2022). The potential complementarities in the pool of knowledge, perspectives, and network in a firm with gender-diverse manager-owner(s) coupling could foster the acquisition of a new combination of expertise by the firm, which ultimately could lead to the creation of new innovative ideas and products (Ritter-Hayashi et al., 2019; Van der Vegt & Janssen, 2003).

In addition, the literature observes differences in orientation between the two genders; while women are inclined to be more "people-oriented," men tend to be more "goal-oriented" (Andersen & Hansson, 2011; Eagly & Johannesen-Schmidt, 2001). These differences in

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orientation are likely to help firms with a gender-diverse manager-owner(s) team create innovative practices that incentivize employees while strategically managing relationships with external stakeholders (Glass & Cook, 2018). Likewise, the influence of gender diversity at the upper echelons of the organization is likely to "trickle down" from the top brass of the firm down to the "rank and file" employees due to two reasons (Tonoyan & Boudreaux, 2023).

First, prospective employees of both genders would find firms with a gender-diverse manager-owner(s) team more attractive (Beckman & Phillips, 2005; Cohen & Huffman, 2007; Terjesen & Singh, 2008), boosting such firms' ability to bring together employees with a diverse set of skills and expertise. Thus, firms with a gender-diverse manager-owner(s) team would have a greater diversity of ideas generated, which is a requisite for developing creative solutions to existing problems.

Second, employees with a gender-diverse manager-owner(s) team are more likely to exhibit innovative behaviour as such firms would afford the employees "psychological safety" when the employees express novel and controversial ideas that are likely to lead to innovation (Carmeli et al., 2010; Glass & Cook, 2018). On the other hand, the social identity theory maintains that individuals are inclined to be positively (negatively) biased toward a group that has similar (dissimilar) demographic characteristics, which in turn is likely to impact cohesion, communication, cooperation, and satisfaction, in a group setting (Hogg et al., 1995; Shayo, 2020).

Third, the gendered differences in worldviews conjectured by social feminists suggest that there is heterogeneity in cognition between men and women, which is likely to lead to clashing values and beliefs, which in turn could impede communication and lead to conflicts across individuals of the two genders (Jehn et al., 1999). In addition, the gendered incongruence in knowledge and perspective between men and women could result in firms with gender-diverse manager-owner(s) teams having longer and slower decision-making (Cox et al., 1991; Watson et al., 1993).

In sum, diversity in manger-owner gender coupling could exacerbate gendered differences in terms of values and beliefs (Taifel & Turner, 1986), which could impede communication and create conflicts between team members of the two genders (Jehn et al., 1999), which could in turn result in a longer and slower decision-making process (Cox et al., 1991). Thus, these arguments suggest that firms with a homophilic relationship in their manager-owner(s) coupling would be associated with greater odds of engaging in innovative activities (Azeem et al., 2022; Bednar et al., 2021). However, while this latter line of argument suggests a negative association between firms with a gender-diverse manager-owner(s) team and innovation at the firm level, the conjectured conflict due to diversity is unlikely to arise between managers and owners (Tonoyan & Boudreaux, 2023). Thus, we state our hypothesis as follows:

> **Hypothesis.** Firms with a gender-diverse manager-owner(s) team are more likely to engage in innovation.

3 | RESEARCH DESIGN

3.1 | The sample and data source

The data required for the study is obtained from the BEEPS database, a joint initiative of the European Bank for Reconstruction and Development (EBRD) and the World Bank (WB). The survey, conducted during the period spanning from 2002 to 2020, uses a uniform questionnaire to gather firm-level information on a gamut of issues about the business environment and firm performance, inter alia, business-government relations, access to finance, cost of inputs including labour, workforce composition, infrastructure, informal payments and corruption, and other topics such as competition, training, technology and innovation (Madison et al., 2022). In addition, it employs a stratified sampling methodology to generate representative samples across firm size, industry, and geographical location.[2]

We began our analysis with all the firms in BEEPS and eliminated firms with missing values for key study variables. After removing the missing observations, our final dataset consists of 33,629 cross-sectional firm-year observations drawn from 39 countries in emerging economies. The countries in our final sample are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Egypt, Estonia, Georgia, Greece, Hungary, Jordan, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lebanon, Lithuania, Macedonia, Malta, Moldova, Mongolia, Montenegro, Morocco, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Tunisia, Turkey, Ukraine, Uzbekistan, and West Bank and Gaza. The countries in the sample show a great deal of variation in terms of innovation and manager-owner(s) team gender diversity. For example, the percentage of firms engaged in innovation is the highest in Greece (74.8%) and the lowest in Morocco (5.3%). Similarly, gender-diverse manager-owner(s) teams are the highest in Greece (73.2%) and lowest in Russia (7.7%). The variability in key variables suggests that the relationship between gender and innovation can be reliably estimated. Table A1 reports the by-country summary statistics.

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3.2 | Model construction

Our main objective is to examine whether gender-diverse manager-owner(s) coupling is associated with the odds of a firm engaging in innovative activities. To this end, we first build a probit model that links the presence or absence of gender diversity in a firm's manager-owner (s) team with the firm's probability of engaging in innovative activities as our dependent variable.[3] The model is expressed as follows:

$$\Pr\left(INV_{i,j}=1\right)=\alpha_0+\alpha_1 DIV_{i,j}+\theta X_{i,j}+\epsilon_{i,j} \quad (1)$$

where the dependent variable $INV_{i,j}$ is a dummy variable that captures whether a firm has undertaken innovation that involved the introduction of a new product or service in the last three years (Ayyagari et al., 2011; Na & Shin, 2019). Our primary research variable, gender diversity in the manager-owner(s) team ($DIV_{i,j}$), captures gender diversity in the manager-owner(s) team of a firm and is conceived as the "mixing-and-matching" of the gender of a business owner and that of the firm's top manager. Consistent with this conceptualisation, we generate a dummy variable set to one if a male top manager runs a female-owned firm or a male-owned firm is run by a female top manager and zero otherwise. Conversely, a female-owned business with a female top manager and a male-owned business with a male top manager is assigned a zero value. Our conceptualisation is depicted in Figure 1, in which Quadrants A and B denote female-owned businesses managed by a female and a male top manager. Similarly, Quadrants C and D respectively represent male-owned businesses managed by a female and a male top manager. Thus, Quadrants B and C represent firms with gender-diverse or heterophilic manager-owner (s) coupling. At the same time, Quadrants A and D indicate firms with non-gender diverse or homophilic manager-owner(s) teams.

Our models control for several factors ($X_{i,j}$) that theory and empirical evidence suggest having an impact on firm innovation. For instance, firm size is often viewed as a proxy for organizational complexity and availability of resources, both of which interact with innovation (Cohen & Klepper, 1996; Cohen & Levin, 1989). We include the natural logarithm of the number of permanent, full-time firm employees (F_SIZ) in the model (Tonoyan & Boudreaux, 2023). A firm's age encapsulates its experience, depth of knowledge, and entrepreneurial flexibility, likely positively impacting its propensity to engage in innovation activities (Chen et al., 2014; Lederman, 2010). On the other hand, older firms tend to be conservative and more likely to withhold resources from innovation risk (Dai et al., 2019; Farooq et al., 2022; Hansen, 1992). We measure firm age as the natural logarithm of years since the firm's establishment ($F_AGE_{i,j}$) and include it in our model.

Greater pressure from foreign competition tends to stimulate innovation; thus, firms that earn a larger share of sales from exports ($EXP_{i,j}$) are more likely to innovate than is the case with those that sell more to the domestic market (Golovko & Valentini, 2011; Gorodnichenko et al., 2010). Choi et al. (2011) contend that foreign investors would provide domestic firms with advanced technical and managerial know-how and resources beyond mere financial contributions, thus fostering innovation in a domestic firm. Hence, foreign-owned firms tend to introduce a considerably higher number of new products or services than is the case with their domestically-owned peers. Thus, our model includes a dummy variable ($FRN_{i,j}$) set to one if a firm was established as a joint venture with a foreign partner and zero otherwise (Ayyagari et al., 2011; Krammer, 2019; Krammer & Jimenez, 2020; Na & Shin, 2019).

Businesses with better access to finance would have higher odds of undertaking innovation (Ayyagari et al., 2011; Krammer & Jimenez, 2020); thus, our model incorporates a dummy variable ($FIN_{i,j}$) set to one if a firm perceives access to finance as an obstacle to doing business and zero otherwise (Dohse et al., 2019). Several prior studies demonstrate that increased competitive pressure on a firm determines the likelihood of a firm engaging in innovative undertakings (Dai et al., 2018; Madison et al., 2022; Tang, 2006). Thus, we control for the extent of

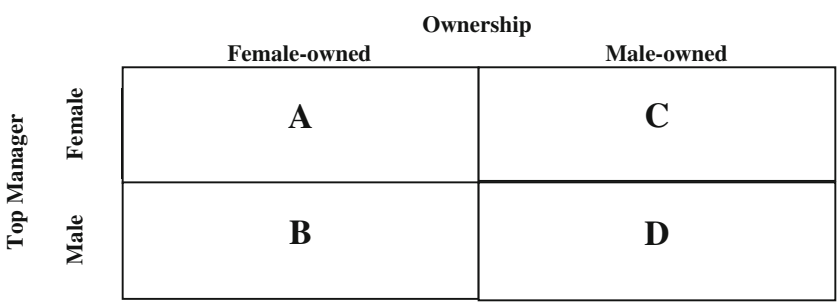


FIGURE 1 The framework for gender diversity in manager-owner(s) team. The figure plots a two-by-two matrix of manager-owner (s) gender diversity. While quadrants B and C represent firms with gender-diverse manager-owner(s) team, quadrants A and D represent firms with non-gender diverse manager-owner (s) team.

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competition faced by a firm ($CMP_{i,j}$) by including a variable computed by taking the natural logarithm of the number of a firm's competitors in our model (Dohse et al., 2019; Madison et al., 2022).

Although privately held firms ($PRV_{i,j}$) may lack access to financial capital that can drive innovation, unlike publicly listed firms, they are not exposed to the myopic incentives and disclosure requirements that may constrain innovation (Graham et al., 2005; Porter, 1992; Wies & Moorman, 2015). Several studies provide evidence that firms that undertake research and development projects are more likely to innovate (He & Tian, 2013; Jiang & Yuan, 2018; Li & He, 2023); thus, we include a dummy variable ($R\&D_{i,j}$) set to one if a firm had invested in research and development (in-house or outsourced) in the previous three years and zero otherwise.

Taking a cue from several studies that demonstrate a positive association between Gross Domestic Product (GDP) and innovation at the firm level (e.g., Acharya & Subramanian, 2009; Chkir et al., 2021; Tonoyan & Boudreaux, 2023), we include logarithm of GDP (*LGDP*) in our model. In addition, Boubakri et al. (2021) incorporated countries' economic growth rate (*GDPG*), instead of the overall economic level, in a study examining the interaction between national culture—a time-invariant variable—and corporate culture innovation. Finally, as inflation (*INF*) tilts firms' technology choices away from innovative activities and toward safer but return-dominated ones, innovation at the firm level decreases in inflationary environments (Evers et al., 2020; Xiao, 2013). Table A2 includes the definition of each variable used in the model.

4 | RESULTS AND DISCUSSIONS

4.1 | Preliminary results

The preliminary statistics, tabulated in Table 1, present the means of each variable for the full-sample and subsamples. In addition, the table presents tests of differences in the means of variables between firms with a gender-diverse manager-owner(s) team and those with a homophilic manager-owner(s) team. The results indicate that 32.7% of firms in our sample introduced new products or services; nonetheless, firms with a gender-diverse or heterophilic manager-owner(s) team engage in innovation activities at a significantly (at the 1% level) higher rate (i.e., 41.1%) than those with a homophilic manager-owner(s) team (i.e., 30.3%).

The positively significant (at the 1% level) pairwise correlation coefficient (0.095) that we observe between the *DIV* and *INV* (see Table 2) complements the findings presented in the difference between means test. These preliminary results support the conjecture that a gender-diverse manager-owner(s) team would foster innovation at the firm level. The bivariate comparisons in Table 1 also indicate that firms with a gender-diverse manager-owner(s) team are more likely to be bigger, younger, and privately held than firms with a non-gender diverse manager-owner(s) team. The table shows further that firms with a heterophilic manager-owner(s) team are more likely to have a higher share of exports in sales, R&D expenditures, and lower obstacles in accessing finance than firms with a homophilic manager-owner (s) team.

Consistent with our observations in the bivariate comparisons, the Pearson pairwise correlation matrix presented in Table 2 shows significant positive correlations between firms with a gender-diverse manager-owner (s) team and firm size, export intensity, R&D expenditure, and privately held firms. On the contrary, we find that such firms are negatively correlated with firms whose owners comprise foreigners, firms that perceive access to finance as an obstacle to doing business, firm age, GDP growth, inflation, and GDP. Moreover, the correlation coefficients' magnitude and significance show no severe multicollinearity problems that would prohibit progression toward multivariate analyses (Yoo et al., 2014).

4.2 | Main results

We first examine whether firms with a gender-diverse manager-owner(s) team are associated with innovation at the firm level by estimating equation 1 using probit regression. A summary of the results is presented in Table 3. Results in Table 3 indicate a significant positive association (at the 1% level) between the $DIV_{i,j}$ and $INV_{i,j}$ across all specifications, suggesting that firms with a gender-diverse manager-owner(s) team are more likely to engage in innovative activities than firms with a homophilic manager-owner(s) team.

The positive association that we observe between firms with a gender-diverse manager-owner(s) team and innovation at the firm level corroborates the resource dependency theory-based conjecture, which contends that the potential complementarity in the expanded perspective and knowledge repertoire arising from gender diversity in a firm's manager-owner(s) team would foster the creation of new and innovative ideas and products (Cox & Blake, 1991; Van der Vegt & Janssen, 2003). It is also in sync with the argument that diversity in "orientation" available to firms with a gender-diverse manager-owner(s) team would allow such firms to engage in innovative practices that incentivize employees while

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TABLE 1 Descriptive statistics: The table presents the means and results of tests of difference between the means of firms with a gender-divers manager-owner(s) team (i.e., diversified firms) and those with homophilic manager-owner(s) team (i.e., non-diversified firms).

		Full sample			Non-diversified			Diversified			
No.	Variables	No. of observations	Mean	Standard deviations	No. of observations	Mean	Standard deviations	No. of observations	Mean	Standard deviations	Differences
1	INV	33,629	0.3272	0.4692	26,122	0.3033	0.4597	7507	0.4107	0.4920	0.1074***
2	INV_A1	25,481	0.5489	0.4976	19,395	0.5374	0.4986	6086	0.5858	0.4926	0.0484***
3	INV_A2	33,629	0.4882	0.4999	26,122	0.4600	0.4984	7507	0.5865	0.4925	0.1265***
4	DIV	33,629	0.2232	0.4164	26,122	0.0000	0.0000	7507	1.0000	0.0000	1.0000***
5	F_MGR	33,629	0.2417	0.4281	26,122	0.2362	0.4248	7507	0.2607	0.4390	0.0245***
6	FOE	33,629	0.3255	0.4686	26,122	0.2066	0.4049	7507	0.7393	0.4390	0.5327***
7	FRN	33,629	0.0189	0.1363	26,122	0.0200	0.1399	7507	0.0153	0.1228	−0.0047***
8	PRV	33,629	0.4726	0.4993	26,122	0.4592	0.4983	7507	0.5192	0.4997	0.0601***
9	FIN	33,629	0.6883	0.4632	26,122	0.7027	0.4571	7507	0.6379	0.4806	−0.0648***
10	F_SIZ	33,629	3.2638	1.0382	26,122	3.2268	1.0215	7507	3.3925	1.0844	0.1658***
11	F_AGE	33,629	2.7858	0.6927	26,122	2.7966	0.7110	7507	2.7480	0.6233	−0.0486***
12	EXP	33,629	0.1043	0.2532	26,122	0.0972	0.2453	7507	0.1290	0.2777	0.0318***
13	CMP	33,629	0.7255	1.0229	26,122	0.7213	1.0123	7507	0.7405	1.0591	0.0192
14	R&D	33,629	0.1690	0.3748	26,122	0.1645	0.3707	7507	0.1848	0.3881	0.0203***

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

strategically managing relationships with stakeholders (Glass & Cook, 2018). This result also rhymes with the contention that the "psychological safety" that employees of firms with a gender-diverse manager-owner(s) team would encourage them to experiment with novel and controversial ideas, which could eventually lead to innovation (Carmeli et al., 2010; Glass & Cook, 2018).

On the contrary, the positive association that we observe between the $DIV_{i,j}$ and $INV_{i,j}$ is in contradiction with the argument that heterogeneity in cognition and diversity in knowledge and perspectives (Jehn et al., 1999) that epitomize gender-diverse manager-owner(s) teams is likely to lead to conflict, lack of cohesion, and cooperation (Hogg et al., 1995; Shayo, 2020), which in turn is likely to impede a firm's propensity to undertake innovation. Our finding rather aligns with Tonoyan and Boudreaux's (2023) view that diversity in the manager-owner(s) team is unlikely to lead to conflict between owners and managers. It contradicts Azeem et al. (2022) and Bednar et al. (2021), both of which report that female-owned businesses managed by female top leaders (an example of a homophilic manager-owner(s) team) have a greater probability of undertaking innovative activities.

A further perusal of the results in Table 3 also reveals that several control variables impact firm-level innovation. For instance, consistent with the contention that foreign investors would provide domestic firms with advanced technical and managerial know-how and resources beyond mere financial contributions and, thus, would foster innovation in a domestic firm (Choi et al., 2011), we find that the presence of foreign investors among the owners of a firm boosts the likelihood of the firm undertaking innovation activities. The positively significant association that we observe between the *FRN* and *INV* across all the models is consistent with the findings reported in prior studies (Ayyagari et al., 2011; Choi et al., 2011; Joe et al., 2019; Krammer & Jimenez, 2020). In line with the argument that the short-term performance pressure exerted by public equity markets (Graham et al., 2005; Porter, 1992; Wies & Moorman, 2015) is likely to discourage publicly held companies from engaging in innovation projects, which oftentimes tend to be of long-term nature (Gao et al., 2018), our results show a significant positive association between privately held firms (*PRV*) and firm innovation (*INV*).

In sync with the argument that older firms tend to be conservative and more likely to withhold resources from innovation risk (Dai et al., 2019) and the available evidence in prior studies (Farooq et al., 2022; Hansen, 1992), we find that older firms are associated with lower probability of undertaking innovation activities. In concurrence with the contention that firm size can influence the resources devoted to innovation (Chaganti &

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TABLE 2 Correlation matrix: The table presents the Pearson pairwise correlation coefficients and their corresponding significances for each variable considered in the study.

No.	INV (1)	INV_A1 (2)	INV_A2 (3)	DIV (4)	F_MGR (5)	FOE (6)	FRN (7)	PRV (8)	FIN (9)	F_SIZ (10)	F_AGE (11)	EXP (12)	CMP (13)	R&D (14)	GDPG (15)	INF (16)	LGDP (17)
(1)	1																
(2)	0.514***	1															
(3)	0.714***	0.864***	1														
(4)	0.095***	0.064***	0.105***	1													
(5)	−0.066***	−0.103***	−0.095***	0.024***	1												
(6)	−0.014**	−0.027***	−0.043***	0.473***	0.404***	1											
(7)	0.052***	0.059***	0.060***	−0.014***	−0.025***	−0.036***	1										
(8)	0.042***	−0.001	0.005	0.050***	0.225***	0.221***	−0.001	1									
(9)	−0.027***	0.006	−0.021***	−0.058***	0.079***	0.074***	−0.018***	−0.004	1								
(10)	0.146***	0.137***	0.147***	0.066***	−0.063***	−0.010*	0.059***	0.073***	−0.033***	1							
(11)	−0.129***	−0.196***	−0.198***	−0.029***	0.218***	0.239***	−0.084***	0.114***	0.077***	0.134***	1						
(12)	0.056***	0.027***	0.040***	0.052***	−0.059***	−0.020***	0.067***	0.052***	−0.043***	0.244***	−0.042***	1					
(13)	0.005	0.037***	0.031***	0.008	0.004	0.088***	0.009	0.078***	0.028***	−0.007	0.058***	−0.045***	1				
(14)	0.258***	0.235***	0.253***	0.023***	−0.093***	−0.029***	0.044***	0.018***	−0.019***	0.167***	−0.066***	0.095***	0.022***	1			
(15)	−0.028***	0.044***	0.011*	−0.044***	0.006	−0.032***	0.037***	−0.096***	0.007	−0.008	−0.115***	−0.065***	0.034***	−0.034***	1		
(16)	−0.021***	0.074***	0.022***	−0.106***	0.078***	0.050***	0.059***	−0.029***	0.078***	0.005	0.018***	−0.116***	0.018***	−0.009*	0.275***	1	
(17)	−0.088***	−0.109***	−0.129***	−0.021***	0.082***	0.095***	−0.004	−0.012**	−0.017***	−0.016***	0.129***	−0.017***	0.019***	−0.055***	0.343***	0.276***	1

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

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TABLE 3 Results of estimating the baseline model: The table presents summary results of regressing corporate innovation (*INV*) on the key research variable (*DIV*) and the control variables identified in the literature to influence corporate innovation.

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
DIV	0.2892***	0.2588***	0.2545***	0.2549***	0.2579***	0.2582***
	(0.0167)	(0.0174)	(0.0174)	(0.0175)	(0.0175)	(0.0175)
FRN		0.2336***	0.2418***	0.2415***	0.2394***	0.2385***
		(0.0537)	(0.0537)	(0.0538)	(0.0536)	(0.0538)
PRV		0.1013***	0.0935***	0.1000***	0.0953***	0.0935***
		(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
FIN		−0.0170	−0.0158	−0.0146	−0.0236	−0.0241
		(0.0159)	(0.0159)	(0.0160)	(0.0159)	(0.0160)
F_SIZ		0.1580***	0.1595***	0.1588***	0.1567***	0.1569***
		(0.0075)	(0.0075)	(0.0075)	(0.0075)	(0.0075)
F_AGE		−0.2795***	−0.2867***	−0.2800***	−0.2670***	−0.2694***
		(0.0109)	(0.0110)	(0.0109)	(0.0110)	(0.0112)
EXP		−0.0320	−0.0421	−0.0400	−0.0311	−0.0310
		(0.0296)	(0.0296)	(0.0298)	(0.0296)	(0.0299)
CMP		0.0071	0.0088	0.0073	0.0083	0.0088
		(0.0072)	(0.0073)	(0.0073)	(0.0073)	(0.0073)
R&D		0.7592***	0.7553***	0.7591***	0.7522***	0.7512***
		(0.0192)	(0.0193)	(0.0192)	(0.0193)	(0.0193)
GDPG			−1.1899***			−0.3798
			(0.2330)			(0.2552)
INF				−0.1585**		0.0670
				(0.0712)		(0.0744)
LGDP					−1.2563***	−1.2164***
					(0.1166)	(0.1291)
Constant	−0.5150***	−0.4465***	−0.3656***	−0.4295***	−0.1733***	−0.1634***
	(0.0081)	(0.0375)	(0.0406)	(0.0379)	(0.0446)	(0.0452)
No. of observations	33,629	33,629	33,629	33,629	33,629	33,629
Pseudo-R2	0.007	0.081	0.082	0.081	0.084	0.084
Log likelihood	−21,112	−19,539	−19,524	−19,536	−19,478	−19,477

Note: Robust standard errors in parenthesis. *, **, and *** denote significance of coefficients at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

Parasuraman, 1997; Dai et al., 2019; Tang, 2015), we observe positively significant associations (at 1% levels across models) between firm size (*F_SIZ*) and innovation (*INV*) at the firm-level, across all the specifications. This finding suggests that larger firms are associated with greater odds of undertaking innovative activities, which is in line with Ayyagari et al. (2011) findings that larger firms are more innovative than smaller firms. Furthermore, the positively significant association between the *R&D* and *INV* corroborates the view that firms that engage in research and development activities are more likely to innovate (He & Tian, 2013; Jiang & Yuan, 2018; Li & He, 2023). Finally, we observe that firms in emerging economies with higher GDP are less likely to innovate.

4.3 | Further analyses

Our primary analyses demonstrated that firms with a heterophilic manager-owner(s) team are positively associated with firm innovation. In addition, Figure 1 showed

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that a heterophilic manager-owner(s) team could be achieved by having a female-owned business run by a male top manager (Quadrant B) or a male-owned business run by a female top manager (Quadrant C). Nevertheless, the positive association between firms with a heterophilic manager-owner(s) team and firm innovation observed in Section 4.2 does not tell whether the diversity of the type denoted in Quadrant B or Quadrant C drives the reported relationship. Moreover, it does not specify whether there are disparities in the association between gender diversity in manager-owner(s) teams and innovation. Therefore, we probe the data to find answers to these important issues. In untabulated results of tests of between groups mean differences, we note a statistically significant difference in the proportion of firms engaged in innovation among female-owned firms with a male top manager (42.0%), male-owned businesses with a female top manager (39.0%), male-owned business with a male top manager (32.4%), and female-owned firms with a female top manager (21.2%). We further probe the data using multivariate models, and a summary of the results is reported in Table 4.

The results of estimating probit models show a negatively significant association between female-owned businesses run by a female top manager (*F_MGR X FOE*) and innovation (*INV*) at the firm level (see Table 4). That is, female-owned firms managed by female top managers—firms denoted by Quadrant A—are less likely to engage in firm innovation. This finding is consistent with the conjecture anchored on resource dependence theory, suggesting a redundant narrow-range knowledge repertoire — a non-gender diverse manager-owner(s) would limit creativity and innovation (Cox & Blake, 1991; Ibarra, 1992; Ibarra, 1993; Macaulay et al., 2019; Østergaard et al., 2011; Wu et al., 2022). However, it contradicts with the proposition based on social identity theory which suggests that ingroup cohesion would promote communication and cooperation (Hogg et al., 1995; Shayo, 2020; Taifel & Turner, 1986), and thus, firms with a homophilic manager-owner(s) team would be more innovative. It is also inconsistent with the view that female-owned businesses managed by female top managers would create less constrained opportunities for women to communicate and forge relationships and thus innovate better, compared to firms with a gender-diverse manager-owner(s) team (Azeem et al., 2022). The contradictions between our findings and Azeem et al. (2022) for firms in developing (primarily African) countries and Bednar et al. (2021) for firms in the U.S. highlight the importance of context within which studies are conducted.

Table 4 also reveals varying levels of positively significant associations between firms represented in Quadrants B, C, and D and firm innovation. Therefore, we omit Quadrant A from the model to avoid multicollinearity problems and use it as the base case. For this decompositional analysis, we find that female-owned firms managed by a male top manager (*M_MGR X FOE*), male-owned firms managed by a female top manager (*M_MGR X MOE*), and male-owned firms managed by a male top manager (*M_MGR X MOE*) are more likely to engage in innovation, compared to female-owned firms managed by female top managers (*F_MGR X FOE*). More specifically, female-owned firms managed by a male top manager (*M_MGR X FOE*), male-owned firms managed by a female top manager (*M_MGR X MOE*), and male-owned firms managed by a male top manager (*M_MGR X MOE*) are more likely to engage in innovation, compared to female-owned firms managed by female top managers (*F_MGR X FOE*). Furthermore, the results of the equality of slopes tests reported in Table 4 indicate that the differences among the coefficients for *M_MGR X FOE*, *M_MGR X MOE*, *M_MGR X MOE* are significantly different from zero (at the 1% level). Taken together, Table 4 indicates that female-owned businesses run by a male (female) top manager are the most (least) innovative, while male-owned firms run by a female (male) top manager are the second (third) innovative. In addition, male-owned businesses, regardless of the gender of the top manager, are more likely to engage in innovation than female-owned businesses run by female managers.

4.4 | Robustness check

4.4.1 | Alternative proxies for innovation

Tonoyan and Boudreaux (2023) contend that it is instead an innovation of the imitative form, such as improvements in existing products that are likely to be more important in emerging economies. In line with this argument, several studies define firm innovation broadly to include upgrading an existing product line or service (e.g., Ayyagari et al., 2011; Mateut, 2018; Nazarov & Obydenkova, 2020; Tonoyan & Boudreaux, 2023). To check whether our findings are sensitive to our choice of the proxy for firm innovation, we re-estimated our baseline model using two alternative innovation proxies. First, we use a dummy variable set to one if a firm has upgraded an existing product line or service in the previous three years (*INV_A1*) and zero otherwise. Second, we use another dummy variable (*INV_A2*) set to one if a firm has either introduced a new product line/service or upgraded an existing product line/service and zero otherwise. The results based on these alternative variable definitions are reported in Table 5.

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TABLE 4 Results of estimating models with different permutations of manager-owner(s) team: The table presents summary results of regressing corporate innovation (*INV*) on different permutations of manager-owner(s) gender combination and the control variables identified in the literature to influence corporate innovation.

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
F_MGR	0.1788***	0.1880***	0.1843***			
	(0.0259)	(0.0273)	(0.0274)			
FOE	0.2561***	0.2381***	0.2412***			
	(0.0193)	(0.0201)	(0.0202)			
F_MGR X FOE	−0.7763***	−0.5878***	−0.5699***			
	(0.0364)	(0.0387)	(0.0392)			
F_MGR X MOE (A)				0.5202***	0.3497***	0.3286***
				(0.0309)	(0.0338)	(0.0342)
M_MGR X FOE (B)				0.5976***	0.3998***	0.3856***
				(0.0256)	(0.0277)	(0.0280)
M_MGR X MOE ('C)				0.3414***	0.1618***	0.1444***
				(0.0213)	(0.0241)	(0.0243)
FRN		0.2229***	0.2268***		0.2229***	0.2268***
		(0.0536)	(0.0537)		(0.0536)	(0.0537)
PRV		0.1283***	0.1184***		0.1283***	0.1184***
		(0.0155)	(0.0156)		(0.0155)	(0.0156)
FIN		−0.0096	−0.0179		−0.0096	−0.0179
		(0.0160)	(0.0161)		(0.0160)	(0.0161)
F_SIZ		0.1512***	0.1508***		0.1512***	0.1508***
		(0.0075)	(0.0075)		(0.0075)	(0.0075)
F_AGE		−0.2597***	−0.2529***		−0.2597***	−0.2529***
		(0.0115)	(0.0118)		(0.0115)	(0.0118)
EXP		−0.0379	−0.0353		−0.0379	−0.0353
		(0.0295)	(0.0298)		(0.0295)	(0.0298)
CMP		0.0086	0.0100		0.0086	0.0100
		(0.0073)	(0.0073)		(0.0073)	(0.0073)
R&D		0.7473***	0.7403***		0.7473***	0.7403***
		(0.0193)	(0.0194)		(0.0193)	(0.0194)
GDPG			−0.4034			−0.4034
			(0.2557)			(0.2557)
INF			0.0882			0.0882
			(0.0746)			(0.0746)
LGDP			−1.1476***			−1.1476***
			(0.1295)			(0.1295)
Constant	−0.4577***	−0.4684***	−0.1973***	−0.7991***	−0.6302***	−0.3416***
	(0.0092)	(0.0380)	(0.0461)	(0.0192)	(0.0483)	(0.0562)
Equality test—A versus B				588.90***	221.80***	199.30***
Equality test—A versus C				345.80***	107.70***	92.55***
Equality test—B versus C				544.20***	233.40***	220.30***
No. of observations	33,629	33,629	33,629	33,629	33,629	33,629
Pseudo-R2	0.014	0.082	0.085	0.014	0.082	0.085
Log likelihood	−20,957	−19,512	−19,457	−20,957	−19,512	−19,457

Note: Robust standard errors in parenthesis. *, **, and *** denote significance of coefficients at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

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TABLE 5 Results of estimating models with alternative proxies for firm innovation: The table presents summary results of regressing alternative proxies of corporate innovation (*INV_1A and INV_2A*) on the key research variable (*DIV*) and control variables identified in the literature to have influence on corporate innovation.

Independent variables	Panel A: INV_A1			Panel B: INV_A2		
	(1)	(2)	(3)	(4)	(5)	(6)
DIV	0.1229***	0.0890***	0.0897***	0.3190***	0.2883***	0.3074***
	(0.0185)	(0.0193)	(0.0195)	(0.0165)	(0.0174)	(0.0177)
FRN		−0.0347	−0.0359		0.2943***	0.2604***
		(0.0554)	(0.0556)		(0.0572)	(0.0579)
PRV		−0.0882***	−0.1079***		0.0197	0.0203
		(0.0165)	(0.0170)		(0.0145)	(0.0146)
FIN		0.0209	0.0123		0.0182	−0.0052
		(0.0182)	(0.0183)		(0.0156)	(0.0157)
F_SIZ		0.1569***	0.1542***		0.1836***	0.1769***
		(0.0086)	(0.0086)		(0.0075)	(0.0075)
F_AGE		−0.3658***	−0.3542***		−0.4046***	−0.3731***
		(0.0122)	(0.0125)		(0.0107)	(0.0110)
EXP		0.1008***	0.1057***		−0.1421***	−0.0950***
		(0.0364)	(0.0367)		(0.0297)	(0.0301)
CMP		0.0636***	0.0674***		0.0487***	0.0489***
		(0.0081)	(0.0082)		(0.0070)	(0.0071)
R&D		0.6115***	0.6024***		0.8041***	0.7967***
		(0.0223)	(0.0224)		(0.0208)	(0.0210)
GDPG			−1.4442***			0.9206***
			(0.2823)			(0.2461)
INF			0.3656***			0.7208***
			(0.0806)			(0.0804)
LGDP						−2.5347***
						(0.1349)
Constant	0.0938***	0.4470***	0.7946***	−0.1004***	0.2521***	0.6679***
	(0.0090)	(0.0414)	(0.0507)	(0.0078)	(0.0366)	(0.0454)
No. of observations	25,481	25,481	25,481	33,629	33,629	33,629
Pseudo-R2	0.001	0.072	0.077	0.008	0.096	0.106
Log likelihood	−17,518	−16,278	−16,191	−23,113	−21,054	−20,833

Note: Robust standard errors in parenthesis. *, **, and *** denote significance of coefficients at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

We note in Table 5 (Panel A), across all the models, that firms with a gender-diverse manager-owner(s) team (*DIV*) are positively significantly (at the 1% level) associated with a higher likelihood of undertaking innovation by upgrading existing product line or service (*INV_A1*). Similarly, the results in Panel B of Table 5 indicate that the odds of a firm either introducing a new product line/service or upgrading existing ones (*INV_A2*) increases in firms with a gender-diverse manager-owner(s) team (*DIV*). These results, once again, are consistent with those reported in the main analyses and rhyme with arguments anchored on resource dependency theory, which posits that gender-diverse manager-owner(s) teams would foster the creation of new and innovative ideas and products (Cox & Blake, 1991; Van Der Vegt & Janssen, 2003).

4.4.2 | Correcting for unobserved fixed effects

As mentioned earlier, probit estimates might be biased as this approach does not allow us to account for unobserved heterogeneity pertaining to firm-, industry-, and

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TABLE 6 Results of estimating models using alternative econometric procedures: The table presents summary results of regressing firm innovation (*INV*) on gender diversity in manager-gender team (DIV), firm-specific and time-variant macro-economic control variables, using the ordinary least squares (OLS), conditional logit (CLOGIT), pseudo samples, nearest neighbour matched samples, instrumental variables (IV) probit maximum likelihood (IVPMLE) and the two-step instrumental variables (IV) probit estimators (2SIVPE).

Independent variables	OLS (1)	CLOGIT (2)	PSEUDO (3)	MATCHED (4)	IVPROBIT1 (5)	IVPROBIT2 (6)
DIV	0.0419***	0.1759***	−0.0111	0.1587***	1.329***	1.507***
	(0.0061)	(0.0338)	(0.0147)	(0.0220)	(0.042)	(0.063)
FRN	0.0548***	0.2039**	0.2238***	0.2206***	0.265***	0.301***
	(0.0197)	(0.0931)	(0.0534)	(0.0845)	(0.051)	(0.058)
PRV	−0.0070	0.0656*	0.1046***	0.1221***	0.043***	0.049***
	(0.0061)	(0.0356)	(0.0149)	(0.0224)	(0.015)	(0.016)
FIN	−0.0096*	−0.0155	−0.0348**	0.0463**	0.016	0.018
	(0.0054)	(0.0309)	(0.0160)	(0.0231)	(0.015)	(0.017)
F_SIZ	0.0505***	0.2229***	0.1624***	0.1173***	0.113***	0.128***
	(0.0025)	(0.0144)	(0.0074)	(0.0106)	(0.008)	(0.008)
F_AGE	−0.0721***	−0.2700***	−0.2718***	−0.0905***	−0.222***	−0.251***
	(0.0040)	(0.0247)	(0.0111)	(0.0183)	(0.012)	(0.013)
EXP	0.0049	0.0564	−0.0249	−0.0648	−0.072**	−0.081**
	(0.0104)	(0.0600)	(0.0297)	(0.0404)	(0.029)	(0.033)
CMP	−0.0041	−0.0154	0.0098	0.0250**	0.002	0.003
	(0.0025)	(0.0145)	(0.0073)	(0.0105)	(0.007)	(0.008)
GDPG			−0.4967*	−0.9377**	−0.055	−0.062
			(0.2555)	(0.3714)	(0.235)	(0.267)
INF			−0.0246	0.7154***	0.463***	0.525***
			(0.0741)	(0.1403)	(0.069)	(0.080)
LGDP			−1.1570***	−0.7511***	−1.242***	−1.409***
			(0.1286)	(0.1842)	(0.121)	(0.137)
Constant	0.3264***		−0.1046**	−0.6940***	−0.383***	−0.435***
	(0.0136)		(0.0452)	(0.0707)	(0.045)	(0.052)
No. of observations	33,629	33,280	33,629	14,516	33,129	33,129
R-square	0.220					
Pseudo-R2		0.049	0.079	0.067	0.060	0.060
Log likelihood	−18,054	−14,899	−19,587	−8881	−34,881	−16.014
First stage F-statistics					3370.00***	3370.00***

Note: Robust standard errors in parenthesis. *, **, and *** denote significance of coefficients at the 10%, 5%, and 1% levels, respectively. All variables are as defined in Table A2.

country-specific idiosyncrasies (Asiedu et al., 2013). Taking a cue from Asiedu et al. (2013), we address this concern using two alternative procedures. First, we re-estimate the model using ordinary least square (OLS) regression with fixed effects. Second, we re-estimate our model using the conditional logit specification, enabling us to capture fixed effects in a discrete choice model. The results are summarized in Columns 1 and 2 of Table 6. Once again, gender-diverse manager-owner(s) teams are positively associated with firm innovation.

4.4.3 | Falsification test

Our measure of gender diversity in a manager-owner (s) team appears to be an important determinant of firm innovation. Nonetheless, it is important that we design a falsification test of whether the association that we observe between firms with a gender-divers manager-owner(s) team and innovation is true or spurious. To implement the falsification test, we randomly assign firms to the diversified and non-diversified groups and

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re-estimate our baseline model. As expected, the coefficient of the *DIV* for the pseudo sample is not significant, suggesting that our results are not driven by confounding effects or some factors unrelated to manager-owner gender diversification (see results in Column 3 of Table 6).

4.4.4 | Addressing selection bias

Our findings thus far are based on regression estimators, which assume that firms with gender-diverse manager-owner(s) team (*DIV*) and those with a homophilic manager-owner(s) team (*non-DIV*) have been drawn from identical distributions. Nonetheless, results in Table 1 reveal that the two groups of businesses differ with respect to several firm-specific attributes; thus, the hitherto results may suffer from selection bias. To address potential selection bias, we generate counterfactual samples using a variation of propensity matching technique—nearest neighbour matching techniques—and re-estimate the model to check whether the observed association between firms with a gender-diverse manager-owner(s) team (*DIV*) and firm innovation (*INV*) persists. The results obtained based on matched samples are presented in Table 6 (column 5). Once again, the results based on matched samples corroborate our earlier finding that firms with a gender-diverse manager-owner(s) team (*DIV*) are associated with higher odds of undertaking innovative activities.

4.4.5 | Addressing endogeneity concerns

Prior studies on firm innovation suggest that model estimates could be biased due to endogeneity issues (Azeem et al., 2022). To address a potential concern that gender diversity in a manager-owner(s) team could be endogenously determined by omitted variables that are potentially correlated with firm innovation, we re-estimate our baseline model using instrumental variables (IV) probit maximum likelihood (IVPMLE) and the two-step instrumental variables (IV) probit estimators (2SIVPE). Taking the lead from the extant literature (e.g., Nason & Patel, 2016; Wellalage et al., 2020; Wellalage & Fernandez, 2019), we use the average of peer firms' scores for *DIV*, which is calculated as the locality-industry average of *DIV*, excluding the *DIV* for the local firm. Our instrument, peer firms' *DIV*, satisfies the validity condition as the first stage F-statistic (3370.00) is significant at the 1% level and is greater than the recommended minimum of 10 (Staiger & Stock, 1997). Table 6 (columns 6 and 7) summarizes results obtained using the IVPMLE and 2SIVPE procedures. Once again, we find that firms with a heterophilic manager-owner(s) team are associated with a higher probability of undertaking innovative activities at the firm level, corroborating the results reported in the primary analyses.

5 | CONCLUSIONS

Heeding recent calls to explore outcomes of gender diversity-related dependencies in a firm's upper echelons, we examine whether firms with a gender-diverse manager-owner(s) team are associated with more innovation. Consistent with insights drawn from resource dependence theory, we find robust evidence that a heterophilic manager-owner(s) team within an emerging market context is more likely to undertake innovation than a homophilic manager-owner(s) team. Furthermore, our results suggest that female-owned firms run by male (female) top managers are the most (least) innovative and male-owned businesses run by female (male) top managers are the second (third) innovative. These findings suggest that the firm's odds of undertaking innovation increases with an expanded repertoire of social and human capital, network resources, and knowledge from a heterophilic manager-owner(s) team. Our findings further suggest the potential negative impact on innovation associated with conflicts arising from differences in perspectives and cognitive heterogeneity in a gender-diverse manager-owner(s) is muted in the case of firms operating in emerging economies.

Unlike Azeem et al. (2022) and Bednar et al. (2021), this study sheds insights into the interaction between *all forms* of homophilic and heterophilic manager-owner (s) teams and innovation at the firm level, using the emerging markets setting. Our finding suggest that female-owned businesses could jump from being the least innovative to being the most innovative firms by switching their top manager from a female to a male. This finding stands in sharp contrast with the tendency of female-owned businesses in emerging economies to hire female rather than male top managers (Madison et al., 2022; Welter et al., 2003). Thus, firms in emerging markets should consider diversifying the gender composition of the manager-owner(s) team to overcome the social and structural barriers that impede innovation in emerging economies. In addition, our findings demonstrate that the interaction between gender diversity in manager-owner (s) teams and innovation in emerging markets firms is not necessarily identical to those reported for developing countries (Azeem et al., 2022) and the U.S. (Bednar et al., 2021). Finally, our study encourages future researchers to explore institutional and other contextual disparities across developed and emerging markets to tease out the heterogenous effect of gender diversity on several aspects of the firm. In sum, these findings echo the need for

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policymakers and advocacy groups to promote gender diversity beyond representation and encompass several facets of role-based diversity in the management and ownership of businesses.

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DATA AVAILABILITY STATEMENT

The data that supports the findings of this study is available from The Business Environment and Enterprise Performance Survey (BEEPS) website via the following link https://www.enterprisesurveys.org. Restrictions may apply to the availability of this data.

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ENDNOTES

[1] Several studies report mixed evidence on the effect of gender on innovation (Na & Shin, 2019, Ritter-Hayashi et al., 2019, Farooq et al., 2019, Arun et al., 2020, Javaid et al., 2021, Strohmeyer et al., 2017, Link & van Hasselt, 2020, Reutzel et al., 2018, Griffin et al., 2021, Attah-Boakye et al., 2020, Ain et al., 2022).

[2] Several studies use the BEEPS dataset (e.g., Ayyagari et al., 2011; Madison et al., 2022; McCann & Bahl, 2017; Pietrovito & Pozzolo, 2021; Tonoyan & Boudreaux, 2023).

[3] By estimating the probit model, we consider the dichotomous nature of our dependent variable. With a view to address a potential concern that our estimates might be biased as the probit procedure does not allow to control for unobserved heterogeneity at firm-, industry-, and country-level via fixed effects, we saturate our models with several firm- and country-specific variables that capture at the firm-level and within the operating environment. We also consider additional procedures to address this limitation in the robustness check section

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APPENDIX A

TABLE A1 Mean of variables by country: The table presents the means of variables included in the models by country.

No.	Country	N	INV	INV_A1	INV_A2	DIV	F_MGR	FOE	FRN	PRV	FIN	F_SIZ	F_AGE	EXP	CMP.	R&D	GDPG	INF.	LGDP
1	Albania	654	0.2615	0.4779	0.4083	0.1330	0.0902	0.1269	0.0122	0.4404	0.6774	3.0525	2.3124	0.1419	0.9927	0.0872	0.0645	0.0308	0.2292
2	Armenia	751	0.5073	0.6622	0.7137	0.1904	0.1119	0.2144	0.0213	0.4021	0.7457	3.1433	2.5071	0.0918	1.2427	0.1731	0.0873	0.0582	0.2278
3	Azerbaijan	768	0.4427	0.5065	0.6576	0.0911	0.0365	0.0964	0.0143	0.2305	0.7253	3.1941	2.4552	0.0304	0.3010	0.0781	0.0994	0.1599	0.2401
4	Belarus	660	0.5227	0.7660	0.8045	0.2485	0.2606	0.2758	0.0652	0.4803	0.7318	3.4520	2.5340	0.1085	0.6858	0.2576	0.0904	0.3888	0.2439
5	Bosnia & H.	573	0.5358	0.7469	0.7818	0.2443	0.1414	0.2670	0.0157	0.3874	0.7452	3.4666	2.7866	0.1324	0.6407	0.3962	0.0540	0.0678	0.2345
6	Bulgaria	1529	0.2492	0.3019	0.3349	0.4114	0.6645	0.3296	0.0059	0.6246	0.6239	3.3815	2.5791	0.1784	0.2029	0.1145	0.0634	0.0676	0.2452
7	Croatia	899	0.2825	0.7815	0.4216	0.4205	0.0890	0.4116	0.0089	0.5317	0.6229	3.3222	2.8088	0.1683	2.1417	0.1846	0.0436	0.0401	0.2480
8	Cyprus	331	0.1964	0.6515	0.1964	0.3565	0.1208	0.4713	0.0030	0.9335	0.3535	2.5758	3.1429	0.0304	1.2812	0.0665	0.0337	−0.0094	0.2389
9	Czech Rp.	602	0.3821	0.5108	0.5565	0.1777	0.1262	0.2010	0.0183	0.5432	0.7625	3.3139	2.5615	0.1350	0.3591	0.2259	0.0256	0.0279	0.1660
10	Egypt	2791	0.0358		0.0358	0.0831	0.0477	0.0706	0.0000	0.1408	0.6360	3.0045	2.9780	0.0457	0.2849	0.0251	0.0551	0.1502	0.2642
11	Estonia	527	0.4497	0.6622	0.6926	0.2087	0.2220	0.2713	0.0323	0.5503	0.4288	3.3166	2.5533	0.1489	0.7716	0.3359	0.0117	0.0621	0.2367
12	Georgia	585	0.3333	0.6230	0.6513	0.2291	0.2017	0.3231	0.0291	0.3966	0.6513	3.1805	2.5279	0.0746	0.5605	0.1624	0.0369	0.0849	0.2302
13	Greece	568	0.7482	0.1883	0.7482	0.7324	0.5563	0.2729	0.0035	0.8134	0.3732	2.9896	3.0547	0.0734	0.9023	0.1021	−0.0044	−0.0035	0.2622
14	Hungary	855	0.3263	0.5082	0.5567	0.2678	0.0901	0.3006	0.0386	0.3123	0.5696	3.3948	2.6431	0.1398	0.3342	0.1474	0.0357	0.0616	0.2557
15	Joran	526	0.1217		0.1217	0.1825	0.0494	0.2243	0.0000	0.0228	0.7243	2.8837	2.7182	0.1177	0.2319	0.1711	0.0194	0.0177	0.2421
16	Kazakhstan	1239	0.3374	0.5837	0.6279	0.1905	0.1921	0.2478	0.0097	0.4383	0.5940	3.4035	2.3668	0.0238	0.6322	0.1759	0.0782	0.1697	0.2540
17	Kosovo	422	0.5379	0.8133	0.7370	0.0829	0.0474	0.1114	0.0024	0.3460	0.8152	2.7917	2.5822	0.0578	0.7952	0.2322	0.0000	0.0000	0.0000
18	Kyrgyz Rp.	518	0.4112	0.6260	0.6699	0.2934	0.1892	0.3880	0.0811	0.3514	0.6795	3.3656	2.6458	0.0706	1.0678	0.1911	0.0714	0.1281	0.2212
19	Latvia	429	0.4942	0.7576	0.7949	0.2401	0.3193	0.3683	0.0396	0.5082	0.5291	3.4459	2.5403	0.1398	0.5101	0.1865	0.0191	0.0835	0.2391
20	Lebanon	486	0.1152		0.1152	0.0823	0.0473	0.1132	0.0000	0.1646	0.7469	3.0455	3.2703	0.1247	0.7703	0.1667	−0.0271	0.0492	0.2446
21	Lithuania	523	0.5793	0.6589	0.7629	0.2333	0.1549	0.2811	0.0363	0.6845	0.5602	3.4419	2.5959	0.1641	0.4093	0.2562	0.0477	0.0507	0.2427
22	Macedonia	520	0.5308	0.6699	0.7500	0.2365	0.2058	0.2981	0.0173	0.4942	0.6731	3.3729	2.6988	0.1947	0.7656	0.3385	0.0378	0.0408	0.2284
23	Malta	229	0.4498		0.4498	0.3755	0.1223	0.4454	0.0000	0.8035	0.3799	3.1562	3.2484	0.1981	1.6074	0.2576	0.0731	0.0212	0.2336
24	Moldova	736	0.5041	0.6096	0.6943	0.3152	0.1807	0.3736	0.0258	0.5571	0.7500	3.4030	2.4856	0.1181	0.4098	0.2514	0.0735	0.0924	0.2250
25	Mongolia	546	0.4066	0.7097	0.4945	0.2015	0.4176	0.5201	0.0165	0.9084	0.8168	3.0400	2.5298	0.0435	1.0259	0.1923	0.1189	0.1252	0.2281
26	Montenegro	197	0.2995	0.7806	0.8274	0.5178	0.5381	0.1269	0.0102	0.1320	0.6954	2.6346	2.5220	0.0273	1.0803	0.1117	0.0697	0.0797	0.2216
27	Morocco	532	0.0526		0.0526	0.1391	0.0583	0.1523	0.0000	0.1335	0.8590	3.4884	2.9559	0.1837	0.3813	0.1560	0.0299	0.0107	0.2554
28	Poland	1279	0.4824	0.5913	0.6873	0.4300	0.1298	0.5035	0.0203	0.1423	0.7740	3.3827	2.8303	0.1152	0.3330	0.2228	0.0397	0.0417	0.2667

(Continues)

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TABLE A1 (Continued)

No.	Country	N	INV	INV_A1	INV_A2	DIV	F_MGR	FOE	FRN	PRV	FIN	F_SIZ	F_AGE	EXP	CMP.	R&D	GDPG	INF.	LGDP
29	Romania	1108	0.4134	0.5883	0.6769	0.3087	0.2969	0.3141	0.0190	0.7220	0.7301	3.5620	2.5909	0.1159	0.6080	0.2202	0.0000	0.0000	0.0000
30	Russia	4401	0.2197	0.2996	0.3163	0.0768	0.6692	0.6794	0.0111	0.7832	0.8787	3.1841	3.3529	0.0171	1.0776	0.1177	0.0541	0.1812	0.2802
31	Serbia	636	0.5157	0.7082	0.7767	0.2201	0.1619	0.2673	0.0142	0.3145	0.7516	3.4690	2.8609	0.0953	0.8892	0.2987	0.0682	0.2779	0.2432
32	Slovakia	466	0.4120	0.7214	0.7511	0.1674	0.2082	0.2210	0.0300	0.3455	0.6438	3.4174	2.5863	0.1300	0.6596	0.1888	0.0499	0.0421	0.2504
33	Slovenia	494	0.4555	0.6130	0.6579	0.2348	0.1397	0.3016	0.0223	0.4372	0.5972	3.2305	2.8595	0.2197	0.6787	0.4130	0.0365	0.0537	0.2453
34	Tajikistan	645	0.4605	0.6542	0.7209	0.2155	0.1085	0.2450	0.0264	0.0868	0.6760	3.3389	2.4542	0.0482	0.6267	0.1674	0.0893	0.2607	0.2214
35	Tunisia	574	0.1098		0.1098	0.2857	0.0976	0.3484	0.0000	0.3815	0.9024	3.4709	3.0044	0.2859	0.3598	0.0923	0.0156	0.0686	0.2466
36	Turkey	2157	0.2707	0.5803	0.3764	0.2865	0.0816	0.3459	0.0051	0.7946	0.4446	3.4348	2.8096	0.2561	0.7572	0.1998	0.0582	0.0658	0.2745
37	Ukraine	1521	0.5220	0.7104	0.7554	0.2242	0.2604	0.3294	0.0519	0.4412	0.7396	3.3487	2.5698	0.0842	0.8541	0.2262	0.0665	0.2046	0.2560
38	Uzbekistan	1053	0.1529	0.5296	0.5670	0.1728	0.0598	0.1937	0.0807	0.0617	0.7654	3.2383	2.6608	0.0354	1.0114	0.0665	0.0733	0.2465	0.2417
39	West B. & G.	299	0.1906		0.1906	0.1037	0.0167	0.1137	0.0000	0.5318	0.6589	3.0577	3.0175	0.1206	0.8642	0.1672	0.0000	0.0000	0.0000

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TABLE A2 Definitions: The table lists the definition of each variable used in the study.

Variable	Label	Definitions
Firm innovation	*INV*	A dummy variable is set to one if a firm has introduced new products or services in the previous three years and zero otherwise.
Firm innovation A1	*INV_A1*	A dummy variable is set to one if a firm has upgraded an existing product line/service in the previous three years and zero otherwise.
Firm innovation_A2	*INV_A2*	A dummy variable is set to one if a firm has either introduced a new product/services or upgraded an existing product line/service and zero otherwise.
Manager-owner(s) team gender diversity	*DIV*	A dummy variable is set to one if a top male manager runs a female-owned firm or a male-owned firm is run by a top female manager and zero otherwise.
Female top manager	*F_MGR*	A dummy variable is set to one if the top manager of a firm is a female and zero otherwise.
Female owned enterprise	*FOE*	A dummy variable is set to one if a female owner(s) is among a firm's owners and zero otherwise.
Foreign ownership	*FRN*	A dummy variable is set to one if a firm was established as a joint venture with a foreign partner and zero otherwise.
Privately held firms	*PRV*	A dummy variable is set to one if a firm indicates privately held, limited liability company, and zero otherwise.
Access to finance obstacle	*FIN*	A dummy variable set to one if a firm perceives access to finance as an obstacle to doing business.
Firm size	*F_SIZ*	Natural logarithm of a firm's permanent, full-time employees at the end of the previous fiscal year.
Firm age	*F_AGE*	Natural logarithm of the difference between the current year and the year the establishment began operations.
Exporting status	*EXP*	The sum of the direct and indirect exports is expressed as a percentage of total sales revenue.
R&D expenditure	*R&D*	A dummy variable is set to one if a firm invested in research and development (in-house or outsourced) in the last three years and zero otherwise.
Competition	*CMP*	Natural logarithm of the number of competitors that a firm's main product/product line face.
Economic growth	*GDPG*	The growth rate of a country's real gross domestic product (GDP).
Inflation	*INF*	The inflation rate is based on the consumer price index (CPI).
Size of the economy	*LGDP*	The natural logarithm of a country's gross domestic product (GDP).

Note: The data used to compute all variables are down from *Business Environment and Enterprise Performance Survey* database, and those used for macroeconomic variables are from the World Bank.

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