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Is this a Man’s World? The Effect of Gender Diversity and Women’s Economic Opportunity on Firm Innovativeness

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Abstract
Gender diversity is known to have a positive effect on a firm’s innovative performance. However, it is unclear if this relationship also exists in emerging economies with diverse but generally low levels of women’s economic opportunity. We suggest that the level of women’s economic opportunity (WEOI), the country-specific laws, practices and attitudes that grant women and men equal access to workforce participation, moderates the effect of gender diversity on a firms’ likelihood to innovate. We examine this relationship in a cross-country study with 15,157 firms in 15 emerging economies. We find a positive effect of gender diversity on firms’ likelihood to innovate. Our results also show that gender diversity increases firms’ innovation likelihood when operating in countries with rising levels of economic opportunity for women and decreases innovation likelihood in countries providing little economic opportunity for women.
THIS A MAN’S WORLD? THE EFFECT OF GENDER DIVERSITY AND WOMEN’S ECONOMIC OPPORTUNITY ON FIRM INNOVATIVENESS

ABSTRACT

Gender diversity is known to have a positive effect on a firm’s innovative performance. However, it is unclear if this relationship also exists in emerging economies with diverse but generally low levels of women’s economic opportunity. We suggest that the level of women’s economic opportunity (WEOI), the country-specific laws, practices and attitudes that grant women and men equal access to workforce participation, moderates the effect of gender diversity on a firms’ likelihood to innovate. We examine this relationship in a cross-country study with 15,157 firms in 15 emerging economies. We find a positive effect of gender diversity on firms’ likelihood to innovate. Our results also show that gender diversity increases firms’ innovation likelihood when operating in countries with rising levels of economic opportunity for women and decreases innovation likelihood in countries providing little economic opportunity for women.

Keywords: Developing economies, gender diversity, binary logistic model, innovation, product innovation, women’s economic opportunity (gender equality)
INTRODUCTION

Gender diversity, which refers to the balance between the two genders (Østergaard, Timmermans, & Kristinsson, 2011), is frequently found to have a positive effect on innovation in high-income economies (Miller & del Carmen Triana, 2009; Østergaard et al., 2011; Pitcher & Smith, 2001; Teruel, Parra, & Segarra, 2013; Torchia, Calabró, & Huse, 2011). Despite the importance of innovation for developing economies (Organisation for Economic Co-operation and Development, 2012) and increasing availability of research thereof (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2011; Bradley, Mcmullen, Artz, & Simiyu, 2012; Goedhuys, 2007; Goedhuys, Janz, & Mohneny, 2014), gender diversity as a means to foster innovation in emerging countries has received no attention in the research literature. The difference in perception and rights of women between emergent and emerging countries in general and between different developing economies in Africa, the Middle East and South Asia in specific (Economist Intelligence Unit, 2012), raises the question whether the previously established positive effect of gender diversity on innovation in developed countries (Miller & del Carmen Triana, 2009; Østergaard et al., 2011; Torchia et al., 2011), also applies to the context of emerging economies in Africa, the Middle East and South Asia.

Women’s economic opportunity (Women’s Economic Opportunity Index, WEOI), defined as “a set of laws, regulations, practices, customs and attitudes that allow women to participate in the workforce under conditions roughly equal to those of men” (Economist Intelligence Unit, 2012, p.5), differs drastically between countries and is generally lower in developing compared to developed economies (Economist Intelligence Unit, 2012). We expect the differences in women’s economic opportunity to influence the effect gender diversity has on innovation. Two differences regarding women’s economic opportunity between developed and
developing countries in general and between the emerging economies participating in our research in particular are especially relevant in this context. First, education levels of women vary across countries, with high levels being prevalent in many high-income economies compared to remarkably lower levels in many low and lower-middle income countries in Africa, the Middle East and South Asia (The World Bank, 2016a). Second, the perception and status women are associated with differs between developed and developing countries in the above listed regions (Economist Intelligence Unit, 2012). Gender is one of the observable attributes related to status beliefs that are powerful in organizing the patterns of respect and influence among individuals as they interact (Ridgeway, 2002). Even though the perception of women is very diverse between countries, there is a trend indicating lower levels of legal and social status associated with women in emerging countries in Africa, the Middle East and South Asia compared to most high-income countries (Economist Intelligence Unit, 2012).

Given these differences, it is vital to broaden and refine the research focus and in doing so the contribution of our study is two-fold: First, this study focuses on the relation between gender diversity and innovation in developing countries. As such, we bring the context of developing countries into mainstream innovation theories in order to understand how “understudied phenomena influence existing theories” (George, Corbishley, Khayesi, Haas, & Tihanyi, 2016: 379). Previous studies on firm-level factors fostering innovation in developing countries have focused on the difference between foreign and local firms (Goedhuys, 2007), the type of innovation (Bradley et al., 2012), the role various knowledge sources play in explaining innovation (Goedhuys et al., 2014) as well as firm-level differences steering incremental versus radial innovation (Robson, Haugh, & Obeng, 2009). The phenomenon of gender diversity as a driver for innovation has so far not been assessed in the developing economy context, but has
high managerial relevance due to the large extent to which this firm characteristic can be influenced by informed management decisions. Second, we refine the existing knowledge on the relationship between gender diversity and innovation by assessing how women’s economic opportunity interacts with gender diversity to explain firms’ likelihood to innovate. Despite the great variance among countries with regards to the level of economic opportunity women are provided with and the “lack of theory that deals satisfactorily with inequality and with the implications of inequality for innovation” (George, Megahan, & Prabhu, 2012: 662), women’s economic opportunity has thus far not been taken into consideration as a contingency when determining the effect of gender diversity on innovation. The results from our study suggest that the country specific economic opportunity for women partially drives the magnitude and direction of the relation between gender diversity and innovation.

The remainder of this article is structured as follows: we first provide an overview of the theoretical background and develop our hypotheses. Next, the empirical data and research methodology are presented. Subsequently, we describe the analysis conducted, followed by a summary of the results. Finally, we discuss our findings and provide closing remarks and conclusions.

**GENDER DIVERSITY AND INNOVATION**

Innovation is an important driver for increasing firm performance (Calantone, Cavusgil, & Zhao, 2002; Hult, Hurley, & Knight, 2004), enhancing competitive advantage (Hitt, Hoskisson, Johnson, & Moesel, 1996) and expanding market share (Franko, 1989). In this study we focus on one of the five types of innovation put forward by Schumpeter (1934), namely product innovation, which is defined as the introduction of new goods or services as well as the
significant improvement of existing products with regards to their characteristics and intended use (Ayyagari et al., 2011; Organisation for Economic Co-operation and Development, 2005; Østergaard et al., 2011). Based on the relational demography perspective, gender diversity is regarded upon as a compositional characteristic of groups (Harrison and Klein, 2007) and gender balance within groups is frequently associated with advantages for a their innovativeness (Díaz-García, González-Moreno, & Sáez-Martínez, 2013; Miller & del Carmen Triana, 2009; Østergaard et al., 2011; Pitcher & Smith, 2001; Teruel et al., 2013; Torchia et al., 2011). In line with the value in diversity perspective put forward by Cox and colleagues (Cox, Lobel, & Mcleod, 1991), we discuss three benefits of gender diversity for innovation, stemming “either from each member’s unique attributes which bring different perspectives to the group or from relational and motivational processes that occur in diverse groups” (Díaz-García et al., 2013: 149).

First, different attributes, perspectives and knowledge of male and female employees in gender-diverse firms are expected to be positively related to innovation: Given their different experiences and career trajectories, men and women have a distinct human and social capital background (Lin, 2000; Singh, Terjesen, & Vinnicombe, 2008). Consequently, men and women diversify a firm’s internal knowledge base and bring different experiences and skills to the talent pool. A diversified knowledge base increases the innovation levels within a firm (Quintana-García & Benavides-Velasco, 2008), as diverse knowledge can be complementary (Quintana-García & Benavides-Velasco, 2011), enables new combinations of knowledge and ultimately the creation of new ideas and products (van der Vegt & Janssen, 2003).

Second, the increased and diversified knowledge pool outside the firm, to which gender diversity provides access, contributes to innovation. Based on social network theory (Granovetter,
1973) and due to their homophily, people typically direct their network strategies to individuals sharing similar personal attributes, including gender (Ibarra, 1993). Gender diversity thus allows for access to different networks, which means firms can leverage insights from a richer pool of external information as a baseline for their innovative activities (Milliken & Martins, 1996). Even more so, gender diversity enables better identification with diverse customer needs and market trends, fostering a firm’s ability to develop new and innovative products for different target groups (Teruel et al., 2013).

Third, the “dynamics that are created in a mixed team” (Díaz-García et al., 2013: 153) are beneficial for innovation. Next to divergent thought, innovation requires well-founded decisions on which innovative ideas to drop and which to turn into tangible innovative outputs (de Dreu & West, 2001). According to Østergaard and colleagues (2011), gender diversity can benefit innovation as it is linked to improved problem solving and decision making. In uncertain situations or when facing complex problems, cognitive conflict and expression of diverse viewpoints stemming from men’s and women’s inherently different perceptions and experiences (Lin, 2000; Singh et al., 2008) can circumvent premature consensus and thus increase the quality of decisions (Priem, Harrison, & Muir, 1995) as a driver for innovation.

As indicated in the foregoing discussions, gender diversity can have several advantages for innovation on a firm level and we argue that the level of women’s economic opportunity within a country impacts the extent to which a firm can extract value from gender diversity for innovation. Following this line of thought, we propose that operating in a country with higher levels of women’s economic opportunity enhances a firm’s ability to reap the benefits of gender diversity among the firm owners and the workforce for innovation compared to operating in countries with little economic opportunity for women. Moreover, we expect women’s economic
opportunity to impact the relationship between having a female top manager and innovation. We elaborate on the three proposed interaction effects in the following sections.

**Women’s Economic Opportunity and Gender Diversity in the Ownership Structure**

The owners of a firm, namely single individuals, a group of individuals or a board of directors representing shareholders (Choi, Park, & Hong, 2012), play a significant role for innovation: they steer crucial strategic decisions (Nielsen & Huse, 2010), such as decisions on investment in R&D or the introduction of new products and thus directly influence innovation (Hoskisson, Hitt, Johnson, & Grossman, 2002). In small to medium-sized firms, which are the predominant organizational form in the developing countries participating in our study, the impact firm owners have on innovation is viewed to be stronger compared to large firms, as owners in small firms are more directly “engaged in all production and process decision” (de Mel, McKenzie, & Woodruff, 2009: 15) as well as highly involved in all innovative activities (de Mel et al., 2009).

Demographic diversity, such as a gender-related diversity, plays an important role in leadership teams as outlined by the upper echelon theory, originally put forward by Hambrick and Mason (1984): Firm leaders filtered and interpreted the stimuli they receive during a decision challenge based on their personal and unobservable cognitive bases and values. Demographical attributes such as gender are used as proxies for underlying differences in cognitions, values and perceptions (Carpenter, Geletkancz, & Sanders, 2004). These insights build the foundation for previous research in developed countries, which widely found a positive effect of gender diversity among board members, the most frequently assessed form of ownership, on a firm’s innovation level (Miller & del Carmen Triana, 2009; Torchia et al., 2011). Improved problem solving and enhanced decision making as a result of gender diversity (Østergaard, Timmermans,
& Kristinsson, 2011) can be viewed upon as a vital benefit of a gender diverse ownership structure for innovation. Board members “with different backgrounds and bases of expertise offer different experiences and can make a valuable contribution to board decisions by providing unique perspectives on strategic issues” (van der Walt & Ingley, 2003: 222) as well as evaluate stimuli based on their personal cognitiva bases (Carpenter et al., 2004). Gender diversity among boards of directors thus allows to prevent premature consensus, increases the quality of decisions (Priem et al., 1995) and with that fosters innovation (de Dreu & West, 2001). In line with the afore discussed studies conducted in developed countries, we expect gender diversity in the ownership structure of a firm to have a positive effect on its likelihood to innovate in the developing countries participating in our study.

Furthermore, we expect the extent to which firms can reap the benefits from a gender diverse ownership structure for their likelihood to innovate to be moderated by women’s economic opportunity, which includes the legal and social status associated with women. As previously elaborated on, gender related status beliefs determine patterns of respect and influence among individuals as they interact with each other and take decisions (Ridgeway, 2002). We therefore suppose low levels of women’s economic opportunity, including low legal and social status of women, to limit the extent to which firms can render the benefits from a gender diverse ownership structure: “when women are perceived as less valuable board members they are less likely to contribute to board decision-making […] and] the potential contributions of women stemming from their different values are likely to be disregarded when women are not perceived as equal board members” (Nielsen & Huse, 2010: 27). However, with increasing levels of women’s economic opportunity, we expect the opinions, knowledge and experiences of both men and women to be taken equally into consideration in the decision-making process, allowing
firms’ innovativeness to benefit from the enhanced decision quality enabled by a gender diverse ownership structure. Hence, we propose that the positive effect of gender diversity among a firm’s ownership structure on innovation will be higher in countries scoring high compared to countries scoring low on women’s economic opportunity and we hypothesize the following:

Hypothesis 1. The effect of gender diversity in a firm’s ownership structure on its likelihood to innovate is positively moderated by women’s economic opportunity in a country.

Women’s Economic Opportunity and the Gender of the Top Manager

Studies on the impact a firm’s top manager can have on innovation are scarce (Smith, Smith, & Verner, 2006), have been primarily conducted in developed countries and have mostly focused on CEOs (Chief Executive Officers) as the highest ranking management individual in large organizations (Ling, Simsek, Lubatkin, & Veiga, 2008; Ruiz-Jiménez & del Mar Fuentes-Fuentes, 2015; Yadav, Prabhu, & Chandy, 2007). CEOs are found to have a “long-term impact on innovation outcomes in firms” (Yadav et al., 2007: 96) given that they as top managers “set up the organizational structure, processes, and culture that support innovation” (Elenkov & Manev, 2005: 385). A broader assessment of firm performance, which is strongly linked to innovation (Rosenbusch, Brinckmann, & Bausch, 2011), provides extensive but ambiguous insights into the impact of female firm leadership on firms’ financial performance such as return on investment, return on equity and return on assets. Whereas some studies find a positive effect of a female CEO on firm performance (Davis, Babakus, Englis, & Al, 2010; Peni, 2014) others attest female firm leadership a negative impact on financial performance (Fairlie & Robb, 2009). In a recent study conducted in three developing regions (Sub-Saharan Africa, Eastern Europe and
Central Asia, Latin America), Bardasi, Sabarwal and Terrell (2011) find gender-based differences to not significantly impact firms’ financial performance. Similar results were obtained by Chirwa (2008) for micro and small enterprises in Malawi, where there was no significant difference between the profit margins of male- and female-led firms.

In contrast to the increasing number of studies assessing the relationship between a CEO’s gender and firm financial performance, studies specifically focusing on innovation are rare. In a recent study, Ruiz-Jiménez and Fuentes-Fuentes (2015) controlled for the effect of a CEO’s gender on innovation. They did not find consistent results across the different models in their regression analysis, ranging from a non-significant effect to a significant positive effect of a male CEO on product innovation. Singhathep and Pholphirul (2015) conducted a study with primarily small and medium sized manufacturing firms in Thailand on the impact of a CEO’s gender on both short-term performance, such as financial performance, as well as on long-term development, such as innovation. They find a negative effect of women CEO on short-term financial performance, however no significant impact of a CEO’s gender on innovation (Singhathep & Pholphirul, 2015).

The leader member exchange (LMX) theory points to the importance of characteristics and behaviors of both leaders and members to form their relationship via a role-making process (Graen & Uhl-Bien, 1995). In this study, we extend the limited insights into how a top manager’s gender impacts innovation and additionally posit a moderating role of women’s economic opportunity. We expect the level of women’s economic opportunity including their legal and social status to impact the extent to which firms can render the aforementioned potential benefits of the transformational leadership associated with female top manager as well as to which degree female top managers can establish a positive relationship with their followers. A study by
Wolfram and colleagues (2007) gives a first indication that the gender of managers and the therewith associated status can play an important role in the interaction with their followers: their findings suggest that male followers respect female leaders less than male leaders if they believe in traditional gender roles. This lack of respect can limit the innovativeness in an organization as, according to the leader-member-exchange theory, a good relationship and quality exchange between leaders and their followers can be a driver for innovative behavior (Basu & Green, 1997). Underlining the importance of the attitude towards women for the success of a female CEO, a recent study by Zhang and Qu (2016) suggests that the success of “male-to-female succession may be moderated by a firm’s attitudes toward female leadership”. Consequently, we suppose women’s economic opportunity to moderate the relationship between a top manager’s gender and firm’s likelihood to innovate and hypothesize:

Hypothesis 2. The effect of the top manager’s gender on a firm’s likelihood to innovate is positively moderated by women’s economic opportunity in a country.

Women’s Economic Opportunity and Gender Diversity in the Workforce

Frequently, innovation is initiated and driven by the employees of a firm (Leonard & Sensiper, 1998). Gender diversity among a firm’s employee base has been found to positively impact innovation in developed countries. Østergaard and colleagues (2011) attested a moderate degree of gender diversity among the overall workforce to have a significant positive effect on product innovation. Moreover, a study by Díaz-García and colleagues (2013) assessed the impact of gender diversity on the degree of radicalness of innovation: they demonstrated that gender diversity within R&D teams results in high levels of radical innovation, especially in technology intensive industries. Furthermore, Fernandes (2015) analyzed whether the positive effect of
gender diversity on innovation depends on the type of innovative output. They found that product and process innovation on the one hand are affected by gender diversity in an inverted u-shape whereas there is a positive linear relationship between gender diversity and service innovation on the other hand. Moreover, Teruel and colleagues (2013) conducted a study to assess the impact of gender diversity on innovation whilst taking the effect of team size into account. They demonstrate that “gender-diverse teams increase the probability of innovating, and this capacity is positively related to team size” (Teruel et al., 2013: 1) with larger teams having a higher likelihood to innovate.

Next to a positive effect of gender diversity on innovation, we expect a country’s level of women’s economic opportunity to impact the extent to which innovation can benefit from gender diversity in the workforce. In a bottom-up innovation process, employees draw upon their individual pool of knowledge and experience to contribute to the different stages of innovation (Leonard & Sensiper, 1998). The extent to which formal education, which is considered to be a key driver for the breadth and depth of knowledge (Hausman, 2005), is available to women differs vastly between countries. We expect a higher degree of women’s economic opportunity, and with that enhanced access for women to education (Economist Intelligence Unit, 2012) and knowledge, to enable better realization of the benefits gender diversity can bring for innovation. The more women and men can contribute equal levels of inherently different knowledge and experiences to a firm’s knowledge pool, the more diverse the knowledge pool becomes, which in turn is a driver for firm innovation. Consequently, we suppose that the positive effect of gender diversity on innovation will be higher in countries with high women’s economic opportunity compared to countries with low women’s economic opportunity. As such, we formulate the following hypothesis:
Hypothesis 3. The effect of gender diversity in a firm’s workforce on its likelihood to innovate is positively moderated by women’s economic opportunity in a country.

DATA AND METHODS

We test our hypotheses using a combination of the Enterprise Survey’s firm-level data provided by the World Bank and the Women’s Economic Opportunity Index (WEOI) of the Economist Intelligence Unit (Economist Intelligence Unit, 2012). The Enterprise Survey (ES) is “a firm-level survey of a representative sample of an economy’s private sector” (The World Bank, 2016b) and it covers three main components. First, it captures firm characteristics such as its ownership-, management- and workforce structure, as well as firm performance. Second, it gathers information on the business environment as well as the investment climate in which firms operate. This includes insights into infrastructure, corruption, crime, access to finance and the degree of competition. Third, it encompasses information on innovation activities by assessing whether or not new products or services, manufacturing-, marketing-, distribution methods, or organizational structures are introduced.

The ES is orchestrated by distributing firm-level surveys to a representative sample of firms in the non-agricultural formal sector, encompassing firms in the manufacturing, retail and service industry. The ES is stratified based on firm size, geographical location and industry sector. For this study, we use data of 3 low and 12 lower-middle income countries in Africa, the Middle East and South Asia. We determined the countries participating in our study based on the following criteria: Out of 146 countries with ES data, information on women’s economic opportunity is available for 125 countries (3 countries out of the total of 128 countries with WEOI are not part of the ES sample). With the focus of this study being low and lower-middle
income countries, we excluded 82 countries from this research, that were labelled by the World Bank as higher-middle or high income countries for the year 2012. From the remaining sample, we disregarded 16 countries as the ES was conducted before 2012, when the most up to date version of the WEOI was published. The ES of 11 out of the 27 remaining countries does not contain all information required to test our hypotheses, which we therefore disregarded. Lastly, we excluded 1 country given that the ES data was only published in 2015 and thus includes a time lag of 3 years to the WEOI, compared to 1 or 2 years for all other countries in our sample.

In summary, the selection of countries for this study was based on three criteria, namely the status of being a developing economy (low or lower-middle income as per World Bank definition in 2012), the period of ES data collection as well as the availability of all required variables, resulting in 15 participating countries.

Using a combined dataset consisting of both ES and WEOI information has two important benefits for the purpose of this research: First, the ES provides firm-level data for 22,616 firms (15,157 firms with complete information), and thus a very extensive data base for the analysis. Second, the ES and WEOI availability in 15 countries offers variety with regards to the levels of women’s economic opportunity, which is required for being able to shed light on the hypothesized interaction effects. More details on the participating countries, the year of the ES and the number of respondents, which typically are owners, directors and top managers of a firm, are summarized in Table I.

| INSERT TABLE I ABOUT HERE |
Dependent Variable: Innovation

We measure innovation by the following question in the ES: “During the last three years, has this establishment introduced new or significantly improved products or services?“. We coded a variable equal to one if firms responded affirmatively and a variable equal to zero if firms responded negatively to the aforementioned question. This measure of innovation is in line with previous studies (Ayyagari et al., 2011; Barasa, Knoben, Vermeulen, Kimuyu, & Kinyanjui, 2017; Rodríguez & Nieto, 2016; Teruel et al., 2013).

Independent Variable: Gender Diversity

Gender Diversity in the Overall Workforce. Our first measure of gender diversity is related to the overall workforce and it is assessed by the following two questions in the ES: “At the end of last fiscal year, how many permanent, full-time individuals worked in this environment?” and “At the end of last fiscal year, how many permanent full-time individuals that worked in this establishment were female?”.

Gender Diversity among the Firm Ownership. So far, studies in developed countries have conceptualized gender diversity in firm ownership primarily by the percentage of women on the corporate board representing a firm’s shareholders (Miller & del Carmen Triana, 2009; Torchia et al., 2011). In contrast to the preference for diversified shareholder models in developed countries (Bedi & Desai, 2014), firms participating in our research in low and lower-middle income countries in Africa, the Middle East and South Asia are primarily small to medium in size with a variety of ownership forms and not necessarily governed by a board of directors. To account for this emerging market context, conceptualizing gender diversity in the ownership structure as the percentage of a firm owned by women thus appears to be more
appropriate than the percentage of female members on the board. The ES captures female ownership by the following two questions: “Among the owners of the firm, are there any females?” and “What percentage of the firm is owned by females?”. Excluded from this research are companies with shares traded publicly, as insights into the gender of the owners of publicly traded shares are difficult to gather and thus not sufficiently reliable.

**Blau’s Index to measure Gender Diversity among the Overall Workforce and Firm Ownership.** Consistent with previous operationalization (Bantel & Jackson, 1989; Campbell & Minguez-Vera, 2008; Díaz-García et al., 2013; Dwyer, Richard, & Chadwick, 2003; Miller & del Carmen Triana, 2009; Pitcher & Smith, 2001; Ruiz-Jiménez & del Mar Fuentes-Fuentes, 2015; Teruel et al., 2013), we used Blau’s (1977) index of heterogeneity to assess the level of heterogeneity versus homogeneity for the two aforementioned independent variables, namely gender diversity among a firm’s owners and employees. Blau’s index, which was originally proposed by Simpson in 1949, is also known as the Herfindahl’s and the Hirschman’s index and it is considered to be an appropriate measure for capturing variations within a group of people (Harrison & Klein, 2007) as it meets the four criteria put forward for a suitable measure of diversity: complete homogeneity is represented by a zero point, higher diversity is indicated by a larger number, no negative values are assumed and the index is not unbounded (Harrison & Sin, 2006). The equation for Blau’s index is \(1 - \sum p_k^2\), where \(p\) is the proportion of group members in each of the \(k\) categories. Given the range of Blau’s index is computed as \((k-1) / k\), gender diversity within the workforce and the firm ownership structure measured by Blau’s index can range from 0 when there is only one gender in the group to 0.50 when there are equal numbers of men and women. With regards to the measurement of gender diversity in the ownership structure, it is worthwhile mentioning that sole proprietorship as one possible form of firm ownership does
per definition not allow for gender heterogeneity and thus automatically represents a Blau’s Index of 0. Repeated analysis excluding sole proprietorship however yielded in results very similar to the results when including sole proprietorship, indicating that our results are not sensitive to this specific measurement characteristic.

**Gender of the Top Manager.** The third independent variable captures the gender of a firm’s top manager. The term top manager in this study refers to the firm’s highest ranking management individual (The World Bank, 2011) and it is measured by the following question: “Is the Top Manager female”. If the question was answered confirmatively, we coded the response one. If the question was answered negatively, the response was coded zero.

**Moderator: Women’s Economic Opportunity**

According to van Staveren (2013), five gender indices are most widely used to measure gender equality given their reputable sources and high coverage, one of which is the Women’s Economic Opportunity Index (WEOI) of the Economist Intelligence Unit (Economist Intelligence Unit, 2012). We use the WEOI in this research to assess to what degree the prevailing laws, practices, customs and attitudes in a country permit women to participate in the workforce under relatively equal conditions to those of men. The WEOI allows for an in-depth understanding of the environment in which female employees and entrepreneurs operate and it has been previously used as a reference in studies on gender equality (Casper, Harris, Taylor-Bianco, & Wayne, 2011; Kharistvalashvili, 2016).

The WEOI, which was first published in 2010, is available for 128 countries and incorporates 29 indicators from several sources, both national and international as well as quantitative and qualitative. It consists of five categories, namely labor policy and practice,
access to finance, education and training, women’s legal and social status, as well as the general business environment. Calculated from the unweighted mean of the underlying four to five indicators in each category, the individual scores of the five categories are scaled from 0-100, with 100 being most favorable. Similarly, the overall score of the WEOI is computed from a simple average of the unweighted indicator and category scores. Hence, each indicator contributes equally to its related parent category, which in turn contributes equally to the overall score. The overall WEOI score ranges from 0-100 with higher values again representing higher levels of economic opportunities for women (Economist Intelligence Unit, 2012).

We chose the WEOI since it includes all four dimension of human development, namely resources, institutions, capabilities and functionings. This is an important prerequisite for being able to encompass the variety of factors that relate to the economic opportunities women have in a given country as well as the differences between men and women (van Staveren, 2013). More specifically, the WEOI can be used to increase our understanding of how laws and regulations enabling women to participate in the workforce under conditions similar to those of men (measured by the dimensions of resources and institutions) influence firms’ ability to leverage the benefits of gender diversity for innovation. Table II provides an overview of the WEOI values of the countries participating in this study as well as their rank in a world-wide comparison.

Control Variables

**Firm size.** This study controls for firm size, as previous research finds a positive relationship between the size of a firm and its innovation levels (Díaz-García et al., 2013;
Small firms do often not have sufficient financial means to bear the risk of innovation (Hausman, 2005) and lack the economies of scale that larger firms are in a position to have (Ayyagari et al., 2011).

The Enterprise Survey measures firm size by the number of full-time permanent employees in an ordinal scale with the following coding: firms with less than 5 employees are coded zero, firms with 5 to 19 employees one, firms whose employee size ranges between 20 and 99 two and firms with more than 100 employees three. For the analysis, we created dummy variables.

**Firm Type.** Based on the previously discussed insights indicating that bigger firms are more likely to innovate, we control for whether or not a firm is part of a larger organization and with that in a position to benefit from the financial support or economies of scale of the parent organization. We coded zero if a firm answered negatively to the question whether the “Establishment is part of a larger firm” and we code one is coded if a firm answered affirmatively.

**Export.** As previous research finds exporting firms to be more innovative than non-exporting firms (Parrotta, Pozzoli, & Pytlíkova, 2014; Söllner, 2010; Teruel et al., 2013), we furthermore control for whether a firm generates sales from export. We coded a firm zero for national sales only and one for indirect and direct export.

**R&D.** This study also controls for R&D investment, as R&D is found to be positively related to higher levels of innovation (Østergaard et al., 2011; Quintana-García & Benavides-Velasco, 2008; Söllner, 2010; Teruel et al., 2013). The ES asks participants “During the last three years, did your establishment spend on formal R&D activities, either in-house or contracted with other companies?” We coded a positive response one and a negative response zero.
**Education.** Given earlier studies suggest a highly education workforce to positively impact the innovation levels of a firm (Østergaard et al., 2011; Söllner, 2010; Teruel et al., 2013; Zhou, Dekker, & Kleinknecht, 2011), we additionally control for the education level of the workforce. We used the percentage of employees with a secondary school degree as a measure.

**Industry Sector.** In line with previous research (Østergaard et al., 2011; Parrotta et al., 2014), we account for the industry sector, in which a firm operates. We coded one for the manufacturing, two for the retail and three for the services (non-Retail) industry. In the analysis, we employed dummy coding to assess the impact of the industry a firm is operating in on innovation.

**Ownership form.** As previously elaborated on, firms participating in our study are characterized by different ownership forms. We coded shareholding companies with privately traded or no shares two, firms governed by sole proprietorship three, partnerships four, limited partnerships five, and all other ownership forms six. To account for the impact of a firm’s ownership structure on innovation, we dummy coded this variable for the analysis.

**Statistical Analysis**

To contrast the before discussed hypotheses, we used a binary logistic regression model for analyzing the data. To account for the moderating effect of women’s economic opportunity, we included interaction effects in the analysis. According to Afshartous and Preston (2011: 7), a “problem common with including interaction terms in a regression model is that such terms are often highly correlated with the corresponding lower order terms”, which we tested for before conducting the analysis, both when the variables were and were not meancentered. Without centering the independent variables and the moderator at their mean, tolerance was at times
below .2 and VIF values above 10, with an average VIF value way beyond 1 (\(\overline{\text{VIF}} = 46.21\)), indicating issues with multicollinearity (Field, 2005). After centering Blau’s Index both for assessing gender diversity among the ownership structure and the workforce as well as for the WEOI value at their respective mean, multicollinearity is of no concern: for all variables, Tolerance was above .2 and VIF values were smaller than 10 with the average VIF value not being substantially greater than 1 (\(\overline{\text{VIF}} = 1.27\)). Based on the afore discussed concerns with regards to multicollinearity, the decision to meancenter the independent variables and the moderator was taken.

RESULTS

The descriptive statistics and bivariate correlations for all variables are outlined in Table III. The subsequent insights illustrate the general trends how and in which context the firms participating in our research operate: First, the majority of the 22,616 firms (15,157 with complete information) across 15 countries are independent firms (79.55 percent) in the manufacturing industry (66.01 percent) with employee numbers ranging from 5 to 99 employees (80.77 percent). Most of the firms, whose average percentage of employees with a secondary school degree accounts for 50.17 percent, are not conducting R&D (76.17 percent) and generate their sales primarily from national transactions (81.39 percent).

Second, Blau’s Index for firm ownership and the overall workforce range between 0.00 referring to 100 percent representation of solely one gender and 0.50 referring to a fully equal representation of 50 percent men and 50 percent women. In our study, Blau’s Index for firm ownership is very low with 0.05 and considerably smaller than Blau’s Index for the overall workforce, which accounts for 0.14. In other words and more illustrative, on average, as much as
roughly 97 percent of the firms are owned by owners of the same gender or by only one owner, thus not allowing for gender diversity, and on average as much as roughly 92 percent of the firms’ workforce are of the same gender. In both cases, the gender accounting for the majority are typically men, which also holds true for the gender of top managers (91.30 percent). Furthermore, the mean WEOI derived for our study (40.55) is well below the worldwide average of 57.30. Nevertheless there is still a considerable range in the WEOI values with a minimum of 19.23 for Sudan, representing the lowest WEOI worldwide, and a maximum of 48.70 for Egypt. The aforementioned results underline our initial observation that the level of women’s economic opportunity in the countries participating in this study differ, however at generally lower levels compared to developed countries. Lastly, the dependent variable, innovation, indicates that 43 percent of the firms participating in this study introduced a new or significantly improved product or service.

As previously elaborated on, we estimated a binary logistic regression model for the analysis of our hypotheses. Model 1 is the baseline model, which exclusively contains the control variables and serves to evaluate the added explanatory value of the independent variables. Model 2 adds the three direct effects of the independent variables, namely: gender diversity in the firm ownership structure and the overall workforce as well as the gender of the top manager. Model 3 includes three interaction effects between the aforementioned two dimensions of gender diversity and women’s economic opportunity as well as the interaction between the gender of the top manager and women’s economic opportunity. The results of these models are reported in Table IV.
Model 1 demonstrates that various control variables have a significant effect on firms’ likelihood to innovate: First, as predicted, firms engaging directly or indirectly in export have a higher likelihood to innovate. Second, in line with our expectation, conducting R&D has a strong positive effect on a firm’s likelihood to innovate. This result suggests that firms investing either in internal R&D or in externally contracted R&D are more probable to innovate. Third, as proposed by previous research (Østergaard et al., 2011; Parrotta et al., 2014; Söllner, 2010; Teruel et al., 2013; Zhou et al., 2011), the likelihood for innovation rises with higher education levels within a firm. This result puts forward that a bigger share of educated employees increases the probability for innovation and it underpins the importance of knowledge in the innovation process. Lastly, the results suggest that the ownership form of a firm matters for its innovation likelihood in that firms governed by limited partnership have the highest prospect to innovate.

Model 2 describes the direct effect of the independent variables on innovation. We follow the common practice to examine the marginal effects of the independent variable at one standard deviation above and below the mean (Hoetker, 2007) to get a better understanding of the impact of gender diversity on innovation. The results of Model 2 suggest that gender diversity at the ownership level and among the overall workforce, as well as a female top manager increase a firm’s likelihood to innovate. We observe that moving from one standard deviation below to one standard deviation above the mean in gender diversity among firm owners gives rise to firms’ innovation likelihood by 5.64 percent. This effect is even more prevalent for gender diversity among the workforce: when moving from one standard deviation below to one standard
deviation above the mean, a firm’s likelihood to innovate increases by 15.79 percent. Moreover, having a female top manager increases the likelihood of firms to innovate by 3.27 percent.

Model 3 assesses the interaction effect between the before discussed measures of gender diversity and women’s economic opportunity and thus sheds light on the three hypothesised moderation effects as outlined in Hypotheses 1 to 3. An important observation regarding the coefficients of the interaction between gender diversity and women’s economic opportunity is that, with the exception of the top manager’s gender, there is a positive and statistically significant moderation effect. Thus, to a large extent, our results support the hypotheses that women’s economic opportunity moderates the relationship between gender diversity and innovation.

Hypothesis 1 is supported in that women’s economic opportunity moderates the relation between gender diversity among a firm’s ownership structure and its likelihood to innovate, as graphically displayed in Figure 1. In line with expectations, the effect of gender diversity on innovation varies for different levels of women’s economic opportunity as illustrated at three WEOI levels: first, at the lowest WEOI value of all countries participating in this study (Sudan: 19.23), second at the mean WEOI value of all countries entailed in this research and third, at the highest WEOI value in this sample (Egypt, 48.7). We observe that when women’s economic opportunity is at its minimum in the terms of this sample, the effect of gender diversity in the firm ownership structure on innovation is negative with a decrease in the innovation likelihood of firms from 46.82 percent to 34.82 percent. It is also evident that at the mean WEOI value for all countries participating in this study, the effect of gender diversity is positive, with an increase in firms’ likelihood to innovate from 40.12 percent to 44.91 percent. Moreover, operating in the country with the highest level of women’s economic opportunity in terms of this sample
amplifies the positive effect of gender diversity even further and increases the likelihood to innovate from 38.01 percent to 48.53 percent. Consequently, innovation likelihood reaches its peak (48.53 percent) at a maximum WEOI value and maximum gender diversity in the ownership structure.

When assessing the cut-off point at which women’s economic opportunity for gender diversity at the ownership level moves from having a negative to having a positive effect on innovation, a women’s economic opportunity index above 36.65 is required. In this study, 4 countries have a WEOI below this cut-off point, worldwide only 15 out of 128 countries have lower WEOI values. Overall, we see a sizeable positive effect of the interaction between gender diversity in the firm ownership structure and women’s economic opportunity on innovation, signaling that higher levels of women’s economic opportunity allow firms to better leverage the benefits of gender diversity in the ownership structure for innovation. Thus, the results offer strong support for Hypothesis 1.

Hypothesis 2 is not supported as there is insufficient evidence at a 5 percent significance level to reject the claim that women’s economic opportunity has no effect on the relationship between the gender of a firm’s top manager and its likelihood to innovate. Following the same logic as for Figure 1, Figure 2 graphically illustrates the impact of having a female top manager on the likelihood to innovate at the three different levels of women’s economic opportunity (lowest, mean and highest WEOI level in terms of this sample). Independent of the level of women’s economic opportunity, having a female top manager increases a firm’s likelihood to innovate. There are two potential explanations for this lack of a moderating effect: first, the top
manager can only be either a man or a woman and does thus not represent a true measure of
gender diversity but is rather a description of a manager’s gender. Second, the majority of the
firms participating in our study are small to medium enterprises, in which it is likely that one of
the firm’s owners serves at the same time also as the highest ranking management individual
(Westhead & Howorth, 2006). It is thus possible that the moderating effect of WEOI is already
captured in the interaction between gender diversity among the firm owners and women’s
economic opportunity.

Hypothesis 3 is supported as women’s economic opportunity is found to moderate the
relation between gender diversity among a firm’s overall workforce and its likelihood to innovate.
Figure 3 illustrates this moderation effect at the three previously elaborated on WEOI levels
(lowest WEOI value, mean WEOI value and highest WEOI value in terms of this sample),
suggesting that the impact of gender diversity in the overall workforce on a firm’s innovation
likelihood differs when the level of women’s economic opportunity changes. At the lowest level
of women’s economic opportunity in this sample, the impact of gender diversity in the workforce
on innovation is negative with a decreasing likelihood for firms to innovate (from 47.39 percent
to 40.64 percent). Moreover, when women’s economic opportunity is at its mean in terms of the
countries participating in this research, the effect of gender diversity in the workforce is positive:
there is a rise in firms’ innovation likelihood from 36.27 percent to 52.24 percent. This positive
effect is even stronger at the highest level of women’s economic opportunity in this sample,
where gender diversity increases a firm’s likelihood to innovate from 32.67 percent to 56.41
percent. With that, the highest likelihood to innovate (56.41 percent) is associated with firms
having maximum gender diversity in the workforce while operating in country with the highest degree of women’s economic opportunity.

The WEOI cut-off point, at which the effect of gender diversity in the workforce changes from a negative to a positive effect on innovation, is at a WEOI value of 29.21. Only 2 countries in this study and 5 out of 128 countries worldwide are below this threshold. The results for firms operating in countries below the WEOI cut-off point suggest that firms with low gender diversity in the workforce are more likely to innovate than firms with a highly gender diverse workforce. Overall, we find a significant positive moderation effect, demonstrating that higher levels of women’s economic opportunity in the country, within which firms operate, help firms to render the benefits of gender diversity in the workforce for their likelihood to innovate. Consequently, the results offer very strong support for Hypothesis 3.

DISCUSSION AND CONCLUSION

The results of this study suggest that women’s economic opportunity plays an important role in the relationship between gender diversity and innovation. On the one hand, the results put forward that the positive effect of gender diversity on firms’ innovation likelihood is amplified with increasingly equal economic opportunities for women. On the other hand, both gender diversity in the ownership structure and in the overall workforce can have a negative effect on a firm’s likelihood to innovate if the firm is operating in a country with very little economic opportunity for women. However, gender diversity only has a potential negative effect on innovation in a handful of countries worldwide, ranging at the bottom of the women’s economic opportunity ranking (lowest 5 countries for gender diversity in the workforce and lowest 15...
countries for gender diversity in the ownership structure). Essentially, our study underscores the importance of both gender diversity as well as of appropriate laws and regulations enabling women to participate in the workforce under similar conditions like men. Our study broadens and refines existing knowledge on gender diversity and innovation research by shedding light on two vital aspects, namely identifying a thus far unstudied contingency effect as well as assessing the applicability of previous gender diversity and innovation findings to a non-mainstream context.

First, despite widely found positive effects of gender diversity on innovation, authors still refer firm diversity to as containing many "black-box issues" (Joshi, Liao, & Roh, 2011: 539), calling for a better understanding of contingencies shaping the effect of diversity on performance. By demonstrating that women’s economic opportunity moderates the magnitude and direction of how gender diversity impacts innovation, we identify a vital contingency in gender diversity and innovation research and build on previous insights that country-level factors such as power distance are important for the relationship between gender diversity and innovation (Van Der Vegt, Van De Vliert, & Huang, 2005). Despite a positive effect of gender diversity on innovation in the majority of the countries participating in this study and an amplification with increasing WEOI levels, both gender diversity in the ownership structure and in the overall workforce can have a negative effect on a firm’s likelihood to innovate if the firm is operating in a country with very little economic opportunity for women.

The negative effect of gender diversity in the ownership structure on innovation in countries below the WEOI cut-off point may be partially driven by the very low status women are associated with (Economist Intelligence Unit, 2012), potentially prompting male owners to not take women’s perceptions, views, experiences and knowledge into account in the decision
making process (Nielsen & Huse, 2010). Given the importance of functional team mechanisms for optimal performance in diverse leadership teams (Wei & Wu, 2013), low female status and neglecting female inputs can be highly problematic. With an increasing proportion of female ownership, the overall input being considered by male owners for taking a decision may decrease, potentially leading to less informed decisions and ultimately to a decrease in innovation. Empowering women and increasing their social status in emerging economies with low WEOI in South Asia and Africa through the initiation and financial support of self-help groups (e.g. microcredit groups) (Atteraya, Gnawali, & Palley, 2016; Ferguson & Kepe, 2011) can be considered as a potential means to overcome this obstacle.

Similarly, gender diversity in the workforce can negatively impact innovation in countries at the low end of providing women with economic opportunity. This insight is in line with previous observations that diversity can at times lead to “increased transaction costs, since interaction and communication between different knowledge bases and groups might be difficult” (Østergaard et al., 2011: 502). As previously elaborated on, an important benefit of gender diversity in the overall workforce for innovation is the inherently different knowledge of male and female employees (Singh et al., 2008) that they build on to create new knowledge and to innovate (Quintana-Garcia & Benavides-Velasco, 2008). Wenger (2000) points out that employees may however not be able to learn from each other and enrich the organizational knowledge pool as afore discussed, if their knowledge base and experiences are too distant from each other. This may be the case in countries with very low levels of women’s economic opportunity, where women’s access to education is very limited (Economist Intelligence Unit, 2012). If women lack scholarly education, the knowledge of male and female employees may be too distant from each other and women’s knowledge may therefore not be considered in the
innovation process. Therefore, the available input for bottom-up innovation could be reduced by increasing gender diversity in the workforce and with that a firm’s likelihood to innovate may decrease in countries with a WEOI below the previously elaborated on cut-off point. This insight underlines the importance of the United Nations Millennium Declaration to provide access to schooling to boys and girls alike (United Nations, 2000).

As a second contribution, by contextualizing gender diversity and innovation in the context of developing countries, we increase the scholarly understanding of how “understudied phenomena influence existing theories” (George et al., 2016: 379). The results of our study put forward that gender diversity at all organizational levels as well as having a female top manager positively affect a firm’s likelihood to innovate in the context of emerging economies in Africa, South Asia and the Middle East. We thus suggest a more universal applicability of gender diversity as a means to increase innovation beyond the previously set boundaries of developed countries and suggest that increasing the labor participation rate of women at all organizational levels in emerging economies can be regarded upon as a means to strengthen firms’ innovative likelihood and to address the United Nations Millennium Declaration of empowering women (United Nations, 2000). By providing empirical evidence as to the importance of including women at all levels of the organization to foster innovation and thus economic growth channels a powerful message and supports not only the societal and ethical rationale for women’s inclusion in the workplace in emerging economies but also showcases the therewith associated business advantages. Firms can actively increase the percentage of their female workforce at all levels through human resource management such as targeted hiring, mentoring or succession planning among others (Wilkinson & Johnstone, 2016).
We suggest future studies to assess whether the effects found in this study also hold true for different types of innovation (e.g. process innovation) as well as for different forms of innovation (radical vs incremental innovation). Furthermore, conducting follow-up studies including both developing as well as developed countries with inherently bigger firms could provide interesting insights.

Concluding Thoughts and Implications

To conclude, the results of our study suggest that gender diversity and gender equality in developing countries are not only relevant from an ethical perspective, but also from an economic point of view: Our findings show that gender diversity at all levels of the organization as well as women’s economic opportunity in a country play an important role for innovation in low and lower-income countries in Africa, the Middle East and South Asia. Gender diversity can serve as an appropriate measure to increase firms’ likelihood to innovate in the majority of the countries participating in our study, despite their generally low levels of women’s economic opportunity compared to the worldwide average. The results of our study suggest that a phenomenon, which has been primarily studied and benefited from in developed countries, is also applicable in the context of emerging economies. Moreover, our findings imply that fostering women’s economic opportunity at a national level and gender diversity at a firm level yields in increased innovation likelihood. Policy makers should thus ensure that country legislation encourages firms to create equal opportunities for men and women at the firm level. It is however imperative that policy makers in countries with very low levels of women’s economic opportunity focus on improving the situation of women at a country level in a first step to allow firms to reap the benefits of gender diversity at the different organizational levels. This includes
adjustments in various regulatory aspects such as equality in labor policies as well as in education and training but also increasing the legal and social status of women.
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TABLE I

Overview of Enterprise Survey Data for Countries Participating in this Study

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Income Countries</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td>2014</td>
<td>490</td>
</tr>
<tr>
<td>Tanzania</td>
<td>2013</td>
<td>534</td>
</tr>
<tr>
<td>Uganda</td>
<td>2013</td>
<td>742</td>
</tr>
<tr>
<td><strong>Lower-middle Income Countries</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2013</td>
<td>1,401</td>
</tr>
<tr>
<td>Egypt</td>
<td>2013</td>
<td>2,667</td>
</tr>
<tr>
<td>Ghana</td>
<td>2013</td>
<td>714</td>
</tr>
<tr>
<td>India</td>
<td>2014</td>
<td>9,079</td>
</tr>
<tr>
<td>Kenya</td>
<td>2014</td>
<td>765</td>
</tr>
<tr>
<td>Morocco</td>
<td>2013</td>
<td>332</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2013</td>
<td>2,585</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2013</td>
<td>1,032</td>
</tr>
<tr>
<td>Senegal</td>
<td>2014</td>
<td>571</td>
</tr>
<tr>
<td>Sudan</td>
<td>2013</td>
<td>659</td>
</tr>
<tr>
<td>Yemen</td>
<td>2013</td>
<td>352</td>
</tr>
<tr>
<td>Zambia</td>
<td>2013</td>
<td>693</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>22,616</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup> World Bank definition of low income countries for 2012: GNI per capita of $1,035 or less (World Bank, 2016)

<sup>b</sup> World Bank definition of lower-middle income countries for 2012: GNI per capita of maximum $4,085 (World Bank, 2016)
TABLE II
Women’s Economic Opportunity Index Ratings and Ranking for Countries Participating in this Study

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>WEOI Value</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>Middle East &amp; North Africa</td>
<td>48.7</td>
<td>80</td>
</tr>
<tr>
<td>Kenya</td>
<td>Sub-Saharan Africa</td>
<td>47.5</td>
<td>86</td>
</tr>
<tr>
<td>Morocco</td>
<td>Middle East &amp; North Africa</td>
<td>47.0</td>
<td>89</td>
</tr>
<tr>
<td>Ghana</td>
<td>Sub-Saharan Africa</td>
<td>46.4</td>
<td>91</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Sub-Saharan Africa</td>
<td>45.4</td>
<td>95</td>
</tr>
<tr>
<td>India</td>
<td>South Asia</td>
<td>41.9</td>
<td>98</td>
</tr>
<tr>
<td>Uganda</td>
<td>Sub-Saharan Africa</td>
<td>40.4</td>
<td>102</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>South Asia</td>
<td>39.2</td>
<td>105</td>
</tr>
<tr>
<td>Malawi</td>
<td>Sub-Saharan Africa</td>
<td>39.0</td>
<td>107</td>
</tr>
<tr>
<td>Senegal</td>
<td>Sub-Saharan Africa</td>
<td>38.7</td>
<td>108</td>
</tr>
<tr>
<td>Zambia</td>
<td>Sub-Saharan Africa</td>
<td>36.9</td>
<td>112</td>
</tr>
<tr>
<td>Pakistan</td>
<td>South Asia</td>
<td>35.5</td>
<td>116</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Sub-Saharan Africa</td>
<td>33.4</td>
<td>119</td>
</tr>
<tr>
<td>Yemen</td>
<td>Middle East &amp; North Africa</td>
<td>24.6</td>
<td>126</td>
</tr>
<tr>
<td>Sudan c</td>
<td>Sub-Saharan Africa</td>
<td>19.2</td>
<td>128</td>
</tr>
</tbody>
</table>

*a Maximum WEOI value: 100.00

*b Out of 128

*c Lowest WEOI score and rank worldwide
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
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</thead>
<tbody>
<tr>
<td>1 Innovation</td>
<td>0.41</td>
<td>0.49</td>
<td>0.00</td>
<td>1.00</td>
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<tr>
<td>2 Manufacturing (Industry)</td>
<td>0.73</td>
<td>0.44</td>
<td>0.00</td>
<td>1.00</td>
<td>0.02</td>
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<tr>
<td>3 Retail (Industry)</td>
<td>0.10</td>
<td>0.3</td>
<td>0.00</td>
<td>1.00</td>
<td>0.03</td>
<td>-0.56</td>
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<tr>
<td>4 Small (Firm Size)</td>
<td>0.40</td>
<td>0.49</td>
<td>0.00</td>
<td>1.00</td>
<td>-0.12</td>
<td>-0.14</td>
<td>0.13</td>
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<tr>
<td>5 Medium (Firm Size)</td>
<td>0.39</td>
<td>0.49</td>
<td>0.00</td>
<td>1.00</td>
<td>0.04</td>
<td>0.07</td>
<td>-0.65</td>
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<tr>
<td>6 Large (Firm Size)</td>
<td>0.21</td>
<td>0.41</td>
<td>0.00</td>
<td>1.00</td>
<td>0.1</td>
<td>0.09</td>
<td>-0.41</td>
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<tr>
<td>7 Firm Type</td>
<td>0.21</td>
<td>0.40</td>
<td>0.00</td>
<td>1.00</td>
<td>0.06</td>
<td>-0.08</td>
<td>0.04</td>
<td>-0.05</td>
<td>-0.05</td>
<td>0.24</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>8 Export</td>
<td>0.18</td>
<td>0.38</td>
<td>0.00</td>
<td>1.00</td>
<td>0.12</td>
<td>0.11</td>
<td>-0.21</td>
<td>-0.03</td>
<td>0.29</td>
<td>0.13</td>
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TABLE IV
Hierarchical Binary Logistic Regression Models: Effect of Gender Diversity and the Interaction Effect between Gender Diversity and Women’s Economic Opportunity on Innovation (n = 15,157)

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**Direct effects of Gender Diversity**

| Gender Diversity Firm Ownership | 0.55** (0.15) | 0.35* (0.16) |
| Gender Top Manager | 0.16* (0.07) | 0.19* (0.08) |
| Gender Diversity Workforce | 1.50** (0.11) | 1.38** (0.11) |

**Interactions**

| WEOI X Gender Diversity Firm Ownership | 0.09* (0.04) |
| WEOI X Gender Top Manager | -0.00 (0.02) |
| WEOI X Gender Diversity Workforce | 0.12** (0.03) |
| Constant | -1.24** (0.20) | -1.64** (0.41) | -1.74** (0.40) |

| LR Chi2 | 249.75 (0.00) | 282.90 (0.00) |

*p<0.10, *p<0.05, **p<0.01
FIGURE I
Moderation Effect of Women’s Economic Opportunity on the Relationship between Gender Diversity in the Ownership Structure and Innovation

Predictive Margins of Gender Diversity Firm Ownership

-0.5  0.00  0.05  0.10  0.15  0.20  0.25  0.30  0.35  0.40  0.45
Gender Diversity Firm Ownership (mean centered Blau's Index)

- - - - Minimum WEOI  - - Mean WEOI  - - - Maximum WEOI

Likelihood to Innovate

0.3  0.35  0.4  0.45  0.5
FIGURE II

Moderation Effect of Women’s Economic Opportunity on the Relationship between the Gender of the Top Manager and Innovation
FIGURE III
Moderation Effect of Women’s Economic Opportunity on the Relationship between Gender Diversity in the Workforce and Innovation

Predictive Margins of Gender Diversity Workforce

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<th>Predictive Margins</th>
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- Minimum WEOI
- Mean WEOI
- Maximum WEOI