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Essays on Gender and Firm performance

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Introduction

Women account for about half of the world's population, and they generally face several barriers to participation in the labor force, run their business, and reach the higher echelon of their careers. Culture, religious views, and gender-related stereotypes are among the major identified constraints (Comi et al., 2019). A burgeoning literature in economics seeks to understand the effect of top managers' or board of directors' gender on firm performance. However, prior studies have focused on the cases of developed countries such as Italy, Norway, among others. (Comi et al., 2019; Ferreira, 2009; Flabbi et al., 2016; Kenneth and Amy, 2012).

This thesis attempts to contribute to the research gap by examining the relationship between the gender of the owners or the board directors and the firm performance in two developing countries—Brazil and Malaysia. In the first chapter, I specifically focus on the role of gender in firm performance and access to credit in the case of Brazil. In the second chapter, instead, I explore the impact of gender diversification of the board of directors on firm performance in the case of Malaysia. In contrast to some studies that focus on the difference in firm performance based on the gender of owners or board directors, this study investigates multiple dimensions of firm performance. This thesis uses various firm performance metrics based on the available information in each dataset. The number of employees, total revenue, sales growth, employee growth, labor productivity, value-added per worker, and export propensity is considered for the study in case of Brazil; while total revenue, asset, profit margin, Return on Equity (ROE), and Tobin's Q are used for the study in case of Malaysia. This thesis, therefore, provides a well-rounded and compressive analysis of the role of gender of owners or board of directors in firm performance. Further, it addresses the impact of gender diversification among the board of directors on firm performance. The majority of prior studies use cross-sectional data, making it difficult to identify causal links (Hillman et al., 2007; Julizaerma and Mohamad, 2012; Post and Byron, 2014). It also considers the influence of other factors such as age, education, and experience of board directors and investigates the existence of heterogeneous effect of gender diversification among the board of directors based on the firm size, sectors, and the status of competitiveness of the firm. Furthermore, it explores an important point that never explored in connection with gender diversification, which is the relationship between the share of directors having family relationships and firm performance. It also investigates the impact of gender diversification requirement in the Malaysian board of directors on the share of directors who have family relations.

This thesis is organized into two chapters. The first one covers "Gender and Entrepreneurial Performance, the case of the Brazilian Manufacturing sector." It analyzes gender-based firm performance gaps, exploring the role of human and financial capital, business, and personal characteristics for explaining gender-based firm performance gaps. Further, it investigates the existence of gender-based differences in access and demand for credit in the Brazilian manufacturing sector. The study uses the data of the World Bank Enterprise Survey (WBES), collected from the manufacturing sector operating in Brazil during 2003 and 2009. The findings indicate that the explanatory variables considered in the analysis partially reflect gender-based firm size, labor productivity, and export propensity gaps. There is evidence that the gender-based employee growth rate gap becomes large and statistically significant once the explanatory variables are taken into consideration. Furthermore, the Heckman Probit model confirms the absence of gender-based differences in access and demand for credit. The ordinary least squares (OLS) estimation shows that female entrepreneurs receive smaller loans than their male counterparts.

The second chapter covers "Gender Diversity and Firm Performance: Evidence from Malaysia Boardrooms." It deals with the impact of gender diversification in the board of directors on firm performance. Specifically, it studies the effect of gender diversification requirement in the Malaysian board of directors on the board characteristics; and whether the requirement has an asymmetric effect on firm performance concerning sectors, the competitiveness of the firm, and firm size. Based on the data obtained from the Orbis data set along with the annual reports published on Bursa Malaysia Stock Exchange, the study provides evidence that the requirement for gender diversification in the Malaysian board of directors in 2011 could elevate female participation in the board of directors, although the 30% target was not achieved. Besides, gender diversification of the board of directors is detrimental to firm size, while having no impact on firm efficiency. Moreover, the gender diversification requirement of the board of directors adversely affects the level of experience and age of the directors, while it has no effect on the number of board members and their educational qualifications. It has an asymmetric effect on firm performance based on sectors, competitive standing of the firm, and firm size.

While Malaysia is working hard to improve the participation of women in the labor force, the country is not making much progress. According to the official World Economic Forum international ranking of countries regarding the overall gender imbalance, economic participation, and opportunity in 2018, Malaysia rank is 101^{st} out of 149 countries. Besides, the findings of this study show that the gender diversification requirement of the board of directors does not achieve the target as 35 percent of firms still do not have at least one female on the board of directors. This result is in line with the economic condition of the country, strong cultural prejudice against women, and the educational level of women, indicating that Malaysia further needs focus on gender equality. Furthermore, the findings of the study show that gender diversification of the board of directors does not affect firm efficiency. Therefore, Malaysia might be able to improve the participation of women by gradually mov-

ing towards hard law. However, the country should first focus on increasing the number of qualified women candidates for the board of directors and improve social perception about the capacity of women. Malaysia may further benefit from the introduction of policies that support families with children (such as the provision of childcare services, maternity leave, early release for women with children, flexible work arrangements, telecommunications, and breastfeeding policies) to help women participate in the labor force. Since the most relevant obstacle to the participation of women in the labor market in Malaysia is due to culture and religious motives, such policies could be less effective. Therefore, the country must work to improve society's perception of women's capacity by considering the religious and cultural perspectives. Working with the religious and cultural institutions on these issues may help in finding a solution that respects the religious and cultural perspective and improves the women's labor force. Similarly, cultural and religious views are among the main impediments to the participation of women in the labor force in Brazil, of which childcare and household responsibilities are considered as one of the major tasks of women. Therefore, Brazil may also benefit from the implementation of policies that support women with children, and programs that improve society's perception of women's ability to gain the confidence, respect, and acceptance of the employees. Training may help to fill the gap in the work-experience of women.

1. Gender and Entrepreneurial Performance, the Case of Brazilian Manufacturing Sector

Abstract

The gender-based firm performance gap was analyzed using two rounds of enterprises' panel data of Brazil, collected by the World Bank (WB) through surveys conducted in 2003 and 2009. The research is primarily focused on the manufacturing sector. The considered explanatory variables partially explain the gender-based firm size, firm efficiency, and export propensity gaps. There is evidence that the gender-based employee growth rate gap becomes larger and statistically significant in considering these explanatory variables. Among others aspects, the following factors have contributed to women-owned firms performing less in terms of the above-mentioned firm performance metrics—having less international recognition, lower firm age, working fewer hours, forms of ownership (restricted to single ownership), employees having limited access to training, and concentration in big cities. The Heckman Probit model confirms that there is no gender-based difference in access and demand for credit. The OLS estimate shows that female entrepreneurs receive smaller loans than their male counterparts.

1.1. Introduction

The lower rate of business ownership among women is a worldwide fact. Further, some theories and empirical findings suggest that women-owned enterprises perform less than men-owned enterprises. Reasonable theoretical arguments drawn from human capital, resource dependency, liberal feminist, and social feminist theories suggest that women-owned enterprises perform less than men-owned enterprises.

Scholars argue that entrepreneurs need to have the following functions- monitoring and controlling firm activities, sharpening the human capital of the firm, linking enterprises with the external environment (Baron and Markman, 2003; Carland et al., 2007; McClelland, 1961). Based on the resource dependency theory, the performance of the enterprises depends on the ability of entrepreneurs to reduce dependence and gain beneficial resources for the firm (Salancik, 1978). Male and female business-owners are different in terms of their interaction with external organizations. Some researchers argue that women entrepreneurs have less interaction and networking with rival firms, input suppliers, customers, government, and other offices (Bardasi et al., 2011; Mayoux, 1995; Morris et al., 2006). As a result, female entrepreneurs may perform less than their male counterparts. Besides, women-owned enterprises may perform less than men-owned enterprises based on human capital theory. According to this theory, the stock of human capital, such as education, skill, knowledge, and experience are important for the success of the enterprises. However, women-owned enterprises have less stock of human capital than men-owned firms (Brush, 1992; Fairlie and Robb, 2009; Gottschalk and Niefert, 2013). Liberal feminist theory also suggests that women-owned enterprises will exhibit inferior performance because women are discriminated against, and socialization of women discourages them from achieving their full capacity. Furthermore, Social feminist theory suggests that men and women are of a different nature. As a result, they have different attitudes, motivation, intention, and values to become an entrepreneur. Besides, they adopt a different approach to business. Several women entrepreneurs are motivated to start a business having a flexible work schedules allowing them to balance their family and work responsibilities (Fairlie and Robb, 2009). Moreover, women entrepreneurs choose firms with a lesser growth rate after making a cost-benefit analysis (Morris et al., 2006). It is reasonable to hypothesize that women-owned enterprises perform less than men-owned enterprises.

The results of several empirical studies are consistent with the theoretical arguments set out above. Several studies in different countries have consistently found that women are less likely to own a business (EIGE, 2014; OECD, 2012; Sabarwal and Terrell, 2008). Further, literature shows that female entrepreneurs run smaller sized firms than their male counterparts (Bardasi et al., 2011; Fairlie and Robb, 2009; Gottschalk and Niefert, 2013; Robb and Watson, 2012; Sabarwal and Terrell, 2008). Certain studies also document that women-owned firms perform less than those owned by men (Loscocco et al., 1991; Rosa et al., 1996; Watson, 2002). For example, Fairlie and Robb (2009) show that women-owned firms in the United

States (US) are more likely to close down and have lower profits, a lesser number of employees, and lower sales as compared to men-owned firms. Likewise, the findings of Aterido and Hallward-Driemeier (2011) and Rijkers and Costa (2012) show that women-owned firms are much smaller in size and less productive than men-owned firms. Some studies argue that women entrepreneurs perform less in terms of all performance metrics, even though personal and firm characteristics, as well as human and financial capitals, are controlled (Loscocco et al., 1991; Rosa et al., 1996; Watson, 2002). Whereas other studies show that the gender-based gap in performance disappears when considering other explanatory variables (Kepler and Shane, 2007; Robb and Watson, 2012).

This paper examines whether there is a gender-based difference in firm performance in Brazil and the role of different variables to explain it. Further, I analyzed the gender-based difference in access to credit, demand for loans, and loan size, using the unbalanced panel of Brazilian manufacturing firms drawn from the World Bank Enterprise Survey (WBES) of 2003 and 2009.

This research paper focuses on the manufacturing sector in Brazil. Brazil is the 5^{th} largest country in the world and the 7^{th} largest economy in terms of GDP (Brazil, 2013). The country has a highly unequal distribution of income (Kumar et al., 2005). Furthermore, women make up more than half of the total population. While Brazil has been working to improve its gender disparity for a long time, the unemployment rate is still higher among women, and they are concentrated in jobs requiring fewer qualifications along with carrying the major responsibilities of the household. Contrary to the crucial role of the manufacturing sector to economic development, its contribution to Brazil's economy has been declining over time due to several constraints.

This paper also contributes to the existing literature in several ways. First, it explores the role of gender in firm performance and access to credit that has not been studied for an important country like Brazil so far. Since women represent more than half of the population, and entrepreneurship plays a key role in economic development, this study improves the understanding of society about the participation of women and firm performance. Second, contrary to other studies on gender-based differences in entrepreneurial performance, this paper focuses on multiple dimensions of measuring firm performance (such as sales, number of employees, employee growth rate, labor productivity, value-added per worker, and propensity to export). Therefore, it provides a comprehensive analysis of the role of gender in firm performance. Third, it investigates the contribution of each firm performance explanatory variable to the gender-based firm performance gap. This study serves as a benchmark for other studies focusing on gender-based firm performance gaps. Therefore, academia, consultants, and government agencies may use the study as a platform for further studies.

The main findings of this paper are summarized as follows. (A) women-owned firms perform less in terms of the number of employees, sales, labor productivity, value-

added per worker, employee growth rate, and export propensity. However, there is no gender-based performance gap in terms of sales growth after considering other explanatory variables. (B) Some of the gender-based performance gaps are explained by differences in human capital, family commitment, and other characteristics of the firm. The findings of the study support the human capital, liberal feminist, and social feminist theories. Women-owned firms have fewer stocks of human capital than men-owned firms, and a gender-based difference in stock of human capital explains some of the gender-based enterprise performance gaps. While women-owned enterprises have favorable firm characteristics for firm growth in support of the Social Feminist Theory, they perform less in terms of the firm's growth rate than their male counterparts. Some important variables could not be controlled due to data limitations and difficulty of measurements, such as risk altitude, entrepreneurs' preference, number of children, marital status, discrimination, and social network. This may result in gender being a proxy for unobserved characteristics that account for a difference in performance. (C) There is no gender-based gap in access and demand for credit. (D) While there is no gender-based gap in access to loans, women entrepreneurs borrow smaller loans than their male counterparts.

The rest of this chapter is organized in the following manner; Section 1.2 presents previous theoretical and empirical findings on gender and firm performance along with an overview of gender equality in Brazil. Section 1.3 describes the data, and Section 1.4 presents the results of the study. Finally, section 1.5 contains the conclusion.

1.2. Literature Review

1.2.1. Theoretical Perspectives on the Relation between Gender and Enterprise Performance

Scholars identified that entrepreneurs play several roles in their enterprise as an owner and manager. For instance, Carland et al. (2007) say that "entrepreneurship is equated with small business ownership and management." On this basis, Sabarwal and Terrell (2008) define an entrepreneur as the owner/manager of an individual or family-owned firm. Besides, McClelland (1961) argues that entrepreneurs are business executives that participate in various business functions, such as sales and marketing, finance, engineering, general management, and other personnel. Researchers have generally documented that entrepreneurs have at least the following functions; monitoring and controlling the firm activities, sharpening the human capital, and linking the firm to external environments (Baron and Markman, 2003; Carland et al., 2007; McClelland, 1961).

Why do I expect the performance of women-owned and men-owned firms to be different? No single theory predicts the nature of the relationship between the

gender of the owner and firm performance, but several theories from diverse fields provide an insight into the issue. I adopt an interdisciplinary approach, building on the significance of economics, political philosophy, and social psychology. Resource dependency, human capital, liberal feminist, and social feminist theories are used to establish the theoretical basis for the research question. All theories suggest that women-owned enterprises perform less than men-owned enterprises.

The role of entrepreneurs in linking firms to the external environment is one of the basic preconditions for studying the relationship between entrepreneurs and firm performance using the resource dependency theory. Baron and Markman (2003) argue that entrepreneurs serve to link enterprises to other external organizations for addressing environmental dependence. Within the framework of the resource dependency theory, the success of an enterprise depends on the capacity of entrepreneurs to acquire control over the resources required by others (Salancik, 1978). Baron and Markman (2003) further suggest that the behavior of entrepreneurs, particularly their effectiveness in interacting with others on a face-to-face basis may play a major role in their financial success. An effective interaction with external organizations supports them in gaining access to venture capitalists, potential customers, and prospective employees. Male and female entrepreneurs are different in terms of their interaction with external organizations (Bardasi et al., 2011; Mayoux, 1995). For instance, Bardasi et al. (2011) argue that female entrepreneurs encounter gender-specific barriers to the cultivation of business networks while dealing with the government and other officials. It is reasonable to hypothesize that women-owned firms perform less than men-owned firms.

The human capital theory argues that the stock of human capital that firms acquire through training and schooling is the source of difference in firm performance (Becker, 1993). Further, some researchers argue that female-owners and their employees have fewer human capital than male-owners and their employees (Brush, 1992; Fairlie and Robb, 2009; Gottschalk and Niefert, 2013). Besides, Liberal Feminist theory suggests that women have limited access to vital resources such as education, business experience, or financial resources. Further, they have limited access to important resources based on overt discrimination (for instance, by the lender), and as such the socialization of women discourages them from achieving their full potential. Consequently, it is reasonable to hypothesize that women-owned firms have lower performance than men-owned firms.

The social feminist theory argues that women differ because of the variation in early and ongoing socialization. They have different attitudes, motivation, intention, and values for becoming an entrepreneur, and adopt a different approach to enterprises. Therefore, the performance of women-owned enterprises is different from men-owned enterprises (Fischer et al., 1993). Some studies argue that the familial responsibilities of women influence their motivation and intention to become an entrepreneur. Several women start a business with flexible work schedules, which allows them to care for their families (Fairlie and Robb, 2009; Gottschalk and Niefert, 2013). Besides, women entrepreneurs are more concerned about the risk associated with the rapid

growth rate of the firm, deliberately choosing to run firms with a slow and steady growth rate (Morris et al., 2006). It is reasonable to assume that women-owned enterprises under-perform as compared to men-owned enterprises.

1.2.2. Empirical Research on the Relationship between Gender and Enterpreneurship

The lower rate of business ownership among women is a global phenomenon (EIGE, 2014; ILO, 2015; Sabarwal and Terrell, 2008). Women have not only a lower rate of entrepreneurial participation but also a lower level of performance compared to their male counterparts. In terms of firm size, women entrepreneurs run the firms smaller than their male equivalents in almost every country in the world (Bardasi et al., 2011; Bruhn, 2009; Fairlie and Robb, 2009; Gottschalk and Niefert, 2013; Loscocco et al., 1991; Rijkers and Costa, 2012; Robb and Watson, 2012; Sabarwal and Terrell, 2008; Watson, 2002).

Some studies investigate the relationship between gender of the entrepreneurs and enterprise performance, and the findings show varied results. Some studies provide evidence of female under-performance, while others do not find a gender-based difference in enterprise performance. For instance, Fairlie and Robb (2009) use regression estimates and a decomposition technique to investigate the performance of female-owned businesses, comparing with male-owned businesses and identifying the contribution of human capital to the gap in the case of United States (US). They find that women-owned firms have lower survival rates, profits, employment, and sales. Besides, Gottschalk and Niefert (2013) explore the relationship between gender of firm owners and firm performance based on 4700 German start-up firms. They also use regression estimates and a decomposition technique to investigate the contribution of measurable characteristics such as education, experience, team size, entrepreneurial motivation, and industry preference to a gender-based firm performance gap. They find that women entrepreneurs perform less in terms of all performance metrics (firm size, growth, and profitability) considered. Additional studies simply use the regression estimation technique to assess the relationship between gender and firm performance. For instance, Loscocco et al. (1991) studied the gender-based firm performance gap based on 540 small-sized firms in New England and found that women-owned firms perform less in terms of sales and income compared to men-owned firms. Contrarily, the study undertaken in the US does not find gender-based difference in enterprise performance when firm performance is measured by return on asset (ROA), closure rates, and a risk-adjusted measurement (Sharpe ratio) (Robb and Watson, 2012). Further, Henrekson and Du Rietz (1999) studied a large sample of 4200 Swedish enterprises and found no gender-based firm performance gap except in terms of firm size. In the case of Australia, no significant difference was found between men-owned and women-owned businesses in terms of the three performance metrics, Total Income to Total Asset, Return on Asset, and Return on Equity (Watson, 2002).

Some studies focus on developing countries. For instance, the case study of Sub-Saharan Africa (SSA) has also documented that women-owned firms have lower productivity than men-owned firms (Aterido and Hallward-Driemeier, 2011). The studies focused on four developing countries, Bangladesh, Ethiopia, Indonesia, and Sri Lanka, which have similar findings that women-owned firms are much smaller in size and less productive than men-owned firms (Rijkers and Costa, 2012). Bardasi et al. (2011) also examine the firm performance gaps between male and female-owned firms for the three regions, namely Eastern Europe and Central Asia (ECA), Latin America (LA), and Sub-Saharan Africa (SSA). They find a significant gap between men and female-owned firms in terms of firm size. Furthermore, women entrepreneurs performed less in terms of firm efficiency and growth in LA. However, they observe smaller gaps in ECA and SSA in terms of firm efficiency and firm growth. The case of ECA also indicates that women entrepreneurs run small and less productive enterprises compared to men. However, women-owned enterprises generate similar profit as men-owned enterprises (Sabarwal and Terrell, 2008).

Previous researches failed to address the issue of cause and effect. Some of the previous studies use panel data, but a change in the gender of the owner over a period is rare. Therefore, data were pooled into a single analysis sample. Only two papers use the decomposition technique to calculate the contribution of explanatory variables to the gender-based firm performance gap (Gottschalk and Niefert, 2013; Fairlie and Robb, 2009). Empirical evidence from previous studies shows inconsistent findings. Some of these studies find either a negative or no relationship between gender of entrepreneurs and enterprise performance. Therefore, it is necessary to broaden the relationship between the gender of entrepreneurs and enterprise performance in one of the largest countries in the world. Thus, this study investigates the relationship between gender and firm performance in the case of Brazil. Since the reasons for the inconsistent findings are the performance metrics used in the previous studies (Robb and Watson, 2012), this study focuses on multiple dimensions of firm performance, such as firm size (revenue, and the number of employees), firm growth rate (sale and employee growth rate), firm efficiency (labor productivity and value-added per worker), and export propensity.

1.2.3. Institutional Background

Brazil is the 5^{th} largest country in the world, with a population of 194 million in 2012. It has the 7^{th} largest GDP, with a diverse economy (Brazil, 2013). However, the country has a highly unequal distribution of income compared to the average in Latin America (LA) or other upper and middle-income countries (Kumar et al., 2005).

In Brazil, women constitute over half of the total population. Moreover, gender equality and women empowerment are a part of Brazil's development goals (Brazil, 2017). Therefore, Brazil has established a gender quota for candidature in the

parliament, issued public policies on gender parity, and created agencies that deal with gender equality, such as the National Agency of Women's Right, Regional Agencies of Women's Conditions, and Police Station Specialized in Women's Affairs. In 1996, Brazil joined other Latin American countries by setting a gender quota for parliamentary candidates. Requirements at the federal and regional levels began to be implemented in 1998. The minimum requirement for female representation was 20 percent in 1996 and increased to 30 percent in 2000 (Araujo, 2003). Besides, women have a fully paid maternal leave of 4 months by law, and some companies have extended it to 6 months. Women with a child have two break of half hour for breastfeeding until the child is 6 months old (Costa et al., 2018). Over the last two decades, Brazil has undergone significant demographic, cultural, and social changes (Bruschini, 2007). Consequently, gender parity has improved, especially in terms of education and participation in the labor force. Research shows that women are currently more educated than men on average (Brazil, 2017; Bruschini, 2007). Based on WB data, the proportion of women in the workforce increased from 51.1% in 2000 to 53.2% in 2017. However, women have a higher rate of unemployment and concentrated in jobs that require a lower level of qualification. Further, they are burdened with double professional and household responsibilities (Bruschini, 2007). The participation of women in decision making in Brazil is less than men, holding only 37.3% of management positions, and Brazil ranks 31^{st} out of 187 counties in this specific dimension (International Labor Organization, 2015). Moreover, gender-based wage inequality has been a long-standing issue. On average, women earn 20 percent less, and the gap increases as the level of education advances (Nopo, 2012). Women generally face more challenges in joining the labor force (Brazil, 2017). The World Economic Forum Gender Gap Index (GGI) of 2017 ranked Brazil 94^{th} out of 189 countries with a score of 0.407.[1]

The manufacturing sector is a driving force for the economic development (Naude and Szirmai, 2012). This sector played an important role in the economic development of Brazil during the 1930s, and through the 1980s. Over the last two decades, the manufacturing sector has faced several problems, leading to a decline in the contribution of this sector. Infrastructure, high competition from trade liberalization, the negative effect of currency appreciation, and the 2008 global crisis are among the major challenges (Domingues et al., 2017). Based on the World Bank Development Index (WBDI), the share of Brazil's manufacturing sector to GDP has declined from 14.73% in 2005 to 10.15% in 2017.

In a nutshell, the gender-based firm performance gap in Brazil is unexplored. Brazil is one of the largest countries with women accounting for more than half of its total population. Gender-based labor force participation gap, the wage gap, and the difference/burden in household responsibilities have been long-standing issues in Brazil. The contribution of the manufacturing sector, which is the main sector of the country, has declined due to several challenges. Therefore, this study will exam-

[1]See http://hrd.undp.org/en/statistics/gii/. The highest score is 1 (equality) and the lowest possible score is 0 (inequality).

ine the existence of a gender-based firm performance gap in Brazil's manufacturing sector. Besides, this study tests the hypothesis that the difference in human capital stock contributes to a gender-based enterprise performance gap. Furthermore, it investigates whether the household responsibilities of women contribute to a gender-based enterprise performance gap. In the wake of Gottschalk and Niefert (2013) and Robb and Watson (2012), I use working hours to measure the influence of family responsibility on firm performance. Unfortunately, I lack information on risk altitude, number of children, marital status, entrepreneur preference, discrimination, and social network, which may also influence firm performance. Since one of the liberal feminist theory arguments is that women are facing gender-based discrimination in terms of access to credit, this study examines the existence of gender-based access to credit discrimination.

1.3. Description of Data

I use an unbalanced panel of Brazilian manufacturing firms drawn from the World Bank Enterprise Survey (WBES) conducted by the World Bank (WB) in 2003 and 2009. The 2003 survey focused only on the manufacturing sector, whereas the 2009 targeted manufacturing and service sectors. Firms operating in sectors subject to government price regulation and prudential supervision such as banks, electric power, rail transport, water, wastewater, agriculture, real estate, and renting activities are excluded from the sample. Sample firms have five or more employees.

WBES uses a Stratified random sampling method from the national registry of firms. The stratification of the sample is based on sector, firm size, and location. The initial sample size was 3,444 firms with 3,063 firms from the manufacturing sector, 301 from the service sector, and 79 without sector information. This included 1,190 firms surveyed in 2003, 1350 from 2009, and 904 from both 2003 and 2009. The sample was further reduced to 2213 (223 women-owned and 1990 men-owned firms) by excluding 441 firms that were missing the information on the gender of the top management, or the existence of at least one woman owner. Further, 409 firms that had no information either on sales, number of permanent employees, value-added per worker, export propensity, or sector were dropped. Moreover, no correlation was observed among missing observations, firm outcomes, and control variables. Thus, dropping the missing observations does not change the results.

The objectives of the WB survey were to identify the barriers faced by the private sector, provide significant indicators of favorable conditions for investment, build panel data at the firm level that enable impact assessment of reforms, and assess changes in the business environment. The WBES contains questions about barriers to entrepreneurship, such as lack of infrastructure, crime, macroeconomic policies, corruption, the quality of the legal system, and financing. It also collected information on performance variables such as current sales, the number of employees, along with the information from three years earlier for both variables I used for measuring

growth in the number of employees and sales. Besides, the export propensity, labor productivity, and value-added per worker are also used as additional firm performance metrics.

The survey contains elaborate information about a set of characteristics of the firm. The variables used in this study are, firm age, working hours per week, the form of firm ownership, top manager experience, percentage of degree holder employees, international recognition, industrial sector, capacity utilization, access to training, access to bank loans, foreign ownership, competition, and location. The major data limitations include (a) the inability of identifying gender under co-ownership; (b) the lack of detailed demographic information about top managers or entrepreneurs; and (c) the significant missing information about the basic variables, such as whether the firm has at least one woman director, and firm performance metrics. Further, information about the characteristics of the sample can be found in the report on the sampling and implementation procedures provided by the WB.[2] The manufacturing sector contributes to 13.06% of Brazilian GDP according to the World Bank Development Index (WDI) of 2009.

Gender is the key variable of this chapter, but the classification of men and women ownership is difficult in case of co-ownership. Based on previous studies (Asiedu et al., 2013; Hansen and Rand, 2014), it is possible to specify the firm as women-owned, if it has at least one female owner. Moreover, some previous studies (Asiedu et al., 2013; Bardasi et al., 2011; Henrekson and Du Rietz, 1999; Watson, 2002) argue that gender of the top manager (decision maker) is more important in calculating the gender-based firm performance gap. Classifying a firm as women-owned, if it has at least one female owner, may lead to wrong interpretation because women may not actively participate in the decision-making process when there is more than one owner. In this research, I specify the firm as women-owned if and only if it has at least one female owner and the top manager is a woman. If the top manager is a woman, the firm has at least one-woman owner for 99% of observations. The top manager and owner are the same people in most firms, particularly for a sole proprietorship. The majority of firms' top managers are not only owners but also the principal owners. The 2009 survey excludes the specific question of whether the principal owner is the top manager. Based on the 2003 survey data, 85% of principal owners are top managers. Sabarwal and Terrell (2008) use the same source of data and state that all the principal owners are managers. The study was conducted in three developing regions (Latin America, Eastern Europe and Central Asia, and Sub-Saharan Africa) using similar data set (WBES), confirming that for a majority of firms, top managers are not only owners but also are the principal owners. For example, 85% of top managers in Eastern Europe and Central Asia (ECA), and 91% in Nigeria are principal owners (Bardasi et al., 2011). Besides, I cross-checked and conferred that the specification of ownership based on either gender of owner and manager, or only the manager would not affect the results.

[2] https://www.enterprisesurveys.org/portal/index.aspx#/library?dataset=Enterprise%20Survey, available on May, 2018

1.4. Results

The analysis begins with a descriptive comparison of women and men business owners. Further, it turns to a series of equations in which the logarithm of sales, the logarithm of the number of employees, the sales growth rate, employee growth rate, labor productivity (total revenue/number of employees), and the value-added per employee are regressed on a gender dummy and an elaborate set of control variables that reflect human and financial capital, along with personal and business characteristics. Logistic regression is also used to show the relationship between the export propensity and explanatory variables. Moreover, Blinder and Oaxaca decomposition illustrates the contribution of each explanatory variable to the gender-based firm performance gap. Finally, I investigate gender-based access and demand for credit differences by using the Heckman Probit model.

1.4.1. Descriptive Results

I summarize the basic characteristics of sampled firms in Tables 1.1 and 1.2, which report summary statistics for the dependent variables, and some key explanatory variables in the pooled sample for women and men-owned firms. The tables report the overall mean and corresponding standard deviation, as well as the mean and standard deviation for male and female entrepreneurs. Column 5 presents the difference between women-owned and men-owned firms in terms of each variable and P-value. Moreover, the difference in zero from a t-test for the null hypothesis. I present descriptive statistics for all other variables in the Tables A.1 and A.2 of the appendix.

Table 1.1.: Summary of descriptive statistics for firm performance measurements

	Observation (1)	Full sample mean (2)	Men entrepreneurs (3)	Women entrepreneurs (4)	Difference from men (5)
Performance measurements					
Employees	2213	139	149	57	-91
		(461)	(482)	(168)	[0.00]
Sales	2213	163492.7	178233.9	31946	-146287.9
		(886546)	(931982.4)	(172889)	[0.00]
Sales Growth	2079	.26	.26	.23	-.03
		(.58)	(.57)	(.65)	[0.53]
Employee Growth	2118	.14	.14	.12	-.02
		(.4)	(.41)	(.03)	[0.5]
Labor productivity	2213	160204.7	172245.9	52751.97	-119493.9
		(1416465)	(1492739)	(120161.1)	[0.00]
Value-added per worker	2213	89695.36	96090.87	32623.29	-63467.58
		(771653.8)	(813213.5)	(66059.26)	[0.00]
Export Propensity	2213	.23	.24	.09	-.15
		(.42)	(.43)	(.29)	[0.00]
		2213	1990	223	

Standard deviations of variables appear in parentheses and p-values for differences of means appear in square brackets.

The descriptive result in Table 1.1, shows that the average firm in the sample generates 163,492.7 Brazilian Real (BRL) in sales and employs about 139 workers, while the mean growth rate of annual sales and the number of employees is 26% and 14% respectively; labor productivity is 160,204.7 BRL, value-added per worker is 89,695.36 BRL, and the export participation rate is 23%. Men-owned firms generally perform better along with all performance metrics except for employees and sales growth rates.

Brazil has 4.1 million registered companies with lower participation for women and a high concentration in the informal sector (UNCTAD, 2013). They are less likely to be involved in business ownership and management, where women encumbered only 37.3% of management positions (ILO, 2015). The manufacturing sector in Brazil is also predominantly owned and managed by men. Of the total 2,213 sampled firms, men own and manage 1,990 (87.9%), whereas women own and manage 223 (12.1%). The women-owned firms are also smaller in size, both in the number of employees and in sales reported. The average number of employees in men-owned and women-owned firms is 149 and 57, respectively. Besides, women entrepreneurs are less likely to participate in export than their men owners. The participation rate of women business owners in direct export is only 9%, while 24% for men owners. Furthermore, the sales for women-owned firms (31,946 BRL) are significantly lower

than men-owned firms (178,233.9 BRL). Women-owned firms also have less labor productivity than their men counterparts, with 52,751.97 BRL and 172,245.9 BRL, respectively. Women-owned enterprises have less value-added per worker than men-owned ones.

The disadvantage of women-led firms along the majority of outcome variables is reflected in the gender gaps that are also evident in many explanatory variables (see Table 1.2). For instance, 59% of permanent workers have received formal training, with 61% for men-owned and 46% for women-owned firms. Similarly, most employees, including managers, have secondary and post-secondary education, but only 7% of employees have graduated from university, with 8% for men-owned and 6% for women-owned firms. Contrarily, the table highlights that women-owned firms use more credit services than men-owned firms. However, after access to the loan, the size of the loan borrowed by women-owned firms is less than one-third of men-owned firms. The average real loan size for women-owned firms is 208,923.2 BRL, whereas it is 2,722,536 BRL for the men-owned firms. Larger firms are more likely to receive a larger sized loan, (see the graph in Appendix A.1). This difference suggests the importance of accounting for firm size when examining the influence of gender on loan size access of firms.

Table 1.2 shows that women-owned firms operate fewer hours than men-owned. Concerning the sector distribution, men-owned firms are more likely to operate in medium-high technology-intensive sectors, like machinery, equipment, and auto parts, as compared to women-owned firms. While only 5% of women-owned firms are active in the machinery and equipment sector, the proportion of men-owned firms is 14%, and difference is statistically significant. Women-owned firms are more likely to be involved in the garment sector than men-owned firms. In terms of firm age, women-owned firms are younger than men-owned. The average firm age is 19.72 years, which is 20.16 years for men-owned firms, and 15.71 years for women-owned. Since foreign-owned firms tend to have more knowledge, capital, and exposure than the domestic owners, I expect them to perform better. The working capital of men-owned firms is financed more by foreign individuals than women-owned firms. Further, the summary result shows that women are often single owners than their male counterparts. Contrarily, women entrepreneurs have better capacity utilization than men entrepreneurs.

These statistics indicate that generally, women entrepreneurs are at a disadvantage in terms of a majority of firm performance explanatory variables, and consequently perform less than their male counterparts. This suggests that the explanatory variables can explain at least some of the gender-based performance gaps. A simple descriptive analysis of the gender-based firm performance gap cannot establish a clear pattern. I need an approach in the multivariate framework that accounts for confounding factors. Besides, the decomposition of Blinder and Oaxaca may shed light on the contribution of each explanatory variable to the gap; and these issues are addressed in the next section.

Table 1.2.: Summary of descriptive statistics for some basic variables

	Observation (1)	Full sample mean (2)	Men entrepreneurs (3)	Women entrepreneurs (4)	Difference from men (5)
Human and financial capital, and personal and business characteristics					
The percentage of degree holder workers	2210	7 (10.86)	8 (11)	6 (9.45)	-2 [0.04]
Training to workers	2198	.59 (.49)	.61 (.49)	.46 (.5)	-.14 [0.00]
Access to credit	2211	.47 (.5)	.46 (.5)	.53 (.5)	.01 [0.06]
Hours devoted in the business	2212	56.03 (30.18)	56.43 (31.94)	52.42 (23.06)	-4.01 [0.02]
Capacity Utilization	2211	75.71 (19.15)	75.29 (19.1)	79.4 (19.18)	4.1 [0.00]
Food	2213	.09 (.29)	.1 (.29)	.07 (.25)	-.03 [0.11]
Textiles	2205	.08 (.27)	.08 (.27)	.07 (.23)	-.01 [0.76]
Garments	2213	.24 (.42)	.21 (.4)	.5 (.5)	.29 [0.00]
Shoes and leather	2213	.11 (.01)	.11 (.31)	.11 (.32)	.00 [0.89]
Chemicals	2213	.07 (.26)	.07 (.26)	.07 (.25)	-.01 [.73]
Machinery and Equipment	2213	.13 (.33)	.14 (.34)	.05 (.22)	-.09 [0.00]
Auto parts	2213	.09 (.29)	.09 (.29)	.05 (.22)	-.05 [.00]
Furniture	2213	.18 (.39)	.19 (.39)	.08 (.27)	-.11 [0.00]
Other manufacturing sectors	2213	.01 (.1)	.01 (.09)	.004 (.07)	-.004 [0.41]
Age of firm	2213	19.72 (17.13)	20.16 (17.43)	15.71 (13.57)	-4.46 [0.00]
Form of firm ownership	2213	.07 (.26)	.06 (.24)	.14 (.35)	.07 [0.00]
loan size	1582	2487381 (137445.9)	2722536 (145381.6)	208923.2 (38503.03)	-2513613 [0.00]
		2213	1990	223	

Standard deviations of variables appear in parentheses and p-values for differences of means appear in square brackets. The descriptive analysis part of the paper discusses both women and men-owned firms characteristics and owners characteristics

1.4.2. Econometric Results

1.4.2.1. Gender and Firm Performance

1.4.2.1.1 Methodology

In this section, I study the relationship between gender and firm performance in the manufacturing sector in Brazil. I measure firm performance in terms of firm size (number of employees and total revenue), growth (sales and employment growth), efficiency (labor productivity and value-added per worker), and export propensity. I use labor productivity as one of the metrics of firm efficiency, which is determined by total revenue per worker. The value-added per worker is used as an additional metric for the measurement of firm efficiency. We can consider the value of total revenue per worker as a reasonable approximation for labor productivity only if the firm-specific ratio of sales to the value-added is constant (Nickell et al., 1992). Value-added is computed by deducting the cost of materials from sales. The export propensity is a dummy variable that indicates whether a firm is directly involved in export or not. These variables reflect the economic conditions of firms, and several researchers have broadly used them to measure firm performance (Fairlie and Robb, 2009; Gottschalk and Niefert, 2013; Kepler and Shane, 2007). Variables reported in monetary terms are deflated using Brazil's GDP deflator obtained from the WB, with 2003 as a base year.

I measure sales and employee growth rate based on the response to the question about sales and the number of employees at the end of the preceding fiscal year and three years earlier, calculating the growth rate over three years. In the wake of Davis and Haltiwanger (1992), I compute the growth rate G of both variables X, as defined in equation (1.1). X_t represents sales or the number of employees at time t, and X_{t-3} represents sales or employees three years earlier. The denominator is the average value of X at t and t-3. The advantage of this approach is that it limits the outliers or firms with sharp expansion or contradiction, resulting in a growth rate ranging between -2 and +2. There are only 21 new firms less than three years old, and they are excluded for growth measurement. Since the share of new firms is less than one percent of the total sample, excluding the new firms cannot change the result. The consistency of the result is also checked using the standard of growth measurement.[3]When I use the second measure of growth instead of the first, the results are the same in terms of significance and direction. Since the first measurement has a relative advantage in controlling the very large growth rates that tend to associate with smaller firms, the coefficient from the first estimation is smaller than the second. The result from the second estimation is presented in Table A.4 of the appendix.

[3] G= $\frac{(Xt-Xt-3)}{Xt-3}$

$$G = \frac{X_t - X_{t-3}}{(X_t + X_{t-3})/2} \tag{1.1}$$

I estimate the following regression equation:

$$Y_{ijy} = \beta_0 + \beta_1 W_{ijt} + \beta_2 X_{1ijt} + \beta_2 X_{2ijt} + \beta_2 X_{3ijt} + \tau_t + \varepsilon_{ijt} \tag{1.2}$$

where Y_{ijt} is, alternatively, the log of the number of employees, the log of sales, the growth rate of the number of employees, the sales growth rate, the log of labor productivity, and log of value-added per worker for the firm i, in the industry j and year y. W_{ijt} is the gender of the owner of firm i, in the industry j and year t; X_{1ijt} is a vector of human and financial capital variables which include the experience of top managers, the training of workers, percentage of degree holder workers, the share of women workers, and access to credit; X_{2ijt} are business characteristics such as the firm age, form of firm ownership, foreign ownership, location, competition, and international recognition; X_{3ijt} are personal characteristics such as working hours, capacity utilization; and sectors such as food, textiles, shoes and leather, chemical, machinery and equipment, auto parts, furniture, and so on; τ_y is year dummy. I sequentially enter X_{1ijt}, X_{2ijt}, and X_{3ijt} in the equation, and assess the power of each set of variables to explain the gender gap in firm performance by examining how the gender coefficient changes with the inclusion of additional control. Definitions of certain control variables that need a detailed description are given below:

Experience: In this study, the experience is treated as a dummy variable, referring to Orser et al. (2010). A manager with more than ten years' experience is considered experienced, and that with less than or equal to ten years is considered a less experienced manager.

Form of firm ownership: It is a dummy variable that indicates whether the form of firm ownership is a sole proprietorship or not.

International recognition: It is a dummy variable that indicates whether the firm has international recognition or not.

Capacity utilization: It is a firm output as a proportion of the maximum output that can be produced if the firm uses all resources available.

Access to training: It is a dummy variable that shows whether the firm has access to training or not.

Access to bank loan: It is a dummy variable that indicates whether the firm has access to bank loans or not.

Foreign ownership: It is a dummy variable that is equal to one if more than 50% of capital is financed by a foreign individual, else it is zero.

Competition: It is a dummy variable that is equal to one if the firm is having more than five competitors, else it is zero.

Location: It is a dummy variable that is equal to one when the firm is in a capital city, or city with a population of over 1 million, else it is zero.

I also use logistic regression to identify a gender-based gap in export propensity after considering other explanatory variables. I estimate the following logistic regression equation:

$$Pr(D_i = 1) = F(\beta_0 + \beta_1 W_{ijt} + \beta_2 X_{1ijt} + \beta_2 X_{2ijt} + \beta_2 X_{3ijt} + \beta_4 \tau_t + \varepsilon_{ijt}) \quad (1.3)$$

where F is the cumulative density of the logistic distribution, i refers to a firm, D_i takes the value of one when the firm sells or exports any of its goods outside Brazil, else it is zero. Such estimates are difficult to interpret as causal effects (equations 1.2 and 1.3). It may be biased by potentially unobserved heterogeneity (there may be unobservable characteristics of firms that determine the share of women as well as firm performance) or reverse causality (when firm performance influences the share of women owners). Besides, some very important explanatory variables in the investigation of gender-based firm performance gaps are endogenous, resulting from the well-performing firm, having the potential to access some key inputs that have a positive influence on firm performance. This chapter is a descriptive study that investigates the relationship between the gender of the owner of the firm and firm performance. Since it is difficult to find valued instrumental variables and there are no significant changes in the gender of the owners within firms between 2003 and 2009 for a meaningful panel model analysis, the data is pooled into a single analysis sample. However, the decomposition technique is essentially used for computing the contribution of each explanatory variable to the gender-based firm performance gap.

For all seven performance metrics, I initially undertake an analysis by specifying as women-owned if and only if it has at least one woman owner, and the top manager is a woman. Further, as a check of robustness, I use only the gender of a top manager for estimation, or if the firm has at least one woman owner. The result by using the gender of a top manager is not substantially different from those using the existence of at least one woman owner and the gender of the top manager (see Table A.6 in the appendix). Since the majority of top managers are owners as well, findings by using at least one woman owner confirm my expectation that women may not participate in decision making when there is more than one owner. The result from this estimate is a small coefficient for some, while for others, it even became insignificant compared to the first estimation (see Table A.5 in the appendix). The result is obtained by using either the gender of the top manager or at least one

woman owner (see table A.5 and A.6 in the appendix). Moreover, as a robustness check, I run a similar regression only for balanced data, and the result is consistent.

1.4.2.1.2 Result

Table 1.3, 1.4, 1.5, and 1.6 present the coefficients of the dummy variable for women ownership, estimated using OLS regression and logistic regression, where the dependent variable is a measure of performance, and the set of control variables increases progressively from column 1 to column 4. Column 2 controls human and financial capital; Column 3 controls the business characteristics, whereas Column 4 additionally controls personal characteristics and sector. The difference in the gender coefficient from one column to another shows the gender gap that is accounted for by the inclusion of an additional set of variables. The gender coefficient for step-by-step estimates of the variables of interest is reported in Tables 1.3, 1.4, 1.5, and 1.6, whereas the result of other key explanatory variables for performance measurement of each firm is shown in Table 1.7.

The coefficient of the indicator variable "women" remains negative and statistically significant for all outcomes except the sales growth rate, even after controlling some of the observable characteristics (see Tables 1.3, 1.4, 1.5 & 1.6). The result shows that women-owned enterprises perform 36% less in the number of employees, 72% less in sales, 8% less in employee growth rate, 35% less in labor productivity, 25% less in value-added per worker, and 6% less in export propensity. The findings of this study are consistent with the result of prior similar researches in terms of the number of employees and sales (Bardasi et al., 2011; Fairlie and Robb, 2009; Loscocco et al., 1991; Rosa et al., 1996; Sabarwal and Terrell, 2008; Watson, 2002). The findings confirm that the difference based on gender in observable characteristics of owners, and firms do not adequately explain the low performance of women-owned firms in terms of sales, the number of employees, labor productivity, value-added per worker, and export propensity. After controlling human and financial capital, and the characteristics of owners and businesses, the gender gap in the number of employees decreases from 56% to 36% but remains statistically significant (compare Columns 1 and 4). Similarly, the difference in sales decreases dramatically from 1.35 to 0.72 log points and remains statistically significant (see Table 1.3). Labor productivity also decreases from 78% to 35% but remains statistically significant. Besides, value-added per worker falls from 69% to 25%, and export propensity falls from 14% to 6%, both remaining statistically significant. Contrarily, the difference in the growth rate of the number of employees becomes more statistically significant (see Table 1.4). The contribution of the explanatory variables to the gender-based gap in the growth rate of number of employees is negative, implying that women entrepreneurs have certain favorable characteristics for growth of the firm, such as being a young firm, having better capacity utilization, and access to credit. However, women-owned firms have less growth, though the difference is not statistically significant.

The lower growth rate of women-owned firms in Brazil is consistent with findings

from the literature. For instance, Gottschalk and Niefert (2013) concluded that women become entrepreneurs out of necessity. Further, Morris et al. (2006) show that the entrepreneurs attracted by recognition of opportunities are more growth-oriented than those pushed into entrepreneurship due to the circumstances. Based on the abovementioned arguments, the difference in motivation between men and women for starting a business could be one of the potential explanations for women entrepreneurs having a lower rate of growth in the number of employees, even with favorable firm characteristics. This result supports the social feminist agreement that women entrepreneurs have different motivations than their male counterparts. Other studies argue that women entrepreneurs prefer to run a stable business, having concerns about the risks associated with a rapid growth rate of the firm (Cliff, 1998; Morris et al., 2006).

Table 1.3.: Gender, and number of employees and sales

Dependent variable	Ln(number of employees)				Ln(sales)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Gender	-.56***	-.45***	-.36***	-.36***	-1.35***	-.95***	-.7***	-.72***
	(.07)	(.07)	(.06)	(.06)	(.14)	(.14)	(.13)	(.13)
Human and financial characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Business characteristics	No	No	Yes	Yes	No	No	Yes	Yes
Personal characteristics and sector	No	No	No	Yes	No	No	No	Yes
Sample size	2213	2282	2089	2086	2213	2182	2089	2086
R-square	0.03	0.19	0.34	0.4	0.04	0.22	0.36	0.41

Table 1.4.: Gender, and employees and sales growth

Dependent variables	Employee growth rate				Sales growth			
	(1)	(2)	(3)	(4)				
Gender	-.04	-.05	-	-.08***	-.03	-.03	-.03	-.04
	(.03)	(.03)	.06**	(.03)	(.05)	(.05)	(.05)	(.05)
			(.03)					
Business characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Business characteristics	No	No	Yes	Yes	No	No	Yes	Yes
Personal characteristics and sector	No	No	No	Yes	No	No	No	Yes
Sample size	2118	2093	2001	1999	2079	2055	1965	1963
R-square	.02	.04	.07	.12	0.001	.01	.03	.07

Table 1.5.: Gender, and labor productivity

Dependent variables	Ln(labor productivity)				Ln(Value added per worker)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Gender	-.78***	-.48***	-.34***	-.35***	-.69***	-.4***	-.24**	-.25**
	(.12)	(.11)	(.11)	(.11)	(.12)	(.12)	(.11)	(.11)
Human and financial characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Business characteristics	No	No	Yes	Yes	No	No	Yes	Yes
Personal characteristics and sector	No	No	No	Yes	No	No	No	Yes
Sample size	2213	2182	2089	2086	2211	2180	2088	2085
R-square	0.02	0.12	0.17	0.21	0.2	0.11	0.16	0.2

Notes: Coefficients of a dummy for women ownership are shown in the table. Human and financial characteristics (top manager experience, training, percentage of degree holder employees, share of female workers, access to credit), business characteristics (age of firm, age square, form of firm ownership, location, competition, international recognition) and personal characteristics (hours devoted in business, capacity utilization) and sector. Regressions include year dummy, and standard errors clustered at firm level in parentheses *** significant at 1%, ** significant at 5%, and * significant at 10%

The findings in Table 1.3, 1.4, 1.5, and 1.6 show that the aspects of human and financial capital partially explain the low performance of women-owned firms in terms of the number of employees, sales, labor productivity, value-added per worker, and export propensity than their male equivalents. These variables do not have a significant influence on the growth rate of the firm, which partially explains the gender

Table 1.6.: Gender and export propensity

Dependent variables	Export propensity			
	(1)	(2)	(3)	(4)
Gender	-.14***	-.1***	-.06**	-.06**
	(.02)	(.02)	(.03)	(.03)
Human and financial characteristics	No	Yes	Yes	Yes
Business characteristics	No	No	Yes	Yes
Personal characteristics and sector	No	No	No	Yes
Sample size	2213	2179	2140	2086
R-square	0.2	0.12	0.21	0.2
In sample prediction	0.00	0.00	0.00	0.00
Accuracy	77.87	78.71	81.89	82.09

gap in the growth of the number of employees (compare Columns 1 and 2 of Table 1.4). Similarly, business characteristics partially explain the gender-based firm performance gap in terms of the number of employees, sales, labor productivity, value-added per worker, and export propensity, and increases the gender-based firm performance gap in terms of growth in the number of employees (compares columns 2 and 3). The rationale behind this is that the negative influence of the age of the firm on the growth rate of the number of employees dominates the influence of other business characteristics. Personal characteristics and the sector can increase the gender gap in all firm performance metrics (compare Columns 3 and 4), implying that these characteristics benefit the women entrepreneurs. The major reason, as discussed in the descriptive section, is that women entrepreneurs have better capacity utilization, and their sector distribution is favorable in terms of the number of employees and sales performance.

In terms of the role of control variables, Table 1.7 shows that only a few of the firm performance explanatory variables have a consistent and significant influence on firm performance metrics. For instance, foreign ownership and exposure to training have a positive and significant relationship with all performance metrics. The fact that the working capital of a women-owned firm is less likely to be financed by foreign individuals partly explains the low performance of their firms compared to men-owned firms. Training is one of the characteristics of human capital that is expected to have a positive relationship with firm performance. Entrepreneurs with a substantial stock of human capital, such as vocational training, are expected to position their enterprises in a better place for responding to the changing business environment. Since such kind of training is expected to enhance the technical knowledge of employees, access to training is likely to have a positive influence on firm performance metrics. The result shows that access to training is positively related to all performance metrics as expected. The performance of firms providing training

to their employees increases in terms of the numbers of employees, sales, employee growth rate, sales growth rate, labor productivity, value-added per worker, and export propensity by 50%, 78%, 4%, 9%, 26%, 24%, and 11%, respectively. The fact that workers in women-owned firms have less access to training may partly explain the low firm performance than their male counterparts.

Capacity utilization also has a positive influence on all firm performance metrics, but it is not statistically significant in terms of export propensity. It shows the efficiency of utilization of resources by measuring the ratio of the output produced to the maximum output that could be produced if all available resources are utilized. Women have better capacity utilization, therefore the contribution of this variable to the gender gap in firm performance is negative. The influence of credit access is positive and statistically significant for all performance metrics except the growth rate of sales. As reported in Table 1.7, a firm with access to credit has 27% more employees, 46% more sales, 5% more employee growth rate, 18% more labor productivity, 15% more value-added per worker, and 6% more likely to participate in export than firms without such access. This result is consistent with prior findings that firms with access to credit perform well compared to firms without it (Brown et al., 2011).

Some performance explanatory variables do not have consistent influence across firm performance metrics. For instance, firm age has a positive relationship with the number of employees, sales, labor productivity, value-added per worker, and export propensity, but has a negative influence on the growth rate of sales and the number of employees (see Table 1.7). The young age of women-owned firms contributes to the gender gap in terms of the number of employees, sales, labor productivity, value-added per worker, and export propensity. However, it is in favor of women entrepreneurs in terms of the growth rate of employees and the growth rate of sales. The influence of competition also is inconsistent. Firms located in a more competitive environment may face lower demand for their products. Further, as several firms need loans in such an environment, they have less access to credit (Muravyev et al., 2009). Competition has a negative influence on the gender-based firm performance gap in terms of growth measurements, which may result from less access to inputs for their products because of competition. Firms in such areas can be larger (in terms of the number of employees) as large firms have better chances of surviving the competition.

The location has a significant negative relationship with all performance metrics except the number of employees, the growth rate of sales and employees. The results show that firms in large cities have 31% fewer sales, 24% less labor productivity, 23% less value-added per worker, and 8% less likely to participate in exports than firms in small cities. This finding indicates that larger and more productive firms that engage in exports are concentrated in small cities (with a population of less than one million). The previous study conducted in the US finds mixed results that firms in large cities are more likely to close, having fewer employees, but more profit and sales than firms in small cities (Fairlie and Robb, 2009). This finding in terms

of location influence on firm performance could be related to the concentration of women in large cities, as 58% of women and 37% of men business owners located in large cities. Women are relatively concentrated in large cities as they are more likely to run a business in large cities because of lower social pressure and easier access to childcare.

Table 1.7.: Gender and firm performance

Variables	Employees (1)	Sales (2)	Employee growth (3)	Sales growth (4)	Sales per worker (5)	Value added (5)	Export (6)
Gender	-.36***	-.72**	-.07***	-.06	-.35***	-.25**	-.06*
	(.07)	(.13)	(.02)	(.04)	(.11)	(.12)	(.03)
Training to	.5***	.78***	.04**	.09***	.26***	.24***	.11***
workers	(.04)	(.08)	(.02)	(.03)	(.06)	(.06)	(.02)
Education	.002	.01***	.0001	-.002	.01***	.01***	.003***
	(.002)	(.004)	(.001)	(.002)	(.004)	(.004)	(.001)
Share of	.29***	-.09	-.01	-.01	-.38**	-.22	.08*
female workers	(.11)	(.2)	(.05)	(.07)	(.17)	(.17)	(.05)
Access to	.27***	.46***	.05***	-.02	.18***	.15**	.06***
credit	(.04)	(.08)	(.02)	(.02)	(.06)	(.06)	(.02)
Age of firm	.03***	.05***	-.01***	-.01***	.02***	.02***	.01***
	(.003)	(.005)	(.001)	(.002)	(.004)	(.004)	(.001)
Age square	-.0001***	-.0002***	.00004***	.00004***	-.0001***	-.0001***	-.0003***
	(.00003)	(.0001)	(.00001)	(.00001)	(.00004)	(.00004)	(.0001)
Firm	-.37***	-.6***	.002	.01	-.22**	-.22***	-.1***
ownership	(.07)	(.14)	(.04)	(.05)	(.12)	(.12)	(.03)
Foreign	.55***	1.26***	.15***	.16	.7***	.68***	.28***
ownership	(.16)	(.24)	(.05)	(.11)	(.24)	(.24)	(.09)
Location	-.06	-.31***	.01	-.03	-.24***	-.23***	-.08***
	(.05)	(.08)	(.02)	(.03)	(.07)	(.07)	(.02)
Competition	.1***	.1	-.05***	-06***	-.004	-.04	.01
	(.04)	(.08)	(.02)	(.03)	(.06)	(.06)	(.02)
International	.66***	.99***	.01	-.01	.32***	.31***	.17***
recognition	(.08)	(.13)	(.02)	(.04)	(.1)	(.11)	(.03)
Work Hours	.01***	.01***	-.00001	-.0001	.003**	.003**	.001***
	(.001)	(.002)	(.0003)	(.0005)	(.001)	(.001)	(.0003)
Capacity	.01***	.01***	.005***	.01***	.004**	.004***	.001
utilization	(.001)	(.022)	(.0005)	(.001)	(.002)	(.002)	(.0003)
Food sectors	.21*	.7***	-.01	.03	.5***	.45***	.1*
	(.12)	(.19)	(.04)	(.06)	(.15)	(.15)	(.05)
Textiles	-.18*	.22	-.04	.03	.41**	.46**	.05
	(.1)	(.19)	(.04)	(.06)	(.16)	(.16)	(.05)
Shoes and	.23***	.29**	-.02	.05	-.06	.09	.18***
leather	(.09)	(.15)	(.03)	(.05)	(.12)	(.12)	(.05)
Chemicals	-.39***	.67***	.01	.08	1.07**	1.02***	.04
	(.22)	(.23)	(.05)	(.08)	(.2)	(.19)	(.06)
Machinery	-.2**	.18	-.02	.1	.39**	.53***	.14**
and equipment	(.1)	(.19)	(.04)	(.06)	(.17)	(.17)	(.06)
Log	.4	.4	.12	.07	.21	.19	-852.2
likelihood/ R^2							
Sample size	2086	2086	1999	1963	2086	2085	2086

For export propensity marginal effects reported and their standard error clustered at firm level *** significant at 1%, ** significant at 5%, and * significant at 10%

The regression further reveals that the number of employees, sales, labor productivity, value-added per worker, and export propensity are higher for partnerships than sole proprietorships, which is consistent with previous evidence in the US context. Coleman and Robb (2009) found that partnership firms have higher equity and debt investment than sole ownership firms. Besides, the working hours of a firm and its international recognition status have a positive and significant relationship with the number of employees, sales, labor productivity, and export propensity. Some studies suggest that women entrepreneurs perform less than men as they spend more time in household activities than managing their business (Fairlie and Robb, 2009; Hundley, 2000). The traditional family model still appears to operate in Brazil, where women are the key agents responsible for household activities (Bruschini, 2007). Accordingly, the descriptive findings of my study show that women spend fewer hours in their business than their male counterparts. I conclude that the difference in working hours, international recognition, and a type of firm ownership can explain that women-owned firms have fewer employees, lower sales, lower labor productivity, lower value-added per worker, and they are less likely to participate in exports.

The garment sector is the reference category in this study, and it has a high density of women. The number of employees in this sector is relatively higher than the textile, chemical, machinery, and equipment. In contrast, the garment sector is less likely to participate in exports than other sectors such as food, shoes and leather, machinery, and equipment. Further, the garment sector has less labor productivity and value-added per worker than food, chemical, and other manufacturing sectors. The distribution of the sectors has no significant contribution to the measurement of firm growth rate. I conclude that the difference in sector distribution between men and women entrepreneurs favors women entrepreneurs in terms of firm size. This result is consistent with the findings of Bardasi et al. (2011), indicating that women entrepreneurs in Latin America are concentrated in sectors where the average firm size is higher than their male counterparts. However, the higher concentration of women in the garment sector can partially explain the lower rate of involvement in exports as well as low labor productivity.

Women and men bring several of their unobservable characteristics to firms, but they are not controlled in this study due to the difficulty of calculation or lack of data. The difference of variables such as preferences, motivation to start a business, risk aversion, number of children, marital status, networking, and discrimination, are not controlled in this study. These variables provide a benchmark of women-owned businesses performing less than men-owned ones. The differences in preference, motivation to start a business, and level of household responsibility may contribute to a gender-based gap in the growth rate of the number of employees. The central question emerging from the preceding analysis is why women-owned enterprises are smaller, less efficient, less growth-oriented, and have a lower rate of participation in exports, even after possessing certain favorable firm characteristics for firm growth? I attempt to answer this question within the data constraints. The regression analysis shows that the considered explanatory variables explain some gender-based firm

performance gaps. In the next section, I discuss the exact contribution of each explanatory variable and the overall explanatory influence of these variables to the gender-based firm performance gap.

1.4.2.2. Explanation for Gender-Based Firm Performance Difference

1.4.2.2.1. Methodology

Blinder–Oaxaca (BO) decomposition[4] technique is used to analyze the extent to which the gender-based firm performance gap is explained by each explanatory variable, or to calculate the contribution of each explanatory variable to the gap (Blinder, 1973; Oaxaca, 1973). The standard BO decomposition for the linear regression model reduces the performance gap (the mean outcome difference $\bar{Y}_M$ - $\bar{Y}_W$) into two components. First, the gap is the result of the difference in the performance of the explanatory variables between men-owned ($\bar{X}_M$) and women-owned ($\bar{X}_W$) firms; second, the gap is the result of the difference in the coefficients of the separate linear regression equation for men (B_M) and women (B_W).

$$\bar{Y}_M - \bar{Y}_W = (\bar{X}_M - \bar{X}_W)B_M + \bar{X}_W(B_M - B_W) \tag{1.4}$$

The variation in coefficients reflects the behavioral difference, or the gender-based difference in response to each variable. However, this technique has been criticized by some researchers. The standard BO decomposition has three components: the portion of the differential due to differing endowments (E), difference in coefficients (C), and an unexplained portion of the difference (U). According to Jones (1983), the empirical findings show that the decomposition has only two parts: the endowment term (E) and the residual term (C+U=D). Since the values of C and U change with the choice of left out categories and variable measurement decisions, the residual term cannot decompose and uniquely determine each portion (C&U), (see Cain, 1986; Fortin et al., 2011; Jones, 1983).

Oaxaca and Ransom (1994) also criticized the choice of coefficients for the first component of decomposition in their calculation.[5] . They used four methods for estimating wage discrimination in terms of race and gender, finding that using a single race or gender wage structure as a standard for measuring discrimination and difference in productivity was too extreme. Therefore, they proposed using the

[4]The Blinder – Oaxaca decomposition technique is not uncommon in the literature. For example, Gottschalk and Niefert (2013) and Fairlie and Robb (2009) used this technique to achieve a similar objective. Such a decomposition method is very common, especially for gender-based wage discrimination (Oaxaca and Ransom, 1994; Oaxaca, 1973). Further, Fortin et al. (2011) provide a detailed discussion about this method.

[5]similar critics provide by (Cotton, 1988;Neumark, 1988)

coefficient of estimates from a pooled sample of the two groups for providing the best estimate. Fairlie and Robb (2009) also pointed to the sensitivity of the Standard Blinder–Oaxaca decomposition method to a specification error.

To overcome these problems, I use an approach similar to Fairlie and Robb (2009), Gottschalk and Niefert (2013), and Oaxaca and Ransom (1994). Specifically, I use an alternative technique that computes only the first part of the decomposition and the coefficients of the pooled model (B). The contribution of gender difference in characteristics is described as follows:

$$\bar{Y}_m - \bar{Y}_w = (\bar{X}_m - \bar{X}_w)B \tag{1.5}$$

where $\bar{Y}_j$ is the mean of outcome variables of gender j, $\bar{X}_j$ is the mean of firm characteristics, B is a vector of pooled coefficient estimates, and J = M or W for men and women. I do not report estimates for an unexplained component of the decomposition because it partially reflects the contributions from group differences in unmeasurable characteristics, which is difficult to interpret.

In this paper, I use the standard BO decomposition for my baseline analysis. Further, I check the robustness of the BO result by using two alternative decomposition methods, also reported by Cotton (1988) and Neumark (1988). Furthermore, I use the Fairlie nonlinear decomposition method (Fairlie, 2005), which allows using the coefficient estimates from the logit model in decomposition specification while studying export propensity. [6]

1.4.2.3. Results

Table 1.8 reports the estimates from the Oaxaca–Blinder and Fairlie decomposition technique (for export propensity) to the gender-based firm performance gap. The detailed contributions of gender-based differences in each explanatory variable to firm performance are reported. Appendix Table A.3 reports the results of three decomposition methods, namely Oaxaca–Blinder, Cotton, and Neumark. Since each decomposition method is slightly different in their assumptions,[7] the results have very small differences in magnitude, whereas the qualitative results are the same.

[6] All the decomposition techniques used in this paper and the critique provided are well discussed by Fortin et al. (2011)

[7] In all methods, the critical point is the choice of B (coefficient) as a reference. The Blinder Oaxaca uses coefficient of pooled model as a reference coefficient ($\bar{Y}_m - \bar{Y}_w = (\bar{X}_m - \bar{X}_w)$B), whereas Cotton consider the explanatory variable return difference between men and women by formulate as follow ($\bar{Y}_m - \bar{Y}_w = (\bar{X}_m - \bar{X}_w)B + \bar{X}_m(B_m - B) + \bar{X}_w(B - B_w)$,and Neumark's used the weight average of men and women, for details read (Cotton, 1988; Oaxaca and Ransom, 1994; and Neumark, 1988)

The decomposition result confirms that the explanatory variables cannot fully explain the gender-based performance difference in terms of the number of employees, sales, employee growth, sales growth, labor productivity, value-added per worker, and export propensity. The explanatory variables explained 32.76% gender-based gap in the number of employees, 42.65% of the gender-based gap in sales, 49.35% of the labor productivity gap, 57.14% of value-added per worker gap, and 85.71% of the export propensity gap. The overall difference in the explanatory variables provides a negative contribution of 250% and 100% in the growth rate gap of employment and sales, respectively. The share over 100% shows that considering the characteristics of women entrepreneurs and their firms if the coefficient estimates from the pooled regression adequately describe the behavior of entrepreneurs, women-owned businesses are expected to exhibit better employment growth than their male counterparts. This is consistent with the social feminist theory, and the consensus of previous studies stating that women entrepreneurs have different preferences than men, and they are more concerned about the risk associated with the rapid growth rate of the firm, hence, they deliberately choose to run the firms with a slow and steady growth rate (Cliff, 1998; Orser and Hogarth-Scott, 2002; Rosa et al., 1996). The "unexplained" portion of gender-based gaps in firm performance may result from the omission of important, unmeasurable, and difficult to measure variables, such as risk aversion behavior, preference for growth, motivation to start a business, networking, number of children, marital status, and gender-based discrimination.

As reported in A.1 and A.2, there is no gender-based difference in the experience of the firm managers, which makes the contribution of experience to the gender based-performance gap insignificant. Contrarily, employees of women-owned firms are less likely to have a graduate degree as compared to employees of men-owned firms. The gender-based difference in education level explains 1.47–7.14% of the gender-based firm performance gap in terms of sales, labor productivity, value-added per worker, and export propensity. Besides, the gender-based differences in access to training have a strong explanatory effect. The gender-based difference in this variable explains 4.76–50% of the gender-based firm performance gap. The possible reasons for not having access to training could be resource constraints, unwillingness, and lack of understanding of its benefits. Generally, the lack of training in women-owned firms restricts employees from developing their skills and knowledge, which has a negative influence on productivity and success in business. This finding typically supports the human capital and social feminist theories that women-owned firms have less stock of human capital than men-owned firms. As a result, women-owned firms have lower performance than men-owned firms. This study shows that women-owned firms have less stock of human capital, for instance, the workers are less educated and have limited access to training. These differences partially explain the gender-based firm performance gap.

Table 1.8.: Decompositions of Male/Female gap in detail in firm performance

Dependent variables	Lnemployees (1)	lnsales (2)	Employee growth (3)	Sales growth (4)	Labor productivity (5)	Value added (6)	Export propensity (7)
Male mean	3.94	9.58	.14	.26	10.59	9.98	.24
Female mean	3.36	8.23	.12	.24	9.82	9.34	.1
Male/Female Gap	.58	1.36	.02	.02	.77	.63	.14
Top manager	-.002	-.005	.0001	-.0002	-.003	-.002	-.01
experience	.34%	.37%	.5%	-1%	-.39	.32%	7.14%
Training to	**.07**	**.11**	.004	**.01**	**.04**	**.03**	**.01**
workers	**12.07%**	**8.09%**	20%	**50%**	**5.19%**	**4.76%**	**7.14%**
Education	.004	**.02**	-.0004	-.003	**.02**	**.02**	**.01**
	.69%	**1.47%**	2%	-15%	**2.6%**	**3.17%**	**7.14%**
The share of	**-.06**	.06	-.001	.002	**.12**	.07	**-.02**
female workers	**-10.3%**	4.41%	-5%	10%	**15.58%**	11.11%	**-14.3%**
Access to credit	-.01	-.02	**-.005**	.001	-.01	-.01	-.003
	-1.72%	-1.47%	**-25%**	5%	1.3%	1.59%	2.14%
Age of firm	**.1**	**.17**	**-.02**	**-.02**	**.06**	**.07**	**.03**
	17.24%	**12.5%**	**-100%**	**-100%**	**7.79%**	**11.11%**	**21.43%**
Form of firm	**.03**	**.05**	-.001	-.001	**.02**	**.02**	**.01**
ownership	**5.17%**	**3.68%**	-5%	-5%	**2.6%**	**3.17%**	**7.14%**
Foreign ownership	**.01**	**.03**	**.004**	.004	**.02**	**.02**	**.005**
	1.72%	**2.21%**	**20%**	20%	**2.6%**	**3.17%**	**3.57%**
Location	**.03**	**.09**	-.006	-.004	**.06**	**.05**	**.03**
	5.17%	**6.62%**	-30%	-20%	**7.79**	**7.94%**	**21.43%**
Competition	-.001	-.001	.0002	.0001	-.0001	.0003	-.0001
	-.17%	-.07%	1%	.5%	.01%	.05%	-.07%
International	**.06**	**.1**	.001	-.001	**.03**	**.03**	**.01**
recognition	**10.34%**	**7.35%**	5%	-5%	**3.9%**	**4.76%**	**7.14%**
Hours devoted in	**.03**	**.04**	-.0001	-.001	**.01**	**.01**	**.01**
business	**5.17%**	**2.94%**	.5%	5%	**1.3%**	**1.59%**	**7.14%**
Capacity	**-.02**	**-.03**	**-.02**	**-.02**	-.01	-.01	-.001
utilization	**-3.45%**	**-2.21%**	**-100%**	**-100%**	-1.3%	1.59%	.71%
Sector	**-.04**	-.03	-.0001	.01	.02	.06	.02
	-6.7%	-2.21%	.5%	50%	2.6%	9.52%	14.29%
All included	.19	.58	-.05	-.02	.38	.36	.12
variables	32.76%	42.65%	-250%	-100%	49.35 %	57.14%	85.71%

The samples and regression specifications are the same with table 1.3, 1.4, 1.5, and 1.6 for pooled sample model, significant effects in bold

As discussed in the descriptive part of this study, women business owners in Brazil have the same opportunity to access credit as men business owners. As a result,

the contribution of this variable to the gender-based firm performance gap is almost non-existent. Regarding the firm age, descriptive statistics show that women-owned firms are younger. The average age of women-owned firms is 15.7 years, whereas that of men-owned firms is 20.16 years. The difference in the firm age explains the lower sales volume, the number of employees, labor productivity, value-added per worker, and export propensity of women-owned firms. The contribution of firm age to the gap is 17.24% in the number of employees, 12.5% in sales, 7.79% in labor productivity, 11.11% in the value-added per worker, and 21.43% in export propensity. In contrast, this variable widens the gap in the growth rates of employees and sales by 100%. This is primarily due to the direct adverse influence of the firm age on employment and sales growth rates. The overall firm age contribution to gender-based difference in the growth rate of sales and the number of employees is significant and negative.

A study in Germany found that women are less likely to start a business in partnership, and this difference explains the gender-based performance gap in sales and firm growth rate (Gottschalk and Niefert, 2013). My findings also show that, on average, women entrepreneurs are more likely to be sole owners than their male counterparts. The difference in the form of ownership explains 5.17% of the gender-based gap in the number of employees, 3.68% of the sales gap, 2.6% of the labor productivity gap, 3.17% of value-added per worker, and 7.14% of export propensity gap. Since the form of ownership is not very important for growth measurements, its contribution to the gender-based difference in the growth rate of the firm is small and statistically insignificant. Further, women-owned firms are financed domestically, whereas men-owned are relatively owned and financed by foreigners. This variable explains 1.72% of the gender-based gap in the number of employees, 2.21% of the sales gap, 20% gap in the growth rate of employees, 2.6% of labor productivity gap, 3.17% gap in the value-added per worker, and 3.57% gap in the export propensity. Generally, foreign owners are expected to have more exposure, experience, and knowledge, which may contribute positively to firm performance.

Location is another variable that explains the gender-based performance gap in terms of sales, the number of employees, labor productivity, value-added per worker, and export propensity. As shown in Table 1.8, this variable explains 5.17% of the gender-based gap in the number of employees; 6.62% of the gender-based gap in sales, 7.79% gap in labor productivity, 7.94% of value-added per worker, and 21.43% of the gender-based gap in export propensity. This is due to the high population of men in small cities, and the sales, the number of employees, labor productivity, value-added per worker, and the rate of involvement in exports are higher than average in small cities. There is no significant difference between men and women entrepreneurs in terms of competitive advantage. As a result, this variable has nearly no contribution to the gender-based performance gap.

There is a significant difference between men and women entrepreneurs in terms of international recognition. 18% of men owners report having international recognition for their firms, whereas it is 9% in the case of women entrepreneurs. The

difference in international recognition explains the gender-based firm performance gap of 10.34%, 7.35%, 3.9%, 4.76%, and 7.14% in terms of the number of employees, sales, labor productivity, value-added per worker, and export propensity, respectively. Further, the gender-based difference in working hours partially explains the firm performance gap (1.3%–7.14%). Some studies argue that family responsibilities of women influence their motivation and intention of becoming an entrepreneur. For instance, certain researchers argue that many women start a business to have flexible work schedules for balancing business and family life (Fairlie and Robb, 2009; Gottschalk and Niefert, 2013). As a result, women-owned firms perform less than men-owned firms. Taking a cue from some previous studies (Gottschalk and Niefert, 2013; Robb and Watson, 2012), I use working hours to assess the contribution of family responsibilities to the gender-based firm performance gap. The finding is consistent with the previous studies that the family responsibilities of women partially explain the gender-based firm performance gap. The difference in the mean of capacity utilization widens the gender-based firm performance gap because, on average, women entrepreneurs have better capacity utilization than their male counterparts.

Another explanatory factor for the gender-based firm performance gap is the gender-based difference in the distribution of the sectors. According to Hundley (2000), the business sector accounts for a significant fraction of the gender-based firm performance gap. Women entrepreneurs are less likely to involve in sophisticated technology-based firms while being very frequent in less technology-intensive service sectors. According to Fairlie and Robb (2009), the possible reasons for gender-based differences in industry distribution are capital constraints, difference in skills, gender-based discrimination, and a difference in preferences. My findings indicate that the gender-based difference in industry distribution makes a negative contribution of 6.7% to the gender-based firm performance gap in terms of the numbers of employees. The results suggest that women-owned firms have a favorable industrial distribution in terms of the number of employees. The crucial reason for this is the more reliable performance of these sectors in terms of the number of employees, even when women entrepreneurs are concentrated in less sophisticated sectors. According to Bardasi et al. (2011) and Rijkers and Costa (2012), women entrepreneurs operate small firms as they are concentrated in smaller sectors. In contrast, my finding reveals that women entrepreneurs are concentrated in non-small sectors but own smaller firms within the sector.

Access to formal credit is one of the most important explanatory variables for firm performance. In recent years, some empirical studies have shown that women-owned businesses have limited access to formal credit (Asiedu et al., 2013; Coleman and Robb, 2009; Muravyev et al., 2009). Further, women entrepreneurs have access to smaller loans compared to their male counterparts (Agier and Szafarz, 2013; Coleman, 2000). If this is true, the difference in access to credit may be an important determinant of the gender-based gap in firm performance. As depicted in the Table 1.2, women entrepreneurs have more access to credit, but the access is for the smaller size loans compared to men entrepreneurs. Since simple statistical summary alone

cannot give a clear image, I address the following questions in the next section. Does the gender of the entrepreneur influence the demand and supply of credit? Do women entrepreneurs access smaller loans than their male counterparts?

1.4.2.4. Entrepreneurs Gender and Financial Constraints

1.4.2.4.1 Methodology

The last objective of this chapter is to examine whether there is a difference in demand and access to loans between men-owned and women-owned businesses. Since loans can only be obtained by firms with non-zero demand for loans, this research considers entrepreneurs with loan demand as well as without loan demand. Firms may not require bank loans due to sufficient availability of cash, however, they are more likely to be approved a loan if they apply. The finding of a prior empirical study indicates that firms with no demand for a loan are strongly linked to an alternative source of finance (Brown et al., 2011). The inclusion of business owners with no demand for credit may lead to a biased conclusion while determining the gender-based difference in access to finance.

According to Beck et al. (2008), there are two classifications of entrepreneurs that do not use financial services—voluntarily excluded/self-excluded and involuntarily excluded. Voluntary/self-excluded are those with no demand for a loan, most probably due to the availability of alternative financial sources or other reasons. Involuntary excluded are the ones that need a loan but may not have access due to the collateral requirements, short tenure of the loan, high-interest rate, complex application procedures, and negative expectation for approval. Voluntary self-excluded observations are omitted from the sample of this study to determine access to financial services. Further, in the wake of Muravyev et al. (2009), firms that have access to credit are those that use formal credit with restriction to bank loans because 71% of them have financed their working capital through bank loans. Only 6.24% of the firms under consideration obtained a microfinance loan and 22.85% from friends/relatives and other sources. Moreover, each financial institution has specific requirements and objectives. The exclusion of firms with no demand for credit may cause a problem with the sampling method (i.e., the sample may lose randomness). I use the Heckman Probit Model to overcome the setback, and by considering the nature of the dependent variable. Several researchers used the same method to achieve similar objectives (Bardasi et al., 2011; Brown et al., 2011; Muravyev et al., 2009). A Probit model is used to determine difference in the gender-based access to the loan, and I specify the equation for credit access as follows:

$$Pr(Loan_{ijt}) = \Phi(\alpha + \beta Women_{ijt} + \gamma X_{ijt} + \delta I_{jt} + \rho\tau_t + \varepsilon_{1ijt}) \tag{1.6}$$

where loan is equal to one, if firm i operates in industry j, and received the loan at year y, else it is zero. X is a vector of explanatory variables for access to credit of firm i, in industry j, at the year t. These variables are associated with firm risk, the ability to provide collateral or not, and firm performance. These variables are considered as the determinants of access to financial services and adopted from relevant literature (Bardasi et al., 2011; Brown et al., 2005; Brown et al., 2011; Muravyev et al., 2009). Risk-related variables and the ability to provide collateral include the number of plants, which may be a dummy for more than one establishment (firms with several establishments may have the capacity to provide collateral), a form of ownership (sole ownership or other forms). The variables related to performance are the firm age, manager experience, educational qualification of manager and employees, competition (dummy for 5 and more competitors), capacity utilization, working hours, firm size (number of permanent employees), location, international recognition, and sector dummies. Following Muravyev et al. (2009), location is considered as a dummy variable, that is whether the firm is located in a big city or not (the big city is either capital city or a city with a population of more than one million).

The selection is described by equation 1.7 Need is a dummy variable that is equal to one if the firm needs a loan, else it is zero. Z is a vector of variables that identify the selection equation (instruments). The first variable is the percentage of working capital financed by retained earnings, while the second variable is the percentage of total annual sales of firm products, paid for before delivery. The result is valid with the assumption that these instrumental variables determine the probability of the need for loans, but not access to credit. This assumption will very likely hold based on the following facts. First, according to Baron and Markman (2003), banks do not use this information in the process of approving loan applications. Second, the study was conducted by WB about the financial institutions of Brazil, based on the information from the Central Bank, and the survey also shows that the bank does not use this information to approve loans. The information used in the loan approval process is about income, wealth, education, possession of collateral or guarantees, and the credit (Kumar et al., 2005). The instrumental variables are expected to be inversely related to the probability of a firm seeking a loan. The model comprising equation 1.6 and 1.7 below also assumes that ε_{ij}~N(0,1), and corr $(\varepsilon_{1ijt}\ \varepsilon_{2ijt}) = \rho$. If $\rho \neq 0$, then the standard Probit model without selection produces biased estimates.

$$Prob(Needi = 1) = \Phi(\alpha + \beta Women_{ijt} + \Upsilon X_{ijt} + \delta I_{jy} + \rho\tau_y + \psi Z_{ijy} + \varepsilon_{2ijy}) \quad (1.7)$$

Some findings show that women entrepreneurs have access to smaller loans than their male counterparts. I used OLS to determine the existence of gender-based differences in loan size obtained by following Coleman (2000). Where Y_{ijt} is a log of real loan size, and X_{ijt} is a vector of explanatory variables.

$$Y_{ijt} = \alpha + \beta Women_{ijt} + \Upsilon X_{ijt} + \delta I_{jt} + \rho \tau_t + \varepsilon_{ijt} \tag{1.8}$$

1.4.2.4.2 Result

Starting with the source of finance is meaningful for discussing financial capital. Internal and bank financing are, therefore, the two important sources of financing for the Manufacturing sector in Brazil (see Graph A.2 in the appendix). Borrowing from banks is the second-largest source of financing for both men and women owners of firms. I begin the analysis of gender-based differences in access to finance by analyzing the self-evaluation of managers provided on the financial constraints faced by their firms. The WBES questionnaire included inquiry on the level of difficulty in accessing external financing, on a scale of 1 (no obstacle) to 4 (very severe obstacle). The findings indicated that women entrepreneurs are in a better position compared to their male counterparts based on the scores 2.43 and 2.48, respectively. However, the difference is not statistically significant (see Table A.2 in appendix).

Table 1.9 shows the results of the Heckman Probit estimates for the model described in equations 1.6 and 1.7 Column 1 shows the outcome of the probability of access to credit, Column 2 shows the result of the selection equation of the probability of the need for a loan, and Column 3 shows the result of OLS estimation to the size of the loan. It reports marginal effect estimated around mean of access points and need for a loan. The main result shows women-owned firms are as likely to obtain loans as men-owned firms when it comes to correcting whether the firm needs a loan, by controlling the firm performance, and other characteristics that capture the creditworthiness of the firms. The coefficient on the gender dummy for access and the need for credit is the major interest in this study, and it is statistically insignificant. This result shows that there is no evidence of gender-based differences in access and need for a loan.

Table 1.9.: Difference in a demand, access, and size of credit by gender

Variables	Access to credit pooled sample (1)	Need to loan pooled sample (2)	Loan size (3)
Gender	.04	.12	-.78***
	(.11)	(.1)	(.17)
Experience	-.06	.04	-.24***
	(.07)	(.07)	(.1)
Education	-.0002	.001	.02***
	(.003)	(.003)	(.01)
Form of firm ownership	.01	.01	-.21
	(.12)	(.12)	(.19)
Number of firms	.04	.05	.3
	(.12)	(.11)	(.23)
Age of firm	-.001	-.001	.01***
	(.002)	(.002)	(.003)
Export	.19**	-.06	.46***
	(.09)	(.09)	(.13)
Capacity utilization	.001	-.004***	-.001
	(.002)	(.002)	(.003)
Hour devoted in the business	-.001	.002**	.005**
	(.001)	(.001)	(.002)
International recognition	.09	.05	.02
	(.1)	(.1)	(.04)
Log number of employees	.19***	.05	.87***
	(.04)	(.03)	(.05)
Location	-.12*	-.11*	.04
	(.07)	(.06)	(.11)
% of sales paid before delivery		-.003*	
		(.002)	
% of working capital financed by retained earnings		-.01***	
		(.001)	
Constant			2.62
			(.36)
R^2			.4
Wald chi2 (1)	163.06		
Pro>chi2	0.00		
ρ	-.82		

The table report marginal effects after probit estimation. Marginal effect is estimated around the mean point. * significant at 10%; ** significant at 5%; *** significant at 1%; sector dummies include; in addition, for loan size estimation standard errors clustered at firm level

The results of the estimates are consistent with my previous expectations, and suggest that firms with a large number of employees, and export firms, are likely to have lower financial constraints. This is consistent with prior findings that large firms have a higher probability of receiving a loan than small firms (Asiedu et al., 2013; Muravyev et al., 2009). The possible explanation for this is that large firms are less risky and have a greater capacity to provide collateral. According to Brown et al. (2011), export firms are more likely to have access to loans because they are successful, have huge assets, and are easier to monitor.

Column 2 of Table 1.9 shows that the coefficients of the instrumental variables have the expected sign and are statistically significant. The first instrument is the percentage of sales paid before delivery; it is negatively correlated with the demand for loans. Logically, firms that receive a higher percentage of payment before delivery are less likely to need a loan as they can cover their expenses through the sales revenue. The second instrument is the percentage of working capital financed through retained earnings. This variable is also negatively related to the demand for loans. Firms having a higher share of their working capital from retained earnings are less likely to need a loan. The statistically significant negative value of ρ shows the coefficient of correlation among the error terms in the main and selection equations. Firms with a higher capacity utilization are less likely to need a loan. Contrarily, firms that located in small cities and operating for longer hours are more likely to need a loan.

The findings of this research show no gender-based difference in access to credit. However, on average, women entrepreneurs received a small amount as a loan (see Graph A.1 in the appendix). Comparing the simple average does not answer whether women entrepreneurs access smaller loans compared to men entrepreneurs. The result in Column 3 confirms that the size of loans for women entrepreneurs is 78 percent smaller than men entrepreneurs, even after controlling the potential explanatory variables. This result is consistent with the finding of Coleman and Robb (2009) that women entrepreneurs start their firms with a significantly lower amount of debt investment. The previous studies suggest that the potential reason for this may be the discrimination of financial institutions, or women needing smaller loans than their male counterparts. Variables such as export participation, working hours, educational qualifications of employees, and firm size have a positive and significant correlation with the size of the loan.

1.5. Conclusion

I investigated whether a gender-based firm performance gap exists using an unbalanced panel of data collected by WB in 2003 and 2009 from the manufacturing sector in Brazil. Besides, I explored the existence of gender-based differences in access and demand for credit and loan size.

On average, women-owned firms are at a disadvantage across a variety of firm performance explanatory variables. For instance, in comparison to men-owned firms, women-owned firms have less access to training and are less likely to have international recognition. They operate fewer hours and are concentrated in low technology-intensive manufacturing sectors, very frequently in large cities. Furthermore, women-owned firms have a legal status of sole proprietorship and are younger than men-owned firms. The considered explanatory variables partially explain the gender-based differences in firm size, labor productivity, value-added per worker, and export propensity. When explanatory variables are controlled, gender-based firm performance gap decreases from 56% to 36% in the number of employees, 1.35 to 0.72 log point in sales, 78% to 35% in labor productivity, 69% to 25% in value-added per worker, and 14% to 6% in export propensity. Nevertheless, women-owned firms have smaller sales, fewer employees, lower labor productivity, less value-added per worker, and are less likely to participate in export propensity. However, there is evidence that controlling the gender-based difference in explanatory variables makes the difference in gender-based employee growth rate even larger and statistically significant.

My study revealed that gender-based differences in access to training, firm age, the form of firm ownership, foreign ownership, firm location, international recognition, and firm operating hours partially explain that women-owned firms have less performance than the men-owned. However, gender difference in capacity utilization and sector distribution is in favor of women entrepreneurs.

In support of Social feminist theory and human capital theory, women-owned enterprises have less stock of human capital, such as less access to training and less educated employees. Such gender-based differences in human capital partially explain the gender-based firm performance gap. According to social feminist theory, women entrepreneurs have different preferences than men entrepreneurs, and their household responsibility is one of the factors that influence their preference. For instance, Fairlie and Robb (2009) argue that women start a business to have flexible work schedules that enable them to take care of their families. As a result, their firms perform less than their male counterparts. In line with these agreements, the findings of this study show that the family responsibility of women contributes to the gender-based firm performance gap.

The overall contribution of the explanatory variables considered depends on the performance indicator used. Firm size, labor productivity, value-added per worker, and export propensity are determined by other characteristics than firm growth. The results of the decomposition show that the explanatory variables explained a gender-based performance gap of 32.76%, 42.65%, 49.35%, 57.14%, and 85.71%, respectively, in the number of employees, sales, labor productivity, value-added per worker, and export propensity. The overall contributions of these explanatory variables to the difference in employee growth rate and sales growth rate are -250% and -100%, respectively. These are primarily the result of some favorable characteristics of women-owned firms for the growth of the firm, such as being a young firm, access

to credit, and better capacity utilization than men-owned firms. Regardless, women entrepreneurs have a lower growth rate of the firm than their men counterparts due to the following reasons. Previous studies (Cliff, 1998; Eddleston and Powell, 2012; Morris et al., 2006) explained that women entrepreneurs deliberately prefer the firms with a slow and steady growth rate to balance their business and household responsibilities, avoid the risks associated with a rapid growth rate of a firm, along with their desire to control it. This result generally supports the social feminist theory that women entrepreneurs have different preferences than men entrepreneurs.

I find no evidence of a gender-based gap in access and demand for financial services. However, women entrepreneurs receive smaller sized loans even after considering the potential explanatory variables. The possible explanations are that women entrepreneurs need smaller sized loans, or they face discrimination from financial institutions (Agier and Szafarz, 2013; Coleman and Robb, 2009; UNCTAD, 2013).

Certain studies have posited that family characteristics, discrimination, networking, preference for growth, and motivation to start a business as the explanatory variables for firm performance. However, I cannot consider these variables due to the limitation of the WB data set. Richer data may help in addressing those issues and contribute to the literature at a more comprehensive level. I could not address the issues related to causal effect since there are no changes in ownership of the firm over the period, and it is difficult to find an instrumental variable.

2. Gender Diversity and Firm Performance: Evidence from Malaysia Boardrooms

Abstract

This chapter contributes to the existing literature about the influence of the requirement of gender diversification (soft law) in the Malaysian board of directors on the participation of women in such positions. Besides, it examines the effect of the gender diversification requirement of the board of directors on the firm performance, board size, and characteristics of the board members. I conducted an empirical analysis based on data taken from the Orbis (Bureau van Dijk) database and the annual reports posted on the Bursa Malaysia Stock Exchange for 452 publicly listed firms for the period of 2007–2016. The requirement significantly increased female participation in the board of directors, however, the objective of 30% participation was not achieved. The findings show that the gender diversification of the board of directors is detrimental to firm size (total revenue and assets) while having no impact on firm efficiency (profit margin, Return on Equity (ROE), Tobin's Q). The requirement of gender diversity adversely affects the level of experience and age of the directors, without impacting the number of board members and their educational qualifications. It has asymmetric effect on firm performance based on sectors, the level of competition in the sector, and the firm size.

2.1. Introduction

Women around the world face substantial challenges to achieve the highest echelon of their careers, particularly to the level of the board of directors. The share of women in the board of directors is 10.3% across 67 countries in the world, with the lowest rate in Morocco (0%) and the highest rate in Norway (42%) (Terjesen et al., 2015). A gender-balanced board may improve the work environment, productivity, and financial performance due to a more diverse and cohesive outlook. The requirement for gender quota by the board of directors may, therefore, improve economic growth (European Commision, 2012). For instance, Ansgar Gabrielsen, Minister of Trade and Industry in Norway, stated in his speech, as cited by Terjesen and Sealy (2016), "Denying an opportunity for women to be in higher positions is a waste of the resources that society invested in educating their daughters." On considering the abovementioned statement, several countries have established gender quotas and diversification as a requirement for appointment to the board of directors. Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, India, Ireland, Israel, Italy, Kenya, Luxembourg, Malawi, Malaysia, Netherlands, Nigeria, Norway, Poland, South Africa, Spain, Sweden, United Kingdom, and the United States are among the countries actively engaged in gender diversification. Some of these countries established the gender quota requirements with sanctions (hard law), while others explicitly set gender diversification as a requirement in the Code of Corporate Governance (soft law) while appointing the directors (Terjesen et al., 2015).

Various scholars or policymakers question whether the firm performance improves or declines due to the gender diversification of the board of directors mandated by soft or hard law. The impact of gender diversification of the board of directors on firm performance is partially intriguing because of the opposing perspective on the subject. Based on the dependency theory, it can improve firm performance. The board of directors plays a significant role in expanding the network of the firm with an external environment to address environmental dependence. They have a key role to play in reducing dependence and achieving beneficial resources for the firm. Since different types of directors provide varying resources to the firm, the gender diversification of the board of directors may improve firm performance. However, according to human capital theory, it could have a positive, negative, or a null effect. It depends on the influence of the gender diversification requirement of the board of directors on the stock of human capital at the level of the board of directors. If the law leads to less qualified females becoming a member of the board of directors, the performance of the firm can decrease. Based on these perspectives, it is possible to hypothesize that the gender diversification of the board of directors may have effect on firm performance.

There are few empirical studies on the subject in the case of developed countries. Some of these studies find the gender diversification of the board of directors having a negative, positive, or a null effect. Among those, the study conducted in Norway

finds that gender diversification of the board of directors affects the firm performance negatively (Ahern and Dittmar, 2012). Contrarily, the study carried out in Italy finds that the gender diversification of the board of directors has a null effect in terms of the majority of firm performance metrics while having a positive effect on financial indicators (Ferrari et al., 2018). The study in the case of Europe finds a heterogeneous effect on firm performance across countries (Comi et al., 2019). Since the previous studies report inconsistent results and it is necessary to expand the evaluation of the effect of gender beyond the developed countries, this study investigates the effect of the gender diversification of the board of directors on firm performance in Malaysia.

Since 2004, Malaysia has been focusing on gender equality in appointments to decision-making roles, when the Malaysian government issued a requirement that women should occupy at least 30% of such positions in the public sector. The prime minister of Malaysia, Mr. Najib Razak, extended this requirement to private sectors in 2011 (Abdullah, 2014). They also set the target in their 2011 Corporate Governance Blueprint for achieving 30% of female members in the board of directors by 2016 (MCCG, 2011). In 2012, Malaysia issued a code of corporate governance requiring boards to specify gender diversity as a prerequisite for the appointment of board members. This was a step to help in achieving the target and disclosing the policy and its performance in the annual report (MCCG, 2012). However, later in 2017, the requirement for 30% of women in the board of directors was reissued, limiting it to very large firms only, that is, companies in the Financial Times Stock Exchange (FTSE) Bursa Malaysia Top 100 index (MCCG, 2017). The gender diversification rule for the board of directors is primarily used in developed countries, particularly in the European Union (EU) countries. The study conducted by Syed and Van Buren (2014) concluded that such a requirement is difficult to implement in Muslim-dominated countries, and suggested taking the relationship between religion, culture, and business into consideration. Therefore, it is fascinating to study the influence of gender diversification requirement of the Malaysian board of directors on the share of female directors, and its impact on firm performance.

This chapter uses 429 sample firms listed on the Bursa Malaysia Stock Exchange and Orbis database to attain its objectives. These firms have a balanced panel for the period from 2007 to 2016. This research addresses: whether the gender diversification requirement of the board of directors influences the share of female board members; and whether it affects the firm performance, board size, and characteristics of the board members. I use an identification strategy similar to Ahern and Dittmar (2012), that is, fixed effects panel data with instrumental variables (IV) strategy.

This paper contributes to the existing literature in various ways. First, the majority of previous research focuses on hard law in developed countries (Ahern and Dittmar, 2012; Comi et al., 2019; Ferrari et al., 2018). Whereas, this study explores the influence of the gender diversification requirement (soft law) of the board of directors on the share of female directors, and its effect on the performance of the firms,

particularly in a Muslim-dominated developing country. Second, the study uses an extensive set of firm performance metrics, such as firm size (total assets and total revenue) and efficiency (profit margin, Return on Equity (ROE), and Tobin's Q). Third, this paper considers the influence of other factors, such as age, education, and experience of the board of directors. Fourth, this research addresses the issue of impact. The majority of prior studies used cross-sectional data, which makes it difficult to address the problems of cause and effect (Hillman et al., 2007; Julizaerma and Sori, 2012; Post and Byron, 2015). Fifth, this paper uses a relatively large number of firms and data of longer duration (10 years).

The findings of this paper are summarized as follows. (A) While the gender diversification requirement of the Malaysian board of directors could not achieve its goal of 30% of women board members, it has contributed positively to female participation, which is reflected through the presence of at least one female member in the board of directors. Further, it is observable through the total percentage of females in the board of directors and the firms that achieved the target of 30% of female directors. Besides, the women appointed to the board of directors based on the requirement are more qualified than their female predecessors along several dimensions. (B) The gender diversification is detrimental to firm size (total revenue and assets) but has no impact on efficiency (profit margin, ROE, and Tobin's Q). The findings from the estimate of the instrumental variable are consistent with the fixed effect estimates. (C) The gender diversification requirement of the board does not affect its size, the educational qualifications of the directors, and family board directors but has a negative effect on their age and experience as a director. (D) It has a negative effect on the size of the firms in higher technology-intensive manufacturing sectors and sectors with strong competition, without impacting other sectors. Contrarily, it has a positive effect in terms of firm size for large firms. Concerning Tobin's Q, the gender diversification requirement of the board of directors has a beneficial impact on the higher technology-intensive manufacturing sector and firms in highly competitive sectors. I found no sector and firm size-based difference in the effect of gender diversification requirement of the board of directors concerning other firm performance metrics.

I organize the rest of this paper in the following manner: Section 2.2 presents an institutional framework related to gender diversification of boards, empirical evidence on the relationship of the board of directors' gender diversification and firm performance, and a detailed discussion about Malaysia on related issues; Section 2.3 presents data sources and description; Section 2.4 present the result; and 2.5 presents the conclusion.

2.2. Literature Review

2.2.1. Gender Diversification of Board of Directors and Firm Performance

The participation of women in decision-making positions is generally diminutive worldwide. For instance, the share of women in the board of directors of large publicly listed companies of Europe was 21.2% in 2015, while that of the Chief Executive Officer (CEO) was only 3.6% (Comi et al., 2019). The percentage of women in 500 board seats in the US was only 14.8% in 2007 (Catalyst, 2007). According to Terjesen et al. (2015), in the 67 countries across the world, women's representation of the board of directors is only 10.3%, with the lowest share in Morocco (0%), followed by Japan (0.9%), and Chile (2.4%). There are some higher shares, such as Norway (42%), Sweden (28%), and Finland (27.2%), while the rest lie in between. In an attempt to improve the situation, several countries, especially developed countries have adopted the gender diversification requirement/law for the board of directors. The law/requirement is intended to bring gender equality for improving the economic condition of the country, and politicians are working on it to gain a political advantage (such as getting acceptance from the society) (Comi et al., 2019; Terjesen et al., 2015). The requirement for gender diversification of the board of directors is classified into two—the hard law and the soft law. Hard law is the requirement in which sanctions are enforced on the non-compliant, while soft law is the gender diversification requirement of the board of directors with no sanctions for non-compliance (Terjesen et al., 2015).

Table B.4 presents the summary of soft and hard laws for the gender diversification requirement of the board of directors. Twenty-six countries are working on the requirement by applying either soft law or hard law. Most of them are members of the EU, including Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Poland, Sweden, Spain, Netherlands, and the United Kingdom. The other developed countries are Australia, Norway, Iceland, Israel, and the United States of America. The developing countries include India, Kenya, Malawi, Malaysia, Nigeria, and South Africa. The three countries from Asia are India, Israel, and Malaysia.

Few studies investigate whether firm performance improves or declines due to the new board structure mandated by soft or hard law. However, there is no consensus on the potential benefits of such actions from a theoretical and empirical point of view. First, gender-balanced boards can improve the work environment, productivity, and financial performance due to the more diverse and cohesive thinking. Therefore, the gender quota requirement of the board of directors may improve economic growth (European Commision, 2012). Furthermore, the gender diversification required by the law itself would improve firm performance (Page, 2008). This argument can be supported by the Dependency theory. According to Pfeffer

and Salancik (1978), the board of directors plays an important role in linking the firm to other external firms for addressing environmental dependence. The firm can reduce dependence and gain beneficial resources by selecting directors with the necessary ability, influences, or networking to external sources of dependence (Hillman et al., 2007). According to the extension of the resource dependence theory, gender diversity in the board of directors will provide a variety of valuable resources (different customers, current and potential employees, important supplies, and investors) to the firm since different categories of directors provide different resources to the firm. As a result, the gender diversity in the board of directors can improve firm performance. Moreover, the law of gender diversification of the board of directors may allow highly qualified women to join the board of directors by overcoming the barriers that prevent them and may improve the value of the firm consequently (Conde-Ruiz et al., 2015; European Commision, 2012).

Second, firms select a board of directors to maximize their firm performance. If there is a lack of qualified female candidates, the law may force the firm to accept less qualified female board members. Thus, leading to a decline in firm performance (Comi et al., 2019; Ferrari et al., 2018). The Human Capital Theory can support this argument. Terjesen et al. (2009) used the Human Capital Theory (which was developed by Becker (1993)) to examine the relationship between gender diversification of the board of directors and firm performance. The theory addresses the role of a personal stock of capital (experience, skill, and education) to influence firm performance. The law of gender diversification of the board of directors can alter the stock of human capital at the level of the board of directors. The law leads to a less experienced board of directors as a younger female becomes a board member (Ahern and Dittmar, 2012; Comi et al., 2019; and Ferrari et al., 2018). If the law influences the human capital of the board of directors, it is reasonable to hypothesize that the gender diversification of the board of directors can affect firm performance. Thus, the Human Capital Theory predicts that the performance of the board will be affected by the gender diversity of the board of directors.

Another suggestion by Ahern and Dittmar (2012) is that the retained male directors may have different preferences than the new female board directors, as a result of which the retained male directors may behave differently after the appointment of new female directors. This may have a negative effect on the operation of the board and firm performance, even in the long run. According to Comi et al. (2019), the retained male directors may not welcome the new female directors if they believe that they achieved the position only because of the law and not their quality. This may cause a conflict within the board, leading to a decline in firm performance. Some studies try to understand the reason for the limited participation of women in top management positions by focusing on highly educated women. They find that differences of involvement in certain types of training, career interruption, working hours, and working along with family responsibilities are among the primary reasons less participation of women in such roles than their male counterparts (Betrand et al., 2009; Herr and Wolfram, 2009). These new female directors may negatively affect

firm performance due to these constraints. Third, if boards less effective in playing their role, the gender diversification of the board of directors forced by the law will not affect firm performance (Helland and Sykuta, 2004). Moreover, if there are no differences between competent and qualified female and male directors, the gender diversity of the board does not influence firm performance.

The empirical evidence from previous studies also shows inconsistent findings. Some of these studies have found negative, positive, or no relationship between the gender diversification of the board of directors and firm performance. Whereas, other studies recorded that gender diversity in the board has either positive (Carter et al., 2003) or a null relation (Carter et al., 2010; Francoeur et al., 2008; Marinova et al., 2016) with firm performance. The majority of previous studies only use cross-sectional data and are unable to address the cause and effect problems. Recently, few studies have been able to address the cause and effect problem by taking advantage of the law of gender diversification of the board of directors. Among those, the study conducted in Norway, which found that the gender diversification requirement leads to a less qualified (younger and less experienced) female to be a director, consequently causing a decline in firm performance. Besides, the adverse impact of the gender diversification of the board of directors is higher for firms with no female directors compared to firms with at least one female director before the enforcement of the requirement (Ahern and Dittmar, 2012). In contrast, the study carried out in Italy found no evidence for the negative effect of the gender diversification on firm performance. They even recorded a positive effect on financial indicators (Ferrari et al., 2018). Moreover, the other study undertaken in the case of the European countries observed heterogeneous results across the countries in Europe. The effect of gender diversification of the board of directors on firm performance is negative in the case of France, null in Spain, and positive in Italy (Comi et al., 2019).

The studies on Norway, Italy, and Europe generally explored the effect of board gender diversification on firm performance by considering the endogenous nature of the gender diversification of the board of directors. However, inconsistent results were observed as some were negative, while others were positive or null effects. Therefore, it is necessary to broaden the assessment of the effects of gender diversity beyond the developed countries. This is reasonable as, besides the issue of gender equality, the cultural and institutional structure of developed countries is completely different from developing countries. Developing countries perform relatively less in terms of gender equality. Thus, it is interesting to observe the effect of gender diversification of the board of directors on firm performance in Malaysia, a country with much worse employment and equal opportunities for women, and characterized by a difference in gender culture and attitudes towards the role of women and men roles in society and labor market. As a result, this chapter investigates the effect of gender diversification of the board of directors on firm performance in Malaysia.

2.2.2. Institutional Setting

Malaysia introduced the concept of the gender diversification requirement of the board of directors in 2004 by setting a goal of at least 30% of women in decision-making in the public sector. However, the rule could not bring women to the level of board of directors, it was successful in bringing women into decision-making positions. It was rolled out to the private sector in 2011 due to the promising results. The study undertaken to assess the effectiveness of the gender diversification requirement at a decision making level in 2004 on the share of female directors confirmed that the requirement had no statistically significant influence (Ahmad-Zaluki, 2012). Securities Commission Malaysia explained that "Gender is not only the aspect of board diversity but has received global attention as an important component of inclusive growth." The commission further indicated the availability of sufficient women with adequate qualifications and experience for positions in the board of directors. Further, Abdullah et al. (2016) discussed that girls constitute the majority of university students in Malaysia. As depicted in Graph B.2 in the appendix, the female students are more likely to enroll based on the World Bank data on tertiary school enrollment in Malaysia.

Starting in July 2011, Malaysia introduced the gender diversification requirement for the board of directors to achieve 30% of women's participation by 2016 (MCCG, 2011). Further, in 2012, a comprehensive requirement was issued for firms to develop a policy on gender diversification and to reveal it on their annual report with their efforts to achieve the goal (MCCG, 2012). The Security Commission Malaysia explained that Malaysia Code Corporate Governance (MCCG) 2012 is a key deliverable of the MCCG 2011 Blueprint. The requirement applied to all publicly listed firms, including those on Bursa Malaysia Stock Exchange. The Bursa Malaysia requires listed firms to make a statement in their annual report about the policy and measures taken to achieve the gender diversification and other requirements for the board of directors. Nevertheless, the requirement is a soft law, which ensures that sanctions are not implemented to enforce it. They issued the requirement to allow qualified women to become members of the board of directors. Malaysian firms did not push back/oppose the requirement publicly.

At the time of the introduction of the gender diversification of the board of directors, the share of female directors was 8.2%. The requirement has attracted the attention of many researchers (Abdullah, 2014; Lee et al., 2015; Low et al., 2015; Terjesen et al., 2015; Terjesen and Sealy, 2016). The study conducted in Malaysia, Singapore, and South Korea concluded that the gender diversification requirement was the reason for Malaysia having a higher share of female directors compared to the other two countries (Low et al., 2015). In 2017, they found that their target could not be achieved due to several constraints such as cultural, religion, multiple responsibilities of women, and lack of qualified women. Therefore, the country reset the requirement in 2017 by limiting it to very large firms, i.e., companies on the FTSE Bursa Malaysia Top 100 index, or companies with a market capitalization of 2 billion Malaysian

Ringgit (RM) or above (MCCG, 2017).

While Malaysia has been working on gender disparity for a long time, the progress has not been satisfactory. Cultural and religious views are among factors that have jeopardized the gender equality in Malaysia in terms of the participation of women in the labor force, particularly in top management (Abdullah et al., 2016; Ahmad-Zaluki, 2012; Ismail and Ibrahim, 2008). Retention of women in the labor force after the marriage has been one of the long-standing issues, befitting to their household responsibilities (Ahmad and Ahmad, 1998). Ismail and Ibrahim (2008) identified family structure, commitment, and difficulty to gain credibility and respect as the main factors that imperil the career progress of women to higher positions in multinational companies in Malaysia (Ismail and Ibrahim, 2008). The definition and the perspective of the role of women in Muslim society differ from western society (Syed and Van Buren, 2014). Western society believes in equal opportunities for women without gender-based discrimination and segregation in employment, whereas the Islamic explanation of gender equality is based on gender difference and not equality. Hussain (1987) explains the role of men and women in Islam; men are responsible for supporting their family, while the key role of women is to take care of children as a mother. Women have an option to participate in economic activities with an emphasis on their primary responsibility of taking care of children, while participation of men in economic activities is their religious responsibility (Syed and Van Buren, 2014). Abdullah (2014) concluded that "Islam is explicit in discouraging the appointment of women at leading managerial positions."

Unlike most of the countries that have implemented the gender diversification requirement of the board of directors, Malaysia is a Muslim-dominated developing country with a high gender gap and has soft law. In 2018, the World Economic Forum calculated the gender gap index for 149 countries to measure gender-based gaps in access to resources and opportunities (health, education, economic participation, and political empowerment), and Malaysia was ranked 101^{st}. They calculated the index for each indicator and averaged the scores of each sub-index to obtain the Global Gender Gap Index. The final value ranges between 1 (gender equality) and 0 (gender inequality). Based on a comparison of 26 countries that implemented the gender diversification requirement of the board of directors, Malaysia is ranked 23^{rd}, preceding India, Malawi, and Nigeria, in terms of women's economic participation and opportunity, and overall gender gap. India set a gender diversification requirement for at least one female board member, while Nigeria and Malawi set the requirement without a quota (they request females to participate at the board level without specifying a particular number for the share of females) Malaysia set a goal to achieve a minimum 30% of females in the board of directors by 2016. Malaysia's ambitious requirement, coupled with its features expressed as a Muslim dominated developing country having a high gender gap, are the motivational factors for studying the effectiveness of the gender diversification requirement of the board on the share of females in the board of directors, and its effect on firm performance. Contrary to the majority of previous studies, this study focuses on multiple dimen-

sions of firm performance (using the number of employees, revenue, ROE, Tobin' Q, and profit margin as firm performance metrics). Besides, it considers the influence of other factors such as age, education, and experience of the board members and investigates the existence of a heterogeneous effect of gender diversification of the board of directors by firm size, sectors, and firm competition status. Furthermore, it explores the impact of the board of directors' gender diversification on the share of board members having family relations.

2.3. Description of Data

This study is based on two sources of data, namely the Bursa Malaysia Stock Exchange, and the Orbis (Bureau van Dijk) database. Orbis is a powerful data source comparable to the best databases and contains comprehensive information for millions of listed and unlisted companies around the world. It collects data from more than 160 providers (acquire media, Asap inform, Bisnode, bizportal, Cerved Cibi, DataPro, ellisphere, EQULFAX, FACTSET, Fitch Solution, Global Data, IBFD, ICAP, Info Credit, NICE information service, private equity information, Global financial intelligence, ZANDERS, etc.) and other sources (annual reports, company websites, newswires, etc.). Orbis provides information such as detailed contact information for companies, industry distributions, current and historical financial information, ratios, credit rating, type of ownership, details of the Board of Directors, etc. This study focuses on firms listed on the Bursa Malaysia Stock Exchange and Orbis database. A total of 913 firms are available in both the Orbis database and the Bursa Malaysia Stock Exchange for the period from 2007 to 2016. A balanced panel data from a final sample of 429 firms are used, with a sample of 3150 person-year observations (2828 male and 322 female board members). The final sample is determined by excluding financial institutions, insurance companies, agriculture, non-profit public organizations (total of 93 firms). Besides, it excludes firms with missing information on firm performance metrics (369 firms), along with those not having identical name in the Bursa Malaysia and Orbis (Bureau van Dijk) database (10 firms), and those without complete information about the background of the board member on their annual report (12 firms). Agricultural companies, non-profit public organizations, insurance companies, and financial institutions are excluded from the sample because their objective and performance metrics are different from other firms. Contrary to non-profit public organizations, the objective of business firms is profit maximization. Further, some sectors such as banking are subject to government regulations.

I used the annual reports published on the Bursa Malaysia Stock Exchange to manually collect additional information such as gender, education, age, number of years as a board member, and family relationships with other directors or shareholders. A photograph found in the bio section of the annual report was used to identify gender. However, in case of unavailability of a photograph, the information containing

identifying pronouns such as she/her, or he/his, was used. When gender information was not found in one annual report, I backfilled it from later reports. The majority of previous studies (cases of Norway, Italy, and Europe) use the person's first name to identify the gender of board members. However, as a non-Malaysian and not being familiar with the naming system of the country, I cannot use first names. I have aggregated the data about the board of directors at the firm level to calculate the number of directors, the percentage of female directors, the average age of directors, and the average experience as a board member. Educational qualifications were classified into four categories - no bachelor's degree, bachelor's degree, more than one degree or master's degree, and doctoral degree. Monetary variables are also deflated using Malaysia's GDP deflator obtained from the World Bank (WB), using 2011 as a base year.

Total assets, total revenue, profit margin, Return on Equity (ROE), and Tobin's Q are used to measure firm performance. Tobin's Q is the ratio of the firm's market value divided by the replacement value of the firm's assets. ROE is the ratio of profit-before-tax to shareholders' funds multiplied by 100. The profit margin is the ratio of profit-before-tax to operating revenue multiplied by 100.

2.4. Results

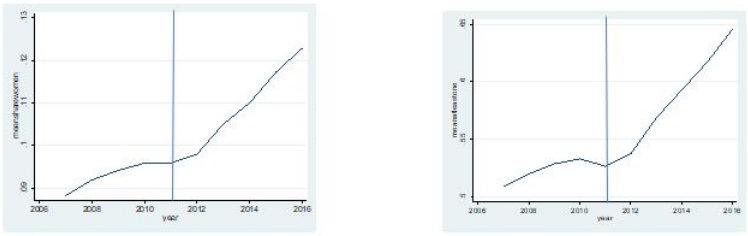
This section begins with a descriptive analysis of the influence of the 2011 Malaysian board of directors' quota requirement on the share of females in the board of directors, the board size, the characteristics of the board members, and firm performance. It proceeds with an econometric analysis in which the percentage of female directors is regressed on a dummy for treatment before and after 2011 and the firm's fixed effect. Further, the logarithm of total real assets and total real revenue, ROE, profit margin, and Tobin's Q are regressed on the percentage of female directors, firm and year fixed effects, age, education, and year of experience as a board member. Besides, IV estimation is used to address endogeneity issues, and the effect of the 2011 board of directors' gender diversification requirement on board size, family relationships of directors, and characteristics of the board members.

2.4.1. Descriptive Results

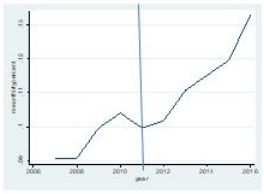
Figure 2.1 shows the sharp increase in female participation following the implementation of the gender diversification in Malaysian board of directors in 2011 across all participation metrics used (share of females at the board of directors level, a dummy variable for the presence of at least one female board member, the percentage of firms that achieved the goal of 30% of female directors). The share of female board members was increasing at a slow rate during the period under consideration (2007–2011) and was below 10% until 2011. It has increased rapidly since

2011, reaching 12% by 2016. Firms with at least one female director were less than 54% until 2011 and grew rapidly to reach 65% by 2016. Although no firm publicly protested the implementation of the requirement, 35% of firms ignored it. Firms with at least 30% of the female directors were less than 5% until 2011. It has increased rapidly since 2011, reaching more than 13% by 2016. However, more than 85% of the firms did not achieve the target.

Figure 2.1.: Female participation in board of directors



A) Share of women board directors B) Share of firms with at least one female board director



C) Share of firms with at least 30% female board directors

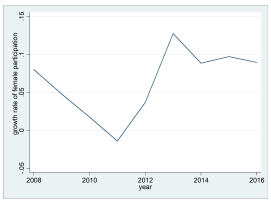
Further, I checked the growth rate of female participation over the years in the board of directors by computing the growth rate G as defined in equation 2.1. The equation 2.2 is used as an alternative growth measurement, where X_t is the number of female board directors at year t, and X_{t-1} is for the year before that. Figure 2.2 shows that the growth rate of female participation in the board of directors was declining until 2011 and started increasing after that. The figure clearly shows that the requirement of gender diversification of the board of directors has a positive influence on the participation of females in the board of directors.

$$G = \frac{X_t - X_{t-1}}{(X_t + X_{t-1})/2} \tag{2.1}$$

or

$$G = \frac{X_t - X_{t-1}}{X_t} \tag{2.2}$$

Figure 2.2.: Growth rate of female participation in board of directors' position



(a) Growth rate of female participation in board of director' position based equation 2.1

(b) Growth rate of female participation in board of directors' position based on equation 2.2

One might assume that the response to the gender quota requirement for the board of directors may vary based on sector. Complex sectors such as construction machinery and equipment may not respond to the requirement as a qualified female for the board of directors may not be identified. Besides, Abdullah (2014) found that the retail sector is more likely to appoint women board members because they can add value through understanding the customers better. However, as shown in figure 2.3, there is no significant difference between various sectors in responding to the gender diversification requirement. Therefore, it is fair to conclude that sector may not be a factor in this regard.

Figure 2.3.: Share of female board directors by sector

As stated in the above discussion, it is proven through evidence that the gender diversification requirement of the board of directors affects the share of females in the board of directors. Besides, it is important to see whether the firm performance is affected by an increase in the number of female directors as well as the difference in the background of the directors.

Table 2.1.: Firm characteristics summary statistics by year

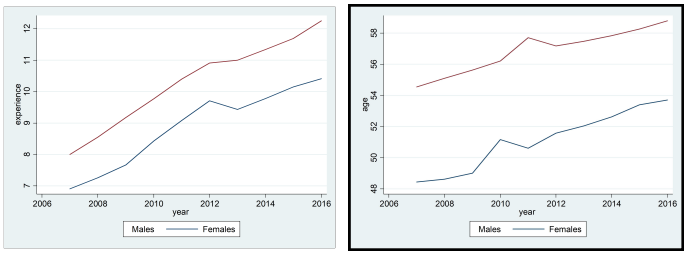
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Firm characteristics										
Board size	7.41	7.45	7.46	7.41	7.35	7.32	7.33	7.25	7.21	7.23
	(2.02)	(1.95)	(1.96)	(1.97)	(1.89)	(1.89)	(1.89)	(1.88)	(1.8)	(1.84)
Profit margin	8.92	6.03	6.24	6.24	8.26	8.48	8.19	8.07	7.6	11
	(15.81)	(16.11)	(15.93)	(15.11)	(14.8)	(17.8)	(15.84)	(16.7)	(16)	(17.8)
ROE	10.63	7.3	7.15	7.69	8.38	8.63	7.94	6.71	7.25	31.02
	(20.42)	(23.63)	(18.22)	(21.47)	(19.08)	(33.74)	(21.17)	(25.51)	(20.33)	(550)
Tobin	.78	.49	.56	.63	.62	.63	.75	.81	.82	.8
	(1.02)	(.69)	(.67)	(.75)	(.81)	(.1)	(1.1)	(1.18)	(1.19)	(1.18)
Log (asset)	7.86	7.9	7.93	7.98	8.03	8.08	8.15	8.22	8.29	8.27
	(1.39)	(1.42)	(1.44)	(1.45)	(1.47)	(1.48)	(1.48)	(1.49)	(1.49)	(1.57)
Log (revenue)	7.47	7.52	7.44	7.54	7.6	7.63	7.69	7.73	7.72	7.75
	(1.38)	(1.4)	(1.43)	(1.44)	(1.47)	(1.52)	(1.5)	(1.51)	(1.51)	(1.51)
Family relation	24.95	24.92	25.41	25.53	25.59	25.27	24.78	24.46	24.88	24.75
	(22.55)	(22.71)	(22.55)	(22.79)	(22.86)	(22.81)	(22.29)	(22.47)	(22.65)	(22.94)
Observation	429	429	429	429	429	429	429	429	429	429

Note: Firm characteristics on Malaysia firms, these firms are listed on Bursa Malaysia market exchange and Orbis database, the standard deviation of a variable appear in square brackets

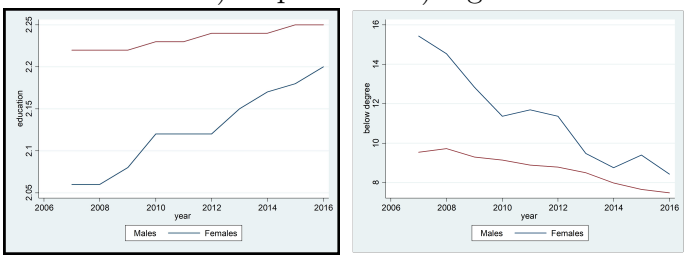
As depicted in the Table 2.1, the size of the board remained the same at around seven during the period under review, while the share of the female directors increased gradually, showing that male directors were being replaced by females. The majority of the measurements do not display consistency over time with respect to firm performance. The firm efficiency metrics such as Profit margin, ROE, and Tobin's Q had declined in 2008, showing improvement later on. This decline could be attributed to the global crisis. The profit margin and ROE again reported a decline in 2013, but reached a maximum in 2016 when several female members joined the board of directors. The total assets and total revenue showed relative growth over

the period. The inconsistency in performance measurements regardless of the composition of board members over the time shows that the share of the female board members may not have any association with most of the firm performance metrics.

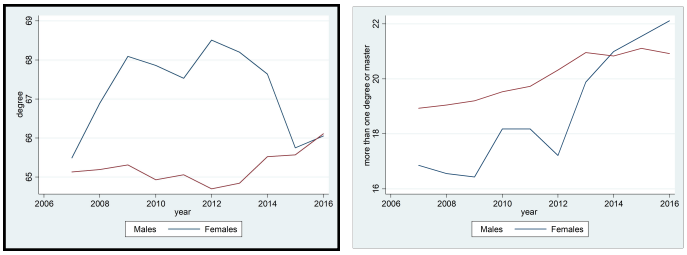
Figure 2.4.: Board characteristics by gender for the periods 2007-2016



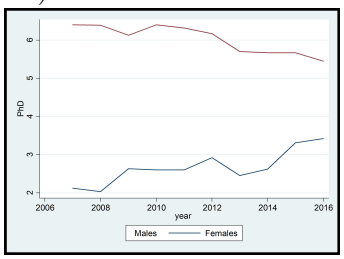
A) Experience B) Age



C) Education D)with out first Degree



E) With first degree F) With more than one dergree or Master's



G) Percentage of female and male board directors with Doctorate Degree

Further, it is important to examine the changes in the primary characteristics of the board members during the period considered for the study (see Figure 2.4). The figure shows that experience as a board member, education, and the age of board members has increased over time. The number of directors without a first degree decreased, while the number of members with more than one degree or master's increased, and the number of doctorate holders remained the same. The majority

of the board members have at least a first degree with a specialization in the fields that are important for managerial functions such as accounting, economics, management, and law. Female directors are less experienced, younger, and less educated. The proportion of female members holding a first degree and less, as well as the proportion of males holding a doctorate, is relatively higher. The education gap between male and female directors has on the decline through time. Accordingly, after 2014, the percentage of female master's degree holders exceeded that of males. However, the number of female doctorate holders has been increasing while that of males has been decreasing. While the gap in educational qualifications has been declining over time, the overall descriptive result shows that female board members are less qualified.

I used an approach similar to certain previous studies to have more insight into the changes in the characteristics of the board members after the gender diversification requirement in 2011 (Ahern and Dittmar, 2012; Comi et al., 2019). Table 2.2 presents the summary statistics of the characteristics of the board members by classifying it into three categories. In this section, I examine the changes in the characteristics of female directors as the firm performance may depend on the changes in qualifications. This paper reports separate descriptive results for pre-implementation periods (2007–2008 and 2009–2011) and post-implementation period (2012–2015) to observe the trend before the introduction of the gender diversification requirement of the board and distinguishing the changes in board composition due to the implementation of the requirement.

As depicted in Table 2.2, the qualifications of women showed an absolute improvement following the implementation of the gender quota requirement. This finding is consistent with the study conducted in Norway (Bertrand et al., 2018). There is no statistically significant difference between the two periods before the implementation of the gender quota requirements of the board in terms of the characteristics of female members such as age, experience, and education, while all characteristics changed significantly after implementation of the quota requirement in 2011. Specifically, the female directors were found to be more educated, older in age (more matured), and more experienced as a director on an average. During 2012–2015, on average, female directors had one year more experience as a director, with a statistically significant difference from zero compared to the pre-implementation periods. Besides, they are more likely to have a first degree, more than one degree or master's degree. In a nutshell, the qualifications of female directors have increased on average after the reform. Whereas, among male board members, the result consistently indicates a statistically significant difference in experience between the two pre-implementation periods and between pre and post-implementation periods. Furthermore, there is no statistically significant change in the educational qualifications of male directors between the two pre-implementation periods as well as between pre and post-implementation (except for the share of male directors without a decrease in educational qualifications after the reform). These facts are evidence that there is no relationship between the characteristics of male directors and the gender

diversification requirement of the board of directors. Therefore, the changes are of a natural trend. Generally, the descriptive result shows that the quota requirement of the board of directors could positively change the qualifications of female directors without affecting those of male members.

In summary, the descriptive result shows that, following the implementation of the reform, the share of female directors increased over the period, the majority of the firm performance metrics do not show a consistent trend, and the qualifications of female directors increased without affecting those of male directors. However, female board directors are less qualified on average. Besides, the female directors replaced the more experienced and older male directors, resulting in the reduction of the average age and experience of the board members. Since the gender-based gap in education rapidly declined after the reform, its influence on education may not be statistically significant. While the share of female directors increased, the inconsistent trend in firm performance may be evidence that the change in the share of female directors may not have any influence on it.

Table 2.2.: Board members characteristics by gender

Variable	Gender	2007-2008	2009-2011	2012-2015	difference	
Board members characteristics trend						
		(1)	(2)	(3)	2-1	3-2
Age	Male	54.82	56.51	57.69	1.69*	1.17
	Female	48.53	50.08	52.4	1.55	2.15**
No bachelor's Degree	Male	.082	.077	.069	.005	.008*
	Female	.015	.012	.011	.003	.001
Bachelor Degree	Male	.592	.599	.589	.007	.004
	Female	.059	.064	.07	.005	.006*
Master or more than one Degree	Male	.177	.18	.187	.003	.007
	Female	.016	.018	.022	.002	.004**
PhD.	Male	.054	.054	.052	.0001	.002
	Female	.002	.003	.003	.001	.00
Experience	Male	8.27	9.79	11.23	1.5**	1.45**
	Female	7.08	8.05	9.77	.96	1.37**

Notes, firm and board director characteristics for Malaysian firms available in Orbis data base and Bursa Malaysia market exchange, * significant at 10%, ** 5 percent, and *** 1 percent. Data classified in to three period two before 2011 board director gender diversity requirement and one after.

2.4.2. Econometric Results

In the beginning, I analyzed the influence of the gender diversification requirement of the Malaysian board of directors on the share of females in the board of directors. Some researchers argue that soft law is not effective (Labelle et al., 2015). One of the cases referred to this regard is the Norwegian soft law in 2003, which had only a minor effect on female participation in the board of directors, and led to the introduction

of serious sanctions (hard law) for non-compliance in 2008. Further, the gender diversification requirement of the board of directors is established and thrives mostly in developed countries. Such laws are difficult to implement in Muslim-dominated countries due to cultural and religious influences (Syed and Van Buren, 2014). Since Malaysia's target of 30% of women in the board of directors by 2016 failed, the requirement was limited only to very large firms. Therefore, as a researcher, I am interested in finding out whether soft law in a Muslim-dominated and developing country of Malaysia has any influence on the participation of women in the board of directors while it failed to achieve the 30% target. The descriptive statistics revealed progress in the share of female directors following the implementation of the quota requirement in 2011.

2.4.2.1. Methodology

To investigate the influence of the 2011 requirement, I follow an approach slightly similar to the study conducted in Europe (Comi et al., 2019). They used additional year and country dummy to control shocks that are common to all countries and time-invariant differences across countries. As this study focuses on Malaysia, the year and country dummies are not required. I use the following regression equation to estimate the influence of the quota requirement:

$$Y_{it} = \Theta_i + \beta_1 D_1 + \varepsilon_{it} \tag{2.3}$$

where Y_{it} is alternatively the percentage of female board directors in year t, dummy for whether a firm has at least one female board director or not, a dummy for more than or equal to 30% share of female board directors or not. D_1 is a dummy before or after 2011. Θ_i is the firm's fixed effect, and ε_{it} is the error term. The standard error is clustered at the firm level. Pooled OLS estimation is also used as an alternative technique.

The estimation technique used (Equation 2.3) cannot identify the soft law effect and the time trend effect distinctly. A difference-in-difference strategy is the best way to tackle this problem by considering unlisted firms, or firms from other countries not subject to the gender quota law, as a control group. However, there is no annual information on the share of female directors of unlisted firms or firms from other countries. In the absence of a control group, a graphical analysis may be used to resolve the setback. Accordingly, the effect of the gender quota law can be identified if the share of female directors shows unusual improvement following the implementation of the law, otherwise, it remains the time trend effect. The abovementioned estimation technique assisted by a graphical analysis is sufficient to achieve the objective of this study based on the following reasons. First, the

graph shows that at the time of the intervention, the participation of women on the board of directors has some shape change (see Figure 2.1). Second, the graph showing the growth rate of women's participation in the board of directors has a discontinuity at the stage of intervention (see Figure 2.2). Third, the result of the fixed effect estimate reports that female participation in the board of directors improved rapidly after the intervention, as shown in Figure B.1 under the appendix.

Further, it is important to see whether the participation rate of women in the board of directors improves due to changes in the qualifications of women. Educational qualification is a major requirement to qualify for a position on the board of directors. For instance, considering education as a requirement for a position in the board of directors, the EU regarded the availability of adequate educated women as one of the factors to establish the gender diversification requirement of the board members.

This study uses the data of the World Bank development index of female and male university enrollment rates for Malaysia since 1998, to further examine whether an unusual change in the educational progress of women could improve their participation in the board of directors, (see Figure B.2). The change in women's qualifications over time would reflect in the change in the participation rate of women in senior and middle-level management and parliament. The participation rate of women in such positions over the given period is tested using the United Nations Development Program (UNDP) Human Development Reports for Malaysia (Figure B.3).

2.4.2.2. Result

The estimate of B.1 reported in Table 2.3 suggests that the gender diversification requirement of the board of directors leads to a statistically significant increase in female participation in all metrics used (at least one female director, percentage of female directors, and at least thirty percent of female directors). The result obtained from Pooled OLS estimation is the same as from the result of the fixed effect estimation. The percentage of female directors, the percentage of firms with at least thirty percent of female directors, and the percentage of firms with at least one female director have increased by 1.72%, 2%, and 7%, respectively.

The 2011 gender diversification of the board of directors is effective even with the progressive introduction of numerous measures that promote female participation in decision-making positions. In 2004, Malaysia set a target for women to encumber at least 30% of the decision-making positions in the public sector. The target was achieved at the decision-making level in 2011, but not at the level of the board of directors. Improving the participation rate of women in higher positions indicates that companies implementing the requirement have recruited qualified women from the market, which may cause a shortage for the 2011 requirement. The absence of dynamic improvements in the constraints that hinder the participation of women (such as cultural and religious views), the lack of changes in qualifications of women during the period under consideration, and the fact that qualified women were al-

ready assigned managerial positions following the 2004 gender quota requirement, could be considered as the factors that hamper implementation of the 2011 gender diversification requirement.

The requirement for gender diversification of the board of directors may contribute to a statically significant positive change in the share of female directors in Malaysian firms. However, 35% of firms do not have at least one female director, and only about 14% of the firms have at least 30% female directors. The requirement cannot achieve its target for the majority of the firms. Several researchers have discussed that some of the primary obstacles for the gender diversification requirement to achieve its target are cultural and religious influences (for instance, being a mother is considered as a major role of females) (Abdullah et al., 2016; Ahmad-Zaluki, 2012; Ismail and Ibrahim, 2008). Another study revealed that family responsibilities were a significant barrier to women's career advancement, and some female directors reported that they received less respect from supervisors and managers (Ismail and Ibrahim, 2008).

Table 2.3.: Regression estimates of the influence of board of directors' gender diversification requirement on female participation

	At least one	Percent of female director	Thirty percent female director
Fixed effect regressions			
Treated	.07***	1.72***	.02**
	(.02)	(.37)	(.01)
Firm fixed effect	Yes	Yes	Yes
Observation	4290	4290	4290
Number of firms	429	429	429

Notes: Data is yearly observation for the year 2007-2016 *** significant at 1%, ** significant at 5%, and * significant at 10%; the standard error clustered at the firm level

Malaysia has been implementing measures since 2004 to increase the participation of women in the labor force, particularly at a decision-making level. The efforts are not effective due to cultural and religious factors. It is ranked 101^{st} out of 149 countries in gender equality, and 79^{th} out of 108 countries in female participation at a decision-making level. Concerning educational qualifications, women are more educated in Malaysia. For instance, in 2016, the share of females with at least the first degree was 12.3%, while that of males was 10.3%. The university enrollment rate of females is greater than males, as indicated in Figure B.2 in the appendix. Therefore, the educational qualification in Malaysia is not a factor that hinders the participation of women on the board of directors.

2.4.2.3. Robustness Analysis

One of the limitations of using a fixed effect estimation method to determine the effect of soft law on the share of women in the board of directors is that the soft law effect and the time trend effect cannot be identified separately. The time trend of female participation in the board of directors can be observed in this study if it indicates significant improvement after the introduction of the requirement. The result of the fixed effect estimate reported in Figure B.1 in the appendix shows the trend of female participation at the level of the board of directors, confirming that it has improved rapidly after 2011. Even if the estimated result cannot separate the effect of the law from the time trend, it clearly shows that there is a special improvement in the participation of females in the board of directors after the requirement has been introduced. Therefore, this graphical analysis limits the concern that the presence of an omitted time-trend substantially drives this study result.

It may be rational to assume that the participation rate of women in the board of directors might have improved due to changes in the qualifications of women. To address this issue, I first checked the progress of the educational qualifications of women over time. In Malaysia, women were more educated even before the implementation of the gender diversification requirement of the board of directors. Furthermore, as indicated in Figure B.2 in the Appendix, as per the WBI, the rate of female enrollment in the universities in Malaysia has been higher than males since 1998. Besides, I examined the trends of female participation in senior and middle-level management, and the parliament based on human development reports for Malaysia by United Nations Development Program (UNDP). The period from 2010 to 2016 is represented in Figure B.3 in the appendix. The data before 2010 is not available. Contrary to the participation of females in the board of directors, the share of females in senior and middle-level management and parliament positions declined in 2011 but remained constant after that. However, it started declining in parliament from 2014, while the same was observed in senior and middle-level management from 2015. It can be reasonably concluded that the improvement in participation of women in the board of directors in Malaysia is due to the implementation of the gender diversification requirement of the board of directors, but not due to the change in qualification.

The other main concern is that the requirement may lead to a decline in the share of female directors of firms having more than 30% female directors before the introduction of the requirement. Since the firms may have anticipated the effect of the gender diversification requirement of the board, it may recruit women on the one hand, and exclude them on the other, to maintain the status of quota. The requirement may lead to the exclusion of women directors from firms with a share of more than 30% of women before the requirement is introduced. So, I checked whether these firms reduced the share of women directors. There were 5% of firms with more than 30% of female directors before the gender diversity requirement was introduced, and only 1% of firms reduced the share of female directors to 30%.

Therefore, I cannot conclude that the requirement leads to a decline in the share of female directors for the firms having more than 30% share of female directors before the introduction of the requirement.

2.4.2.4. Impact of Board of Directors Gender Diversification on Firm Performance

In this section, I study the effect of the gender diversification of the board of directors on several firm performance metrics such as Total Assets, Revenue, ROE, Profit Margin, and Tobin's Q.

2.4.2.4.1. Methodology

Taking a cue from Ahern and Dittmar (2012), I used a fixed effect and IV estimation technique to identify the causal effect of the gender diversification of the board of directors on firm performance. I estimate the effect of the share of female board members on firm performance metrics using the following equation:

$$Q_{it=\Theta_i+\tau_t+\beta_1 FD_{it}+BD_{it}X+\sum_s tx\delta_s+\varepsilon_{it}} \tag{2.4}$$

where Q_{it} is alternatively the firm performance metrics such as total revenue, total assets, profit margin, ROE, and Tobin's Q. Θ_i is the firm fixed effect, and τ_t is year fixed effect. FD is a percentage of female directors, $BD_{it}X$ is a vector of the observable characteristics of the board of directors aggregated at the firm-year level (age, experience, education), $\sum_s t\ x\ \delta_s$ are industry-specific time trends. In this specification, the firm fixed effect captures time-invariant firm characteristics that may affect both the share of women in the board directors and firm performance. The year fixed effect is used to control aggregate fluctuation in the firm performance metrics. In all fixed effect estimations, the standard error is clustered at the firm level. However, the above estimation technique (equation 2.4) cannot control for all forms of endogeneity, particularly reverse causality. Following certain previous research (Ahern and Dittmar, 2012; Comi et al., 2019; Ferrari et al., 2018), I use an IV estimation technique to solve the issue. The pre-request variation of female board directors across firms is used as an instrument to capture an exogenous proportion of female directors over time in response to the implementation of the gender diversification requirement of the board. I use the percentage of female board members in 2010 (the year before the gender quota was set) interacted with year dummies as an instrumental variable. The logic behind using it as an instrumental variable is that the firms without female directors are more likely to increase the number of female directors than firms with at least 30% female directors, or at least one female board director before the introduction of the requirement. It is important to acknowledge that the pre-requirement share of female directors is not randomly

selected. Therefore, I should be concerned about the correlation between the pre-requirement percentage of female directors in 2010 and the subsequent change in firm performance., I compare the characteristics of the 211 firms having no female director to the 241 firms having at least one female director (see Table 2.4). I found no substantial difference between the two sets of firms in all firm performance metrics. However, firms with a large number of members on the board of directors are more likely to have female members. Concerning the disparity in industrial composition between the two sets of firms, both sets are equally distributed among all sectors and there is no statistically significant difference. The use of firm-fixed effect documents that firms with a large number of members on the board of directors are more likely to have female directors.

Table 2.4.: Firm characteristics by share of female board directors in 2010

	No female director	Female director>0	Difference
Board size	7.04	7.77	-.73***
Profit margin	5.89	8.26	-2.37
ROE	7.24	8.44	-1.19
Tobin'Q	.58	.69	-.11
Log asset	7.96	7.99	-.03
Log revenue	7.54	7.53	.01
Chemical, rubber, plastic, non-metal products	.12	.15	-.03
Construction	.09	.1	-.005
Food, beverage, tobaco	.08	.05	.03
Gas, water, electricity	.005	.009	-.004
Hotel and restaurant	.01	.03	-.02
Machinery, equipment, furniture, recycling	.17	.2	-.02
Metals & metals product	.11	.08	.03
Other service	.15	.18	-.03
Publishing, printing	.03	.02	.01
Textiles, wearing, leather	.03	.02	.01
Transport	.03	.04	-.01
Wholesale & retail trade	.08	.06	.02
Wood, cork, paper	.08	.06	.02
Observation	210	219	

Notes, firm and board director characteristics for listed Malaysia firm avaliable in Orbis data base Bursa Malaysia market exchange, * significant 10 percent, ** 5 percent, and *** 1 percent

For the second stage of the IV estimation, I use the following equation

$$Q_{it} = \alpha + \beta FD_{it} + \theta_i + \tau_t + \epsilon_{it} \tag{2.5}$$

However, the IV technique is not a perfect instrument since it has some limitations. For instance, the timing of compliance may be endogenous because the law applies when the board has officially expired. As a result, the early compliant firms may face different adjustment costs than the late ones. Besides, they may differ along with other unobserved characteristics. However, Comi et al. (2019) argue that this variable can be used as an instrumental variable when no genuinely exogenous instruments for a share of female directors are available. Eckbo et al. (2016) attempted to solve the endogenous nature of the timing of compliance that arises when the firm self-selects the timing of compliance with the quota. They use the gap between the share of women directors and the threshold required by law, rather than the share of female directors to address the issue. Further, the pre-reform distance of women directors from the threshold associated with year dummies is used as an instrumental variable. In the wake of Eckbo et al. (2016), I also check that my findings remain unchanged when I use the distance of the share of women directors from the threshold required by the gender diversity requirement (30%) as a dependent variable, rather than the percentage of women directors.

The other main concern is that using the year 2010 for the pre-requirement percentage of female directors could be misleading in the case that the board of directors expired in that year. Thus, it is necessary to check the expiration date of the board of directors. Some countries have a specific selection period for the board of directors. For instance, in Italy, the directors are elected every three years (Ferrari et al., 2018). However, in Malaysia, there is no specific date for the expiration of the board of directors (specific year or months of implementation by all firms). Some directors are known to serve for less than five years, others above five, or even ten years (the period under consideration).

2.4.2.4.2. Result

Table 2.5 presents the result of a fixed effect estimate of my preferred specification of equation 2.5 for the metrics of firm performances considered, namely the logarithm of total assets, the logarithm of total revenue, profit margin, ROE and Tobin's Q. All columns include a firm-fixed effect, and year fixed effects, while columns 2, 4, 6, 8, and 10 have additional covariance such as industry-specific time trends (the industry classification is based on 2-digits level of the NACE classification), firm-level controls (age, experience as a board director, and level of education of directors) to each firm performance metric. Table 2.5a presents the result of fixed effect estimation of the impact of participation of females in the board on firm size. Contrarily, the study in Norway concludes that the percentage of female directors has a negative effect on firm size. The coefficients of the percentage of female directors with time and firm-fixed effect on column 1 after considering other variables such as industry time trend and firm-level controls (education, age, and experience) column (2) are negative and statistically significant. The result shows that a 1% increase in female directors corresponds to a 0.3% decline in total assets. Similarly, a 1% increase in female directors leads to a 0.5% decline in total revenue. However, the change in the percentage of female directors has no effect on all three alternatives firm efficiency

metrics (profit margin, ROE, and Tobin's Q). The gender diversification of the board of directors has a detrimental effect on firm efficiency metrics in the case of Norway but not in Malaysia. The cofactors considered (age, education, experience, and industry-specific time trends) partially explain gender-based firm performance gaps. The gender-based gap in total assets declines from 0.3% to 0.2%, and the total revenue declines from 0.5% to 0.4% after considering the cofactors.

Table 2.5.: Effect of the board of directors' gender diversification on firm performance (fixed effect estimation)

(a)
5A

Variable	Log asset (1)	(2)	Log revenue (3)	(4)
Percent of female	-.003**	-.002*	-.005***	-.004*
	(.002)	(.002)	(.002)	(.002)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Firm-level control	No	Yes	No	Yes
Industry-specific time trend	No	Yes	No	Yes
Observation	4290	4290	4290	4290
Number of firms	429	429	429	429

(b)
Cont'd
B

Variable	Profit Margin (5)	(6)	Tobin's Q (7)	(8)	ROE (9)	10
Percent of female	-.47	-.4	.0002	.001	.14	.08
	(.61)	(.55)	(.003)	(.003)	(.17)	(.16)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level control	No	Yes	No	Yes	No	Yes
Industry-specific time trend	No	Yes	No	Yes	No	Yes
Observation	4290	4290	4290	4290	4290	4290
Number of firms	429	429	429	429	429	429

Notes: The data is yearly observations for 2007-2016, *** significant at 1%, ** significant at 5%, and * significant at 10%; the standard error is clustered at the firm level

Table 2.6.: The first stage regression

First Stage Regression: Dependent variable= percent of female directors	
2012 dummy	.88***
	(.24)
2013 dummy	2.55***
	(.39)
2014 dummy	3.5***
	(.46)
2015 dummy	4.7***
	(.54)
2016 dummy	5.74***
	(.61)
2012 dummy x percent of female director 2010	-.08***
	(.03)
2013 dummy x percent of female director 2010	-.18***
	(.04)
2014 dummy x percent of female director 2010	-.22***
	(.04)
2015 dummy x percent of female director 2010	-.27***
	(.04)
2016 dummy x percent of female director 2010	-.33***
	(.04)
Firm fixed effects	Yes
F-Statistics	9.8
Observation	2578

Notes: The data is yearly observations 2011-2016, year 2011 is omitted, and the standard error is clustered at the firm level. Set of instruments in the first stage is the initial share females on board interacted with year dummies. * significant at 10%, ** 5%, *** 1%

Table 2.7.: The effect of board of directors' gender diversification requirement on firm performance (fixed effect and IV estimation, based on subsample for 2011-2016) A

Variable	Log Asset		Log revenue		Profit margin
	Fixed Effect	IV	Fixed Effect	IV	Fixed Effect
Percent of female	-.003** (.002)	-.01*** (.005)	-.004* (.002)	-.01* (.006)	-.72 (1.02)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Observation	2574	2574	2574	2574	2574
Number of firms	429	429	429	429	429

Table 2.8.: The effect of board of directors' gender diversification requirement on firm performance (fixed effect and IV estimation, based on subsample for 2011-2016) B

Variable	Profit margin	ROE		Tobin's Q	
	IV	Fixed Effect	IV	Fixed Effect	IV
Percent of female	8.39 (11.7)	.26 (.34)	-4.29 (3.53)	.002 (.003)	.01* (.01)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Observation	2574	2574	2574	2574	2574
Number of firms	429	429	429	429	429

Notes: Data is yearly observation for 2011-2016, *** significant at 1%, ** significant at 5%, and * significant at 10%; the standard error clustered at the firm level

The data only covers the period from 2011 to 2016 for IV estimation. Since the variance in female directors across firms in 2010 is used as an instrument to capture the exogenous change of the share of female directors in response to the gender diversification requirement of the board of directors. I perform a fixed effect and IV estimation from 2011 to 2016. The first stage estimation result shows the time-series participation of women on the board of directors. As anticipated, the share

of female directors in 2010 predicts a change of female representation in the board of directors, implying that firms with fewer or no female directors are more likely to increase the number of female directors. The estimation indicates that the biggest change to the percentage of female directors has occurred in the year close to the deadline of the requirement (2015 and 2016) (see Table 2.6).

Table 2.7 and 2.8 show IV estimates, and the result confirmed the majority of the estimates of the fixed effect model. Similar to the fixed effect model estimates, IV estimates demonstrated that the gender diversity of the board has a negative effect on firm size (total assets, and total revenue), and the positive effect on Tobin's Q became statistically significant. After considering the endogeneity issue, the magnitude of the coefficient increases. In the context of Ferrari et al. (2018), I also verified that my findings are unchanged on using the distance of the share of women directors from the threshold required by the gender diversity requirement (30%) as a dependent variable, rather than the percentage of women directors.

Furthermore, it is also important to check the effect of the gender diversification of the board of directors on the characteristics of certain firms and board members. Based on the study conducted in Norway by Ahern and Dittmar (2012), I examined the effect of gender diversification requirement of the board of directors on board characteristics, namely board size, experience, age, education, and share of related directors (see Table 2.9). The key explanation is that the requirement for gender diversification of the board of directors may compel firms to consider less qualified female candidates for the board of directors. Besides, if the firm assumes that the new female directors may negatively affect the firm performance, it may increase the board size to make room for female directors without terminating valued male directors. I have used an IV estimation technique to examine the effect of gender diversification of the board directors on firm characteristics. The result records that the requirement does not affect the size of the board. Moreover, it has no effect on the educational level, implying that equally qualified females are replacing male board members. The average experience and age of the board members have declined significantly due to the implementation of the gender diversification requirement. A 1% rise in the share of female board directors leads to a 7% decline in the experience as a board director. Further, a 1% increase in the share of female directors leads to an 8% decline in average age, implying that the female members are young and less experienced. The gap in education is statistically and economically insignificant. As discussed in the descriptive section, the newly joined female directors are more qualified (age, experience, and Education) than the existing female directors. On average, female members succeeding the males are young and less experienced than male directors. Therefore, the requirement for the gender diversification of the board of directors has a negative effect on age and experience as board members, whereas, it has no effect on the level of education, and the gender-based educational gap has declined over the period particularly after the reform. However, based on the data from the WB, since 1998, the majority of students in Malaysian universities are girls, providing educated women for positions such as members of the board of directors.

The other major concern is the introduction of gender quota requirements relating to the risk of appointing non-competent women through their family relationships with shareholders or other directors. Around 50% of female directors in Malaysia have a family association with at least one shareholder or board member (Abdullah et al., 2016). This is relatively high compared to other countries. For instance, in Norway, only 3.8% of female directors shared a last name with other members in 2009 (Ahern and Dittmar, 2012). I find consistent results with Abdullah et al. (2016) about a positive relationship between gender diversity and the presence of family board directors. I have used the abovementioned IV estimation technique to check the impact of the gender diversification requirement of the board of directors on the share of directors that have family relationships with other directors or shareholders. Table 2.9 shows that the gender quota is not associated with a significant change in the number of directors having a family relationship with the other directors or shareholders.

While it is not the main objective of this study, it is important to observe the relationship between the share of directors having family relationships and firm performance, as no prior research addresses this issue. It is common in Malaysia to appoint a family member as a member of the board of directors to better monitor and control the operation of the company. I used equation 2.4 to examine the relationship between the share of directors that have a family relationship with other directors or shareholders and firm performance by replacing the percentage of female directors with the percentage of directors that have family relationships. It is known that the estimation technique cannot address the issue of endogeneity, particularly reverse causality. Well-performing firms may employ directors that have a family relationship to better monitor the operation of the firm as the directors having a family relationship may monitor and control the firm's operation effectively, which may improve the firm performance. As it is challenging to find a good instrument, and it is not the primary objective of this study, I examine only the relationship between firm performance and the share of board directors having family relationships. The finding shows that the expectations of the owners for a positive relationship between the family relationship of a director and firm performance are irrelevant. I did not find any association between the percentage of directors that have family relationships and the majority of firm performance metrics. However, I found a negative association between the share of board directors that have family relationships and Tobin's Q (see Table 2.10).

Table 2.9.: The effect of board of directors' gender diversification requirement on firm characteristics

	Instrumental variables regressions				
Variable	Board Size (1)	Age (2)	Experience (3)	Education (4)	Family relation (5)
Percent of female	.003	-.08**	-.07***	.0002	0.5
	(.01)	(.04)	(.03)	(.002)	(.11)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	429	429	429	429	429

Notes: Data is yearly observation for 2011-2016, set of instruments in the first stage is the initial share of female board directors interacted with year dummies. * significant at 10 %, ** 5%, *** 1 %

Table 2.10.: The percent of board directors that have family relationship and firm performance

Variable	(1) asset	(2)revenue	(3)	(4)margin	(5) 's Q
percent of board	.001	.001	.01	-1.1	-.04**
directors with family	(.001)	(.001)	(.11)	(1.03)	(.002)
relation					
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Firm-level control	Yes	Yes	Yes	Yes	Yes
Industry-specific	Yes	Yes	Yes	Yes	Yes
time trend					
Observation	4290	4290	4290	4290	4290
Number of firms	429	429	429	429	429

Notes: The data is yearly observations for 2007-2016, *** significant at 1%, ** significant at 5%, and * significant at 10%; the standard error is clustered at the firm level

I further examine the existence of heterogeneous effects of the requirement for gender diversification of the board of directors among different categories of firms. First, I investigate whether a gender diversification requirement has an asymmetric effect among sectors. The new female directors are less experienced, and higher technology-intensive sectors may require more experienced and knowledgeable directors. I examine whether the negative effect of the share of female directors on firm size is higher for these sectors. As per the descriptive result, there is no evidence for sector-based difference in response to the gender diversification requirement of the board of directors. I categorized sectors into four groups. Based on the International Standard Industry Classification (ISI ReV.2), the manufacturing sector is categorized into two - medium and higher technology-intensive manufacturing sector (Chemicals, rubber, plastics, non-metal product, machinery, equipment,

furniture, recycling, metals and metal products); and lower technology-intensive manufacturing sector (Food, beverage, tobacco, textiles, wearing apparel, leather, wood, cork, and paper). The service sector is also classified into two—construction and engineering-related services, and other service sectors (gas, electric, water, hotel, restaurant, publishing, printing, transport, wholesale, retail trade, and other services). As indicated in Table B.1 in the appendix, there is no difference among the four groups of sectors in responding to the gender diversification requirement.

The result in Table 2.11 shows that the requirement for gender diversification of the board of directors has asymmetric effects between sector groups. The result also confirmed the expectation laid out in the above paragraph. The requirement for gender diversification of the board of directors has a negative effect on firm size measurements (total revenue and total assets) in the higher technology-intensive manufacturing sector, while not affecting other sectors (construction, other service sectors, less technology-intensive manufacturing sectors). A 1% increase in the share of female directors due to the gender diversification requirement of the board of directors, leads to around 3.1% decline in total assets in the high technology-intensive manufacturing sector relative to service and less technology-intensive manufacturing sectors. I find no sector-based difference in the effect of the board of directors' gender diversification requirement in the two firm efficiency metrics (profit margin and ROE). Concerning Tobin's Q, the additional female board director has a positive effect on high-technology intensive sectors, while not affecting the service sector.

Table 2.11.: The effect of board of directors' gender diversification requirement on firm performance across sectors

Instrumental variables regressions					
Variable	Log asset (1)	Log revenue (2)	Profit margin (3)	ROE (4)	Tobin's Q (5)
Percent of female director	-.031***	-.026*	26.56	-13.9	.036**
	(.01)	(.01)	(29.94)	(9.1)	(.02)
Percent of female director x Other service	.029**	.02	-27.48	13.36	-.037**
	(.01)	(.01)	(30.1)	(9.1)	(.02)
Percent of female director x Construction	.028**	.032**	-23.19	13.73	-.042**
	(01)	(.01)	(30.18)	(9.42)	(.02)
Percent of female director x less technology-intensive	.027**	.0255*	-23.64	16.92*	-.025
	(.01)	(.02)	(30.08)	(9.17)	(.02)
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Observation	2572	2572	2572	2572	2572

Notes: Data is yearly observations for 2011-2016. set of instruments in the first stage is the 2010 share females on board interacted with year dummies. The higher technology-intensive sector is a reference category, * significant at 10 %, ** 5%, *** 1 %

Second, I examine the potential asymmetric effect among firms in different competition groups. The new female directors are less experienced and working along with family responsibilities may reduce their effectiveness in firms with higher competition compared to firms in less competition. I use the Herfindahl index (HHI) to classify firms in terms of competition, and the overall revenue for 2007 is used to calculate HHI. The firms are classified into three groups based the value of HHI—observation below 1/3, between 1/3 and 2/3, and above 2/3 percentile of HHI—while firms with HHI greater than 1057.059 are considered high concentration, those with HHI between 844.75 and 1057.059 are classified as moderate concentration, and those with HHI less than 844.75 are considered good competition. The formula for calculating HHI is the sum of the square of the market share of each sector participant (measured in terms of total revenue). The result in table 2.12 shows that the gender diversification requirement of the board of directors has an asymmetric effect among a group of firms categorized by competition. It has a negative effect on the size of the firms in the good competition sectors, while not affecting other groups. The result for total revenue is also statistically significant at a 15% P-value. A 1% increase in the share of female directors due to the board of directors' gender diversification requirement leads to around 3.5% decline in total assets of firms in good competition

group compared to firms in moderate competition and high concentration groups. In terms of Tobin's Q, an additional female director has a positive effect on firms in good competition group, while negatively affecting the firms in moderate and high concentration groups. I did not find a competitive difference in the effect of the gender diversification requirement of the board of directors on the other two firm efficiency metrics.

Table 2.12.: The effect of board of directors' gender diversification requirement on firm performance across groups of firms classified by competition

Instrumental variables regressions					
Variable	Log asset (1)	Log revenue (2)	Profit margin (3)	ROE (4)	Tobin's (5)
Percent of female director	-.035**	-.025	25.46	-10.68	.039*
	(.01)	(.02)	(35.28)	(10.68)	(.02)
Percent of female director x high concentration	.029**	.02	-26.99	10.14	-.04**
	(.01)	(.02)	(35.33)	(10.69)	(.02)
Percent of female director x moderate concentration	.034**	.024	-26.26	10.36	-.04**
	(.01)	(.02)	(35.6)	(10.77)	(.02)
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Observation	2572	2572	2572	2572	2572

Notes: Data is yearly observation for 2011-2016. set of instruments in the first stage is the 2010 share females on board interacted with year dummies. Good competition is a reference category, * significant at 10 %, ** 5%, *** 1 %

Based on the above finding, the gender diversification requirement of the board has a negative effect in terms of firm size and positive effect in terms of Tobin's Q on the higher technology-intensive manufacturing sector, and sectors with a good level of competition. I attempted to identify whether the difference in the characteristics of the board members in these groups of firms may lead to a heterogeneous effect of the board of directors' gender diversification requirement on firm performance. First, I observe the difference in characteristics between these groups of firms before the gender diversity requirement and after it. Second, I investigate the heterogeneous effects of the gender diversification requirement of the board of directors on characteristics of the board among various categories of sectors.

As depicted in Tables B.1 and B.2 in the appendix below, characteristics of the board members are similar across different groups of sectors showing a similar trend. Therefore, the heterogeneous effect of gender diversification requirement on firm performance in terms of the sector is not due to the different characteristics of the board members. The IV estimation result also records no evidence for the existence of a

heterogeneous effect of gender diversification requirement of the board of directors on the board characteristics among different groups of sectors. However, in firms with a good competition status, the board of directors' gender diversification requirement leads the less experienced and younger directors to occupy the positions in the board of directors. Therefore, the less experienced and younger female directors might be the reason for the negative effect of the gender diversification of the board of directors on firm size (see Table 2.13).

Table 2.13.: The effect of board of directors' gender diversification requirement on board characteristics across sectors and group of firms based sectors competition status

	Instrumental variables regressions					
Variable	Age	Education	Experience	Age	Education	Experience
	(1)	(2)	(3)	(4)	(5)	(6)
Percent of female director	-.07 (.11)	.003 (.01)	-.11 (.07)	-.22* (.13)	-.003 (.01)	-.15** (.08)
Percent of female director x other service	-.04 (.11)	-.01 (.01)	.07 (.07)			
Percent of female director x construction	.1 (.11)	-.002 (.01)	.06 (.07)			
Percent of female director x less technology intensive	.03 (.11)	-.003 (.01)	.05 (.07)			
Percent of female director x high concentration				.15 (.13)	.005 (.01)	.12 (.08)
percent of female director x moderate concentration				.23* (.13)	.003 (.01)	.13 (.08)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	2572	2572	2572	2572	2572	2572

Further, I examine the potential asymmetric effect among firms in different groups

based on firm size (small and large firms). Following Ferrari et al. (2018), in this study, firms with assets above the median of 2007 were classified as large firms and the ones below it as small firms. As expected, large firms are more likely to respond to the gender diversification requirement than small firms. Large firms had less share of female directors than small firms before the gender diversification requirement, whereas they showed a higher share of female directors after it (see Table B.3 in the Appendix). The gender diversification requirement of the Board of directors has a positive effect on the size for large firms, while not affecting other firm efficiency metrics. This result is consistent with Conyon and He (2017), positing that female directors have a significant positive effect in high-performing firms relative to low-performing firms. They established several justifications for their finding. First, when the firm performs well, there is less pressure to suppress the idea of women directors. As a result, these firms effectively utilize the knowledge, expertise, and unique perspectives of the female directors compared to low-performing firms. Second, the cost of the board of directors' gender diversification (prolonged decision-making time and internal conflicts) is higher in the case of low-performing firms. Third, highly qualified directors match with these firms having the capability to utilize their talents, and less qualified directors are more likely to find jobs in low-performing firms. Fourth, based on job matching and quality sorting approach, female directors in well-performing firms may have better human and social capital, and well-performing firms can utilize their capacity.

Therefore, it is necessary to examine whether there is a difference in the qualification of the board of directors between small and large firms. As depicted in table B.3 in the appendix below, board members in large firms are older, more educated, and more experienced than those in small firms, while the two groups of firms have a parallel time trend. I performed the IV estimation technique to investigate the effect of gender diversification of the board of directors across firm size, and the results are presented in Table 2.15. However, the result does not show a statistically significant difference between the qualification of the board of directors of small and large firms. Thus, the possible explanation for the gender diversification requirement of the board of directors having a positive effect in terms of firm size for large firms than small firms is laid down as follows. Large firms may have less pressure to suppress the idea of female directors along with the better capacity to use their knowledge, experience, and unique perspective than small firms. Besides, the cost of the board of directors' gender diversification is higher for small firms than large firms.

Table 2.14.: The effect of board of directors' gender diversification requirement on firm performance across small and large firms

Instrumental variables regressions					
Variables	Log asset (1)	Log revenue (2)	Profit margin (3)	ROE (4)	Tobin's Q (5)
Percent of female director	-.022***	-.018**	13.82	-6.3	.02*
	(.01)	(.01)	(17.47)	(5.28)	(.01)
Percent of female director x Firms size	.02***	.016**	-11.91	4.36	-.01
	(.01)	(.01)	(13.86)	(4.19)	(.01)
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Observation	2572	2572	2572	2572	2572

Notes: The data is yearly observations for 2011-2016. Set of instruments in the first stage is the 2010 share females on board interacted with year dummies. * significant at 10 %, ** 5%, *** 1 %

Table 2.15.: The effect of board of directors' gender diversification requirement on board characteristics across group of firms by firm size

Instrumental variable regressions			
Variable	Age (1)	Education (2)	Experiance (3)
Percent of female directors	-.07***	-.00001	-.08**
	(.11)	(.003)	(.04)
Percent of female directors x firm size	-.05	.0004	.03
	(.11)	(.003)	(.03)
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes
Observation	2570	2570	2570

Notes: The data is yearly observations for 2011-2016. Set of instruments in the first stage is the 2010 share females on board interacted with year dummies. * significant at 10 %, ** 5%, *** 1 %

In a nutshell, the board of directors' gender diversification requirement has a negative effect on firm size metrics (total assets and revenue), whereas it has no impact on firm efficiency (profit margin, Tobin's Q, and ROE). This might be due to the similarity in the level of education between the newly joining female members and the existing male directors. The negative effect of the participation of female directors on firm size could be due to their higher household responsibilities. Prior research shows that in the wake of their household responsibilities, women are limited to operate (own) smaller firms, to control and/or avoid higher risks and keep their firm manageable (Cliff, 1998; Orser and Hogarth-Scott, 2002). Although Malaysia is a developing country with strong cultural resistance to female progress; and about 50% of female

directors in Malaysia have a family relationship with governance (election based on family relations than qualification); and, its institutional condition is very different from developed countries, the finding of prior research states that negative effect of gender diversification of the board of directors on firm efficiency does not apply.

According to Comi et al. (2019), the institutional design of the law, and gender equality rank of the country before reform are the crucial factors in explaining the potential effect of the gender diversification of the board of directors on firm performance. Soft law does not force the firm greatly for implementing the gender diversification requirement. Therefore, they may take time to select the directors of good quality and do so with their willingness and not by fear of sanctions. This may have a positive effect on the influence of the board of directors' gender diversification on firm performance. For instance, Spain is the only country in Europe to introduce the gender diversification of the board of directors without sanctions (soft law) and they observed a null effect on firm performance. Since Malaysia also used soft law to increase the participation of women in the board of directors, my finding that the gender diversification of the board of directors has no impact on firm efficiency might be related to the institutional design of the law. In the countries that have worked scarcely on gender equality issues before the reform, the law increases the number of highly qualified women by overcoming the barriers. This change may contribute positively to firm performance. Comi et al. (2019) considered it as one of the main reasons for finding a positive effect of the gender diversification of the board on firm performance in the case of Italy. Italy has a bottom rank for all the gender equality metrics compared to other European countries. It shows stronger cultural prejudice against women in the labor market. Thus, the board of directors' gender diversification law can help the qualified women by removing the obstacles. In the case of Malaysia, the law gives an opportunity to highly educated women. This may be the other reason for the finding of previous research stating that the negative effect of the board of directors' gender diversification on firm efficiency does not apply in the case of Malaysia.

Table B.5 on the appendix reports the official World Economic Forum's international ranking of countries regarding the overall gender imbalance, economic participation, and opportunity in 2018. Among the countries that have implemented the gender diversification requirement of board of directors, Malaysia is ranked 23^{rd} preceding Nigeria, Malawi, and India. The gap befits the country's economic condition, strong cultural prejudice against women, and educational level of women. It indicates that Malaysia needs to work more on gender equality. According to Hillman et al. (2007), one of the advantages of increasing women's participation in the board of directors is that it encourages women to participate in other decision-making positions and employment in general; and my finding also shows that the board of directors gender diversification does not affect firm efficiency. Therefore, Malaysia might be able to improve women's participation by gradually shifting to hard law as Norway did in the past. However, the country should first work on increasing the number of qualified female candidates for the board of directors and improve the society's perception of

capacity of women. Matsa and Miller (2013) state that the decline in operational performance and the increase in costs that are caused by the shift from soft law to hard law in Norway are related to women's characteristics, such as their altruistic and long-term sight. Such characteristics may have a negative effect on short-run firm performance, but beneficial in the long run. Further, policies should be viewed from several dimensions like benefits to the society, national economy, and so forth.

According to Orloff (1996) women in countries with policies that support families with children, such as the provision of child care service, maternity leave, women work-life balance, etc. are more likely to participate in the labor force. For instance, in Norway mothers with a university degree are more likely to use a childcare service than mothers with secondary education. In a Muslim dominated country like Malaysia, where childcare is primarily considered as a women's responsibility, such policies are crucial to improve participation of women in the workforce. For instance, Iran could improve women's participation in the labor force, including in higher decision-making positions by implementing family policies like an early release for women with a child without affecting their salary, and by providing maternal and other related leaves. Sweden is the first country that achieved the highest share of female board directors with the implementation of soft law and the most extensive family policies. Therefore, Malaysia may benefit from considering family policies such as the provision of childcare services, maternity leave, an early release for women with a child, flexible working arrangement, and full utilization of their the capacity of educated women and increasing their participation in labor force including in the board of directors. In Malaysia, the most relevant obstacle to women's participation in the labor market is due to culture and religious motives, thus, such kind of policies could be less effective. Therefore, the country needs to work on improving society's perception regarding women's capabilities by considering the religious and cultural perspectives. Working with the religious and cultural institution on these issues may help in finding a solution that respects the religious and cultural perspective and improves women participation in the labor force.

2.5. Conclusion

This research has dealt with the relationship between the gender diversification of the board of directors and firm performance in the case of Malaysia. Malaysia is a developing country with higher gender inequality that implemented soft law for the board of directors' gender diversification requirement. This chapter focuses on the influence of Malaysia's 2011 board of directors' gender diversification requirement on the share of females in the board of directors, and its effect on firm performance and characteristics of the board members. Based on 429 listed firms available in both the Orbis database and Bursa Malaysia Stock Exchange for the period of 2007–2016, I use fixed effect estimate and an instrumental variable technique to investigate the effect of the board of directors' gender diversification requirement on

firm performance. I used the interaction of the percentage of female board members in 2010 with year dummies as an instrumental variable.

The result shows that the gender diversification requirement of the Malaysian board of directors has a positive influence on the share of female directors in their listed firms. Besides, women appointed to the board post requirement were observably more qualified than their female predecessors along many dimensions. I also examined whether the improvement in female participation in the board of directors after 2011 in Malaysia is due to either the gender quota requirement or change in their qualifications, and found that it is the result of the quota requirement. During the period under consideration, educational qualification did not show special progress; and female participation at senior and middle-level management and parliament seats did not show improvement that can be comparable with that of the share of the female directors. Although female participation in the board of directors has improved because of the gender quota requirement, while 35% of firms are without at least one female director. Researchers discussed that cultural and religious views are among factors that hamper the board of directors' gender diversification requirement to achieve its target. Further, the women directors reported that they receive less respect from supervisors and managers.

The result further reveals that the board of directors' gender diversification has a negative effect on firm size (total revenue, total assets), while it has no effect on firm efficiency measurements (Tobin's Q, ROE, and profit margin). Malaysia's board of directors' gender diversification requirement has a negative effect on age and experience of board members, whereas, it does not affect board size, educational level of board members, and family board directors. Comparison by sector and competition status in the sector indicates that the board of director's gender diversification requirement has an asymmetric effect on firm performance. The increase in the female directors has a negative effect on firm size (total revenue, total assets) in more technology-intensive sectors and sectors with good competition status while it has no effect on other sectors. The increase in the female board of directors' participation rate has a positive effect on more technology-intensive manufacturing sectors and sectors with good competition status in terms of Tobin's Q, while it does not affect other sectors. There is no asymmetric effect by sector and competition status in other firm efficiency measurements. Besides, the board of directors' gender diversification requirement has a positive effect in terms of firm size in large firms than small firms. I did not find an asymmetric effect of board director gender diversification on firm efficiency measurements by firm size.

Considering the findings, Malaysia may benefit from taking some policy measures. As all the cultural, and religious views lead to the keen obstruction to implementation of the board of directors gender diversification, which is considering child care as the major women's responsibilities, introducing policies that support families with children (provision of child care service, maternity leave, early release for women with child, flexible working arrangement, telecommuting, and breastfeeding policy) are crucial for improving women's participation in the workforce. In Malaysia the

most relevant obstacles to women's participation in the labor market are culture and religious motives, such kind of policies could be less effective. Therefore, the country needs to work on improving society's perception regarding women's capabilities by considering the religious and cultural perspectives. Working with the religious and cultural institution on these issues may help in finding a solution that respects the religious and cultural perspective and improve women's participation in the labor force. Furthermore, introducing programs that improve society's perception toward women's capability may help to gain manager's confidence and respect for female directors. Since educated women are sufficiently available in the market in Malaysia, the gap in experience, to bring women to decision making levels, may be filled through training.

A. Gender and Entrepreneurial Performance, The case of Brazilian Manufacturing sector

Table A.1.: Summary statistics for pooled sample

	Observation (1)	Full sample mean (2)	Men entrepreneurs (3)	Female entrepreneurs (4)	Difference from men entrepreneurs (5)
Performance measurements					
Employees	2213	139	149	57	-91
		(461)	(482)	(168)	[0.00]
Sales	2213	163492.7	178233.9	31946	-146287.9
		(886546)	(931982.4)	(172889)	[0.00]
Sales growth	2079	.26	.26	.23	-.03
		(.58)	(.57)	(.65)	[0.53]
Employee growth	2118	.14	.14	.12	-.02
		(.4)	(.41)	(.03)	[0.5]
Labor productivity	2213	160204.7	172245.9	52751.97	-119493.9
		(1416465)	(1492739)	(120161.1)	[0.00]
Value added per worker	2213	89695.36	96090.87	32623.29	-63467.58
		(771653.8)	(813213.5)	(66059.26)	[0.00]
Export propensity	2213	.23	.24	.09	-.15
		(.42)	(.43)	(.29)	[0.00]
Human and financial capital					
Top manager experience	2210	.57	.57	.56	-.01
		(.49)	(.49)	(.5)	[0.84]
Training to workers	2198	.59	.61	.46	-.14
		(.49)	(.49)	(.5)	[0.00]
The percentage of degree holder workers	2210	7	8	6	-2
		(10.86)	(11)	(9.45)	[0.04]
Access to credit	2211	.47	.46	.53	.01
		(.5)	(.5)	(.5)	[0.06]
Female workers	2187	38.65	34.98	61.22	-26.24
		(30.5)	(28.09)	(32.54)	[0.00]
Personal characteristics					
Hours devoted in the business	2212	56.03	56.43	52.42	-4.01
		(30.18)	(31.94)	(23.06)	[0.02]
Capacity utilization	2211	75.71	75.29	79.4	4.1
		(19.15)	(19.1)	(19.18)	[0.00]

Table A.2.: Summary of descriptive statistics for pooled sample B

	Observation (1)	Full sample mean (2)	Men entrepreneurs (3)	Female entrepreneurs (4)	Difference from men entrepreneurs (5)
Manufacturing sector					
Food	2213	.09	.1	.07	-.03
		(.29)	(.29)	(.25)	[0.11]
Textiles	2205	.08	.08	.07	-.01
		(.27)	(.27)	(.23)	[0.76]
Garments	2213	.24	.21	.5	.29
		(.42)	(.4)	(.5)	[0.00]
Shoes and Leather	2213	.11	.11	.11	.00
		(.01)	(.31)	(.32)	[0.89]
Chemicals	2213	.07	.07	.07	-.01
		(.26)	(.26)	(.25)	[.73]
Machinery and equipment	2213	.13	.14	.05	-.09
		(.33)	(.34)	(.22)	[0.00]
Auto part	2213	.09	.09	.05	-.05
		(.29)	(.29)	(.22)	[0.00]
Furniture	2213	.18	.19	.08	-.11
		(.39)	(.39)	(.27)	[0.00]
Other manufacturing sector	2213	.01	.01	.004	-.004
		(.1)	(.09)	(.07)	[0.41]
Firm characteristics					
Age of firm	2213	19.72	20.16	15.71	-4.46
		(17.13)	(17.43)	(13.57)	[0.00]
Form of firm ownership	2213	.07	.06	.14	.07
		(.26)	(.24)	(.35)	[0.00]
Foreign ownership	2199	.03	.03	.01	-.02
		(.17)	(.18)	(.09)	[0.00]
Location	2264	.38	.36	.51	.15
		(.48)	(.48)	(.5)	[0.00]
Competition	2213	.63	.63	.64	.01
		(.48)	(.48)	(.48)	[0.82]
International recognition	2133	.17	.18	.09	-.09
		(.38)	(.39)	(.29)	[0.00]
Issues related with financial services					
Subjective perception about financial services	2192	2.48	2.48	2.43	-.05
		(1.5)	(1.49)	(1.59)	[0.64]
Financing capital by retained earning	2212	46.2	45.97	48.24	-2.27
		(41.02)	(41.01)	(40.32)	[0.43]
Financing capital by bank credit	2212	25.78	26.15	22.49	-3.66
		(33.54)	(33.66)	(32.31)	[0.11]
Loan size	1582	2487381	2722536	208923.2	-2513613
		(137445.9)	(145381.6)	(38503.03)	[0.00]
		2213	1990	223	

Table A.3.: Decomposition result of Oaxaca-Blinder (OB), Cotton's and Reimers' (CR) and Neumark's decompositions

Performance measurements	Number of employees			Sales		
Decomposition technique	OB	CR	Neumark	OB	CR	Neumark
Unexplained	.39	.38	.35	.78	.78	.7
Explained	.19	.2	.2	.58	.58	.66
Percent of unexplained	67.24%	65.4%	60.1%	57.3%	57.2%	51.6%
Percent of explained	32.76%	34.6%	39.9%	42.7%	42.8%	48.4%
Performance measurements	Employee growth rate			Sales growth		
Decomposition technique	OB	CR	Neumark	OB	CR	Neumark
Unexplained	.07	.07	.06	.04	.04	.03
Explained	-.05	-.05	-.04	-.02	-.02	-.01
Percent of unexplained	350%	348.3%	312%	200%	181.7%	143.5
Percent of explained	-250%	-248.3%	-212%	-100%	-81.7%	-59.7%
Decomposition technique	OB	CR	Neumark	OB	CR	Neumark
Performance measurements	Labor productivity			Value added per worker		
Unexplained	.39	.39	.25	.27	.27	.24
Explained	.38	.38	.39	.36	.36	.39
Percent of unexplained	50.65%	50.9	45	42.86	43.3	38.4
Percent of explained	49.35%	49.1	55	57.14	56.7	61.6

Table A.4.: Gender and firm's growth

Dependent variables	Employee growth rate				Sales growth rate			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Gender	-.11 (.08)	-.12 (.08)	-.19*** (.05)	-.22*** (.05)	-112.9 (109.8)	-53.74 (52.79)	- 77.37 (76.5)	- 92.49 (.02)
Human and financial characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Business characteristics	No	No	Yes	Yes	No	No	Yes	Yes
Personal characteristics and sector	No	No	No	Yes	No	No	No	Yes
Sample size	2116	2091	1999	1997	2079	2055	1965	1963
R-square	0.02	0.03	0.06	0.07	0.001	0.003	0.005	0.01

Table A.5.: Gender and firm performance

Dependent variable	Ln(Number of employees) (1)	Ln(sales) (2)	Employee growth (3)	Sales growth (4)	Ln(labor Productivity (5)	Ln (Value added per worker) (6)	Export propensity (7)
Atleast one female director	-.18***	-.26***	-.02	-.005	-.07	-.07	-.02
	(.05)	(.1)	(.02)	(.03)	(.08)	(.08)	(.02)
Human and financial characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Business characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personal characteristics and sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	2086	2086	1999	1963	2137	2085	2086
R-square	0.4	0.4	0.12	0.07	0.2	0.19	853.36

Table A.6.: Gender and firm performance

Dependent variable	Ln(Number of employees) (1)	Ln(sales) (2)	Employee growth (3)	Sales growth (4)	Ln(labor Productivity (5)	Ln (Value added per worker) (6)	Export propensity (7)
Top manager gender	-.33***	-.66***	-.06***	-.06	-.32***	-.25***	-.03
	(.06)	(.11)	(.02)	(.04)	(.09)	(.1)	(.02)
Human and financial characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Business characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personal characteristics and sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	2086	2086	1999	1963	2086	2085	2086
R-square	0.4	0.4	0.12	0.07	0.21	0.19	-853.32

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Figure A.1.: : Gender and loan size

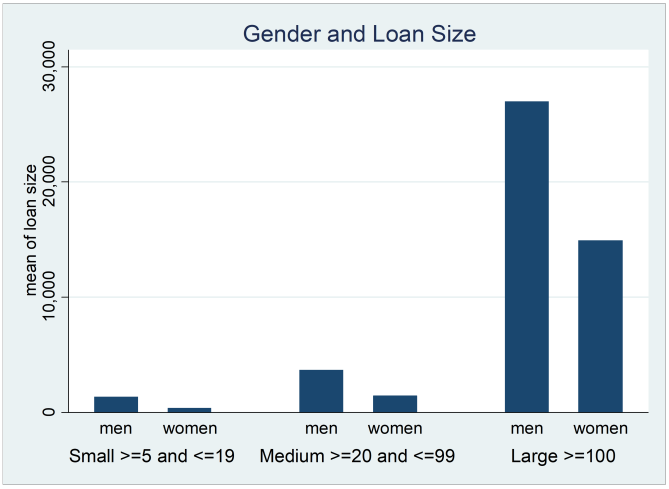
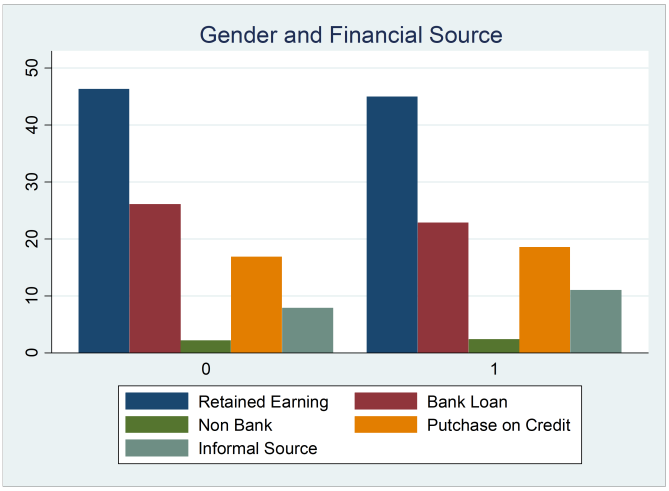


Figure A.2.: Gender and financial source



B. Gender Diversity and Firm Performance: Evidence from Malaysia Boardrooms

Table B.1.: Descriptive firm characteristics by year across sectors

Variable	Sector	2007	2008	2009	2014	2015	2016
Share of female BD	1	9.03	9.27	9.24	9.43	10.19	10.9
		(10.39)	(10.49)	(10.29)	(9.53)	(10.63)	(10.63)
	2	10.32	11.89	11.85	13.08	13.2	13.2
		(13.44)	(14.44)	(13.61)	(13.06)	(12.34)	(12.34)
	3	6.62	6.84	7.28	10.67	11.43	11.91
		(9.94)	(9.98)	(10.31)	(12.56)	(12.77)	(13)
	4	9.14	9.38	9.79	11.87	12.71	13.31
		(10.21)	(10.37)	(11.2)	(12.71)	(12.1)	(11.83)
Age of BD	1	53.47	53.89	54.49	56.98	56.99	57.6
		(4.99)	(4.75)	(4.57)	(4.79)	(4.99)	(5.05)
	2	55.13	55.71	55.85	57.99	58.68	59.13
		(4.63)	(4.5)	(4.17)	(58.68)	(4.4)	(3.98)
	3	54.39	54.99	55.23	57.77	58.83	59.07
		(5.53)	(4.84)	(4.92)	(5.12)	(5.93)	(6.15)
	4	53.45	54.08	54.6	56.61	57.11	57.69
		(4.98)	(4.82)	(4.75)	(5.44)	(5.36)	(5.46)
Education BD	1	2.23	2.24	2.23	2.25	2.25	2.26
		(.28)	(.28)	(.28)	(.3)	(.31)	(.35)
	2	2.33	2.32	2.34	2.27	2.27	2.26
		(.29)	(.28)	(.3)	(.27)	(.27)	(.27)
	3	2.18	2.2	2.2	2.24	2.26	2.25
		(.32)	(.32)	(.3)	(.3)	(.37)	(.37)
	4	2.17	2.18	2.18	2.22	2.22	2.22
		(.31)	(.31)	(.31)	(.32)	(.31)	(.31)
Experience	1	7.33	7.85	8.5	10.64	10.83	11.23
		(3.33)	(3.38)	(3.46)	(4.15)	(4.26)	(4.32)
	2	9.56	10.05	10.53	12.13	12.34	12.98
		(4.16)	(4.22)	(3.93)	(4.43)	(4.28)	(4.54)
	3	8.1	8.47	8.87	11.23	11.84	12.37
		(3.53)	(3.44)	(3.54)	(3.97)	(4.08)	(4.62)
	4	7.79	8.39	9.06	11.08	11.52	11.85
		(3.83)	(3.82)	(3.65)	(4.05)	(4.29)	(4.69

Note: Sector 1 represent other service sector, 2 construction, 3 less technology intensive manufacturing sector, 4 medium and higher technology intensive manufacturing sector; standard deviation of a variable appears in square brackets

Table B.2.: Descriptive firm characteristics by year across firm size

Variable	Firm size	2007	2008	2009	2014	2015	2016
Percent of female directors	large	8.32	8.48	8.93	11.31	12.14	12.4
		(10.54)	(10.61)	(10.76)	(11.34)	(11.58)	(11.74)
	small	9.35	10	10.02	10.44	10.9	11.83
		(10.65)	(11)	(11.4)	(11.68)	(11.7)	(11.65)
Age	large	52.87	53.54	54.1	56.55	57.07	57.55
		(.5)	(4.74)	(4.68)	(5.21)	(5.64)	(5.62)
	small	50.03	52.69	53.2	55.48	55.79	56.25
		(4.88)	(4.81)	(4.84)	(4.45)	(5.72)	(5.67)
Education	large	2.25	2.25	2.25	2.26	2.27	2.27
		(.3)	(.3)	(.31)	(.31)	(.33)	(.35)
	small	2.17	2.17	2.17	2.21	2.2	2.2
		(.3)	(.29)	(.28)	(.29)	(.28)	(.27)
Experience	large	8.76	9.14	9.67	11.55	11.84	12.32
		(3.83)	(3.82)	(3.74)	(4.1)	(4.19)	(4.4)
	small	6.67	7.62	8.21	10.28	10.69	10.01
		(3.33)	(3.43)	(3.36)	(4.05)	(4.31)	(4.68)

Note: Sector 1 represent other service sector, 2 construction, 3 less technology intensive manufacturing sector, 4 medium and higher technology intensive manufacturing sector; standard deviation of a variable appears in square brackets

Table B.3.: Descriptive firm characteristics by year across sector competition status

	Sector competition status	2007	2008	2009	2014	2015	2016
Share of female BD	High concentration	8.6 (11.4)	9.06 (11.54)	9.52 (11.79)	12.33 (12.44)	12.77 (13.01)	13.23 (12.75)
	Moderate concentration	9.3 (10.61)	9.68 (11.22)	9.94 (12.28)	11.84 (11.68)	12.47 (11.4)	13.01 (11.38)
	Good competition	8.53 (9.76)	8.81 (9.6)	8.98 (10.15)	8.56 (9.72)	9.65 (10.1)	10.27 (10.82)
Age	High concentration	54.31 (5.42)	54.9 (4.9)	55.33 (4.77)	57.41 (5.06)	57.78 (5.23)	58.55 (5.15)
	Moderate concentration	53.73 (4.96)	54.3 (4.78)	54.7 (4.6)	56.77 (5.07)	57.38 (5.08)	57.86 (5.09)
	Good competition	53.29 (4.78)	53.78 (4.63)	54.39 (4.64)	57.08 (5.06)	57.41 (5.6)	57.69 (5.82)
Education	High concentration	2.25 (.31)	2.26 (.3)	2.27 (.31)	2.31 (.29)	2.29 (.29)	2.3 (.29)
	Moderate concentration	2.19 (.31)	2.19 (.3)	2.2 (.31)	2.21 (.31)	2.22 (.3)	2.21 (.29)
	Good competition	2.19 (.29)	2.19 (.3)	2.18 (.28)	2.2 (.3)	2.22 (.35)	2.22 (.39)
Experience	High concentration	7.61 (3.3)	8.1 (3.19)	8.62 (3.09)	10.89 (3.78)	11.28 (3.99)	11.88 (4.18)
	Moderate concentration	8.33 (4.06)	8.9 (4.09)	9.49 (3.88)	11.32 (4.23)	11.71 (4.33)	12.06 (4.75)
	Good competition	7.54 (3.57)	8.12 (3.68)	8.76 (3.8)	10.97 (4.33)	11.24 (4.47)	11.55 (4.71)

Table B.4.: Soft and Hard law for board of directors gender diversification

No	Country	Quota	Law	Introduced date	Compliance date
1	Australia		Soft law	January, 2011	
2	Austria	30%	Soft law	January 2012	2018
3	Belgium	33%	Hard law	June 30, 2011	2016 for SOEs; 2017-2018 PTFs
4	Canada	50%	Soft law	December 1, 2006	
5	Denmark	50%	Soft law	2014	
6	Finland	40%	Soft law	April 15, 2005	December 14, 2011; 2010 for SOEs
7	France	40%	Hard law	January 13, 2011	January 1, 2016 500+ employees or € 50 M in revenue
8	German	30%	Hard law	2015	January 2016
9	Iceland	40%			
10	India	At least one	Soft law		
11	Ireland		Soft law	September 2012	
12	Israel	50%	Soft law	March 11, 2007	September 1, 2013 firms with 50+ employees
13	Italy	33%	Hard law	June 28, 2011	2015
14	Kenya	33%		August 28, 2010	
15	Luxembourg		Soft law	October 2009	
16	Malawi		Soft law	June 2010	
17	Malaysia	30%	Soft law	March 2012	2016
18	Netherland	30%	Soft law	June 2011	2013
19	Nigeria		Soft law	January 2011	
20	Norway	40%	Hard law	December 9, 2003	2006 SOEs and 2008 PTFs
21	Poland		Soft law	July 2010	
22	South Africa		Soft law	September 2009	
23	Spain	40%	Hard law	March 27, 2007	June 1, 2005
24	Sweden		Soft law	February 2010; January 2007	
25	United King-dom		Soft law	February 2010; January 2007	
26	United State		Soft law	February 2010	

Note; PTFs publicly traded firms, SOEs state-owned enterprises; adopted from several sources (Terjesen et al., 2015; Terjesen and Sealy, 2016)

Table B.5.: Indicators of gender imbalance for countries with board of directors gender diversification requirement or hard law

No	Country	Overall Rank	Economic participation and opportunity rank	The rank 26 countries with board gender diversification requirement by gender gap index
1.	Iceland	1	16	1
2.	Norway	2	11	2
3.	Sweden	3	9	3
4.	Finland	4	17	4
5	Ireland	9	43	5
6	France	12	63	6
7	Denmark	13	38	7
8	German	14	36	8
9	United Kingdom	15	52	9
10	Canada	16	27	10
11	South Africa	19	91	11
12	Netherland	27	56	12
13	Spain	29	80	13
14	Belgium	32	49	14
15	Australia	39	46	15
16	Poland	42	51	16
17	Israel	46	66	17
18	United State	51	19	18
19	Austria	53	81	19
20	Luxembourg	61	60	20
21	Italy	70	118	21
22	Kenya	76	37	22
23	Malaysia	101	84	23
24	India	108	142	24
25	Malawi	112	109	25
26	Nigeria	133	79	26

Source: World Economic Forum, 2018

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Figure B.1.: Female participation in board of directors level trend related and gender diversification requirement

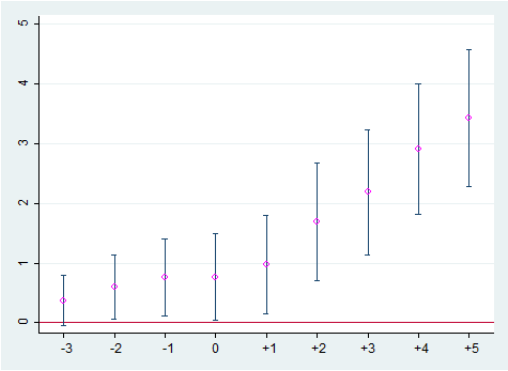
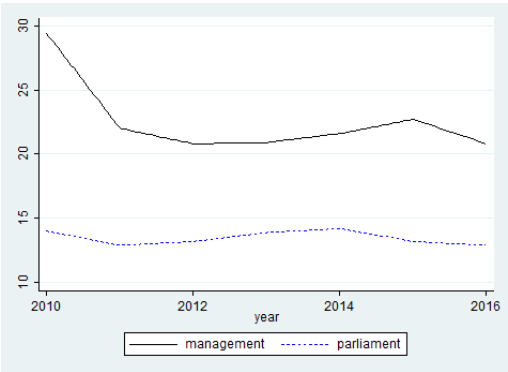


Figure B.2.: Tertiary enrolment rate based on gender

Note: Based on the world bank development index for Malaysia data to the period 2004-2016

Figure B.3.: Share of female in the senior and middle level management, and parliament



Note: Based on UNDP report for Malaysia to the period 2010-2016

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