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GENDER DIVERSITY AND FIRM PERFORMANCE: WHAT ORGANIZATION LAYER MATTER?

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ABSTRACT

The resource-based view of a firm considers its human resources as a potential strategic asset, providing a sustainable competitive advantage as valuable (V), rare (R), imperfectly imitable (I), and non-substitutable (N). As such, employee gender diversity could be considered a VRIN resource contributing to firm performance. However, empirical studies exploring how gender diversity affects firm performance reflect mixed results. In general, the mixed results may be due to the fact that extant research has explored the impact of gender diversity solely at the board of director level, while searching for a linear relationship between the two. Our study extends the research by exploring how gender diversity among middle management and staff affects firm performance. We also explore a critical mass condition, an inverted U-shape, and a hat-shaped (two flat borders around a top) relationship between gender diversity and firm performance. Analysing a dataset of 159 French firms, our underlying study contributes to the existing research by confirming that gender diversity at middle management and staff levels is a valuable resource that significantly affects firm performance. We also find a nonlinear relationship due to a threshold effect related to a critical mass condition. Firms with balanced diversity (between 40 and 60% women) tend to create more value. Such diversity among middle management and staff is relatively rare and difficult to imitate and substitute. Finally, the results suggest a hat-shaped relationship between gender diversity and firm performance, supporting the conjecture that gender diversity at firms has a greater positive impact than same-sex populations do.

Keywords: Gender diversity, firm performance, middle management, organisational staff, competitive advantage, threshold effect

INTRODUCTION

Exploring the potential links between gender diversity and firm performance has nurtured a large stream of academic research and several theoretical frameworks to support this relationship. The basic assumption is that gender diversity, by bringing different skills, knowledge, experience, beliefs, values, and leadership styles, affects firm performance (Galbreath, 2018; Hoobler, Masterson, Nkomo & Michel, 2018; Post & Byron, 2015; Velte, 2017). Human capital theory argues that firms excluding candidates based on any characteristic other than productivity could ultimately harm their own performance by depriving the organisation of talented people (Becker, 1957; Richard, Ford, & Ismail, 2006). The resource-based view (RBV) (Barney, 1991; Krishnan & Park, 2005; Shrader, Blackburn, & Iles, 1997) also supports the assumption that gender diversity contributes to the competitiveness of the firm by improving decision-making processes, fostering innovation and creativity, and bringing to the firm different perspectives and cognitive structures. Ultimately, gender diversity may provide a sustainable competitive advantage by being valuable, rare, imperfectly imitable, and non-substitutable (VRIN). From a strategic management perspective, there are some research questions to answer: Is gender diversity a strategic resource that affects firm performance? Does gender diversity at different organisational levels affect firm performance differently? Is there a linear or a nonlinear relation between gender diversity and firm performance?

A broad stream of empirical research has tested hypotheses linking gender diversity and firm performance, but with mixed results. Some have found a positive relationship (Abdullah, Ismail & Nachum, 2016; Carter, Simkins & Simpson, 2003; Reguera-Alvarado, Fuentes & Laffarga, 2017), some a negative one (Adams & Ferreira, 2009; De Andres, Aaofra & Lopez, 2005; Minguez-Vera & Martin, 2011; Smith, Smith & Verner, 2006), and others no effect (Haslam, Ryan, Kulich, Trojanowski & Atkins, 2010; Rose, 2007). Such inconsistent and inconclusive findings are due mainly to three limitations. First, most research explores the impact of gender

diversity at the board of director level (Hoobler et al., 2018; Joecks, Pull, & Vetter, 2013; Post & Byron, 2015; Velte, 2017) and some at the executive committee level (Jeong & Harrison, 2017; Luanglath, Ali & Mohannak, 2019). Focusing on these two levels ignores the potential impact of gender diversity at other firm areas, such as middle management and staff, which are equally or more important to the functioning of the firm. Second, diversity at these other levels could be a sustainable competitive advantage for firms with this resource as altering diversity takes time. The diversity of the corporate board is more easily alterable and thus less of a sustainable competitive advantage. Conversely, gender diversity at middle management and staff levels represents a more stable feature of a firm's human resource structure that could be considered either a sustainable competitive advantage or disadvantage. Third, on average, boards of directors rarely reach a 20% diversity threshold, except in countries that have recently imposed quotas (e.g. Norway, Spain, France, Germany), and the executive committee barely reaches a 15% diversity threshold in Western countries (Deloitte, 2018). Therefore, these studies may be affected by low female representation, preventing the exploration of any threshold condition (Joecks et al., 2013).

In her seminal article, Kanter (1977) argues that under a given threshold, a subpopulation may not affect firm performance. She defines the following firm groupings: *uniform groups* as unisex; *skewed groups* as those with less than 20% women; *tilted groups* as those with a 20% to 40% female population, and *balanced groups* as those with a female population between 40% and 60%. She assumes that a critical mass of 20% and 40% is required to impact an organisation and that, thus, *balanced groups* really matter. She implicitly assumes a nonlinear relationship between gender diversity and firm performance. This relationship is hat-shaped with two flat sides (between 0 and 20% and between 80 and 100%), two slopes (between 20 and 40% and between 60 and 80%), and a flat top between 40 and 60%.

To investigate the link between gender diversity at middle management and staff levels and firm performance, we analyse 159 publicly listed French companies. We add to the literature on gender diversity and organisational performance by showing that gender diversity at the middle management and staff levels positively impacts firm performance. We contribute to the RBV literature by pointing out that gender diversity can be a VRIN resource that provides a sustainable competitive advantage. However, such a positive impact depends on a threshold condition in a range between 20 and 40%, more precisely, closer to 40%. Our results suggest a hat-shaped curve between gender diversity and firm performance such that balanced organisations (between 40 to 60%) have better performance than predominantly male or female organisations.

The rest of the article is organised as follows. First, we present a review of the literature on the characterisation of gender diversity and how it affects firm performance. Then, we introduce our hypotheses relating firm performance and gender diversity at middle management and staff levels to explore the shape of the relationship. Statistical results are presented next. The final sections include a discussion of our findings and the study's limitations.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

Gender differences

A large body of literature on management, sociology, economics, and psychology documents that women are different from men in their knowledge, experience, values, beliefs, choices, and preferences¹. They differ in their cognitive frames due to differences in their experiences and knowledge related to education, roles outside work, and nonwork interests (Post & Byron, 2015). They bring different professional experiences to organisations (Singh, Terjesen, &

¹ Essentialist (Schein, 1975) and nonessentialist theory (Acker, 1992) agree on differences between genders but disagree on their origin (natural or socially produced and reproduced in society). Our purpose is not to discuss or challenge such findings but to build on them to explore how gender diversity might affect firm performance.

Vinnicombe, 2008). Social role theory (Eagly, 2009) suggests that men and women behave according to different stereotypes, values, and beliefs. Women tend to be more relationally oriented, participative, and democratic (Wood & Eagly, 2009). The social construction of gender leads to different representations of reality and different social pressures to comply with specific gender roles (Cech, 2013; Correll, 2004; Pedulla, 2016). Eckel and Grossman (2008) point out that women are generally more risk averse. Niederle and Vesterlund (2007) show that genders differ in competitive orientation. Women also appear to be more altruistic and have more socially oriented values than men do (Burgess & Tharenou, 2002; Dufwenberg & Muren, 2006). Ferrary (2018) points out that men and women differ in their professional preferences, which influences their career expectations and contributions.

As managers, women have specific leadership styles and bring different dynamics to leadership teams than men do (Dwyer, Richard, & Chadwick, 2003). They often adopt a more participative leadership style (Eagly & Carli, 2003) and are more control-oriented with people they are monitoring (Adams & Ferreira, 2009).

Mechanisms linking gender diversity and firm performance

Research linking gender diversity to the functioning of organisations belongs to a larger academic field that examines the effects of demographics on firm outcomes. Organisational demography assumes that the demographic composition of work groups impacts group processes, which, in turn, relate to group and firm performance (Van Knippenberg et al., 2004). Extensive literature on management has studied the implications of greater diversity on firm performance (Richard, 2000; Richard, Barnett, Dwyer, & Chadwick, 2004). Building on the RBV of the firm, gender diversity may contribute to firm performance (Ali et al., 2011; Barney, 1991) and may be a sustainable competitive advantage if such structure is VRIN.

Several arguments support a relationship between diversity and firm performance. In promoting gender diversity, employers improve their effectiveness by tapping broader talent pools. Human capital theory (Becker, 1957; Richard, Ford, & Ismail, 2006) argues that firms that practice discrimination could be penalised by market forces by depriving them of talented workers. Conversely, recruitment based solely on skills and capabilities can bring more talented people into the organisation (Kulich et al., 2011; Velte, 2017).

Due to social construction and internalised cultural beliefs, men and women differ in their behaviours and contribute to organisations in different ways (Reguera-Alvarado et al., 2017). Women, as more risk averse than men (Croson & Gneezy, 2009; Niederle & Vesterlund, 2007), might mitigate risks taken by firms. If they are less aggressive in their choice of strategy, they may be more likely to invest in a more sustainable manner (Apesteguia et al., 2012; Charness & Gneezy, 2012). Due to gender differences in cognitive frames related to ethical reasoning, risk aversion, and concerns about legitimacy, gender diversity might influence collective decision making (Post & Byron, 2015). Dezsö and Ross (2012) argue that diversity improves the information processing and decision making of the team since women have additional insights to address questions related to female consumers, employees, and trading partners. Heterogeneous groups are also connected to more diversified networks that can access more resources and better information (Reguera-Alvarado, 2017). Moreover, by contributing to a better understanding of the market by matching the diversity of the firm's employees to its customer base, the firm's ability to enter new markets increases (Carter, D'Souza, Simkins, & Simpson, 2010; Williams & O'Reilly, 1998). Diversity also appears to increase firm creativity and innovation (Ali et al., 2011; Yang & Konrad, 2011) and can enhance problem-solving through the variety of perspectives that allow more alternatives to be evaluated (Campbell & Miguez-Vera, 2008; McMahan, Bell, & Virrick, 1998).

Last but not least, greater diversity fits with socially responsible management that can improve the image of the firm, thereby having a positive effect on customers' behaviour and other stakeholders and, in turn, firm performance (Ali & Konrad, 2017; Bear, Rahman & Post, 2010; Smith, Smith, & Verner, 2006).

However, a question of the nature of the relationship between gender diversity and firm performance remains. Some researchers suggest a positive linear relationship where a group that includes even a single female will outperform an all-male group (Rogelberg & Rumery, 1996). However, the critical mass assumption postulates that until a certain threshold of women in a group is reached, they will not influence group functioning and performance. As stated above, Kanter (1977) hypothesises that there needs to be a 20-40% critical mass condition before a minority group starts to affect organisational functioning. Scholars have since argued that diversity only impacts collective decision making and, therefore, performance, when a critical mass is reached (Fenwick & Neal, 2001; Joecks et al., 2013; Goergen & Renneboog, 2014; Liu, Wei & Xie, 2014; Kirsch, 2018). Below a certain threshold, minority employees often do not speak up in meetings (Westphal & Milton, 2000). Konrad and Kramer (2006) assert that women tend to have a greater impact on board decision making when there are three or more female members.

Research on gender diversity and firm performance

As already mentioned, there is a large body of work that explores the relationship between gender diversity and firm performance. The vast majority of this analyses the way diversity in the board of directors affects performance (see Hoobler et al., 2018; Post & Byron, 2015; Velte, 2017 for extensive literature reviews). It is argued that gender diversity in the board of directors improves a firm's strategic choices (Krishnan & Park, 2005). Similar empirical studies analyse

relationships between executive committees or top management teams and firm performance (Ali & Koonrad, 2017; Homberg & Bui, 2013; Jeong & Harrison, 2017).

However, the research presents mixed results of board of director diversity on firm performance (Abdullah et al., 2016; Ali et al., 2011; Carter et al., 2003; Williams & O'Reilly, 1998). For instance, based on a large panel of US commercial banks, Palvia, Vähämaa, and Vähämaa (2015) find that female CEOs and gender diversity at the board level mitigates financial risks and reduces the likelihood of failure during the financial crisis. Similarly, based on a sample of 125 nonfinancial Spanish firms, Reguera-Alvarado et al. (2017) find a positive impact of board gender diversity. In contrast, some scholars report a negative effect, whereby greater gender diversity may detract from firm performance (Adams & Ferreira, 2009; De Andres et al., 2005; Minguez-Vera & Martin, 2011). For example, diversity creates heterogeneous groups that may generate more opinions and critical questions and more conflict. Thus, the decision-making process becomes more time-consuming and less effective (Williams & O'Reilly, 1998). In a fast-paced environment where the market demands quick responses, a slower decision-making process can be detrimental to firm performance (Hambrick, Cho, & Chen, 1996).

In an extensive review of 140 studies related to the topic, Post and Byron (2015) conclude that the empirical evidence for a relationship between female board representation and firm financial performance is decidedly mixed. Others conclude that the two are unrelated (Dang & Nguyen, 2016; Haslam, Ryan, Kulich, Trojanowski & Atkins, 2010; Rose, 2007; Smith et al., 2006; Terjesen, Sealy, & Singh, 2009). In their meta-analysis, Joshi and Roh (2009) underscore that most studies report no significant, direct relationship between diversity in the board of directors and performance.

Three reasons might explain the mixed results. The first is that this vein of research examines gender diversity solely at the board of director level (Cabrera-Fernández, Martínez-Jiménez & Hernández-Ortiz, 2016, Hoobler et al., 2018; Post & Byron, 2015; Velte, 2017). Boards of

directors play a specific role in the functioning of large firms as they are not involved in day-to-day business decisions. Their role is mainly to appoint the firm's CEO, validate remuneration, and to control and monitor overall corporate strategy (Golden & Zajac, 2001). Beyond boardroom gender composition, little research has explored the impact of gender diversity at other levels of the organisation. Hoobler et al. (2018) suggest that the popularity of research on gender diversity within the board of directors and firm performance is due to ease of access to data containing both the independent variable (board of directors from annual reports) and dependent variables (numerous measures of organisational performance from databases such as Compustat and Reuters). The difficulty of accessing data on gender diversity at other organisational layers has made exploring different perspectives on this relationship more challenging.

Second, boards of directors are generally characterised by a very low presence of women, which limits research on the critical mass effect (Torchia, Calabrò & Huse, 2011). For instance, the most recent study of Fortune 500 companies indicates that men still occupy 77.5% of board seats (Deloitte, 2018). In addition, a female presence is particularly low in countries with no legal obligations to integrate women into boards of directors. This poses a range of problems for the robustness of results and makes testing the critical mass assumption more difficult (Kirsch, 2018). Moreover, boards of directors are small groups and their gender diversity is too easily imitable to provide a sustainable competitive advantage or affect long-term firm performance. For instance, a board of 10 directors with 10% gender diversity needs to replace only one male director by a woman to double the percentage. In contrast, a firm with 10% diversity among 10,000 middle managers has to replace 1,000 male managers with the same number of female managers to reach a 20% diversity threshold. Recent quotas in several European countries (e.g. Norway, Spain, France, Finland, Italy, and Netherlands) illustrate the ease of changing gender diversity in the boardroom. Female directors are not a rare resource.

Due to quotas, gender diversity has increased tremendously in a short period of time and dispersion among firms is now limited within individual countries. For example, in France, women represented 8.5% of boards of directors in 2007. Since 2018, due to a law that imposes a 40% quota, all companies are very close to 40% and the standard deviation among them is low (Ferrary, 2018). Such characteristics prevent gender diversity at the board of director level from providing a sustainable competitive advantage according to the VRIN criteria. Gender diversity on the board of directors may be a valuable resource, but it is no longer rare. Gender diversity at this organisational level does not seem to provide a sustainable competitive advantage by being a valuable, rare, imperfectly imitable, and non-substitutable resource.

In response to mixed evidence, some researchers have adopted a contingency perspective (Luanglath et al., 2019); namely, that gender diversity on the board of directors positively or negatively affects the functioning of organisations depending on the industry (Joshi & Roh, 2009), the firm's lifecycle, and the span of control mediating the link between the two variables (Richard et al., 2006), or whether the organisation is innovation driven (Dezsö & Ross, 2012). Abdullah et al. (2016) measure the impact of gender diversity depending on firm ownership and board of director structure. According to others, gender diversity in the board of directors affects the socially responsible behaviour of the firm; thus, indirectly positively impacting organisational performance (Boulouta, 2013; Galbreath, 2018).

Building on Kanter's (1977) assumption that a 20-40% critical mass is required for a minority group to start to influence an organisation, several scholars have explored threshold conditions. For example, Fenwick and Neal (2001) show that *tilted boards of directors* outperform *skewed* and *uniform boards of directors*. Similarly, Torchia, Calabrò, and Huse (2011) reveal that with three or more women on the board, firm innovativeness is higher than when there are fewer women on the board. Campbell and Minguez-Vera (2008) highlight that the positive influence on firm value is derived from a higher ratio of women to men on the board rather than just the

presence of one or a few women. Joecks et al. (2013), based on a panel of 151 listed German firms, conclude that gender diversity positively affects firm performance only after a critical mass of approximately 30% women has been reached on the board of directors. Amore, Garofalo, and Minichilli (2014), based on 2,400 Italian family-controlled firms, show that the interaction between a female CEO and an increasing rate of women on the board of directors has a significant and positive effect on Italian family firm productivity. Apesteguia et al. (2012) show that teams of students with three or more women are less aggressive in their pricing strategies and invest more in social sustainability initiatives (but less in research and development). More sophisticated research suggests that the link between gender diversity on the board of directors and performance takes on an inverted U-shaped curve (Joecks et al., 2013).

The main conclusion we garner from our literature review is that there is no robust evidence reflecting the impact of gender diversity in the board of directors on firm performance. Thus, the limitations of these empirical studies linking boardroom gender diversity and firm performance open avenues for research exploring the impact of such diversity at other layers of the organisation such as middle management and staff.

HYPOTHESIS DEVELOPMENT: DIFFERENT PERSPECTIVES ON GENDER DIVERSITY AND FIRM PERFORMANCE

The middle management and staff perspective

We propose to consider the impact of diversity at different organisational levels on firm performance. Gender diversity might differ at the middle management and staff levels and, therefore, affect performance differently. Organisational layers fulfil different functions within the firm (Mintzberg, 1980; Daft & Armstrong, 2009). Hierarchies tend to group employees with similar knowledge who perform similar jobs in the firm (Caliendo et al. 2015).

The upper layer of the structure is composed of the *board of directors*, which represents shareholder interests. The board of directors formally convenes with the CEO several times a year to discuss and approve business strategy and control its implementation and is rarely involved in the operational management of large firms (Luanglath et al., 2019). The *executive committee* is the *strategic apex* (Mintzberg, 1980) and consists of the top general managers of the organisation. It includes the CEO, functional directors, and operational directors. The executive committee is in charge of designing and operationalising business strategy and oversees most of the firm's organisational decisions (Hambrick & Mason, 1984).

The *middle-management* layer is responsible for implementing and controlling execution of the business strategy in the day-to-day activities of the firm (Caliendo et al. 2015). Mintzberg (1980) considers middle management the link between the board of directors, executive teams (*strategic apex*), and the staff (*operating core*). The role is partially one of interpretation, as the work of the operating core has to be consistent with the expectations and plans of the strategic apex. Gender diversity at that level may have a different impact on the functioning of the organisation than diversity in the board of directors or executive committees. At the middle-management level, Rosener (1990) finds that women exhibit an interactive leadership style that emphasises inclusion. Specifically, women are said to encourage participation by soliciting input from others, sharing power and information by keeping open communication channels with their subordinates, and bolstering their subordinates' sense of self-worth. Other scholars find women to be less hierarchical and more cooperative than men (Dwyer, Richard, & Chadwick, 2003; Eagly & Carli, 2003).

The *staff* layer is made up of operational workers who execute the operational plans. Mintzberg (1980) considers the staff population (*operating core*) to include all employees who produce the basic products and services of the organisation or directly support their production. At this level, Kalleberg and Leicht (1991) point out that gender diversity influences group dynamics

and performance. Richard (2000) argues that by introducing more cultural diversity, population diversity throughout the firm's workforce should have a greater impact on firm performance than diversity in the top management echelon alone. For instance, Richard, Stewart, McKay, and Sackett (2017) point out that matching the diversity of store employees to the diversity of customers is positively related to store performance. In contrast, inequality at the staff level might have negative consequences. Unequal employee treatment (compensation, recruitment, career opportunities) is demotivating (King et al., 2010), while diversity enhances motivation within the female workforce and strengthens firm performance (Ali & Konrad, 2017; Bilimoria, 2006).

Considering that each layer contributes differently to the functioning of the organisation, we argue that gender diversity at middle management and staff levels should affect firm performance differently. Thus, we posit the following:

Hypothesis 1a: Diversity in the middle-management population contributes to firm performance.

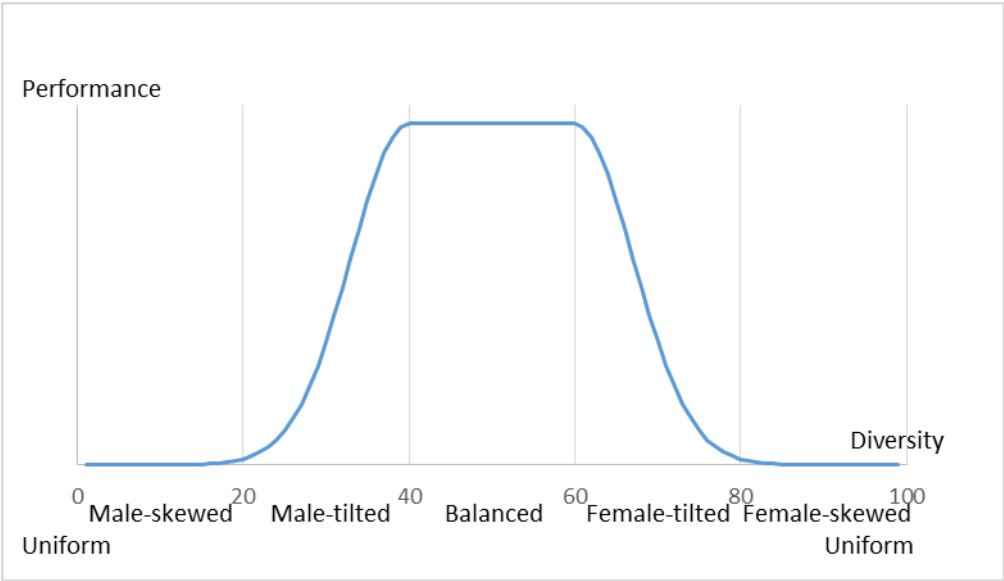
Hypothesis 1b: Diversity in the operational workforce (staff) contributes to firm performance.

The threshold condition for gender diversity influence: a hat-shaped curve

As referenced, in her seminal article, Kanter (1977) suggests that a critical mass of women is needed to exert an influence on the power structure and decision-making process of an organisation. After defining the four different populations (*uniform* (0%), *skewed* (0 to 20%), *tilted* (20 to 40%), and *balanced* (40 to 60%)), she claims that a critical mass of 20 to 40% diversity is required to impact an organisation. She implicitly assumes a nonlinear relationship between gender diversity and firm performance. The curve is flat from 0% to 20%, starts to increase between 20 and 40%, and reaches its highest impact between 40 and 60%. According to her reasoning, a threshold effect works in two ways; namely, a predominantly female firm

should produce the same results as a predominantly male firm. The curve should decrease between 60 to 80% and become flat again between 80 and 100%. The whole curve of the link between gender diversity and firm performance should look hat-shaped with two flat borders (from 0 to 20%; and from 80 to 100%), two sloping sides (from 20 to 40% and from 60 to 80%), and a flat top between 40 to 60% (Figure 1).

Figure 1 – Kanter’s hat-shaped curve



Following this line of reasoning, we test a threshold effect for the relationship between gender diversity at the two organisational layers we consider and firm performance. We explore how four degrees of gender diversity (less than 20%, 20 to 40%, 40 to 60%, and 60 to 80% women) at the two organisational layers affect firm performance. A validation of three sets of hypotheses would indicate, by transitivity, that firms with *balanced* populations outperform those with *skewed* and *tilted* populations.

Hypothesis 2a: Firms with 20 to 40% women (male-tilted) in the middle-management population outperform those with less than 20% (male-skewed).

Hypothesis 2b: Firms with 20 to 40% women (male-tilted) in the staff population outperform those with less than 20% (female-skewed).

Hypothesis 3a: Firms with 40 to 60% women (balanced) in the middle-management population outperform those with 20 to 40% (male-tilted).

Hypothesis 3b: Firms with 40 to 60% women (balanced) in the staff population outperform those with 20 to 40% (male-tilted).

Hypothesis 4a: Firms with 60% to 80% women (female-tilted) in the middle-management population underperform those with 40 to 60% (balanced).

Hypothesis 4b: Firms 60% to 80% women (female-tilted) in the staff population underperform those with 40 to 60% (balanced).²

METHODS

Data

As the basis for our methodology, we collect data on the 250 largest French public companies listed on the French Securities Exchange for 2016 (SBF250). By French law, listed companies have to report information on gender diversity at four hierarchical levels: board of directors, executive committee, middle management, and staff. In France, the legal definition of a middle manager ('cadre') makes it more straightforward to obtain consistent and comparable data for one company to another. The data are collected from company annual reports, corporate social responsibility (CSR) reports, and registration documents. After excluding firms with missing data, our final sample includes 159 firms with complete data at all hierarchical levels.

We also test whether there is selection bias for the dependent variables as well as the control variables (Table 1). To do this, we gather information for all companies on the SBF 250 index and compare whether the sample with missing information on gender diversification is

² To be fully consistent, we should add Hypothesis 5, testing whether firms with 60 to 80% women (female-tilted) outperform firms with 80 to 100% women (female-skewed). Unfortunately, due to data limitations, we cannot test this as there was no firm in the sample with more than 80% women.

significantly different. On average, the companies with missing gender information are significantly smaller than the whole sample. However, for all other variables, the difference between the omitted companies and the overall sample is not statistically significant; hence, there is no validation to the hypothesis of selection bias.

Table 1: Selection bias

Variable	In sample companies		Omitted companies		T-stat*
	Mean	Standard deviation	Mean	Standard deviation	
Dependent Variables					
Net Margins	6.47	13.21	7.73	10.11	57.5
EBIT Margins	11.52	15.64	12.45	11.07	71.7
EBITDA Margins	18.76	17.45	20.41	15.73	63.4
Tobin's Q	2.21	1.71	2.34	1.39	67.6
Control variables					
Percentage of women, board level	0.37	0.10	0.33	0.11	7.2
Percentage of women, exec. committee	0.16	0.15	0.12	0.14	16.9
Size of Board	11.01	3.80	10.36	3.55	38.4
Market Capitalisation (log of)	8.36	2.24	7.51	1.25	0.5
Beta	0.73	0.38	0.85	0.36	10.8

Dependent Variables

Building on previous empirical research, we propose to operationally define firm performance using common measures: the *Net Margin*, the earnings before interest and taxes (*EBIT*) margin, and the earnings before interest, taxes, depreciation, and amortisation (*EBITDA*) margin (Ali & Konrad, 2017; Post & Byron, 2015; Smith & al., 2006), and *Tobin's Q* (Marinova et al., 2016; Reguera-Alvarado et al., 2017). Those three margins describe different aspects of the profit and loss (P&L) statement of a company and, thus, embody different managerial decisions. The *Net Margin* reflects the total revenue after accounting for all outgoing cash flow and additional income streams including input costs, other operational expenses, debt payments, such as interest, investment income, income from secondary operations, and one-time payments for unusual events such as lawsuits and taxes. The *EBIT* margin represents earnings before interest and taxes and is also known as the operating margin. Finally, the *EBITDA* margin represents a company's operating profit as a percentage of its revenue. By using these metrics, we focus

purely on operational efficiency, avoiding firm financial decisions that affect the leveraging of profits or tax optimisation at multinationals. Such elements muddle the results as they depend on management decisions that do not fully correlate with the operational efficiency of the company. Finally, the inclusion of *Tobin's Q* provides another approach often used in the literature, which compares the market value of the firm with its book value. We use the three-year average for these variables over the period 2016-2018 to smooth the variables and diminish the effect of one-off movements at a specific date.

Independent variables

Gender diversity: to examine the organisational level that matters most, we alternatively use the two hierarchical levels included in the reports on gender diversity, *middle management* and *staff*. The diversity literature often uses the Blau index defined as $1 - \sum P_i^2$, where P_i represents the fractions of the population in each group (Ali et al., 2011). Below we use this index as well in our econometric approach.

One critical caveat of our approach is reverse causality. We cannot exclude the possibility that the best performing firms attract women (Smith et al. 2006) or that women select those firms. To address those endogeneity issues, following Dittman et al. (2010) and Farrell and Hersch (2005), we use a lag explanatory variable. Our gender diversity variables relate to 2016 information published in 2017 reports.

Control variables

Percentage of women on the board and percentage of women on the executive committee. As stated, gender diversity has been tested at these hierarchical levels with inconclusive results. We control for those variables to capture the effect of gender diversity specifically at the middle management and staff levels. Hence, we have to control for feminisation at other hierarchical levels.

Size of the board. Some previous research has pointed out that the size of the board of directors might affect firm performance (Marinova et al., 2016). Hermalin and Weisbach (2003) find a negative relationship between board size and firm performance and Carter et al. (2003) find a positive link between board size and Tobin's Q.

Firm size. Due to economies of scale, large organisations have a greater potential to make large profits. We use the log of the average market capitalisation over the period as a proxy of size.

Beta. a higher percentage of women in an organisation is usually associated with a lower level of risk being undertaken (Croson & Gneezy, 2009; Niederle & Vesterlund, 2007). A traditional capital market approach would suggest that riskier companies have to reward their shareholders better than companies with lower risk profiles; hence, they have to be more profitable to justify their risky profiles. We control for this bias by using the market's beta of the companies over the period.

Industry. We retain the Euronext industry classification codes for the listed French companies. The classification contains 10 industry types. We aggregate the 10 sectors in three groups, creating two dummies variables. First, we use a dummy for material: the first two sectors of the classification 'Oil & Gas' and 'Basic materials', and the second for consumer-related sectors: this encompasses the three sectors 'Consumer goods', 'Healthcare', and 'Consumer services'.

RESULTS

Table 2 presents the cross-sectional mean values of the variables we use in the regressions. For our gender variable, it is worth mentioning two points. First, the average percentage of women on the executive committee (16%) is lower than at middle management (34%), which is lower than at the staff level (40%). Moreover, there is vast heterogeneity among companies. The second point worth highlighting is that the variable 'Board level' is very homogeneous, with a standard deviation of only 0.10 and a small gap between the limits of the first and third quarter.

Due to a French legal obligation (Copé-Zimmermann law), companies have been forced to increase the number of women on their boards to reach a 40% quota as of January 2017. Thus, they have converged to similar ratios (40%). This phenomenon suggests that this variable, often used in academic studies, has become less discriminant in the French case.

Table 2: Summary statistics

Variable	Mean	Standard deviation	Median	First quartile	Second quartile	Nmbr observations
Gender variables						
Percentage of women, manager level	0.34	0.16	0.30	0.22	0.44	159
Percentage of women, all company	0.40	0.17	0.37	0.26	0.54	177
Control variables						
Percentage of women, board level	0.36	0.10	0.38	0.30	0.43	184
Percentage of women, executive committee	0.16	0.15	0.13	0.00	0.25	184
Size of Board	10.91	3.76	11.00	8.00	13.00	184
Market Capitalisation (log of)	7.64	2.13	8.08	6.03	9.22	184
Beta	0.75	0.37	0.75	0.50	0.96	184
Profitability (average 2016-2018)						
Net Margins	6.67	12.74	5.08	2.51	9.46	169
EBIT Margins	11.67	14.97	9.35	5.56	15.45	162
EBITDA Margins	19.03	17.15	14.33	9.46	23.94	162
Tobin's Q	2.23	1.66	1.76	1.10	2.71	177

The gender variables we looked at have weak correlation (Table 3). If the percentage of women in the staff population is highly correlated with the percentage of middle managers (76% correlation), the correlation drops considerably at higher hierarchical levels. The correlation between the percentage of women on the board and the three other gender variables is very low and not even statistically significant at the 10% level. These results provide further justification of our approach, as the information in these ratios is largely different depending on the hierarchical level.

Table 3: Correlation between variables

	Manager	All company	Board	Exec. Com.	Size of Board	Market Cap (log)	Beta	Net Margins	EBIT Margins	EBITDA Margins	Tobin's Q
Percentage of women, manager level	100.0										
Percentage of women, all company	75.9	100.0									
Percentage of women, board level	-0.8	2.3	100.0								
Percentage of women, executive committee	41.7	32.1	2.1	100.0							
Size of Board	-10.3	-6.9	29.3	-8.8	100.0						
Market Capitalisation (log of)	-18.3	-7.1	41.4	-16.6	61.1	100.0					
Beta	-26.3	-16.6	5.4	-26.4	35.4	39.7	100.0				
Net Margins	11.0	15.6	3.2	-1.3	6.2	20.4	-9.8	100.0			
EBIT Margins	9.1	17.4	17.6	2.4	8.2	30.1	-5.5	86.6	100.0		
EBITDA Margins	7.0	13.5	8.5	10.1	2.6	20.5	-13.2	72.0	80.6	100.0	
Tobin's Q	5.6	1.5	-3.7	-4.4	-7.8	9.4	3.3	9.8	9.8	10.0	100.0

Profitability and gender diversity

Table 4a below shows the results of ordinary least squares (OLS) regressions when the dependent variable is *Net Margin*. The first regression is without the gender diversity variable and with only the control variables. Gender diversity when measured at the board of director and executive committee levels is not statistically significant. This adds to the mixed results mentioned in the literature review on the link between gender diversity and firm performance. The size of the company positively affects its profitability. Consistent with financial theory, the risk profile of the firms also influences their profitability; the riskier ones seemed to have fared worse during the period under review.

The following two regressions add the gender diversity variables; in the first case with the percentage of female middle managers, and in the second, with the percentage of women at the staff level. In both instances the gender diversity variables are statistically significant, supporting our assumption of the positive impact of gender diversity on profitability (supporting hypotheses H1a and H1b). Gender diversity at the staff level is a much better explanatory variable (t-stat significant at the 1.9% level) than the percentage of female middle managers (t-stat significant at the 9.1% level). This validates the view that a lower hierarchical level is more relevant in terms of measuring the impact of diversity on profitability.

Finally, the two last regressions introduce non-linearity in the relationship between profitability and gender diversity by using the Blau index instead of the plain gender diversity variable. By

using the Blau index, we impose a specific form to the relationship, a polynomial of degree two, with the aim to eventually find an inverted-U relationship. The result is less supportive. This suggests that the relationship between gender diversity and firm performance is not an inverted U-shaped one.

Table 4a: Net Margins as a function of gender diversity

Dependent variable	Net Margins (average 2016-2018)				
	Middle-managers		Women	Women	
Constant	0.87 (5.00)	-2.30 (5.66)	-2.19 (5.25)	10.84 (10.14)	16.04 * (9.61)
Gender		13.92 * (8.45)	15.37 ** (6.50)		
Blau Index - Gender				-14.83 (12.25)	-23.35 * (13.16)
Market Cap	2.09 *** (0.63)	2.24 *** (0.72)	2.27 *** (0.66)	2.22 *** (0.72)	2.31 *** (0.67)
Size of Board	-0.11 (0.32)	-0.32 (0.38)	-0.13 (0.34)	-0.31 (0.39)	-0.14 (0.34)
% of Wom. at the BoD	-10.08 (10.88)	-10.30 (12.61)	-17.81 (12.15)	-9.08 (12.62)	-15.45 (12.19)
% of Wom. at the EC	-1.67 (7.07)	-2.01 (8.35)	-3.67 (7.44)	-0.06 (8.21)	-2.24 (7.44)
Beta	-7.89 *** (2.92)	-6.39 * (3.26)	-7.69 *** (2.94)	-7.06 ** (3.25)	-8.26 *** (2.97)
Dum, sector 1	5.60 (4.06)	5.52 (4.39)	7.27 * (4.30)	5.76 (4.42)	7.21 * (4.34)
Dum, sector 2	0.81 (2.02)	-2.23 (2.46)	-2.03 (2.19)	-1.84 (2.48)	-0.88 (2.09)
R-squared	0.096	0.108	0.139	0.100	0.125
Adj. R-squared	0.056	0.055	0.094	0.047	0.080
No observations	169	145	163	145	163

Signif. codes: 1% '***' 5% '**' 10% '*'

We run the same set of five regressions using EBIT and EBITDA margins as the dependent variables, followed by Tobin's Q (Tables 4b, 4c, and 4d). The first additional two metrics suggest similar findings and reinforce the conclusion that gender diversity does matter, but only at the lower hierarchical levels. The three operating metrics are positively related to the percentage of women in the company and also, albeit to a somewhat lesser extent, to the percentage of female middle managers.

Table 4b: EBIT margins as a function of gender diversity

Dependent variable	EBIT (average 2016-2018)				
		Middle-managers	Women	Middle-managers	Women
Constant	-5.70 (6.01)	-8.63 (6.84)	-11.03 * (6.34)	3.92 (12.17)	11.43 (11.43)
Gender		14.33 (10.42)	20.78 ** (8.12)		
Blau Index - Gender				-13.89 (15.02)	-27.68 * (15.98)
Market Cap	2.92 *** (0.72)	3.18 *** (0.83)	3.03 *** (0.76)	3.16 *** (0.83)	3.08 *** (0.77)
Size of Board	-0.43 (0.38)	-0.67 (0.45)	-0.42 (0.40)	-0.65 (0.45)	-0.46 (0.40)
% of Wom. at the BoD	10.64 (12.80)	9.96 (14.82)	4.22 (14.20)	11.48 (14.80)	7.54 (14.30)
% of Wom. at the EC	2.47 (8.28)	1.31 (9.73)	0.29 (8.64)	3.42 (9.54)	2.47 (8.67)
Beta	-5.87 * (3.45)	-4.65 (3.90)	-4.76 (3.48)	-5.44 (3.85)	-5.77 (3.49)
Dum, sector 1	-1.48 (4.71)	-1.54 (5.09)	0.22 (4.95)	-1.57 (5.12)	-0.14 (5.01)
Dum, sector 2	-0.97 (2.38)	-4.49 (2.96)	-5.07 * (2.66)	-3.94 (2.99)	-3.14 (2.49)
R-squared	0.129	0.158	0.178	0.152	0.159
Adj. R-squared	0.090	0.107	0.133	0.100	0.113
No observations	162	139	156	139	156

Signif. codes: 1% '***' 5% '**' 10% '*'

Table 4c: EBITDA margins as a function of gender diversity

Dependent variable	EBITDA (average 2016-2018)				
	Middle-managers		Women	Middle-managers	
Constant	8.68	6.46	5.06	17.63	33.02 **
	(6.97)	(7.78)	(7.52)	(13.81)	(13.34)
Gender		10.81	16.84 *		
		(11.85)	(9.62)		
Blau Index - Gender				-12.96	-38.50 **
				(17.05)	(18.65)
Market Cap	2.94 ***	3.00 ***	3.23 ***	2.99 ***	3.29 ***
	(0.84)	(0.94)	(0.90)	(0.94)	(0.90)
Size of Board	-0.44	-0.78	-0.54	-0.78	-0.57
	(0.44)	(0.51)	(0.47)	(0.51)	(0.47)
% of Wom. at the BoD	-4.75	-5.83	-14.46	-4.89	-11.78
	(14.86)	(16.87)	(16.83)	(16.80)	(16.69)
% of Wom. at the EC	11.98	18.98 *	12.32	20.33 *	12.65
	(9.61)	(11.07)	(10.24)	(10.83)	(10.11)
Beta	-9.76 **	-5.43	-8.22 **	-5.97	-9.00 **
	(4.00)	(4.44)	(4.12)	(4.37)	(4.07)
Dum, sector 1	2.98	3.06	5.72	3.12	5.83
	(5.46)	(5.79)	(5.87)	(5.81)	(5.84)
Dum, sector 2	-1.62	-6.17 *	-5.12	-5.98 *	-4.37
	(2.76)	(3.37)	(3.16)	(3.39)	(2.90)
R-squared	0.105	0.125	0.138	0.123	0.145
Adj. R-squared	0.065	0.071	0.091	0.069	0.098
No observations	162	139	156	139	156

Signif. codes: 1% '***' 5% '**' 10% '*'

The results are not convincing in the case of Tobin's Q (Table 4d). One interpretation could be that Tobin's Q embodies too much information, representing a ratio between the book value of the firm and the market value, and thus is influenced by accounting practices (the treatment of goodwill, for instance, could cause significant variation in the book value) but also by market distortion (one can imagine that low-risk companies trade at a lower risk premiums and, hence, have higher market values, while our tests focus on efficiency rather than stability). Overall, our gender variables provide too little information to explain that.

Table 4d: Tobin's Q as a function of gender diversity

Dependent variable	Tobin's Q (average 2016-2018)				
	Middle-managers		Women	Women	
Constant	2.07 *** (0.61)	2.16 *** (0.71)	2.25 *** (0.66)	2.98 ** (1.25)	2.32 * (1.25)
Gender		1.03 (1.05)	-0.24 (0.86)		
Blau Index - Gender				-0.84 (1.57)	-0.22 (1.75)
Market Cap	0.19 ** (0.08)	0.20 ** (0.09)	0.24 *** (0.09)	0.20 ** (0.09)	0.24 *** (0.09)
Size of Board	-0.10 ** (0.04)	-0.11 ** (0.05)	-0.12 *** (0.05)	-0.11 ** (0.05)	-0.12 *** (0.05)
% of Wom. at the BoD	-0.98 (1.37)	-1.85 (1.56)	-2.02 (1.55)	-1.80 (1.56)	-2.05 (1.55)
% of Wom. at the EC	-0.61 (0.89)	-0.85 (1.06)	-0.13 (0.97)	-0.63 (1.03)	-0.22 (0.95)
Beta	0.27 (0.38)	0.29 (0.42)	0.38 (0.39)	0.25 (0.42)	0.38 (0.39)
Dum, sector 1	-1.22 ** (0.55)	-1.23 ** (0.61)	-1.04 * (0.61)	-1.20 ** (0.61)	-1.03 * (0.61)
Dum, sector 2	0.36 (0.26)	0.09 (0.32)	0.32 (0.29)	0.14 (0.31)	0.28 (0.27)
R-squared	0.086	0.077	0.092	0.073	0.091
Adj. R-squared	0.048	0.027	0.047	0.022	0.046
No observations	177	154	171	154	171

Signif. codes: 1% '***' 5% '**' 10% '*'

The statistical analysis validates the hypothesis of a positive relationship between gender diversity and firm performance. However, it does not provide any support for an inverted U-

shaped curve. This result could be due to the fact that there is no such relation, but it could also be because the form we imposed, a polynomial of degree two, is inappropriate.

However, the theory assuming the threshold effect exists could lead to a more complex form of the relationship, including a critical mass condition and, eventually, a hat-shaped relationship.

Critical mass and firm performance

To test the critical mass hypothesis and non-linearity in the relationship, following Kanter (1977), we define four brackets of gender diversity: firms with a *male-skewed* population (<20% females), firms with a *male-tilted* population (20-40% females), those with a *balanced* population (40-60% females), and finally, those with a *female-tilted* population (40-60% females). The purpose is to look for two threshold effects linking gender diversity and firm performance: one related to female underrepresentation and the other to female overrepresentation. We aim to explore whether too many men have the same impact as too many women and whether the real issue that improves firm performance is truly diversity. If diversity matters, overrepresentation should affect performance similarly as underrepresentation.

For this, we run a Mann-Whitney test. Table 5 shows, for the different metrics of profitability and for the two different metrics of gender diversity, whether companies in the *male-skewed* bracket have significantly different metrics than those in the second bracket (*male-tilted*) (Table 5a). We then test whether the *male-tilted* bracket differs from the *balanced* one (Table 5b) and whether the *balanced* one differs from the *female-tilted* bracket (Table 5c).

Table 5: Mann-Whitney test for profitability at different brackets of gender diversity

Table 5a

Difference between companies with male skewed population (<20% females) and companies with male tilted population (20-40% females)

P-value	Net Margins	EBIT Margins	EBITDA Margins	Tobin's Q
% of female middle-managers	86.2%	60.3%	50.2%	86.8%
% of women (staff)	58.5%	76.9%	72.0%	25.5%

Table 5b

Difference between companies with male tilted population (20-40% females) and companies with balanced population (40-60% females)

P-value	Net Margins	EBIT Margins	EBITDA Margins	Tobin's Q
% of female middle-managers	3.9% **	7.6% *	6.0% *	92.9%
% of women (staff)	8.9% *	11.4%	3.0% **	14.6%

Table 5c

Difference between companies with balanced population (40-60% females) and companies with female tilted population (>60% females)

P-value	Net Margins	EBIT Margins	EBITDA Margins	Tobin's Q
% of female middle-managers	79.9%	48.9%	92.5%	33.0%
% of women (staff)	89.3%	42.0%	66.1%	12.1%

Signif. codes: 1% '***' 5% '**' 10% '*'

Table 5d

Difference between companies with male skewed population (<20% females) and companies with balanced population (40-60% females)

P-value	Net Margins	EBIT Margins	EBITDA Margins	Tobin's Q
% of female middle-managers	10.2%	23.9%	33.9%	80.6%
% of women (staff)	10.2%	17.7%	8.1% *	70.1%

Signif. codes: 1% '***' 5% '**' 10% '*'

The first finding is that a slight increase in gender diversity, namely, comparing firms with *male-skewed* populations to firms with *male-tilted* populations, does not reflect any significant change in profitability metrics. This result holds true regardless of the metric we use for gender diversity or the profit metric we compare. The P-value is sufficiently high to reject the null hypothesis with a high degree of confidence. In conclusion, hypotheses H2a and H2b are rejected: *Firms with male-skewed or male-tilted* populations have the same effect on firm performance.

The comparison between firms with a *male-tilted* population (20-40% female) and those with *balanced* (40-60% female) populations suggests a significant and positively altered profit distribution. When the test is rejected, it is by a small margin, which suggests that a larger sample could lead to a more supportive answer. These results validate hypotheses H3a and H3b:

firms with *balanced* populations are significantly more profitable than those with *male-tilted* and *male-skewed* populations.

We also test if firms with *male-skewed* populations are different from firms with *balanced* populations. By transitivity, firms with *male-skewed* populations should differ from firms with *balanced* ones. The results support such transitivity (Table 5c): the *balanced* group does, indeed, outperform the other two groups where women are underrepresented (*male-skewed* and *male-tilted*).

By contrast, the comparison between firms with *balanced* populations and those with *female-tilted* ones provides less convincing results: statistically, there is no difference between the two samples. This result suggests, however, that a critical mass of women is reached in firms with *female-tilted* populations with positive externality on profitability; and diversification gains disappear past this threshold.

The difference between firms with *male-tilted* populations and those with *balanced* population and that between *male-skewed* firms and *male-tilted* firms suggests that the threshold in the 20 to 40% bracket is closer to 40% than to 20%. Our results partly validate the hat-shaped relationship between gender diversity and performance. We point out the right flat border of the hat (between 0 and 35%), a steep right slope between 35 and 40% and, a flat top between 40 to 60%, but lack data to empirically prove the left border of the hat.

The second finding is that the metrics most influenced are those affecting the P&L: *Net Margin*, *EBIT*, and *EBITDA* margins seem to differ significantly across the firm groupings, although the effect on Tobin's Q is less convincing. However, the form of the relationship of profitability measured by *Net Margin*, *EBIT*, and *EBITDA* and gender diversity remains unclear. We try to precisely depict the shape of this relationship in the following.

A graphical perspective

Chart 1a shows the graphical relationship between gender diversity measured as the percentage of female middle managers and profitability measured as net income margins. First, it appears that there is, indeed, an upward sloping relationship between gender diversity and profitability across firms with gender diversity ranging from 0% to 50%, supporting our hypothesis H1a. The chart also shows evidence of a nonlinear relationship. Specifically, it shows some levelling off when the percentage of women in the firms exceed 50%, with some very tentative evidence that the relationship is downward sloping as women become the dominant population in the firms. The upward pattern when gender diversity is below 50% is consistent with H2a and H3a, while the levelling off after this could be interpreted as a form of support for hypothesis H4a. These findings support the Kanter assumption that the highest positive impact comes from a balanced population (40 to 60%). It also supports the assumption of a hat-shaped relationship that would be symmetrical in the neighbourhood of 50%. However, there are few instances of companies with a majority of women, let alone companies with more than 60% women. Those with more than 60% are also clustered near the top mark and, hence, not sufficiently differentiated to provide clear-cut results. This is one limitation of our study, making it difficult to fully test for the downward slope of the relationship when women are dominant; thus, explaining the difficulty associated with testing H4a.

For consistency, we produce the same chart with the number of women (chart 1b). The graphical interpretation is similar with an upward sloping relationship up to 50% and a plateau reached after this.

Chart 1a

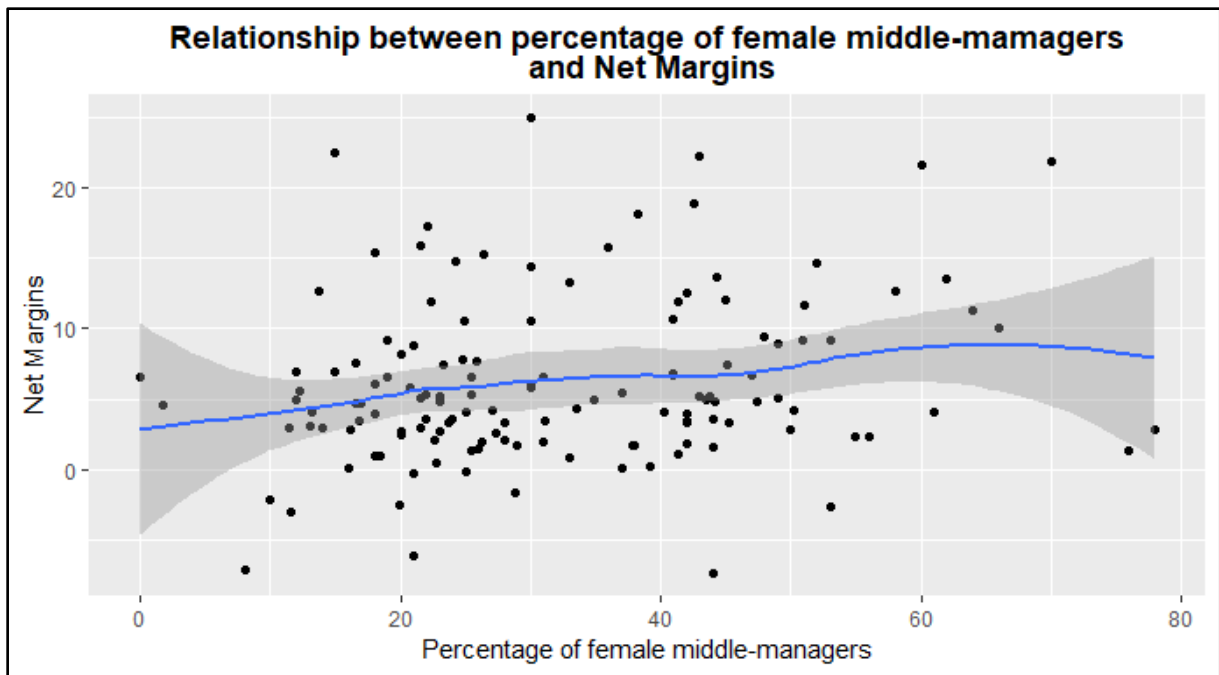
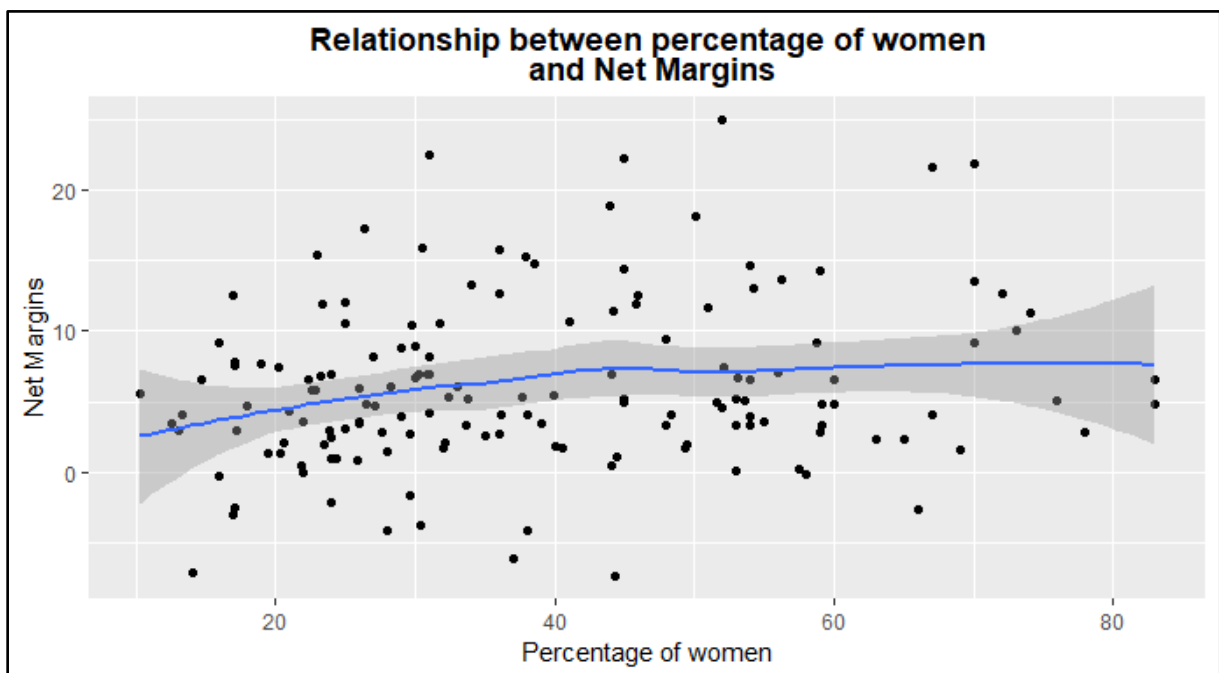


Chart 1b



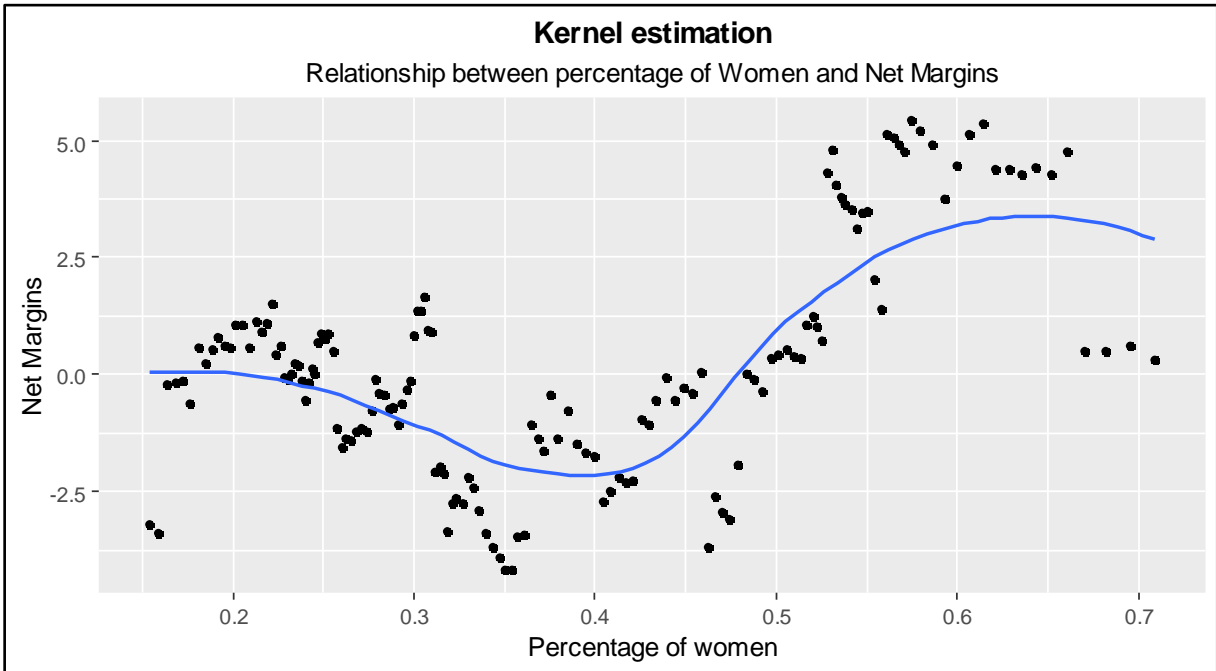
The non-parametric test to capture the non-linearity of the relationship

To further investigate the shape of the relationship we found for the three P&L variables (net margin, EBIT, and EBITDA), we rely on a non-parametric test. We use a kernel density approach that is fully agnostic in terms of the shape of the relationship. First, we correct the

dependent variable from the control variables. Then, at each point of the independent variable, we estimate a linear kernel density function and extract the mean. This provides an estimate of the expected level of profitability, adjusted for the control variables, for firms with a given level of gender diversity.

Chart 2a estimates the relationship between the percentage of women at a firm and the net margin (adjusted for control variables). The shape of the curve confirms that there is no increase in profitability in firms with a greater percentage of women from 0 to 40%. However, the relationship clearly becomes upward sloping as the share of women in the firms becomes closer to 50%. Although we have few data points above 50%, let alone above 60%, we find signs that the relationship is also, indeed, downward sloping after 50%, when women become too dominant in a firm and gender diversity declines.

Chart 2a



The charts 2b and 2c reflect the same approach, again using the percentage of women as the independent variable, but using two other profitability metrics, EBIT and EBITDA margins. Similarly, we find the three characteristics that we are looking for: first, a threshold effect, as the relationship is broadly flat up to a percentage of 40% women in the firms; second, an upward

sloping relationship when the 40% threshold is passed, validating that diversity has an impact on profitability; and third, signs of declining profitability when the 50% mark is passed and gender diversity declines. The kernel approach graphically supports the hypothesis of a hat-shaped relationship between gender diversity and performance.

Chart 2b

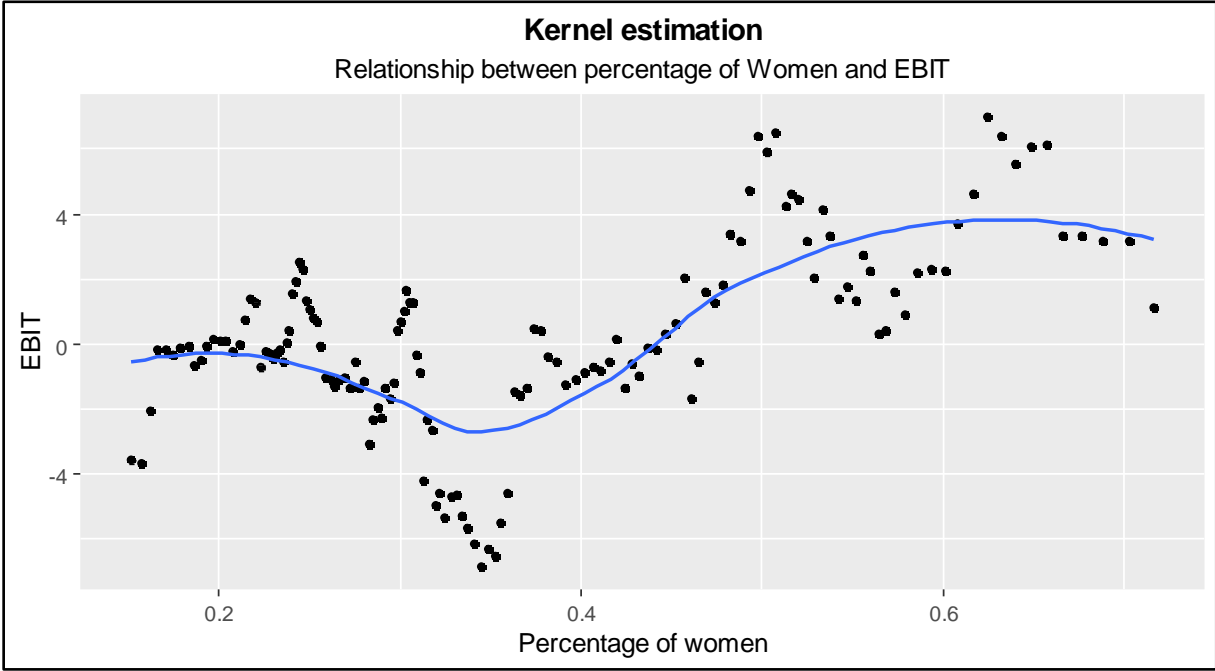
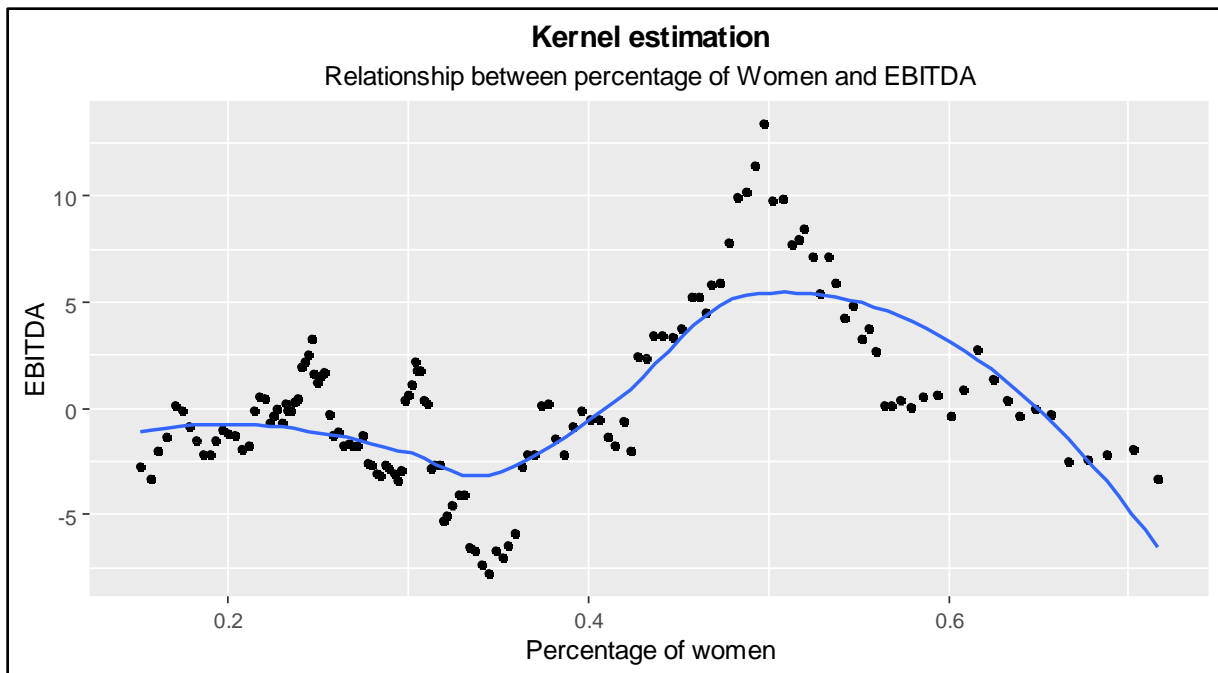


Chart 2c



Finally, we run the same non-parametric tests again with the three profitability metrics, but this time using the percentage of female middle managers as the explanatory variable. (Charts 3a and 3c are presented in the Appendix.) Although there is some similarity, the results from these tests are less clear-cut than in the previous case.

The findings from this are essentially twofold. First, the relationship seems to be, indeed, more complex than a simple inverted-U relationship. Hence, our ‘hat-shaped’ description: the relationship is essentially flat up to 40%, which appears to be the critical mass threshold; then, the relationship becomes more clearly positive. Although the subsample of companies with a majority of women is unfortunately limited, we find tentative evidence that the relationship is at least stable past 50%, if not declining. This suggests that a symmetry around 50% is highly plausible.

Second, our main finding is that the gender diversity relationship is more convincing at the staff level than at the middle-management one. It appears, thus, from this that gender diversity matters more at a lower hierarchical level.

DISCUSSION

The purpose of this article is to contribute to the debate on gender diversity and firm performance by discussing two unexplored organisational layers: middle management and staff.

There are several interesting findings. First, gender diversity in both the middle management and staff populations positively affects firm profitability. In most cases, the three profitability metrics are significantly positively impacted by gender diversity in middle management and staff populations. The consistency of the gender variables in explaining the three different metrics should be considered a further affirmation of their reliability. Overall, we find that the P&L metrics as dependent variables provide the best results. They also are the simplest efficiency metrics as they report the profits of the companies with little accounting leeway.

Second, although the percentages of female middle managers and women in the staff populations are both statistically significant in explaining profitability, the latter is more powerful. The t-stat is systematically higher, showing a strong consistency of results across the profitability metrics.

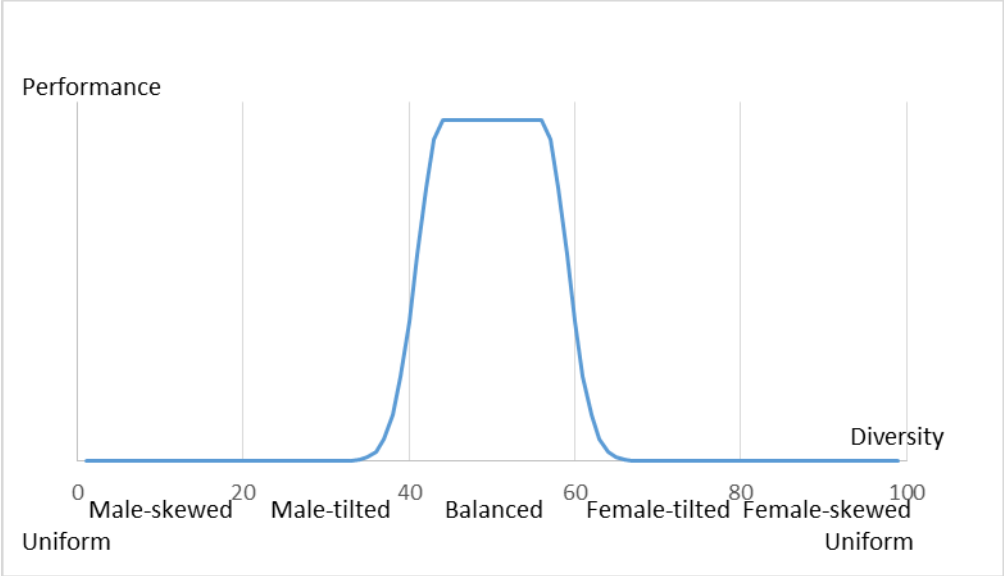
Overall, these findings support two hypotheses. The first is that diversity matters: a higher proportion of women is, indeed, associated with superior profitability when measured by net margin, EBIT, or EBITDA. The second is that rather than looking at the board of directors and executive committees, it is more relevant to examine lower hierarchical levels, namely, middle management and staff. Such assumptions have, to our knowledge, never been tested in previous studies due to data limitations.

Thus, our study allows a better evaluation of the contribution of each organisational layer to performance. Our research also sheds light on the threshold effect by investigating the impact of a critical mass of women at multiple hierarchical levels on company performance. A critical mass of women at approximately 40% of middle management provides a competitive advantage; increasing the proportion above this improves competitiveness up to approximately

50 to 60%. Beyond that, evidence of incremental gains wane and we even find evidence of a downward sloping relationship, validating the view of a broadly symmetrical relationship. Such a hat-shaped relationship between gender diversity and firm performance seems to be more salient at the staff level. The graphical analysis (Figure 2) shows a flat relationship (no impact) from 0 to 40%, a positive impact after 40%, with an optimal impact around 50%, followed by a similarly patterned decline.

Thus, the results suggest a flat top, hat-shaped curve linking gender diversity and firm performance. Male-dominant firms show similar performance to female-dominant firms and outperform balanced firms. However, the form of the hat differs somewhat from the one suggested by Kanter. Our results suggest two flat borders from 0 to 35% and from 65 to 100% and two steep slopes from 35 to 40% and from 60 to 65%. The flat top stands between 40 and 60% (Figure 2). However, such results require more empirical research to be validated.

Figure 2 – Our research hat-shaped graph



From the RBV of the firm, gender diversity at middle management and staff levels provides a sustainable competitive advantage as a resource that creates value (V), is rare (R), imperfectly imitable (I), and non-substitutable (N). A balanced population (between 40 to 60%) is a valuable resource that contributes to efficiency and success (such firms are more profitable). It is also a

rare resource. Among our sample, only 30.1% of firms had balanced middle-management populations and 32.2% balanced staff populations. Diversity at these organisational levels would be difficult to imitate. For a large company, this would mean significant hiring shifts and dismissals, which would require time to implement. Thus, an adequate gender ratio at these two hierarchical levels will represent a sustainable competitive advantage by virtue of being a condition that cannot be easily imitated by competitors. Thus, it is difficult to consider that such diversity is substitutable. For instance, value creation due to similarity between saleswomen and female customers can rarely be substituted by anything else. Such findings contribute to resource-based theory and to strategic human resource management by highlighting the importance of gender diversity at middle management and, even more importantly, at staff levels to provide a sustainable competitive advantage.

LIMITATIONS

This study has some limitations. First, the restricted sample size and the cross-sectional approach may not allow for a complete picture of the main effects at play. Nevertheless, the sample size was determined solely by the availability of data from the 250 listed companies, and missing data led to the retention of 62.4% of the population of interest. Second, selection bias could occur based on the missing data. It is possible that companies with less than desirable levels of gender representation may not have wished to publish this information in their reports. Conversely, companies taking pride in their diversity may readily have publicised these data for self-promotion. However, under the enforcement of the legal requirement, companies may no longer be able to withhold such information. Moreover, the econometric tests did not identify any selection bias. Finally, one limitation is due to the small number of data points with gender diversity above 60%, making it difficult to test robustly the downward relationship when gender diversity decreases due to too much female dominance. As illustrated in the charts, we found evidence of a ‘hat-shaped’ relationship. In other words, it seems that the relationship reaches a

plateau at approximately 50% with little difference in productivity, for example, between firms with 40% or 50% gender diversity. This result can also explain why tests in the sample ‘women tilted’ (i.e. a population of women between 60% and 80%) were inconclusive, as the vast majority of data points were only slightly above 60%, thus, not sufficiently differentiating.

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APPENDIX

The following charts present the kernel estimations, measuring gender diversity by the percentage of women managers. The results are less convincing than those reflecting the total percentage of women in the workforce.

Chart 3a

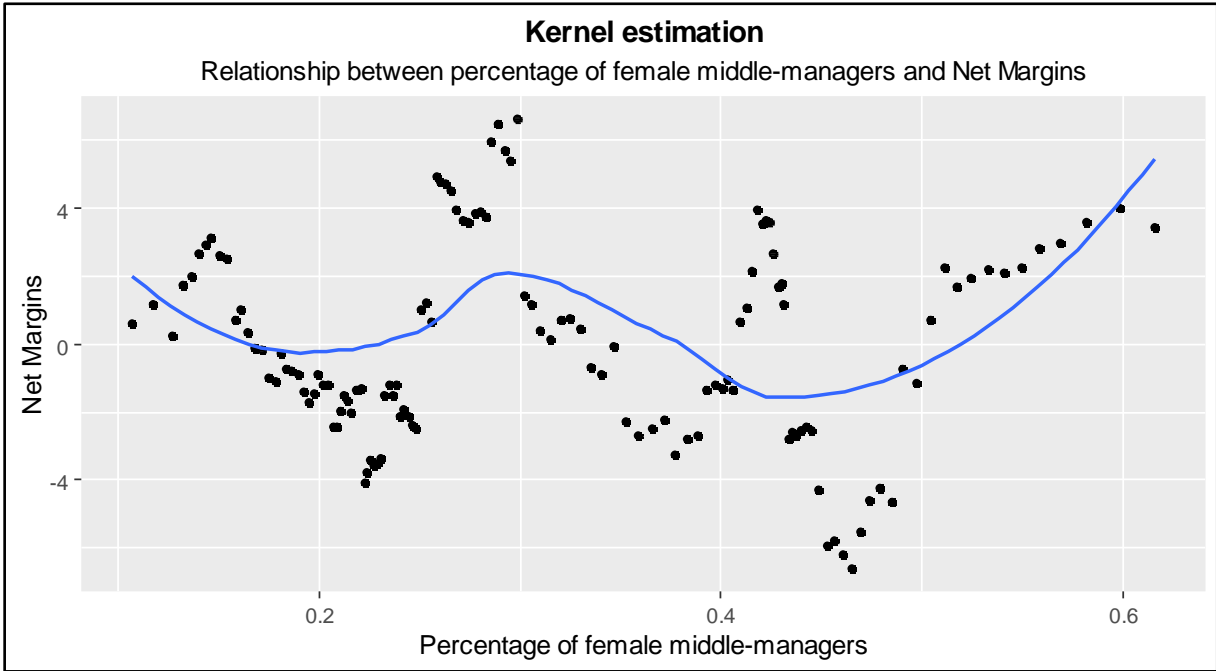


Chart 3b

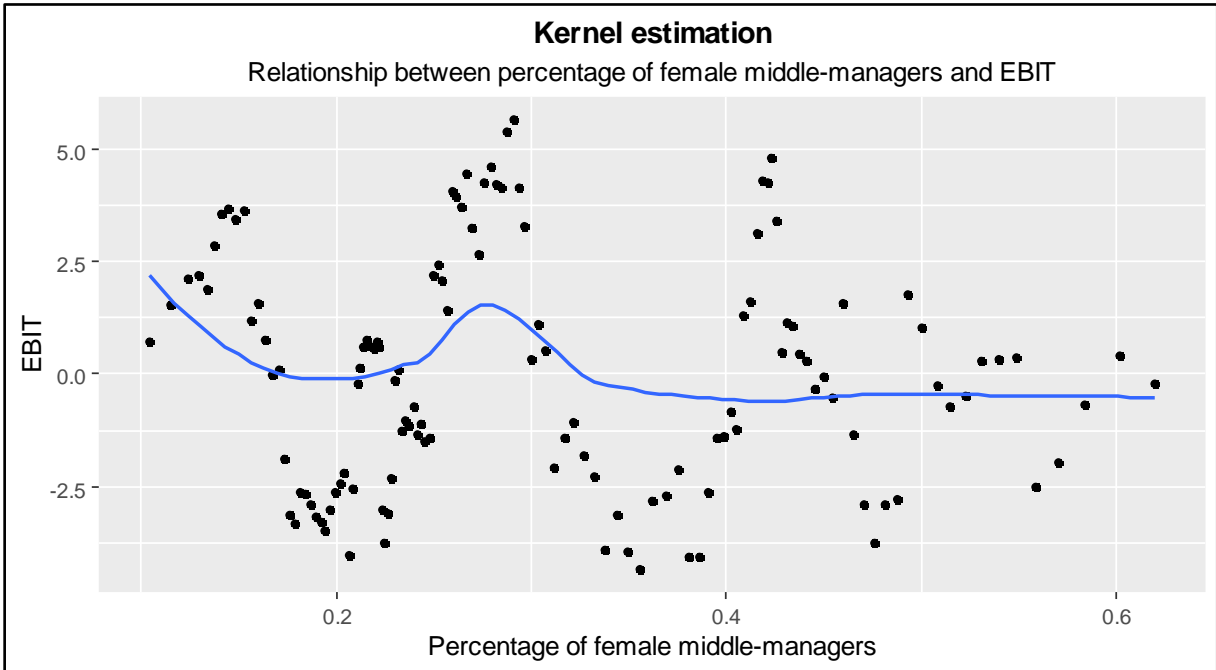


Chart 3c

