

1
2
3 **The gender diversity-performance linkage at the board of directors and the workforce**
4
5 **levels: Testing Two Competing Curvilinear Models in the Spanish educational sector**
6
7
8
9

10
11 **Abstract**
12

13 **Purpose:** The use of linear models has major limitations for accurately representing the true
14 link between gender diversity and organizational performance. This study explores two
15 curvilinear models and tests which one —the U-shape or the inverted U-shape— best represents
16 the gender diversity-performance link at two hierarchical levels: the board of directors and the
17 workforce.
18
19

20
21
22 **Design/methodology/approach:** Both models are tested using data collected from a
23 representative sample of Spanish educational organizations, which are dominated numerically
24 by women, although women are still slightly under-represented in managerial positions.
25
26
27

28 **Findings:** The results show the existence of an inverted U-shape and, therefore, the existence
29 of a potential ‘optimal’ level of gender diversity for both the board of directors and the
30 workforce. While the highest performance by the board of directors is attained when the
31 proportion of women and men is balanced in the workforce the highest level of performance is
32 attained when the proportion of women is greater.
33
34
35
36

37 **Originality:** There are hardly any studies simultaneously exploring the gender diversity-
38 performance linkage at two hierarchical levels where the proportion of women/men is
39 substantially different: the board of directors and the workforce. Thus, our study contributes to
40 better know whether such relationship is dependent on the hierarchical position. It is important
41 to know this because each level is related to different functions and tasks and shape a social
42 status that can significantly influence performance.
43
44
45
46
47

48 **Keywords:**

49 Gender diversity, female representation, workforce, boards, performance, educational
50 organizations.
51
52
53
54
55
56
57
58
59
60

Introduction

The last few years have witnessed the emergence of a large body of research focusing on exploring how the shape of the relationship between gender diversity and organizational performance (mainly in executive positions) is. This interest seems logical when one considers that the percentage of women in the global labor force has increased sharply, currently reaching figures close to 50% in many countries. Women also occupy more managerial positions, but their overall representation still remains low (Deloitte, 2019; The World Bank, 2021).

Even considering that the extant research uses different methodologies, its main findings can be summarized as follows: on the one hand, many studies argue that the presence of more women benefits organizations, reporting a positive linear correlation/relationship/effect in several performance measures (e.g., An & Lee, 2022; Moreno-Gómez, Lafuente, & Vaillant, 2018; Provasi & Harasheh, 2021). These studies assume that performance increases in step with the number of women. In contrast, other studies argue that the presence of more women might compromise organizations, reporting a negative linear correlation/relationship/effect (e.g., He & Huang 2011; Darmadi, 2013; Chen *et al.*, 2021). This implies that performance decreases as the number of women increases. Finally, other studies report that gender diversity is unrelated to organizational outcomes (for a review, see Abbey & Adu-Danso, 2022; Ali, Ng, & Kulik 2014 or Post & Byron 2015).

In an attempt to reconcile disparate findings, several researchers argue that neither positive nor negative monotonic linear models are suitable for representing the shape of the gender diversity-performance link (e.g., Abbey & Adu-Danso, 2022; Ali, Kulik, & Metz 2011; Ali *et al.*, 2014; Frink *et al.*, 2003; Luis-Carnicer *et al.*, 2008). They suggest that this link might be more accurately depicted by curvilinear models. In line with Luis-Carnicer *et al.* (2008), we posit that there are two types of curvilinear relationships. On the one hand, there is an inverted U-shape, which is based on the assumption that performance increases in step with the

1
2
3 proportion of women until an optimal threshold of gender diversity is reached, after which
4 performance decreases as more women join the group. On the other hand, there is a U-shaped
5 form, which is based on the notion that performance decreases as the proportion of women
6 increases until a certain threshold of gender diversity is reached, beyond which performance
7 increases as more women join the group.
8
9

10
11
12
13
14
15 This study aims to shed light on which curvilinear model can be considered a better
16 representation of the gender diversity-performance link. The point of departure is that past
17 studies using linear models have major limitations for properly representing this link, whereby
18 their findings should be interpreted with caution. So, this study may also allow us to discover *a*
19 *posteriori* the existence of a potential ‘optimal’ (or, alternatively, ‘worse’) proportion of women
20 to men in terms of performance, even though we are fully aware that such proportion can vary
21 in different contexts and/or samples of the study. In any case, linear models clearly do not
22 permit us to assess this issue. Moreover, this study addresses the gender diversity-performance
23 link at two different positions in the organizational hierarchy: board of directors and workforce.
24
25 The research setting consists of educational organizations, which have been traditionally
26 depicted as a ‘feminized environment’, as women account for the majority of the workforce
27 (OECD, 2022).
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42
43 This study contributes to the extant literature on gender diversity in several ways. First, we
44 test different competing predictions or hypotheses regarding the curvilinear shape of the gender
45 diversity-performance link. These hypotheses build on arguments from contrasting theoretical
46 perspectives that have explored this link in the last years. Thus, this study is an attempt to test
47 which theoretical arguments are more valid when explaining such an association. The use of
48 competing hypotheses is justified when prior knowledge about a particular topic *a priori* leads
49 to several alternative reasonable explanations (Ali *et al.*, 2014). Accordingly, this study can
50
51
52
53
54
55
56
57
58
59
60

1
2
3 guide us toward a better understanding of how the gender diversity-performance link really is,
4
5 and thus help to explain the inconsistent findings of past research.
6
7

8 Second, there are still few studies focused on identifying *a posteriori* an ‘optimal’ ratio of
9
10 women over men in terms of performance. Some outstanding exceptions are the studies by
11
12 Frink et al. (2003), Ali et al. (2011), Joecks, Pull, and Vetter (2013), Ali et al. (2014) or, more
13
14 recently, Abbey and Adu-Danso (2022). But, most these past studies seek to separately identify
15
16 the existence of a possible optimal rate of gender diversity either in the workforce or on boards
17
18 of directors in different types of organizations. In contrast, we explore the existence *a posteriori*
19
20 of a possible optimal (or worse) ratio in both the workforce and boards in order to know whether
21
22 such ratio and, hence, the specific form of the gender diversity-performance link is dependent
23
24 on the specific position that women occupy in the hierarchy. It is important to know this because
25
26 each hierarchical position accomplishes different functions and tasks within an organization
27
28 and shape a social status that can significantly influence performance (Choi, Sung, & Zhang,
29
30 2017).
31
32
33

34
35 Finally, the education sector in general, and secondary schools in particular, is an alluring
36
37 research setting for several reasons: On the one hand, this type of organizations is dominated
38
39 numerically by women in the workforce, although they are still slightly under-represented in
40
41 top managerial positions —both as leaders and on the board of directors (OECD, 2022). On the
42
43 other hand, most past research has been conducted on samples of manufacturing firms or firms
44
45 of service sectors that, in general, are considered masculinized environments. Thus, this study
46
47 adds and complements past research by examining whether our results are similar to those
48
49 conducted on other contexts. Additionally, the education sector has a major socio-economic
50
51 impact, as it represents a significant part of a country’s public spending. For example, in 2020,
52
53 the total budget on education in EU (Spain, where the study is conducted) amounted to 5.0%
54
55 (4.6%) of GDP; ‘secondary education’ accounted for 1.9% (1.8%) of GDP (Eurostat, 2022).
56
57
58
59
60

Conceptualizing Gender Diversity

Figure 1 illustrates the linear models by which the gender diversity-performance link is typically addressed by most existing research (see Models 1a and 1b), as well as the competing, curvilinear models posited in this paper (see Models 2a and 2b). Linear models assume that performance continues to increase/decrease as a particular gender proportion increases, and therefore do not allow identifying an 'optimal' gender diversity level. In contrast, Kanter (1977) classifies gender diversity in groups based on the range of different proportions of women and men into four main categories: uniform groups (UG) with 0/100 proportions, skewed groups (SG) with 5/95-15/85 gender proportions, tilted groups (TG) with 20/80-35-65 gender proportions, and balanced groups (BG) with 40/60-50/50 gender proportions. According to this classification, different levels of gender diversity should have different effects on performance. A fully gender diverse workplace (in our case, workforce and board of directors) should have an approximately 50/50 proportion of men and women. An increase (decrease) in the proportion of women (men) beyond (below) 50 per cent means the workforce and board of directors become less diverse (i.e. more homogeneous).

Insert Figure 1 here

The inverted U-shaped link between gender diversity and performance

An inverted U-shaped relationship (see *Model 2a*) can be derived from arguments and evidence related to the following theoretical perspectives: the resource-based view of the firm, the upper echelons theory, the value-in-diversity approach, and the information/decision-making perspective (see Figure 1).

Proponents of the resource-based view suggest that an organization can improve its performance by exploiting its rare, valuable, irreplaceable, and inimitable resources (Barney 1991). The potential to obtain a sustainable competitive advantage, and, hence a better

1
2
3 performance, depends on certain internal resources, and in particular the organization's human
4 resources. These are the internal resources that are among the more sustainable and difficult to
5 imitate for competitors. While optimizing these resources is cited as the most important strategy
6 for increasing competitiveness, effectively using and managing human resources becomes a
7 crucial factor for improving performance. Women are the human resources most cited as under-
8 utilized in most organizations (Harel, Tzafrir, & Baruch 2003). Therefore, greater gender
9 diversity in an organization's workforce and senior management is considered a source of
10 intangible and socially complex resources that may improve the organization's performance
11 (Ali *et al.*, 2011; Luis-Carnicer *et al.*, 2008). This is because a greater level of gender diversity
12 is expected to introduce an organization to multiple and distinct skills, abilities, competences,
13 knowledge, opinions, and backgrounds (Egan, 2005).

14
15
16
17
18
19
20
21
22
23
24
25
26
27
28 The upper echelons theory also provides a theoretical foundation for linking gender
29 diversity, especially at board or senior management level, and performance. According to this
30 approach, senior managers significantly differ in their cognitive frames, and these cognitive
31 frames, in turn, influence performance (Hambrick, 2007). Because senior managers' cognitive
32 frames are difficult to measure, most studies using this approach have relied on observable
33 characteristics, such as gender, as an appropriate proxy (Dezső & Ross 2012; Krishnan & Park
34 2005). This theory posits that female directors are likely to bring different cognitive frames to
35 a board due to differences in knowledge, experiences, and values compared to their male
36 counterparts. For example, female directors may bring different knowledge and experiences to
37 the board by virtue of their different paths to directorships; they are less likely to have
38 previously held similar leadership positions (e.g., Post & Byron, 2015; Singh, Terjesen, &
39 Vinnicombe 2008) and they also need to demonstrate more competencies than men to reach
40 such positions (Eagly & Carli, 2003).

41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Female directors are also likely to hold higher educational qualifications than their male
4 counterparts (e.g., Carter *et al.*, 2010; Singh *et al.*, 2008), and are often significantly younger
5 (e.g., Peterson & Philpot, 2007). Differences in values between male and female directors can
6 also influence decision-making processes on the board. Post and Byron (2015: 1548) contend
7 that greater gender diversity (as a result of an increased representation of women on the board)
8 “may influence not only *what* information is brought to bear in decision-making, but also *how*
9 decisions are made”. Ultimately, because female directors help to diversify decision-making
10 and the viewpoints available to a board, they may play a major role in improving the ability to
11 generate better outcomes from the resources available to the organization.
12
13
14
15
16
17
18
19
20
21
22

23
24 The value-in-diversity and information/decision-making perspectives also consider that
25 variation in demographic composition (for instance, in terms of gender) can have a positive
26 influence on work group processes and effectiveness at any organizational level (Ancona &
27 Caldwell 1992; Frink *et al.*, 2003). Both approaches posit that diverse or more heterogeneous
28 groups should outperform less diverse or more homogeneous groups. The logic behind this
29 assumption (which is consistent with the resource-based view) is that groups characterized by
30 greater diversity are more likely to “possess a broader range of task-relevant knowledge, skills,
31 and abilities that are distinct and non-redundant and to have different opinions and perspectives
32 on the task at hand” (van Knippenberg, De Dreu, & Homan 2004: 1009). In this regard,
33 exposure to divergent viewpoints and, thus, a more diverse pool of resources may be conducive
34 to more creative and innovative ideas and problem-solving solutions (Ancona & Caldwell 1992;
35 De Dreu & West, 2001). Corroborating these ideas, there are studies reporting a positive
36 relationship between gender diversity and organizational innovation (e.g., Østergaard,
37 Timmermans, & Kristinsson, 2011). Likewise, other research suggests that the presence of
38 more female members diversifies boardroom perspectives, helps to better represent
39 shareholders, and fosters more active and stimulating discussions, particularly when setting an
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 organization's strategic heading (e.g., Letendre, 2004). Studies also find that a greater number
4
5 of women on boards is related to more ethical decision-making and more organizational
6
7 transparency (e.g., Liao, Luo, & Tang, 2015; Upadhyay & Zeng, 2014).
8
9

10 With regard to research testing curvilinear relationships, Frink et al. (2003) have studied
11
12 291 US organizations, finding an inverted U-shaped form between gender diversity and
13
14 performance, demonstrating that performance is maximized when women comprise around half
15
16 of an organization's workforce. Ali et al. (2011), using a sample of Australian manufacturing
17
18 and service organizations, Richard et al. (2004) and Owen and Temesvary (2018) on samples
19
20 of US bank holding companies, and Abbey and Adu-Danso (2022), using a sample of
21
22 manufacturing firms from several Sub-Saharan African countries, report similar results.
23
24 Therefore, we propose:
25
26

27
28 *Hypothesis 1a: There will be an inverted U-shaped relationship between the level of gender*
29
30 *diversity (in the workforce and on the board of directors) and organizational performance.*
31
32

33 34 **The U-shaped link between gender diversity and performance**

35
36
37 In marked contrast, a U-shaped relationship between gender diversity and performance (see
38
39 *Model 2b*) can be derived from arguments and evidence linked to different theories of social
40
41 psychology. These include the social identity and self-categorization theories, the similarity-
42
43 attraction paradigm, and the group threat or group competition theory (see Figure 1).
44
45

46
47 Research guided by social identity and related self-categorization theories suggests that a
48
49 greater level of gender diversity should be associated with negative performance (Pelled,
50
51 Eisenhardt, & Xin 1999; Richard *et al.*, 2004; Tsui, Egan, & O'Reilly 1992). The proponents of
52
53 these theories argue that individuals use their demographic attributes (such as gender) to
54
55 categorize both themselves and others into distinct social groups: "us" versus "them" (Ali *et*
56
57 *al.*, 2014; van Knippenberg *et al.*, 2004). Within homogeneous groups (i.e. groups comprised
58
59 of either men or women), members will tend to trust one another more and communicate with
60

1
2
3 one another more often and in a greater variety of ways because they are more likely to hold
4 similar viewpoints, values, and expectations (Twenge *et al.*, 2010). Consequently, relations in
5 homogeneous groups are perceived as positive, while relations in heterogeneous groups are
6 conceived as problematic. In support of this view, several studies show that member
7 commitment, engagement (e.g., Riordan & Shore, 1997; Tsui *et al.*, 1992), and group cohesion
8 tend to be higher in more homogenous groups (e.g., O'Reilly, Caldwell, & Barnett 1989) and
9 relational/emotional conflicts usually diminish (e.g., Jehn, Northcraft, & Neale 1999; Pelled *et*
10 *al.*, 1999). Greater gender diversity is therefore expected to decrease group cohesiveness, make
11 it more complicated for members of different sub-groups to openly and clearly communicate
12 with one another, and increase conflict within the group. All these problems impair group
13 effectiveness and, ultimately, performance (Luis-Carnicer *et al.*, 2008; van Knippenberg *et al.*,
14 2004).

15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31 The similarity-attraction paradigm (Byrne, 1971) derives assumptions consistent with
32 social identity and related self-categorization theories, providing further reasons as to why
33 similarity/dissimilarity may affect organizational outcomes. It suggests that individuals are
34 attracted to and prefer to spend time with others who are similar to themselves, rather than
35 dissimilar. There are several plausible reasons for supporting this argument (Berscheid &
36 Walster, 1969; Byrne, 1971): Interaction with similar others (for instance, women with women)
37 is considered a potential source of social reinforcement, because similar others are more likely
38 than dissimilar others to have opinions and viewpoints that validate one's own. In addition, all
39 other things being equal, individuals more readily expect acceptance by similar others than by
40 dissimilar others. Interaction with similar others is also viewed as more enjoyable than
41 interaction with dissimilar others because similar others can share one's own interests,
42 preferences, or values. It is therefore highly likely that similarity in the gender composition of
43 a work group can have a direct impact on individuals' social interaction and integration in work
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 settings (Lee & Peccei, 2007), enhancing group and organizational performance. Considerable
4
5 empirical support has been found for these predictions. For example, gender similarity within
6
7 different types of work groups has been positively linked to higher levels of social integration
8
9 (e.g., O'Reilly *et al.*, 1989), higher job satisfaction, higher self-esteem, and lower job-related
10
11 depression (e.g., Fields & Blum, 1997; Peccei & Lee, 2005), and higher job-related well-being
12
13 (Haile, 2012). Given that gender dissimilarity is therefore associated with less positive
14
15 outcomes for social integration and individual attitudes and well-being, we may expect greater
16
17 gender diversity to be linked to lower levels of organizational performance.
18
19

20
21 The group threat or group competition theory (Blalock, 1967) focuses on majority-minority
22
23 relations and posits that competition and inter-group hostility are largely reactions by majority
24
25 groups to perceived threats to their advantageous social position by minority groups. Conflict,
26
27 which disrupts organizational performance, is more prevalent when minority groups are
28
29 relatively large and where there is competition for limited social resources (Blalock, 1967; King
30
31 & Wheelock, 2007), as may occur with jobs in general or certain organizational positions in
32
33 particular. According to this theory, the presence of women in many workplaces, particularly
34
35 in senior level positions, might threaten the historical, social, and economic dominance of male
36
37 directors. Moreover, such threats are expected to increase as the relative size of the female
38
39 representation in managerial positions increases (Chin *et al.*, 2007; Luis-Carnicer *et al.*, 2008).
40
41 This could impact upon an organization's social integration and, ultimately, its organizational
42
43 outcomes. As a result, it is likely that social integration and, hence, organizational outcomes
44
45 should be greater when "there is a clear numerical imbalance between minority and majority
46
47 groups" (Lee & Peccei, 2007: 692).
48
49
50
51
52

53
54 In sum, these three approaches argue in favor of certain gender homogeneity in any work
55
56 group, as a greater diversity is expected to decrease performance. Joecks *et al.* (2013), using a
57
58 sample of listed German firms, and Bae and Skagss (2019), using a sample of Korean firms,
59
60

1
2
3 corroborate to a certain such arguments. Therefore, we propose the following competing
4
5 hypothesis:

6
7 *Hypothesis 1b: There will be a U-shaped relationship between the level of gender diversity*
8
9 *(in the workforce and on the board of directors) and organizational performance.*

14 **Method**

16 **Data and Sample**

17
18 This study used both primary and secondary data collection. The target population
19
20 consisted of all secondary schools in the Community of Madrid. We designed a survey to collect
21
22 information related to the organization and operation, along with the gender composition of the
23
24 management teams and teaching staff, because to our knowledge no comprehensive and
25
26 detailed archival information on the issues examined was available from secondary sources. As
27
28 detailed in the Measures sub-section, we also used archival data on the organizations' academic
29
30 performance posted on each one's website, as well as on the website of the Department of
31
32 Education of the Community of Madrid.
33
34

35
36 The OECD Teaching and Learning International Survey (TALIS) Principal Questionnaire
37
38 was used as an initial benchmark for building our survey¹. Face-to-face interviews were also
39
40 conducted with two principals and several teachers from two educational organizations in order
41
42 to receive feedback on the clarity of the questions, thereby ensuring that unfamiliar and
43
44 ambiguous terms or issues were identified and removed, and that the survey was as concise as
45
46 possible.
47
48

49
50 The survey was emailed to the principals of all 595 secondary schools in the Community
51
52 of Madrid between May and September 2015. All information collected in the survey referred
53
54

55
56
57 ¹ However, we have not used the TALIS database because we did not have access to most of the information in it
58
59 when we conducted this study and, importantly, some relevant information for building some variables of interest
60
was not available either (for instance, gender of the other members that make up the board of directors apart from
the principal or stability of the teaching staff at a school).

1
2
3 to the 2014-2015 academic year. During this period, no external events worthy of mention took
4
5 place that could have any type of incidence in our study. In terms of sampling strategy, this
6
7 study is based on the equiprobability principle because, *a priori*, all secondary schools in the
8
9 Community of Madrid had the same probability of being part of the final sample (i.e.
10
11 responding to the survey proposed). We also guarantee absolute anonymity in the processing
12
13 of collected information. After three follow-up reminders the number of usable questionnaires
14
15 returned via email was 105, representing a 17.6% response rate.
16
17

18
19 We checked whether there were significant differences between the reference population
20
21 and our study sample. We used two variables, as we had complete information on them: *District*
22
23 (schools are grouped by 5 districts: Madrid City, Madrid North, Madrid South, Madrid West,
24
25 and Madrid East) and *University admission test* (one of the performance variables depicted
26
27 below). Our tests confirmed the sample representativeness and the potential absence of
28
29 selection bias in our final sample.
30
31

32 33 34 **Measures**

35
36 ***Dependent variable.*** The dependent variable of interest is *Academic Performance (AP)*
37
38 because students' academic outcomes are traditionally considered a good proxy when assessing
39
40 an educational organizations' success. Two variables of *AP* are used. One of these variables
41
42 (*University admission test*) is computed as the average score obtained by each organization in
43
44 the standardized university admission test conducted at the end of the academic year. The other
45
46 variable (*External assessment of knowledge and skills*) is calculated as the average score
47
48 obtained by each organization in a compulsory external test that evaluates students' acquisition
49
50 of reading and mathematical competence in secondary education. Both variables are similar to
51
52 other performance measures used by prior research in the educational context (e.g., Campos-
53
54 García & Zúñiga-Vicente, 2019, 2020; Leana & Pil, 2006; Wikström & Wikström 2005). The
55
56
57
58
59
60

1
2
3 scores for both variables were retrieved from the website of the Department of Education of the
4
5 Community of Madrid.

6
7 **Independent variables.** The independent variables were collected in the survey. *Female*
8
9 *board representation* is a continuous variable that indicates the proportion of women on the
10
11 board of directors/governors in relation to the total number of governors. *Female workforce*
12
13 *representation* is a continuous variable that measures the proportion of women in the total
14
15 workforce. We follow Frink et al. (2003) and others (e.g., Abbey & Adu-Danso, 2022; Moreno-
16
17 Gómez et al., 2018; Owen & Temesvary, 2018) in using the proportion of women as a measure
18
19 of gender composition, also adding the squared term in both variables (*Female board/workforce*
20
21 *representation squared*, similarly to the linear terms are also scaled by 100) to effectively
22
23 capture the specific type of curvilinear association prompted by gender diversity. The choice of
24
25 the percentages of females on boards and in the workforce is also justified because they allow
26
27 to identify possible 'optimal' points *a posteriori*.
28
29
30
31
32

33 **Control variables.** We controlled for a number of variables reflecting the potential
34
35 influence on *AP* of other contextual, organizational, and personal characteristics, as suggested
36
37 by prior research on schools (e.g., Campos-García & Zúñiga-Vicente, 2019, 2020; Harris &
38
39 Sass, 2011; Rivkin, Hanushek, & Kain, 2005). We controlled for the potential effect of
40
41 *Organization type* with a variable that takes a value of 0 or 1 depending on whether it involves
42
43 a state or private-concerted organization, respectively. *Organization size* is a continuous
44
45 variable that is measured by the total number of school teachers. *Students composition* was
46
47 operationalized as the proportion of foreign students over the total number of students. *Staff*
48
49 *instability* refers to how long teachers have been practising as a teacher in his/her current
50
51 organization and it is measured as the proportion of teachers with fewer than 5 year's service.
52
53
54
55
56
57
58
59
60

Analysis

Hierarchical regression analysis² is used to test the relationship between gender diversity (*Female board representation* and *Female workforce representation*) and performance (*AP: University admission test* and *External assessment of knowledge and skills*). We estimated different models for each performance measure (see Tables II and III). Step 1 considers solely the linear term of *Female board representation* and *Female workforce representation*, respectively (see Models 1 and 2 in both tables). Step 2 includes the quadratic terms of both variables (see Models 3 and 4 in both tables). We consider all these models individually in order to infer whether there is in fact a direct association between our indicators of gender diversity and performance. Step 3 considers the control variables, as well as the linear and quadratic term of each independent variable of interest (see Models 5 and 6 in both tables). Finally, Step 4 includes all the control and independent variables considered in the study (see Model 7). Thus, Models 5-7 pose the question as to whether the inclusion of such control variables reduces or eliminates the relationship estimated in the simpler models (i.e. Models 1-4). We have also controlled for potential problems of heteroscedasticity by using the *Breusch-Pagan LM test*.

Results

Table I provides the descriptive statistics and correlations for all the study variables. This table reveals that the proportion of women on the board of governors within our sample is around 45%, and the proportion of women in the workforce is approximately 64%. The minimum and maximum values of the latter two variables were, respectively, 0% and 75%, and 39.6% and about 90%. Table I also shows that 59% are state organizations; the average number of teachers in the organizations in our sample is 42; the proportion of foreign students is 16%, and the proportion of teachers with fewer than five years' service is around 32%. The third

² All variables used comply with the assumptions of normality and homogeneity of variance.

1
2
3 column in Table I shows that multicollinearity is not a problem in our study, as most of the
4
5 explanatory variables (i.e. independent and control variables) have variance inflation factors
6
7 (VIFs) that are well below the rule of thumb of 5 or 10—none exceeded 2—advocated by,
8
9 respectively, Marquardt and Snee (1975) and Kutner, Nachtsheim, and Neter (2004).
10
11

12
13 -----
14 **Insert Table I here**
15 -----

16
17 Tables II and III report the results of the hierarchical regression analysis for both dependent
18
19 variables. The results shown under Model 1 in Tables II-III indicate that the linear term of
20
21 *Female board representation* has a positive and significant association with *AP*. In Model 3 in
22
23 Tables II-III, the coefficient of this linear term is also positive and significant, while the
24
25 coefficient of the quadratic term is negative and significant. These findings suggest there is a
26
27 direct association between *Female board representation* and both indicators of performance,
28
29 and that this relationship is curvilinear (adopting an inverted U-shape), in line with the
30
31 arguments of Hypothesis 1a. Generally, this variable statistically significantly predicted *AP* (see
32
33 *F-test* and *adjusted R-squared* in Models 1-3 in Tables II-III). Models 5 and 7 in Table II also
34
35 suggest an association conditional on several control variables between *Female board*
36
37 *representation* and *University admission test* as the coefficient of the linear term of this variable
38
39 is positive and significant, while the coefficient of the quadratic term is negative and significant
40
41 (albeit weakly so, $p < 0.1$). However, in Models 5 and 7 in Table III, only the coefficient of the
42
43 quadratic term is negative and significant. These findings therefore provide some statistical
44
45 support for Hypothesis 1a, but not for Hypothesis 1b, as the curvilinear form that better depicts
46
47 the relationship between *Female board representation* and performance is the inverted U-
48
49 shape.
50
51
52
53

54
55 -----
56 **Insert Tables II and III here**
57 -----
58
59
60

1
2
3 Similar results are found for workforce. The coefficient of the linear term of *Female*
4 *workforce representation* in Model 2 in Table II is positive and significant while in Table III is
5 not significant. In Model 4 in Tables II-III, the coefficient of the linear term is positive and
6 significant, while the coefficient of the quadratic term is negative and significant. These
7 findings also suggest a direct association between *Female workforce representation* and both
8 indicators of performance considered, and that this relationship is also curvilinear (adopting an
9 inverted U-shape), also in line with the arguments of Hypothesis 1a. Overall, this variable
10 statistically significantly predicted *AP* (see *F-test* and *adjusted R-squared* in Models 2 and 4 in
11 Tables II-III). Models 6 and 7 in Table II and Model 6 in Table III also suggest an association
12 conditional on several control variables, between *Female workforce representation* and
13 *University admission test* as the coefficient of the linear term of this variable is positive and
14 significant, while the coefficient of the quadratic term is negative and significant (albeit weakly
15 so, $p < 0.1$). However, Model 7 in Table III reports that the coefficients of the linear and quadratic
16 term are not significant. Therefore, these findings provide some statistical support for
17 Hypothesis 1a; in general, the curvilinear model that better depicts the relationship between
18 *Female workforce representation* and performance is the inverted U-shape.

19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Figures 2 and 3 plot the link between gender diversity on board (the share of woman in the
board ranged from 0% to 75%) and workforce (the share of woman in the workforce ranged
from 39.6% to 90%), respectively, and both variables of performance according to the
hierarchical regression analysis that include the linear and quadratic terms (Model 7 in Tables
II and III, respectively). Both figures confirm the existence of an inverted U-shaped form.
Specifically, according to Figures 2 and 3, the best performance (i.e. the estimated 'optimal'
threshold) is reached when the proportion of women on the board of directors is around 40%-
50% (about 40% for *External assessment of knowledge and skills* and about 50% for *University*
admission test), and the proportion of women in the workforce is around 60%-70%

(approximately 60% for *External assessment of knowledge and skills* and 70% for *University admission test*).

Insert Figures 2 and 3 here

Additional results

We conducted new estimations to seek some additional robustness checks of our findings. In line with Kanter (1977) and other researchers (e.g., Joecks *et al.*, 2013), we created four dummy variables reflecting the different group types for board and workforce, respectively: *Uniform board/workforce* (assuming the value 1 if board/workforce has no woman, and 0 otherwise); *Skewed board/workforce* (assuming the value 1 if board/workforce has at least one woman but less than 20% women, and 0 otherwise); *Tilted board/workforce* (assuming the value 1 if the ratio of women in the boardroom/workforce is at least 20% but less than 40%, and 0 otherwise); and *Balanced board/workforce* (assuming the value 1 if the ratio of women in the board/workforce is at least 40% but less than 60%, and 0 otherwise). Unlike the study by Joecks *et al.* (2013), in our sample there are several organizations (schools) with a share of women over 60% both in workforce and board. Thus, we have considered a new dummy variable named *Prevalent board/workforce* (assuming the value of 1 if the ratio of women in the boardroom/workforce is between 60% and 100%, and 0 otherwise).

We also use hierarchical regression analysis, and five different models were estimated. Table IV report the main results when the dependent variable is *University admission test*. This table shows that the coefficients for the dummy variables *Uniform board*, *Skewed board* and *Title board* are negative and statistically significant, i.e., having a completely male board or with less women than men is negatively and significantly associated with having a higher academic performance (see Models 1, 3 and 5) as compared to having a more balanced board. The coefficient for the dummy variable *Prevalent board* is negative but not statistically

1
2
3 significant. The coefficient for *Titled workforce* is negative but not statistically significant (see
4
5 Models 2, 4 and 5) while the coefficient for *Prevalent workforce* is positive and statistically
6
7 significant (see Models 2, 4 and 5). This means that having a workforce with more women than
8
9 man is positively and significantly related to higher academic performance as compared to
10
11 having a more balanced workforce³. Similar results are found when the dependent variable is
12
13 *External assessment of knowledge and skills*. These findings hint at a critical mass of women
14
15 in balanced groups in the case of board, and unbalanced groups (with more women than men)
16
17 as opposed to balanced ones, in the case of workforce.
18
19
20

21
22 -----
23 **Insert Table IV here**
24 -----
25

26 27 **Discussion and Conclusions**

28
29 This study is one of the first attempts to test the validity of two competing curvilinear
30
31 models on the gender diversity-performance link at two hierarchical levels (workforce and
32
33 board of directors) in a feminized workplace context. Our findings indicate a significant,
34
35 inverted U-shaped curvilinear association between female representation in the workforce and
36
37 on the board of directors with performance. At first glance, these findings seem to be consistent
38
39 with the assumptions of theoretical approaches that are in favor of heterogeneity in
40
41 organizations, such as the resource-based view or the value-in-diversity and
42
43 information/decision-making perspectives. However, in light of our results, it needs to be
44
45 clarified that this level of heterogeneity might be heavily dependent on the organizational
46
47 position being analyzed. In this sense, our results reveal that the existence *a posteriori* of an
48
49 ‘optimal’ level of gender diversity is lower in the case of the board of directors (40%-50%) than
50
51 in the workforce (59%-68%). In other terms, these findings suggest that in managerial positions
52
53
54
55
56
57
58

59
60 ³ Because the minimum share of women in the workforce is 39.6%, the coefficients for *Uniform* and *Skewed workforce* can not be identified (i.e. these dummies always take a value of 0).

1
2
3 the heterogeneous groups (i.e. more gender diversity) can have a more positive impact on
4 performance, while in the workforce this more positive impact can be reached when groups
5 tend to be a bit more homogeneous. These findings justify the desirability of examining both
6 organizational level separately. This means that future studies, rather than examining this link
7 at a single organizational position, should do so at different positions in order to obtain a much
8 more accurate and realistic picture.
9

10
11
12
13
14
15
16
17 With regard to gender diversity on boards, our results are contrary, to a certain extent, to
18 those reported by Joecks et al. (2013) or Bae and Skaggs (2019), among others. Overall, these
19 authors find that firms considered in their empirical studies achieved worse performance when
20 there is a balanced proportion of women and men in the board⁴. By contrast, our findings are in
21 line with those reported in prior studies such as Richard et al. (2014) or Owen and Temesvary
22 (2018), among others, thereby confirming that a balanced representation of women and men is
23 beneficial for performance within our target population of organizations. This is also consistent
24 with past research theorizing that members of under-represented groups tend to be treated as
25 symbols or ‘tokens’, and that token minority members can face stereotypes and discrimination,
26 preventing them from contributing fully to the organization (e.g., Kanter, 1977, 1993; Rosener
27 ,1995). However, as the number of minority members increases, they are better able to form
28 coalitions and networks of mutual support, and have more positive interactions with the
29 majority. It therefore takes not only one woman, but a greater overall female representation, to
30 give the board the benefit of women's talents (i.e. skills, abilities, knowledge, experience, and
31 values). An over-representation of women (or, alternatively, men) can have negative
32 repercussions in terms of performance because this means less diversity, and therefore fewer
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53

54
55
56
57 ⁴ For example, Joecks et al. (2013) report that organizations examined achieve the best performance when a
58 ‘critical mass’ of 30% women in the board is reached. They also find that *skewed* boards are outperformed by
59 *tilted* boards. Bae and Skaggs (2019) find that for the sample of service-oriented firms the highest performance is
60 achieved in homogeneous groups, while the lowest performance is achieved for moderately heterogeneous groups.
These authors also find a ‘critical mass’ of about 30% women to men.

1
2
3 complementary resources for the board to draw upon. In consonance with Krüger (2008: 156),
4
5 our findings suggest that a mix of masculine and feminine elements could lead to a broader
6
7 repertoire of behavior and, ultimately, to a better organizational performance.
8
9

10 As for the link between workforce gender diversity and performance, our study has also
11
12 found the possible existence of a curvilinear (inverted U-shaped) link. These findings are
13
14 consistent with those reported by Frink et al. (2003), Ali et al. (2011) or Abbey and Adu-Danso
15
16 (2022), among others. However, in our study the best performance is not attained when there is
17
18 a greater gender balance; on the contrary, the maximum benefit of diversity is obtained when
19
20 females represent 59%-68% of the workforce⁵. In line with Kanter (1977), our findings reveal
21
22 a critical proportion that is more unbalanced towards women. This is logical to a certain extent,
23
24 given the feminization of the teaching profession and the value it places upon characteristics
25
26 traditionally associated with women.
27
28
29

30 The association between higher performance and educational organizations with more
31
32 gender-balanced boards certainly emphasizes the potential benefits of eliminating barriers to
33
34 women's professional development and their appointment to senior management positions. On
35
36 the other hand, the association between a higher performance and an over-representation of
37
38 women in the workforce should not in any way be interpreted as saying that the role of male
39
40 employees is unnecessary. Efforts to increase the social prestige of the teaching profession may
41
42 be necessary for it to be considered attractive by men, who typically can enjoy greater
43
44 employment opportunities than women in other sectors. This undoubtedly may require a
45
46 redesign of the profession that includes better career plans and greater incentives (both
47
48 monetary and non-monetary) for the entire workforce (Campos-García, 2022; OECD, 2022).
49
50
51
52
53
54
55
56
57

58 ⁵ For example Frink et al. (2003) find that the best (optimal) performance for the organizations of the
59
60 wholesale/service/retail industry is achieved when the ratio of women over men is approximately 56%.

1
2
3 This study has several limitations. On the one hand, it precludes causality relationships.
4
5 Future research could address a longitudinal analysis to conclude if the best performance is
6
7 caused by greater/lower gender diversity. On the other hand, our study is based on Spanish
8
9 educational organizations. Therefore, a sample selection bias may exist. A country bias may
10
11 also be present because national context could significantly affect gender diversity through
12
13 educational choices and collective beliefs. Although educational organizations are highly
14
15 feminized environments in terms of the workforce in most countries (OECD, 2022), further
16
17 research in other countries in similar organizations can help overcome this potential limitation.
18
19 Certain caution should also be considered in generalizing our findings beyond the educational
20
21 sector. Thus, we also claim for conducting further research in other 'feminized' and
22
23 'masculinized' sectors in order to see whether our findings regarding the influence of the
24
25 hierarchical level on the gender diversity-performance are maintained. It is also possible that
26
27 other factors do not considered here (for instance, motivation, training or work-life programs)
28
29 can have a significant moderating effect on the gender diversity-performance linkage, either to
30
31 the organizations' detriment or benefit. Further longitudinal research considering these issues
32
33 is necessary. Finally, it would also interesting to extend our research to other hierarchical
34
35 positions in organizations.
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

- Abbey, E., & Adu-Danso, E. (2022), "Gender diversity and productivity in manufacturing firms: Evidence from six Sub-Saharan African (SSA) countries", *Journal of Management & Organization*, First view, pp.1-22. DOI: <https://doi.org/10.1017/jmo.2022.50>.
- Ali, M. Kulik, C. & Metz, I. (2011), "The gender diversity–performance relationship in services and manufacturing organizations", *The International Journal of Human Resource Management*, Vol. 22 No. 07, pp.1464-1485.
- Ali, M. Ng, Y.L. & Kulik, C.T. (2014), "Board age and gender diversity: A test of competing linear and curvilinear predictions". *Journal of Business Ethics*, Vol. 125 No. 3, pp.497-512.
- An, S., & Lee, S. Y. (2022), "The impact of gender diversity and disparity on organizational performance: Evidence from Korean local government-owned enterprises", *Review of Public Personnel Administration*, Vol. 42 No.3, pp. 395-415.
- Ancona, D.G. & Caldwell, D.F. (1992), "Demography and design: Predictors of new product team performance", *Organization Science*, Vol. 3 No. 3, pp.321-341.
- Bae, K.B., & Skaggs, S. (2019), "The impact of gender diversity on performance: The moderating role of industry, alliance network, and family-friendly policies–Evidence from Korea", *Journal of Management & Organization*, Vol. 25 No.6, 896-913.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp.99-120.
- Berscheid, E. & Hatfield, E. (1969), "*Interpersonal attraction*", Reading, MA: Addison-Wesley.
- Blalock HM (1967), "*Toward a theory of minority-group relations*", New York: Wiley.
- Byrne, D. (1971), "*The attraction paradigm*", New York: Academic Press.
- Campos-García, I. (2022), "¿Por qué somos diferentes? Directores y profesores en el epicentro de la reforma educativa española", *Revista de Investigación Educativa*, Vol. 40, No.1, pp. 275-302.
- Carter, D.A., D'Souza, F., Simkins, B.J. & Simpson, W.G. (2010), "The gender and ethnic diversity of US boards and board committees and firm financial performance", *Corporate Governance: An International Review*, Vol. 18 No.5, pp.396-414.
- Chen, M. H., Chen, S. J., Kot, H. W., Zhu, D., & Wu, Z. (2021), "Does gender diversity matter to hotel financial performance?" *International Journal of Hospitality Management*, Vol. 97, 102987. <https://doi.org/10.1016/j.ijhm.2021.102987>

- 1
2
3 Chin, J.L., Lott, B., Rice, J.K. & Sanchez-Hucles, J. (2007), “*Women and leadership: Transforming visions and diverse voices*”, Malden, MA: Blackwell Publishing.
- 4
5
6 Choi, J. N., Sung, S. Y., & Zhang, Z. (2017), “Workforce diversity in manufacturing companies
7 and organizational performance: the role of status-relatedness and internal processes”, *The
8 International Journal of Human Resource Management*, Vol. 28 No.19, pp. 2738-2761.
- 9
10
11 Darmadi, S. (2013), “Do women in top management affect firm performance? Evidence from
12 Indonesia”, *Corporate Governance: The International Journal of Business in
13 Society*, Vol.13 N°.3, pp. 288-304.
- 14
15
16 De Dreu, C.K.W. & West, M.A. (2001), “Minority dissent and team innovation: The
17 importance of participation in decision making”, *Journal of Applied Psychology*, Vol. 86
18 No.6, pp.1191-1201.
- 19
20
21 Deloitte (2019), “*Women in the boardroom: A global perspective* (sixth edition)”, Accessed
22 February 1, 2020 from [https://www2.deloitte.com/global/en/pages/risk/articles/women-in-
23 the-boardroom-global-perspective.html](https://www2.deloitte.com/global/en/pages/risk/articles/women-in-the-boardroom-global-perspective.html)
- 24
25
26 Dezsö, C.L. & Ross, D.G. (2012), “Does female representation in top management improve
27 firm performance? A panel data investigation”, *Strategic Management Journal*, Vol. 33
28 No.9, pp.1072-1089.
- 29
30
31 Eagly, A.H. & Carli, L.L. (2003), “The female leadership advantage: An evaluation of the
32 evidence”, *The Leadership Quarterly*, Vol. 14 No.6, pp.807-834.
- 33
34
35 Egan, T.M. (2005), “Creativity in the context of team diversity: Team leader
36 perspectives”, *Advances in Developing Human Resources*, Vol. 7 No.2, pp.207-225.
- 37
38
39 Eurostat (2022), *Government expenditure on education*. Accessed August 12, 2022 from
40 [https://ec.europa.eu/eurostat/statistics-
41 explained/index.php?title=Government_expenditure_on_education#Expenditure_on_27e
42 ducation.27](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_education.27)
- 43
44
45 Frink, D.D., Robinson, R.K., Reithel, B., Arthur, M.M., Ammeter, A.P., Ferris, G.R.,
46 Morrisette, H.S. (2003), “Gender demography and organization performance: A two-study
47 investigation with convergence”, *Group & Organization Management*, Vol. 28 No.1,
48 pp.127-147.
- 49
50
51 Haile, G.A. (2012), “Unhappy working with men? Workplace gender diversity and job-related
52 well-being in Britain”, *Labour Economics*, Vol. 19 No.3, pp.329-350.
- 53
54
55 Hambrick, D.C. (2007), “Upper echelons theory: An update”, *Academy of Management
56 Review*, Vol. 32 No.2, pp.334-343.
- 57
58
59
60

- 1
2
3 Harel, G., Tzafrir, S. & Baruch, Y. (2003), "Achieving organizational effectiveness through
4 promotion of women into managerial positions: HRM practice focus", *The International*
5 *Journal of Human Resource Management*, Vol. 14 No.2, pp.247-263.
6
7
8 Harris. D.N., & Sass, T.R. (2011), "Teacher training, teacher quality and student
9 achievement", *Journal of Public Economics*, Vol. 95 No.7, pp.798-812.
10
11 He, J. & Huang, Z. (2011), "Board informal hierarchy and firm financial performance:
12 Exploring a tacit structure guiding boardroom interactions", *Academy of Management*
13 *Journal*, Vol. 54 No.6, pp.1119-1139.
14
15
16 Jehn, K.A., Northcraft, G.B. & Neale, M.A. (1999), "Why differences make a difference: A
17 field study of diversity, conflict, and performance in workgroups", *Administrative Science*
18 *Quarterly*, Vol. 44 No.4, pp.741-763.
19
20
21 Joecks, J., Pull, K. & Vetter, K. (2013), "Gender diversity in the boardroom and firm
22 performance: What exactly constitutes a "critical mass"?", *Journal of Business Ethics*, Vol.
23 118 No.1, pp.61-72.
24
25
26 Kanter, R.M. (1977), "Some effects of proportions on group life: Skewed sex ratios and
27 responses to token women", *American Journal of Sociology*, Vol. 82 No.5, pp.965-990.
28
29
30 King, R.D. & Wheelock, D. (2007), "Group threat and social control: Race, perceptions of
31 minorities and the desire to punish", *Social Forces*, Vol. 85 No.3, pp.1255-1280.
32
33
34 Krishnan, H.A. & Park, D. (2005), "A few good women - on top management teams", *Journal*
35 *of Business Research*, Vol. 58 No.12, pp.1712-1720.
36
37
38 Krüger, M.L. (2008), "School leadership, sex and gender: Welcome to
39 difference", *International Journal of Leadership in Education*, Vol. 11 No.2, pp.155-168.
40
41
42 Kutner, M.H., Nachtsheim, C.J. & Neter, J. (2004), "*Applied linear regression models* (4th
43 edition)", Irwin: McGraw-Hill.
44
45
46 Leana, C.R. & Pil, F.K. (2006), "Social capital and organizational performance: Evidence from
47 urban public schools", *Organization Science*, Vol. 17 No.3, pp.353-366.
48
49
50 Lee, H.J. & Peccei, R. (2007), "Organizational-level gender dissimilarity and employee
51 commitment", *British Journal of Industrial Relations*, Vol. 45 No.4, pp.687-712.
52
53
54 Letendre, L. (2004), "The dynamics of the boardroom", *Academy of Management*
55 *Executive*, Vol. 18 No.1, pp.101-104.
56
57
58 Liao, L., Luo, L. & Tang, Q. (2015), "Gender diversity, board independence, environmental
59 committee and greenhouse gas disclosure", *British Accounting Review*, Vol. 47 No.4,
60 pp.409-424.

- 1
2
3 Luis-Carnicer, P., Martínez-Sánchez, Á., Pérez-Pérez, M. & Vela-Jiménez, M.J. (2008),
4 “Gender diversity in management: curvilinear relationships to reconcile findings”, *Gender*
5 *in Management*, Vol. 23 No.8, pp.583-597.
6
7
8 Marquardt, D.W. & Snee, R.D. (1975), “Ridge regression in practice”, *American Statistician*,
9 Vol. 29, pp.3-20.
10
11 Moreno-Gómez, J., Lafuente, E., & Vaillant, Y. (2018), “Gender diversity in the board,
12 women’s leadership and business performance”, *Gender in Management*, Vol. 33 No.2,
13 pp.104-122.
14
15
16 O’Reilly, C.A., Caldwell, D.F. & Barnett, W.P. (1989), “Work group demography, social
17 integration, and turnover”, *Administrative Science Quarterly*, Vol. 34 No.1, pp.21-37.
18
19
20 OECD (2022), “*Education Indicators in Focus*”, Accessed July 25, 2022 from
21 [https://www.oecd-ilibrary.org/docserver/8fea2729-](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
22 [en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
23 [8AECA12AD89C3DA](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
24
25
26 Østergaard, C.R., Timmermans, B. & Kristinsson, K. (2011), “Does a different view create
27 something new? The effect of employee diversity on innovation”, *Research Policy*, Vol.
28 40 No.3, pp.500-509.
29
30
31 Owen, A.L. & Temesvary, J. (2018), “The performance effects of gender diversity on bank
32 boards”, *Journal of Banking & Finance*, Vol. 90, pp.50-63.
33
34
35 Pelled, L.H., Eisenhardt, K.M. & Xin, K.R. (1999), “Exploring the black box: An analysis of
36 work group diversity, conflict and performance”, *Administrative Science Quarterly*, Vol.
37 44 No.1, pp.1-28.
38
39
40 Peterson, C.A. & Philpot, J. (2007), “Women’s roles on US Fortune 500 boards: Director
41 expertise and committee memberships”, *Journal of Business Ethics*, Vol. 72 No.2, pp.177-
42 196.
43
44
45 Post, C., & Byron, K. (2015), “Women on boards and firm financial performance: A meta-
46 analysis”, *Academy of Management Journal*, Vol. 58 No.5, pp.1546-1571.
47
48
49 Provasi, R., & Harasheh, M. (2021), “Gender diversity and corporate performance: Emphasis
50 on sustainability performance”, *Corporate Social Responsibility and Environmental*
51 *Management*, Vol. 28 No.1, pp.127-137.
52
53
54 Riordan, C. & Shore, L. (1997), “Demographic diversity and employee attitudes: Examination
55 of relational demography within work units”, *Journal of Applied Psychology*, Vol. 82 No.3,
56 pp.342-358.
57
58
59
60

- 1
2
3 Rivkin, S.G., Hanushek, E.A., & Kain, J.F. (2005), "Teachers, schools, and academic
4 achievement", *Econometrica*, Vol. 73 No.2, pp. 417-458.
- 5
6 Rosener, J.B. (1995), "*America's competitive secret: Utilizing women as management*
7 *strategy*", New York: Oxford University Press
- 8
9
10 Singh, V., Terjesen, S. & Vinnicombe, S. (2008), "Newly appointed directors in the boardroom:
11 How do women and men differ?", *European Management Journal*, Vol. 26 No.1, pp.48-
12 58.
- 13
14
15 The World Bank (2021), "Labor force, female (% of total labor force) ", Accessed May 24,
16 2021 from <https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>
- 17
18 Tsui, A.S., Egan, T.D. & O'Reilly III CA (1992), "Being different: Relational demography and
19 organizational attachment", *Administrative Science Quarterly*, Vol. 37 No.4, pp.549-579.
- 20
21
22 Twenge, J.M., Campbell, S.M., Hoffman, B.J. & Lance, C.E. (2010), "Generational differences
23 in work values: Leisure and extrinsic values increasing, social and intrinsic values
24 decreasing", *Journal of Management*, Vol. 36 No.5, pp.1117-1142.
- 25
26
27 Upadhyay, A. & Zeng, H. (2014), "Gender and ethnic diversity on boards and corporate
28 information environment", *Journal of Business Research*, Vol. 67 No.11, pp.2456-2463.
- 29
30 van Knippenberg, D., De Dreu, C.K. & Homan, A.C. (2004), "Work group diversity and group
31 performance: an integrative model and research agenda", *Journal of Applied*
32 *Psychology*, Vol. 89 No.6, pp.1008-1022.
- 33
34
35
36 Wikström, C., & Wikström, M. (2005), "Grade inflation and school competition: an empirical
37 analysis based on the Swedish upper secondary schools", *Economics of Education*
38 *Review*, Vol. 24 No.3, pp.309-322.
- 39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 **The gender diversity-performance linkage at the board of directors and the workforce**
4
5 **levels: Testing Two Competing Curvilinear Models in the Spanish educational sector**
6
7
8
9

10
11 **Abstract**
12

13 **Purpose:** The use of linear models has major limitations for accurately representing the true
14 link between gender diversity and organizational performance. This study explores two
15 curvilinear models and tests which one —the U-shape or the inverted U-shape— best represents
16 the gender diversity-performance link at two hierarchical levels: the board of directors and the
17 workforce.
18
19

20
21
22 **Design/methodology/approach:** Both models are tested using data collected from a
23 representative sample of Spanish educational organizations, which are dominated numerically
24 by women, although women are still slightly under-represented in managerial positions.
25
26
27

28 **Findings:** The results show the existence of an inverted U-shape and, therefore, the existence
29 of a potential ‘optimal’ level of gender diversity for both the board of directors and the
30 workforce. While the highest performance by the board of directors is attained when the
31 proportion of women and men is balanced in the workforce the highest level of performance is
32 attained when the proportion of women is greater.
33
34
35
36
37

38 **Originality:** There are hardly any studies simultaneously exploring the gender diversity-
39 performance linkage at two hierarchical levels where the proportion of women/men is
40 substantially different: the board of directors and the workforce. Thus, our study contributes to
41 better know whether such relationship is dependent on the hierarchical position. It is important
42 to know this because each level is related to different functions and tasks and shape a social
43 status that can significantly influence performance.
44
45
46
47

48 **Keywords:**

49 Gender diversity, female representation, workforce, boards, performance, educational
50 organizations.
51
52
53
54
55
56
57
58
59
60

Introduction

The last few years have witnessed the emergence of a large body of research focusing on exploring how the shape of the relationship between gender diversity and organizational performance (mainly in executive positions) is. This interest seems logical when one considers that the percentage of women in the global labor force has increased sharply, currently reaching figures close to 50% in many countries. Women also occupy more managerial positions, but their overall representation still remains low (Deloitte, 2019; The World Bank, 2021).

Even considering that the extant research uses different methodologies, its main findings can be summarized as follows: on the one hand, many studies argue that the presence of more women benefits organizations, reporting a positive linear correlation/relationship/effect in several performance measures (e.g., An & Lee, 2022; Moreno-Gómez, Lafuente, & Vaillant, 2018; Provasi & Harasheh, 2021). These studies assume that performance increases in step with the number of women. In contrast, other studies argue that the presence of more women might compromise organizations, reporting a negative linear correlation/relationship/effect (e.g., He & Huang 2011; Darmadi, 2013; Chen *et al.*, 2021). This implies that performance decreases as the number of women increases. Finally, other studies report that gender diversity is unrelated to organizational outcomes (for a review, see Abbey & Adu-Danso, 2022; Ali, Ng, & Kulik 2014 or Post & Byron 2015).

In an attempt to reconcile disparate findings, several researchers argue that neither positive nor negative monotonic linear models are suitable for representing the shape of the gender diversity-performance link (e.g., Abbey & Adu-Danso, 2022; Ali, Kulik, & Metz 2011; Ali *et al.*, 2014; Frink *et al.*, 2003; Luis-Carnicer *et al.*, 2008). They suggest that this link might be more accurately depicted by curvilinear models. In line with Luis-Carnicer *et al.* (2008), we posit that there are two types of curvilinear relationships. On the one hand, there is an inverted U-shape, which is based on the assumption that performance increases in step with the

1
2
3 proportion of women until an optimal threshold of gender diversity is reached, after which
4 performance decreases as more women join the group. On the other hand, there is a U-shaped
5 form, which is based on the notion that performance decreases as the proportion of women
6 increases until a certain threshold of gender diversity is reached, beyond which performance
7 increases as more women join the group.
8
9

10
11
12
13
14
15 This study aims to shed light on which curvilinear model can be considered a better
16 representation of the gender diversity-performance link. The point of departure is that past
17 studies using linear models have major limitations for properly representing this link, whereby
18 their findings should be interpreted with caution. So, this study may also allow us to discover *a*
19 *posteriori* the existence of a potential ‘optimal’ (or, alternatively, ‘worse’) proportion of women
20 to men in terms of performance, even though we are fully aware that such proportion can vary
21 in different contexts and/or samples of the study. In any case, linear models clearly do not
22 permit us to assess this issue. Moreover, this study addresses the gender diversity-performance
23 link at two different positions in the organizational hierarchy: board of directors and workforce.
24
25 The research setting consists of educational organizations, which have been traditionally
26 depicted as a ‘feminized environment’, as women account for the majority of the workforce
27 (OECD, 2022).
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42
43 This study contributes to the extant literature on gender diversity in several ways. First, we
44 test different competing predictions or hypotheses regarding the curvilinear shape of the gender
45 diversity-performance link. These hypotheses build on arguments from contrasting theoretical
46 perspectives that have explored this link in the last years. Thus, this study is an attempt to test
47 which theoretical arguments are more valid when explaining such an association. The use of
48 competing hypotheses is justified when prior knowledge about a particular topic *a priori* leads
49 to several alternative reasonable explanations (Ali *et al.*, 2014). Accordingly, this study can
50
51
52
53
54
55
56
57
58
59
60

1
2
3 guide us toward a better understanding of how the gender diversity-performance link really is,
4
5 and thus help to explain the inconsistent findings of past research.
6

7
8 Second, there are still few studies focused on identifying *a posteriori* an ‘optimal’ ratio of
9
10 women over men in terms of performance. Some outstanding exceptions are the studies by
11
12 Frink et al. (2003), Ali et al. (2011), Joecks, Pull, and Vetter (2013), Ali et al. (2014) or, more
13
14 recently, Abbey and Adu-Danso (2022). But, most these past studies seek to separately identify
15
16 the existence of a possible optimal rate of gender diversity either in the workforce or on boards
17
18 of directors in different types of organizations. In contrast, we explore the existence *a posteriori*
19
20 of a possible optimal (or worse) ratio in both the workforce and boards in order to know whether
21
22 such ratio and, hence, the specific form of the gender diversity-performance link is dependent
23
24 on the specific position that women occupy in the hierarchy. It is important to know this because
25
26 each hierarchical position accomplishes different functions and tasks within an organization
27
28 and shape a social status that can significantly influence performance (Choi, Sung, & Zhang,
29
30 2017).
31
32
33

34
35 Finally, the education sector in general, and secondary schools in particular, is an alluring
36
37 research setting for several reasons: On the one hand, this type of organizations is dominated
38
39 numerically by women in the workforce, although they are still slightly under-represented in
40
41 top managerial positions —both as leaders and on the board of directors (OECD, 2022). On the
42
43 other hand, most past research has been conducted on samples of manufacturing firms or firms
44
45 of service sectors that, in general, are considered masculinized environments. Thus, this study
46
47 adds and complements past research by examining whether our results are similar to those
48
49 conducted on other contexts. Additionally, the education sector has a major socio-economic
50
51 impact, as it represents a significant part of a country’s public spending. For example, in 2020,
52
53 the total budget on education in EU (Spain, where the study is conducted) amounted to 5.0%
54
55 (4.6%) of GDP; ‘secondary education’ accounted for 1.9% (1.8%) of GDP (Eurostat, 2022).
56
57
58
59
60

Conceptualizing Gender Diversity

Figure 1 illustrates the linear models by which the gender diversity-performance link is typically addressed by most existing research (see Models 1a and 1b), as well as the competing, curvilinear models posited in this paper (see Models 2a and 2b). Linear models assume that performance continues to increase/decrease as a particular gender proportion increases, and therefore do not allow identifying an 'optimal' gender diversity level. In contrast, Kanter (1977) classifies gender diversity in groups based on the range of different proportions of women and men into four main categories: uniform groups (UG) with 0/100 proportions, skewed groups (SG) with 5/95-15/85 gender proportions, tilted groups (TG) with 20/80-35/65 gender proportions, and balanced groups (BG) with 40/60-50/50 gender proportions. According to this classification, different levels of gender diversity should have different effects on performance. A fully gender diverse workplace (in our case, workforce and board of directors) should have an approximately 50/50 proportion of men and women. An increase (decrease) in the proportion of women (men) beyond (below) 50 per cent means the workforce and board of directors become less diverse (i.e. more homogeneous).

Insert Figure 1 here

The inverted U-shaped link between gender diversity and performance

An inverted U-shaped relationship (see *Model 2a*) can be derived from arguments and evidence related to the following theoretical perspectives: the resource-based view of the firm, the upper echelons theory, the value-in-diversity approach, and the information/decision-making perspective (see Figure 1).

Proponents of the resource-based view suggest that an organization can improve its performance by exploiting its rare, valuable, irreplaceable, and inimitable resources (Barney 1991). The potential to obtain a sustainable competitive advantage, and, hence a better

1
2
3 performance, depends on certain internal resources, and in particular the organization's human
4 resources. These are the internal resources that are among the more sustainable and difficult to
5 imitate for competitors. While optimizing these resources is cited as the most important strategy
6 for increasing competitiveness, effectively using and managing human resources becomes a
7 crucial factor for improving performance. Women are the human resources most cited as under-
8 utilized in most organizations (Harel, Tzafrir, & Baruch 2003). Therefore, greater gender
9 diversity in an organization's workforce and senior management is considered a source of
10 intangible and socially complex resources that may improve the organization's performance
11 (Ali *et al.*, 2011; Luis-Carnicer *et al.*, 2008). This is because a greater level of gender diversity
12 is expected to introduce an organization to multiple and distinct skills, abilities, competences,
13 knowledge, opinions, and backgrounds (Egan, 2005).

14
15
16
17
18
19
20
21
22
23
24
25
26
27
28 The upper echelons theory also provides a theoretical foundation for linking gender
29 diversity, especially at board or senior management level, and performance. According to this
30 approach, senior managers significantly differ in their cognitive frames, and these cognitive
31 frames, in turn, influence performance (Hambrick, 2007). Because senior managers' cognitive
32 frames are difficult to measure, most studies using this approach have relied on observable
33 characteristics, such as gender, as an appropriate proxy (Dezsö & Ross 2012; Krishnan & Park
34 2005). This theory posits that female directors are likely to bring different cognitive frames to
35 a board due to differences in knowledge, experiences, and values compared to their male
36 counterparts. For example, female directors may bring different knowledge and experiences to
37 the board by virtue of their different paths to directorships; they are less likely to have
38 previously held similar leadership positions (e.g., Post & Byron, 2015; Singh, Terjesen, &
39 Vinnicombe 2008) and they also need to demonstrate more competencies than men to reach
40 such positions (Eagly & Carli, 2003).

1
2
3 Female directors are also likely to hold higher educational qualifications than their male
4 counterparts (e.g., Carter *et al.*, 2010; Singh *et al.*, 2008), and are often significantly younger
5 (e.g., Peterson & Philpot, 2007). Differences in values between male and female directors can
6 also influence decision-making processes on the board. Post and Byron (2015: 1548) contend
7 that greater gender diversity (as a result of an increased representation of women on the board)
8 “may influence not only *what* information is brought to bear in decision-making, but also *how*
9 decisions are made”. Ultimately, because female directors help to diversify decision-making
10 and the viewpoints available to a board, they may play a major role in improving the ability to
11 generate better outcomes from the resources available to the organization.
12
13
14
15
16
17
18
19
20
21
22
23

24 The value-in-diversity and information/decision-making perspectives also consider that
25 variation in demographic composition (for instance, in terms of gender) can have a positive
26 influence on work group processes and effectiveness at any organizational level (Ancona &
27 Caldwell 1992; Frink *et al.*, 2003). Both approaches posit that diverse or more heterogeneous
28 groups should outperform less diverse or more homogeneous groups. The logic behind this
29 assumption (which is consistent with the resource-based view) is that groups characterized by
30 greater diversity are more likely to “possess a broader range of task-relevant knowledge, skills,
31 and abilities that are distinct and non-redundant and to have different opinions and perspectives
32 on the task at hand” (van Knippenberg, De Dreu, & Homan 2004: 1009). In this regard,
33 exposure to divergent viewpoints and, thus, a more diverse pool of resources may be conducive
34 to more creative and innovative ideas and problem-solving solutions (Ancona & Caldwell 1992;
35 De Dreu & West, 2001). Corroborating these ideas, there are studies reporting a positive
36 relationship between gender diversity and organizational innovation (e.g., Østergaard,
37 Timmermans, & Kristinsson, 2011). Likewise, other research suggests that the presence of
38 more female members diversifies boardroom perspectives, helps to better represent
39 shareholders, and fosters more active and stimulating discussions, particularly when setting an
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 organization's strategic heading (e.g., Letendre, 2004). Studies also find that a greater number
4
5 of women on boards is related to more ethical decision-making and more organizational
6
7 transparency (e.g., Liao, Luo, & Tang, 2015; Upadhyay & Zeng, 2014).
8
9

10 With regard to research testing curvilinear relationships, Frink et al. (2003) have studied
11
12 291 US organizations, finding an inverted U-shaped form between gender diversity and
13
14 performance, demonstrating that performance is maximized when women comprise around half
15
16 of an organization's workforce. Ali et al. (2011), using a sample of Australian manufacturing
17
18 and service organizations, Richard et al. (2004) and Owen and Temesvary (2018) on samples
19
20 of US bank holding companies, and Abbey and Adu-Danso (2022), using a sample of
21
22 manufacturing firms from several Sub-Saharan African countries, report similar results.
23
24
25 Therefore, we propose:
26
27

28 *Hypothesis 1a: There will be an inverted U-shaped relationship between the level of gender*
29
30 *diversity (in the workforce and on the board of directors) and organizational performance.*
31
32

33 34 35 **The U-shaped link between gender diversity and performance**

36
37 In marked contrast, a U-shaped relationship between gender diversity and performance (see
38
39 *Model 2b*) can be derived from arguments and evidence linked to different theories of social
40
41 psychology. These include the social identity and self-categorization theories, the similarity-
42
43 attraction paradigm, and the group threat or group competition theory (see Figure 1).
44
45

46 Research guided by social identity and related self-categorization theories suggests that a
47
48 greater level of gender diversity should be associated with negative performance (Pelled,
49
50 Eisenhardt, & Xin 1999; Richard *et al.*, 2004; Tsui, Egan, & O'Reilly 1992). The proponents of
51
52 these theories argue that individuals use their demographic attributes (such as gender) to
53
54 categorize both themselves and others into distinct social groups: "us" versus "them" (Ali *et*
55
56 *al.*, 2014; van Knippenberg *et al.*, 2004). Within homogeneous groups (i.e. groups comprised
57
58 of either men or women), members will tend to trust one another more and communicate with
59
60

1
2
3 one another more often and in a greater variety of ways because they are more likely to hold
4 similar viewpoints, values, and expectations (Twenge *et al.*, 2010). Consequently, relations in
5 homogeneous groups are perceived as positive, while relations in heterogeneous groups are
6 conceived as problematic. In support of this view, several studies show that member
7 commitment, engagement (e.g., Riordan & Shore, 1997; Tsui *et al.*, 1992), and group cohesion
8 tend to be higher in more homogenous groups (e.g., O'Reilly, Caldwell, & Barnett 1989) and
9 relational/emotional conflicts usually diminish (e.g., Jehn, Northcraft, & Neale 1999; Pelled *et*
10 *al.*, 1999). Greater gender diversity is therefore expected to decrease group cohesiveness, make
11 it more complicated for members of different sub-groups to openly and clearly communicate
12 with one another, and increase conflict within the group. All these problems impair group
13 effectiveness and, ultimately, performance (Luis-Carnicer *et al.*, 2008; van Knippenberg *et al.*,
14 2004).

15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31 The similarity-attraction paradigm (Byrne, 1971) derives assumptions consistent with
32 social identity and related self-categorization theories, providing further reasons as to why
33 similarity/dissimilarity may affect organizational outcomes. It suggests that individuals are
34 attracted to and prefer to spend time with others who are similar to themselves, rather than
35 dissimilar. There are several plausible reasons for supporting this argument (Berscheid &
36 Walster, 1969; Byrne, 1971): Interaction with similar others (for instance, women with women)
37 is considered a potential source of social reinforcement, because similar others are more likely
38 than dissimilar others to have opinions and viewpoints that validate one's own. In addition, all
39 other things being equal, individuals more readily expect acceptance by similar others than by
40 dissimilar others. Interaction with similar others is also viewed as more enjoyable than
41 interaction with dissimilar others because similar others can share one's own interests,
42 preferences, or values. It is therefore highly likely that similarity in the gender composition of
43 a work group can have a direct impact on individuals' social interaction and integration in work
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 settings (Lee & Peccei, 2007), enhancing group and organizational performance. Considerable
4
5 empirical support has been found for these predictions. For example, gender similarity within
6
7 different types of work groups has been positively linked to higher levels of social integration
8
9 (e.g., O'Reilly *et al.*, 1989), higher job satisfaction, higher self-esteem, and lower job-related
10
11 depression (e.g., Fields & Blum, 1997; Peccei & Lee, 2005), and higher job-related well-being
12
13 (Haile, 2012). Given that gender dissimilarity is therefore associated with less positive
14
15 outcomes for social integration and individual attitudes and well-being, we may expect greater
16
17 gender diversity to be linked to lower levels of organizational performance.
18
19

20
21 The group threat or group competition theory (Blalock, 1967) focuses on majority-minority
22
23 relations and posits that competition and inter-group hostility are largely reactions by majority
24
25 groups to perceived threats to their advantageous social position by minority groups. Conflict,
26
27 which disrupts organizational performance, is more prevalent when minority groups are
28
29 relatively large and where there is competition for limited social resources (Blalock, 1967; King
30
31 & Wheelock, 2007), as may occur with jobs in general or certain organizational positions in
32
33 particular. According to this theory, the presence of women in many workplaces, particularly
34
35 in senior level positions, might threaten the historical, social, and economic dominance of male
36
37 directors. Moreover, such threats are expected to increase as the relative size of the female
38
39 representation in managerial positions increases (Chin *et al.*, 2007; Luis-Carnicer *et al.*, 2008).
40
41 This could impact upon an organization's social integration and, ultimately, its organizational
42
43 outcomes. As a result, it is likely that social integration and, hence, organizational outcomes
44
45 should be greater when "there is a clear numerical imbalance between minority and majority
46
47 groups" (Lee & Peccei, 2007: 692).
48
49
50
51
52

53 In sum, these three approaches argue in favor of certain gender homogeneity in any work
54
55 group, as a greater diversity is expected to decrease performance. Joecks *et al.* (2013), using a
56
57 sample of listed German firms, and Bae and Skagss (2019), using a sample of Korean firms,
58
59
60

1
2
3 corroborate to a certain such arguments. Therefore, we propose the following competing
4
5 hypothesis:

6
7 *Hypothesis 1b: There will be a U-shaped relationship between the level of gender diversity*
8
9 *(in the workforce and on the board of directors) and organizational performance.*

14 Method

16 Data and Sample

17
18 This study used both primary and secondary data collection. The target population
19
20 consisted of all secondary schools in the Community of Madrid. We designed a survey to collect
21
22 information related to the organization and operation, along with the gender composition of the
23
24 management teams and teaching staff, because to our knowledge no comprehensive and
25
26 detailed archival information on the issues examined was available from secondary sources. As
27
28 detailed in the Measures sub-section, we also used archival data on the organizations' academic
29
30 performance posted on each one's website, as well as on the website of the Department of
31
32 Education of the Community of Madrid.
33
34

35
36 The OECD Teaching and Learning International Survey (TALIS) Principal Questionnaire
37
38 was used as an initial benchmark for building our survey¹. Face-to-face interviews were also
39
40 conducted with two principals and several teachers from two educational organizations in order
41
42 to receive feedback on the clarity of the questions, thereby ensuring that unfamiliar and
43
44 ambiguous terms or issues were identified and removed, and that the survey was as concise as
45
46 possible.
47
48

49
50 The survey was emailed to the principals of all 595 secondary schools in the Community
51
52 of Madrid between May and September 2015. All information collected in the survey referred
53
54

57
58 ¹ However, we have not used the TALIS database because we did not have access to most of the information in it
59
60 when we conducted this study and, importantly, some relevant information for building some variables of interest
was not available either (for instance, gender of the other members that make up the board of directors apart from
the principal or stability of the teaching staff at a school).

1
2
3 to the 2014-2015 academic year. During this period, no external events worthy of mention took
4
5 place that could have any type of incidence in our study. In terms of sampling strategy, this
6
7 study is based on the equiprobability principle because, *a priori*, all secondary schools in the
8
9 Community of Madrid had the same probability of being part of the final sample (i.e.
10
11 responding to the survey proposed). We also guarantee absolute anonymity in the processing
12
13 of collected information. After three follow-up reminders the number of usable questionnaires
14
15 returned via email was 105, representing a 17.6% response rate.
16
17
18

19 We checked whether there were significant differences between the reference population
20
21 and our study sample. We used two variables, as we had complete information on them: *District*
22
23 (schools are grouped by 5 districts: Madrid City, Madrid North, Madrid South, Madrid West,
24
25 and Madrid East) and *University admission test* (one of the performance variables depicted
26
27 below). Our tests confirmed the sample representativeness and the potential absence of
28
29 selection bias in our final sample.
30
31
32
33

34 **Measures**

35
36 ***Dependent variable.*** The dependent variable of interest is *Academic Performance (AP)*
37
38 because students' academic outcomes are traditionally considered a good proxy when assessing
39
40 an educational organizations' success. Two variables of *AP* are used. One of these variables
41
42 (*University admission test*) is computed as the average score obtained by each organization in
43
44 the standardized university admission test conducted at the end of the academic year. The other
45
46 variable (*External assessment of knowledge and skills*) is calculated as the average score
47
48 obtained by each organization in a compulsory external test that evaluates students' acquisition
49
50 of reading and mathematical competence in secondary education. Both variables are similar to
51
52 other performance measures used by prior research in the educational context (e.g., Campos-
53
54 García & Zúñiga-Vicente, 2019, 2020; Leana & Pil, 2006; Wikström & Wikström 2005). The
55
56
57
58
59
60

1
2
3 scores for both variables were retrieved from the website of the Department of Education of the
4
5 Community of Madrid.

6
7 **Independent variables.** The independent variables were collected in the survey. *Female*
8
9 *board representation* is a continuous variable that indicates the proportion of women on the
10
11 board of directors/governors in relation to the total number of governors. *Female workforce*
12
13 *representation* is a continuous variable that measures the proportion of women in the total
14
15 workforce. We follow Frink et al. (2003) and others (e.g., Abbey & Adu-Danso, 2022; Moreno-
16
17 Gómez et al., 2018; Owen & Temesvary, 2018) in using the proportion of women as a measure
18
19 of gender composition, also adding the squared term in both variables (*Female board/workforce*
20
21 *representation squared*, similarly to the linear terms are also scaled by 100) to effectively
22
23 capture the specific type of curvilinear association prompted by gender diversity. The choice of
24
25 the percentages of females on boards and in the workforce is also justified because they allow
26
27 to identify possible 'optimal' points *a posteriori*.
28
29
30
31
32

33 **Control variables.** We controlled for a number of variables reflecting the potential
34
35 influence on *AP* of other contextual, organizational, and personal characteristics, as suggested
36
37 by prior research on schools (e.g., Campos-García & Zúñiga-Vicente, 2019, 2020; Harris &
38
39 Sass, 2011; Rivkin, Hanushek, & Kain, 2005). We controlled for the potential effect of
40
41 *Organization type* with a variable that takes a value of 0 or 1 depending on whether it involves
42
43 a state or private-concerted organization, respectively. *Organization size* is a continuous
44
45 variable that is measured by the total number of school teachers. *Students composition* was
46
47 operationalized as the proportion of foreign students over the total number of students. *Staff*
48
49 *instability* refers to how long teachers have been practising as a teacher in his/her current
50
51 organization and it is measured as the proportion of teachers with fewer than 5 year's service.
52
53
54
55
56
57
58
59
60

Analysis

Hierarchical regression analysis² is used to test the relationship between gender diversity (*Female board representation* and *Female workforce representation*) and performance (*AP: University admission test* and *External assessment of knowledge and skills*). We estimated different models for each performance measure (see Tables II and III). Step 1 considers solely the linear term of *Female board representation* and *Female workforce representation*, respectively (see Models 1 and 2 in both tables). Step 2 includes the quadratic terms of both variables (see Models 3 and 4 in both tables). We consider all these models individually in order to infer whether there is in fact a direct association between our indicators of gender diversity and performance. Step 3 considers the control variables, as well as the linear and quadratic term of each independent variable of interest (see Models 5 and 6 in both tables). Finally, Step 4 includes all the control and independent variables considered in the study (see Model 7). Thus, Models 5-7 pose the question as to whether the inclusion of such control variables reduces or eliminates the relationship estimated in the simpler models (i.e. Models 1-4). We have also controlled for potential problems of heteroscedasticity by using the *Breusch-Pagan LM test*.

Results

Table I provides the descriptive statistics and correlations for all the study variables. This table reveals that the proportion of women on the board of governors within our sample is around 45%, and the proportion of women in the workforce is approximately 64%. The minimum and maximum values of the latter two variables were, respectively, 0% and 75%, and 39.6% and about 90%. Table I also shows that 59% are state organizations; the average number of teachers in the organizations in our sample is 42; the proportion of foreign students is 16%, and the proportion of teachers with fewer than five years' service is around 32%. The third

² All variables used comply with the assumptions of normality and homogeneity of variance.

1
2
3 column in Table I shows that multicollinearity is not a problem in our study, as most of the
4
5 explanatory variables (i.e. independent and control variables) have variance inflation factors
6
7 (VIFs) that are well below the rule of thumb of 5 or 10—none exceeded 2—advocated by,
8
9 respectively, Marquardt and Snee (1975) and Kutner, Nachtsheim, and Neter (2004).
10
11

12
13 -----
14 **Insert Table I here**
15 -----

16
17 Tables II and III report the results of the hierarchical regression analysis for both dependent
18
19 variables. The results shown under Model 1 in Tables II-III indicate that the linear term of
20
21 *Female board representation* has a positive and significant association with *AP*. In Model 3 in
22
23 Tables II-III, the coefficient of this linear term is also positive and significant, while the
24
25 coefficient of the quadratic term is negative and significant. These findings suggest there is a
26
27 direct association between *Female board representation* and both indicators of performance,
28
29 and that this relationship is curvilinear (adopting an inverted U-shape), in line with the
30
31 arguments of Hypothesis 1a. Generally, this variable statistically significantly predicted *AP* (see
32
33 *F-test* and *adjusted R-squared* in Models 1-3 in Tables II-III). Models 5 and 7 in Table II also
34
35 suggest an association conditional on several control variables between *Female board*
36
37 *representation* and *University admission test* as the coefficient of the linear term of this variable
38
39 is positive and significant, while the coefficient of the quadratic term is negative and significant
40
41 (albeit weakly so, $p < 0.1$). However, in Models 5 and 7 in Table III, only the coefficient of the
42
43 quadratic term is negative and significant. These findings therefore provide some statistical
44
45 support for Hypothesis 1a, but not for Hypothesis 1b, as the curvilinear form that better depicts
46
47 the relationship between *Female board representation* and performance is the inverted U-
48
49 shape.
50
51
52
53

54
55 -----
56 **Insert Tables II and III here**
57 -----
58
59
60

1
2
3 Similar results are found for workforce. The coefficient of the linear term of *Female*
4 *workforce representation* in Model 2 in Table II is positive and significant while in Table III is
5 not significant. In Model 4 in Tables II-III, the coefficient of the linear term is positive and
6 significant, while the coefficient of the quadratic term is negative and significant. These
7 findings also suggest a direct association between *Female workforce representation* and both
8 indicators of performance considered, and that this relationship is also curvilinear (adopting an
9 inverted U-shape), also in line with the arguments of Hypothesis 1a. Overall, this variable
10 statistically significantly predicted *AP* (see *F-test* and *adjusted R-squared* in Models 2 and 4 in
11 Tables II-III). Models 6 and 7 in Table II and Model 6 in Table III also suggest an association
12 conditional on several control variables, between *Female workforce representation* and
13 *University admission test* as the coefficient of the linear term of this variable is positive and
14 significant, while the coefficient of the quadratic term is negative and significant (albeit weakly
15 so, $p < 0.1$). However, Model 7 in Table III reports that the coefficients of the linear and quadratic
16 term are not significant. Therefore, these findings provide some statistical support for
17 Hypothesis 1a; in general, the curvilinear model that better depicts the relationship between
18 *Female workforce representation* and performance is the inverted U-shape.
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39

40 Figures 2 and 3 plot the link between gender diversity on board (the share of woman in the
41 board ranged from 0% to 75%) and workforce (the share of woman in the workforce ranged
42 from 39.6% to 90%), respectively, and both variables of performance according to the
43 hierarchical regression analysis that include the linear and quadratic terms (Model 7 in Tables
44 II and III, respectively). Both figures confirm the existence of an inverted U-shaped form.
45 Specifically, according to Figures 2 and 3, the best performance (i.e. the estimated 'optimal'
46 threshold) is reached when the proportion of women on the board of directors is around 40%-
47 50% (about 40% for *External assessment of knowledge and skills* and about 50% for *University*
48 *admission test*), and the proportion of women in the workforce is around 60%-70%
49
50
51
52
53
54
55
56
57
58
59
60

(approximately 60% for *External assessment of knowledge and skills* and 70% for *University admission test*).

Insert Figures 2 and 3 here

Additional results

We conducted new estimations to seek some additional robustness checks of our findings. In line with Kanter (1977) and other researchers (e.g., Joecks *et al.*, 2013), we created four dummy variables reflecting the different group types for board and workforce, respectively: *Uniform board/workforce* (assuming the value 1 if board/workforce has no woman, and 0 otherwise); *Skewed board/workforce* (assuming the value 1 if board/workforce has at least one woman but less than 20% women, and 0 otherwise); *Tilted board/workforce* (assuming the value 1 if the ratio of women in the boardroom/workforce is at least 20% but less than 40%, and 0 otherwise); and *Balanced board/workforce* (assuming the value 1 if the ratio of women in the board/workforce is at least 40% but less than 60%, and 0 otherwise). Unlike the study by Joecks *et al.* (2013), in our sample there are several organizations (schools) with a share of women over 60% both in workforce and board. Thus, we have considered a new dummy variable named *Prevalent board/workforce* (assuming the value of 1 if the ratio of women in the boardroom/workforce is between 60% and 100%, and 0 otherwise).

We also use hierarchical regression analysis, and five different models were estimated. Table IV report the main results when the dependent variable is *University admission test*. This table shows that the coefficients for the dummy variables *Uniform board*, *Skewed board* and *Title board* are negative and statistically significant, i.e., having a completely male board or with less women than men is negatively and significantly associated with having a higher academic performance (see Models 1, 3 and 5) as compared to having a more balanced board. The coefficient for the dummy variable *Prevalent board* is negative but not statistically

1
2
3 significant. The coefficient for *Titled workforce* is negative but not statistically significant (see
4
5 Models 2, 4 and 5) while the coefficient for *Prevalent workforce* is positive and statistically
6
7 significant (see Models 2, 4 and 5). This means that having a workforce with more women than
8
9 man is positively and significantly related to higher academic performance as compared to
10
11 having a more balanced workforce³. Similar results are found when the dependent variable is
12
13 *External assessment of knowledge and skills*. These findings hint at a critical mass of women
14
15 in balanced groups in the case of board, and unbalanced groups (with more women than men)
16
17 as opposed to balanced ones, in the case of workforce.
18
19
20

21
22 -----
23 **Insert Table IV here**
24 -----
25

26 27 **Discussion and Conclusions**

28
29 This study is one of the first attempts to test the validity of two competing curvilinear
30
31 models on the gender diversity-performance link at two hierarchical levels (workforce and
32
33 board of directors) in a feminized workplace context. Our findings indicate a significant,
34
35 inverted U-shaped curvilinear association between female representation in the workforce and
36
37 on the board of directors with performance. At first glance, these findings seem to be consistent
38
39 with the assumptions of theoretical approaches that are in favor of heterogeneity in
40
41 organizations, such as the resource-based view or the value-in-diversity and
42
43 information/decision-making perspectives. However, in light of our results, it needs to be
44
45 clarified that this level of heterogeneity might be heavily dependent on the organizational
46
47 position being analyzed. In this sense, our results reveal that the existence *a posteriori* of an
48
49 ‘optimal’ level of gender diversity is lower in the case of the board of directors (40%-50%) than
50
51 in the workforce (59%-68%). In other terms, these findings suggest that in managerial positions
52
53
54
55
56
57
58

59
60 ³ Because the minimum share of women in the workforce is 39.6%, the coefficients for *Uniform* and *Skewed workforce* can not be identified (i.e. these dummies always take a value of 0).

1
2
3 the heterogeneous groups (i.e. more gender diversity) can have a more positive impact on
4 performance, while in the workforce this more positive impact can be reached when groups
5 tend to be a bit more homogeneous. These findings justify the desirability of examining both
6 organizational level separately. This means that future studies, rather than examining this link
7 at a single organizational position, should do so at different positions in order to obtain a much
8 more accurate and realistic picture.
9

10
11
12
13
14
15
16
17 With regard to gender diversity on boards, our results are contrary, to a certain extent, to
18 those reported by Joecks et al. (2013) or Bae and Skaggs (2019), among others. Overall, these
19 authors find that firms considered in their empirical studies achieved worse performance when
20 there is a balanced proportion of women and men in the board⁴. By contrast, our findings are in
21 line with those reported in prior studies such as Richard et al. (2014) or Owen and Temesvary
22 (2018), among others, thereby confirming that a balanced representation of women and men is
23 beneficial for performance within our target population of organizations. This is also consistent
24 with past research theorizing that members of under-represented groups tend to be treated as
25 symbols or ‘tokens’, and that token minority members can face stereotypes and discrimination,
26 preventing them from contributing fully to the organization (e.g., Kanter, 1977, 1993; Rosener
27 ,1995). However, as the number of minority members increases, they are better able to form
28 coalitions and networks of mutual support, and have more positive interactions with the
29 majority. It therefore takes not only one woman, but a greater overall female representation, to
30 give the board the benefit of women's talents (i.e. skills, abilities, knowledge, experience, and
31 values). An over-representation of women (or, alternatively, men) can have negative
32 repercussions in terms of performance because this means less diversity, and therefore fewer
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55

56
57 ⁴ For example, Joecks et al. (2013) report that organizations examined achieve the best performance when a
58 ‘critical mass’ of 30% women in the board is reached. They also find that *skewed* boards are outperformed by
59 *tilted* boards. Bae and Skaggs (2019) find that for the sample of service-oriented firms the highest performance is
60 achieved in homogeneous groups, while the lowest performance is achieved for moderately heterogeneous groups.
These authors also find a ‘critical mass’ of about 30% women to men.

1
2
3 complementary resources for the board to draw upon. In consonance with Krüger (2008: 156),
4
5 our findings suggest that a mix of masculine and feminine elements could lead to a broader
6
7 repertoire of behavior and, ultimately, to a better organizational performance.
8
9

10 As for the link between workforce gender diversity and performance, our study has also
11
12 found the possible existence of a curvilinear (inverted U-shaped) link. These findings are
13
14 consistent with those reported by Frink et al. (2003), Ali et al. (2011) or Abbey and Adu-Danso
15
16 (2022), among others. However, in our study the best performance is not attained when there is
17
18 a greater gender balance; on the contrary, the maximum benefit of diversity is obtained when
19
20 females represent 59%-68% of the workforce⁵. In line with Kanter (1977), our findings reveal
21
22 a critical proportion that is more unbalanced towards women. This is logical to a certain extent,
23
24 given the feminization of the teaching profession and the value it places upon characteristics
25
26 traditionally associated with women.
27
28
29

30 The association between higher performance and educational organizations with more
31
32 gender-balanced boards certainly emphasizes the potential benefits of eliminating barriers to
33
34 women's professional development and their appointment to senior management positions. On
35
36 the other hand, the association between a higher performance and an over-representation of
37
38 women in the workforce should not in any way be interpreted as saying that the role of male
39
40 employees is unnecessary. Efforts to increase the social prestige of the teaching profession may
41
42 be necessary for it to be considered attractive by men, who typically can enjoy greater
43
44 employment opportunities than women in other sectors. This undoubtedly may require a
45
46 redesign of the profession that includes better career plans and greater incentives (both
47
48 monetary and non-monetary) for the entire workforce (Campos-García, 2022; OECD, 2022).
49
50
51
52
53
54
55
56
57

58 ⁵ For example Frink et al. (2003) find that the best (optimal) performance for the organizations of the
59
60 wholesale/service/retail industry is achieved when the ratio of women over men is approximately 56%.

1
2
3 This study has several limitations. On the one hand, it precludes causality relationships.
4
5 Future research could address a longitudinal analysis to conclude if the best performance is
6
7 caused by greater/lower gender diversity. On the other hand, our study is based on Spanish
8
9 educational organizations. Therefore, a sample selection bias may exist. A country bias may
10
11 also be present because national context could significantly affect gender diversity through
12
13 educational choices and collective beliefs. Although educational organizations are highly
14
15 feminized environments in terms of the workforce in most countries (OECD, 2022), further
16
17 research in other countries in similar organizations can help overcome this potential limitation.
18
19 Certain caution should also be considered in generalizing our findings beyond the educational
20
21 sector. Thus, we also claim for conducting further research in other ‘feminized’ and
22
23 ‘masculinized’ sectors in order to see whether our findings regarding the influence of the
24
25 hierarchical level on the gender diversity-performance are maintained. It is also possible that
26
27 other factors do not considered here (for instance, motivation, training or work-life programs)
28
29 can have a significant moderating effect on the gender diversity-performance linkage, either to
30
31 the organizations’ detriment or benefit. Further longitudinal research considering these issues
32
33 is necessary. Finally, it would also interesting to extend our research to other hierarchical
34
35 positions in organizations.
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

- Abbey, E., & Adu-Danso, E. (2022), "Gender diversity and productivity in manufacturing firms: Evidence from six Sub-Saharan African (SSA) countries", *Journal of Management & Organization*, First view, pp.1-22. DOI: <https://doi.org/10.1017/jmo.2022.50>.
- Ali, M. Kulik, C. & Metz, I. (2011), "The gender diversity–performance relationship in services and manufacturing organizations", *The International Journal of Human Resource Management*, Vol. 22 No. 07, pp.1464-1485.
- Ali, M. Ng, Y.L. & Kulik, C.T. (2014), "Board age and gender diversity: A test of competing linear and curvilinear predictions". *Journal of Business Ethics*, Vol. 125 No. 3, pp.497-512.
- An, S., & Lee, S. Y. (2022), "The impact of gender diversity and disparity on organizational performance: Evidence from Korean local government-owned enterprises", *Review of Public Personnel Administration*, Vol. 42 No.3, pp. 395-415.
- Ancona, D.G. & Caldwell, D.F. (1992), "Demography and design: Predictors of new product team performance", *Organization Science*, Vol. 3 No. 3, pp.321-341.
- Bae, K.B., & Skaggs, S. (2019), "The impact of gender diversity on performance: The moderating role of industry, alliance network, and family-friendly policies–Evidence from Korea", *Journal of Management & Organization*, Vol. 25 No.6, 896-913.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp.99-120.
- Berscheid, E. & Hatfield, E. (1969), "*Interpersonal attraction*", Reading, MA: Addison-Wesley.
- Blalock HM (1967), "*Toward a theory of minority-group relations*", New York: Wiley.
- Byrne, D. (1971), "*The attraction paradigm*", New York: Academic Press.
- Campos-García, I. (2022), "¿Por qué somos diferentes? Directores y profesores en el epicentro de la reforma educativa española", *Revista de Investigación Educativa*, Vol. 40, No.1, pp. 275-302.
- Carter, D.A., D'Souza, F., Simkins, B.J. & Simpson, W.G. (2010), "The gender and ethnic diversity of US boards and board committees and firm financial performance", *Corporate Governance: An International Review*, Vol. 18 No.5, pp.396-414.
- Chen, M. H., Chen, S. J., Kot, H. W., Zhu, D., & Wu, Z. (2021), "Does gender diversity matter to hotel financial performance?" *International Journal of Hospitality Management*, Vol. 97, 102987. <https://doi.org/10.1016/j.ijhm.2021.102987>

- 1
2
3 Chin, J.L., Lott, B., Rice, J.K. & Sanchez-Hucles, J. (2007), “*Women and leadership: Transforming visions and diverse voices*”, Malden, MA: Blackwell Publishing.
- 4
5
6 Choi, J. N., Sung, S. Y., & Zhang, Z. (2017), “Workforce diversity in manufacturing companies
7 and organizational performance: the role of status-relatedness and internal processes”, *The*
8 *International Journal of Human Resource Management*, Vol. 28 No.19, pp. 2738-2761.
- 9
10
11 Darmadi, S. (2013), “Do women in top management affect firm performance? Evidence from
12 Indonesia”, *Corporate Governance: The International Journal of Business in*
13 *Society*, Vol.13 N°.3, pp. 288-304.
- 14
15
16 De Dreu, C.K.W. & West, M.A. (2001), “Minority dissent and team innovation: The
17 importance of participation in decision making”, *Journal of Applied Psychology*, Vol. 86
18 No.6, pp.1191-1201.
- 19
20
21 Deloitte (2019), “*Women in the boardroom: A global perspective* (sixth edition)”, Accessed
22 February 1, 2020 from [https://www2.deloitte.com/global/en/pages/risk/articles/women-in-](https://www2.deloitte.com/global/en/pages/risk/articles/women-in-the-boardroom-global-perspective.html)
23 [the-boardroom-global-perspective.html](https://www2.deloitte.com/global/en/pages/risk/articles/women-in-the-boardroom-global-perspective.html)
- 24
25
26 Dezsö, C.L. & Ross, D.G. (2012), “Does female representation in top management improve
27 firm performance? A panel data investigation”, *Strategic Management Journal*, Vol. 33
28 No.9, pp.1072-1089.
- 29
30
31 Eagly, A.H. & Carli, L.L. (2003), “The female leadership advantage: An evaluation of the
32 evidence”, *The Leadership Quarterly*, Vol. 14 No.6, pp.807-834.
- 33
34
35 Egan, T.M. (2005), “Creativity in the context of team diversity: Team leader
36 perspectives”, *Advances in Developing Human Resources*, Vol. 7 No.2, pp.207-225.
- 37
38
39 Eurostat (2022), *Government expenditure on education*. Accessed August 12, 2022 from
40 [https://ec.europa.eu/eurostat/statistics-](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_education.27)
41 [explained/index.php?title=Government_expenditure_on_education#Expenditure_on_](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_education.27)
42 [education.27](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_education.27)
43 [education.27](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_education.27)
- 44
45
46 Frink, D.D., Robinson, R.K., Reithel, B., Arthur, M.M., Ammeter, A.P., Ferris, G.R.,
47 Morrisette, H.S. (2003), “Gender demography and organization performance: A two-study
48 investigation with convergence”, *Group & Organization Management*, Vol. 28 No.1,
49 pp.127-147.
- 50
51
52 Haile, G.A. (2012), “Unhappy working with men? Workplace gender diversity and job-related
53 well-being in Britain”, *Labour Economics*, Vol. 19 No.3, pp.329-350.
- 54
55
56 Hambrick, D.C. (2007), “Upper echelons theory: An update”, *Academy of Management*
57 *Review*, Vol. 32 No.2, pp.334-343.
- 58
59
60

- 1
2
3 Harel, G., Tzafrir, S. & Baruch, Y. (2003), "Achieving organizational effectiveness through
4 promotion of women into managerial positions: HRM practice focus", *The International*
5 *Journal of Human Resource Management*, Vol. 14 No.2, pp.247-263.
6
7
8 Harris. D.N., & Sass, T.R. (2011), "Teacher training, teacher quality and student
9 achievement", *Journal of Public Economics*, Vol. 95 No.7, pp.798-812.
10
11 He, J. & Huang, Z. (2011), "Board informal hierarchy and firm financial performance:
12 Exploring a tacit structure guiding boardroom interactions", *Academy of Management*
13 *Journal*, Vol. 54 No.6, pp.1119-1139.
14
15
16 Jehn, K.A., Northcraft, G.B. & Neale, M.A. (1999), "Why differences make a difference: A
17 field study of diversity, conflict, and performance in workgroups", *Administrative Science*
18 *Quarterly*, Vol. 44 No.4, pp.741-763.
19
20
21 Joecks, J., Pull, K. & Vetter, K. (2013), "Gender diversity in the boardroom and firm
22 performance: What exactly constitutes a "critical mass"?", *Journal of Business Ethics*, Vol.
23 118 No.1, pp.61-72.
24
25
26 Kanter, R.M. (1977), "Some effects of proportions on group life: Skewed sex ratios and
27 responses to token women", *American Journal of Sociology*, Vol. 82 No.5, pp.965-990.
28
29
30 King, R.D. & Wheelock, D. (2007), "Group threat and social control: Race, perceptions of
31 minorities and the desire to punish", *Social Forces*, Vol. 85 No.3, pp.1255-1280.
32
33
34 Krishnan, H.A. & Park, D. (2005), "A few good women - on top management teams", *Journal*
35 *of Business Research*, Vol. 58 No.12, pp.1712-1720.
36
37
38 Krüger, M.L. (2008), "School leadership, sex and gender: Welcome to
39 difference", *International Journal of Leadership in Education*, Vol. 11 No.2, pp.155-168.
40
41
42 Kutner, M.H., Nachtsheim, C.J. & Neter, J. (2004), "*Applied linear regression models* (4th
43 edition)", Irwin: McGraw-Hill.
44
45
46 Leana, C.R. & Pil, F.K. (2006), "Social capital and organizational performance: Evidence from
47 urban public schools", *Organization Science*, Vol. 17 No.3, pp.353-366.
48
49
50 Lee, H.J. & Peccei, R. (2007), "Organizational-level gender dissimilarity and employee
51 commitment", *British Journal of Industrial Relations*, Vol. 45 No.4, pp.687-712.
52
53
54 Letendre, L. (2004), "The dynamics of the boardroom", *Academy of Management*
55 *Executive*, Vol. 18 No.1, pp.101-104.
56
57
58 Liao, L., Luo, L. & Tang, Q. (2015), "Gender diversity, board independence, environmental
59 committee and greenhouse gas disclosure", *British Accounting Review*, Vol. 47 No.4,
60 pp.409-424.

- 1
2
3 Luis-Carnicer, P., Martínez-Sánchez, Á., Pérez-Pérez, M. & Vela-Jiménez, M.J. (2008),
4 “Gender diversity in management: curvilinear relationships to reconcile findings”, *Gender*
5 *in Management*, Vol. 23 No.8, pp.583-597.
6
7
8 Marquardt, D.W. & Snee, R.D. (1975), “Ridge regression in practice”, *American Statistician*,
9 Vol. 29, pp.3-20.
10
11 Moreno-Gómez, J., Lafuente, E., & Vaillant, Y. (2018), “Gender diversity in the board,
12 women’s leadership and business performance”, *Gender in Management*, Vol. 33 No.2,
13 pp.104-122.
14
15
16 O’Reilly, C.A., Caldwell, D.F. & Barnett, W.P. (1989), “Work group demography, social
17 integration, and turnover”, *Administrative Science Quarterly*, Vol. 34 No.1, pp.21-37.
18
19
20 OECD (2022), “*Education Indicators in Focus*”, Accessed July 25, 2022 from
21 [https://www.oecd-ilibrary.org/docserver/8fea2729-](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
22 [en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
23 [8AECA12AD89C3DA](https://www.oecd-ilibrary.org/docserver/8fea2729-en.pdf?expires=1658758669&id=id&acname=guest&checksum=32881869022DF2B9F8AECA12AD89C3DA)
24
25
26 Østergaard, C.R., Timmermans, B. & Kristinsson, K. (2011), “Does a different view create
27 something new? The effect of employee diversity on innovation”, *Research Policy*, Vol.
28 40 No.3, pp.500-509.
29
30
31 Owen, A.L. & Temesvary, J. (2018), “The performance effects of gender diversity on bank
32 boards”, *Journal of Banking & Finance*, Vol. 90, pp.50-63.
33
34
35 Pelled, L.H., Eisenhardt, K.M. & Xin, K.R. (1999), “Exploring the black box: An analysis of
36 work group diversity, conflict and performance”, *Administrative Science Quarterly*, Vol.
37 44 No.1, pp.1-28.
38
39
40 Peterson, C.A. & Philpot, J. (2007), “Women’s roles on US Fortune 500 boards: Director
41 expertise and committee memberships”, *Journal of Business Ethics*, Vol. 72 No.2, pp.177-
42 196.
43
44
45 Post, C., & Byron, K. (2015), “Women on boards and firm financial performance: A meta-
46 analysis”, *Academy of Management Journal*, Vol. 58 No.5, pp.1546-1571.
47
48
49 Provasi, R., & Harasheh, M. (2021), “Gender diversity and corporate performance: Emphasis
50 on sustainability performance”, *Corporate Social Responsibility and Environmental*
51 *Management*, Vol. 28 No.1, pp.127-137.
52
53
54 Riordan, C. & Shore, L. (1997), “Demographic diversity and employee attitudes: Examination
55 of relational demography within work units”, *Journal of Applied Psychology*, Vol. 82 No.3,
56 pp.342-358.
57
58
59
60

- 1
2
3 Rivkin, S.G., Hanushek, E.A., & Kain, J.F. (2005), "Teachers, schools, and academic
4 achievement", *Econometrica*, Vol. 73 No.2, pp. 417-458.
- 5
6 Rosener, J.B. (1995), "*America's competitive secret: Utilizing women as management*
7 *strategy*", New York: Oxford University Press
- 8
9
10 Singh, V., Terjesen, S. & Vinnicombe, S. (2008), "Newly appointed directors in the boardroom:
11 How do women and men differ?", *European Management Journal*, Vol. 26 No.1, pp.48-
12 58.
- 13
14
15 The World Bank (2021), "Labor force, female (% of total labor force) ", Accessed May 24,
16 2021 from <https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>
- 17
18 Tsui, A.S., Egan, T.D. & O'Reilly III CA (1992), "Being different: Relational demography and
19 organizational attachment", *Administrative Science Quarterly*, Vol. 37 No.4, pp.549-579.
- 20
21
22 Twenge, J.M., Campbell, S.M., Hoffman, B.J. & Lance, C.E. (2010), "Generational differences
23 in work values: Leisure and extrinsic values increasing, social and intrinsic values
24 decreasing", *Journal of Management*, Vol. 36 No.5, pp.1117-1142.
- 25
26
27 Upadhyay, A. & Zeng, H. (2014), "Gender and ethnic diversity on boards and corporate
28 information environment", *Journal of Business Research*, Vol. 67 No.11, pp.2456-2463.
- 29
30 van Knippenberg, D., De Dreu, C.K. & Homan, A.C. (2004), "Work group diversity and group
31 performance: an integrative model and research agenda", *Journal of Applied*
32 *Psychology*, Vol. 89 No.6, pp.1008-1022.
- 33
34
35
36 Wikström, C., & Wikström, M. (2005), "Grade inflation and school competition: an empirical
37 analysis based on the Swedish upper secondary schools", *Economics of Education*
38 *Review*, Vol. 24 No.3, pp.309-322.
- 39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

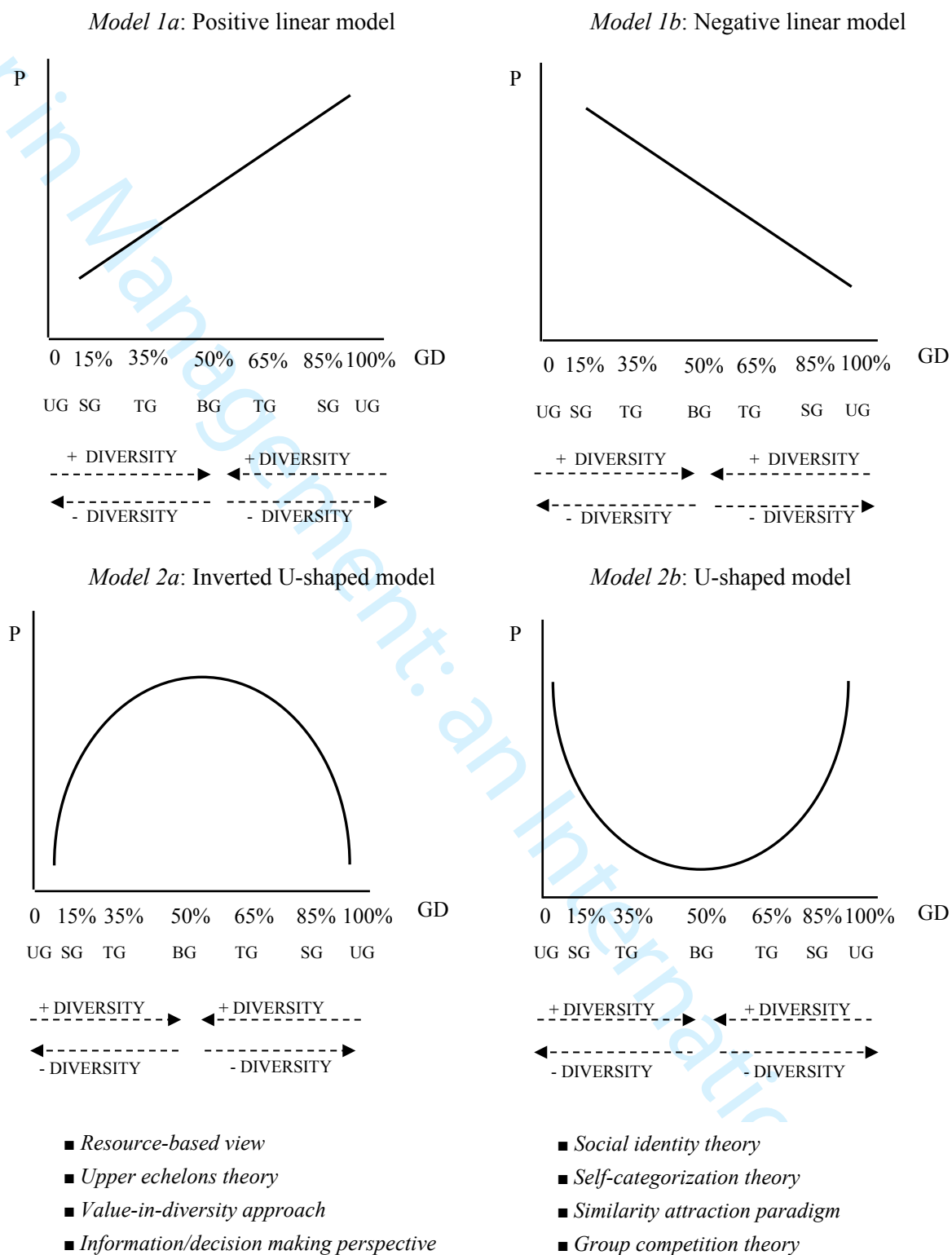


Figure 1. Examples of linear versus curvilinear models of the gender diversity-performance link.

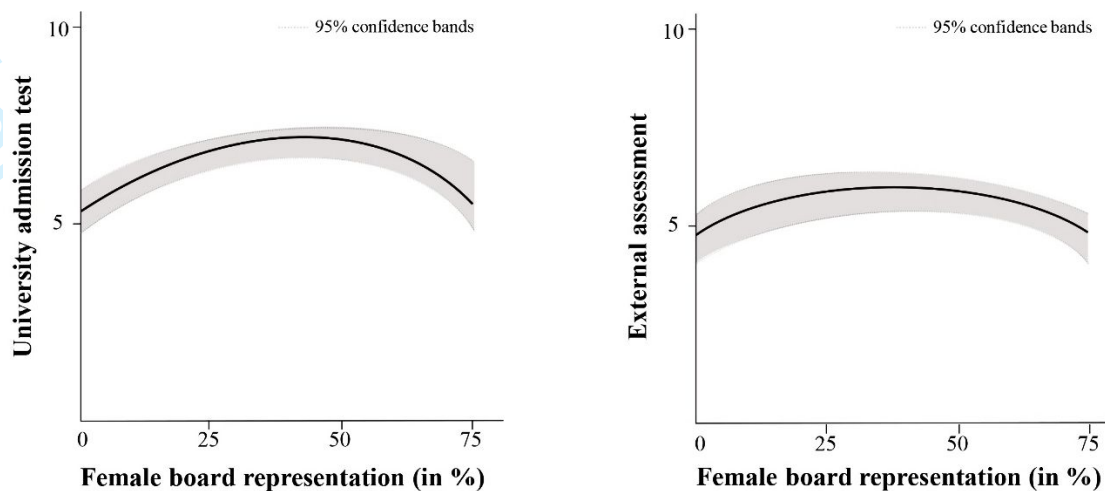


Figure 2. Academic performance and board gender diversity by female board representation.

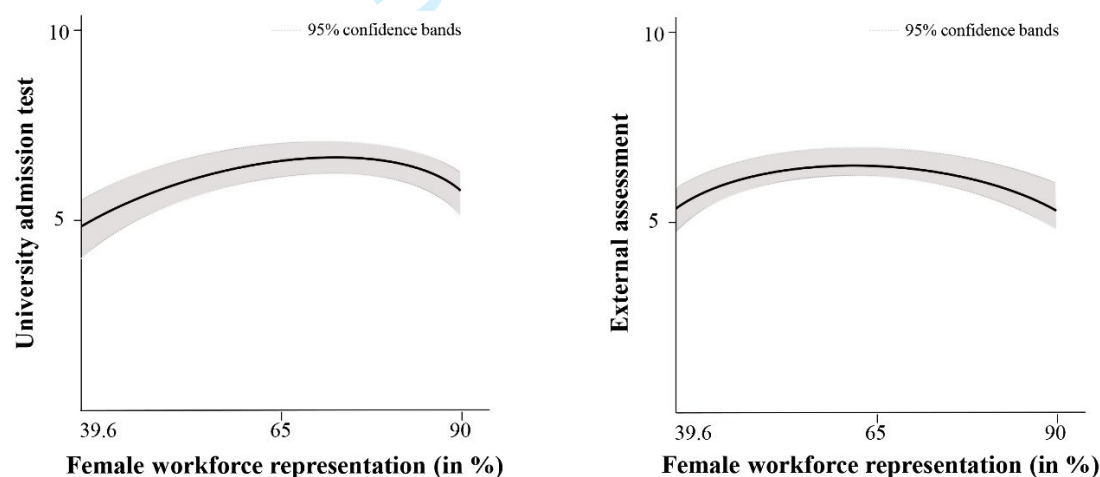
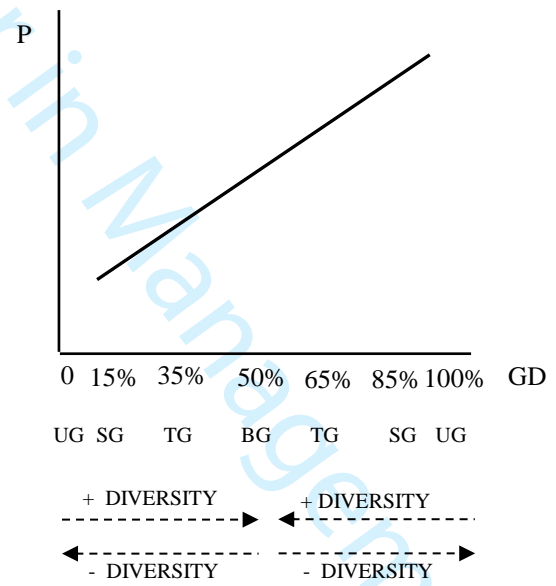


Figure 3. Academic performance and workforce gender diversity by female workforce representation.

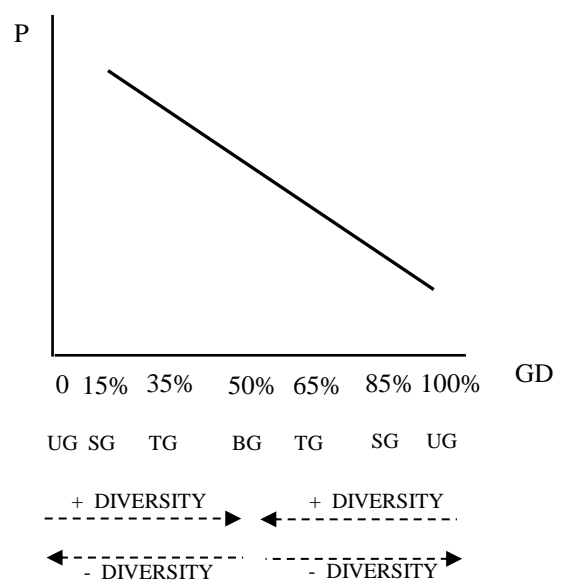
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

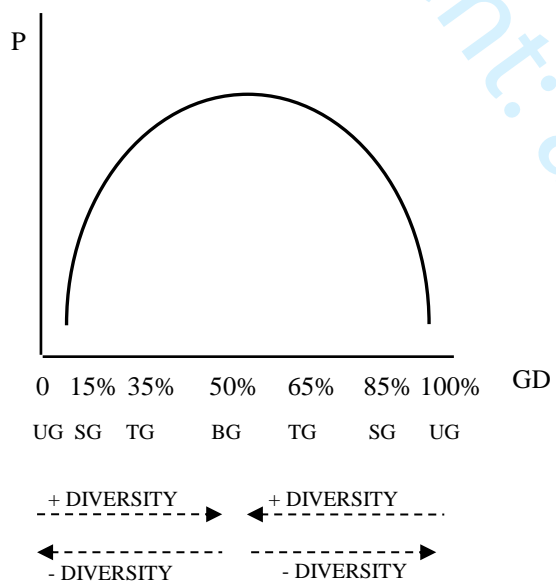
Model 1a: Positive linear model



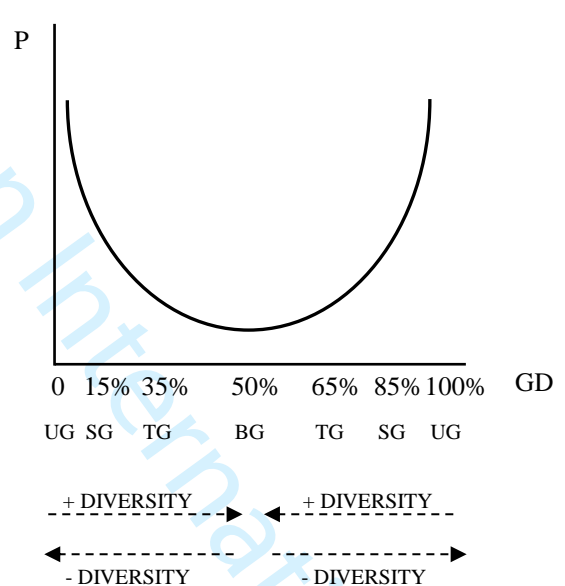
Model 1b: Negative linear model



Model 2a: Inverted U-shaped model



Model 2b: U-shaped model



- Resource-based view
- Upper echelons theory
- Value-in-diversity approach
- Information/decision making perspective

- Social identity theory
- Self-categorization theory
- Similarity attraction paradigm
- Group competition theory

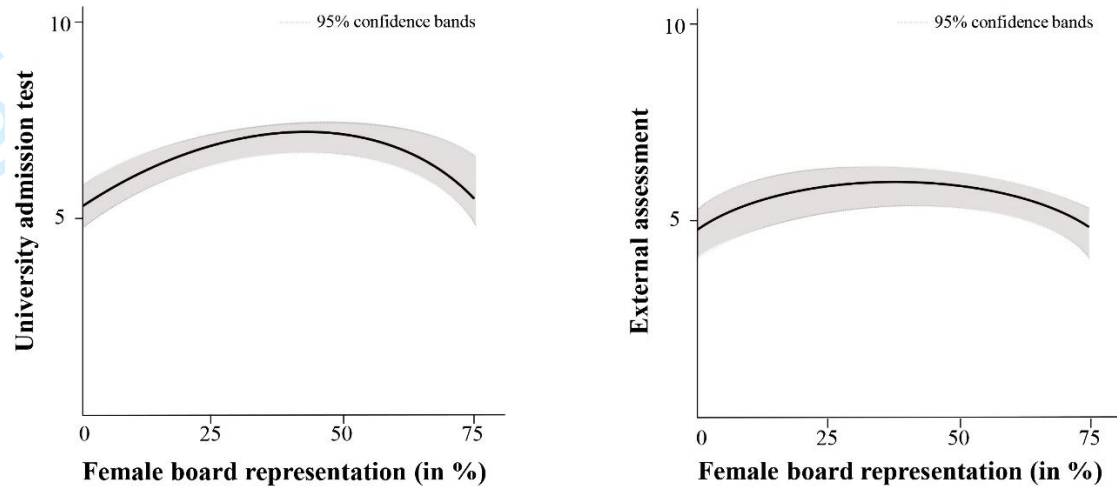


Figure 2. Academic performance and board gender diversity by female board representation.

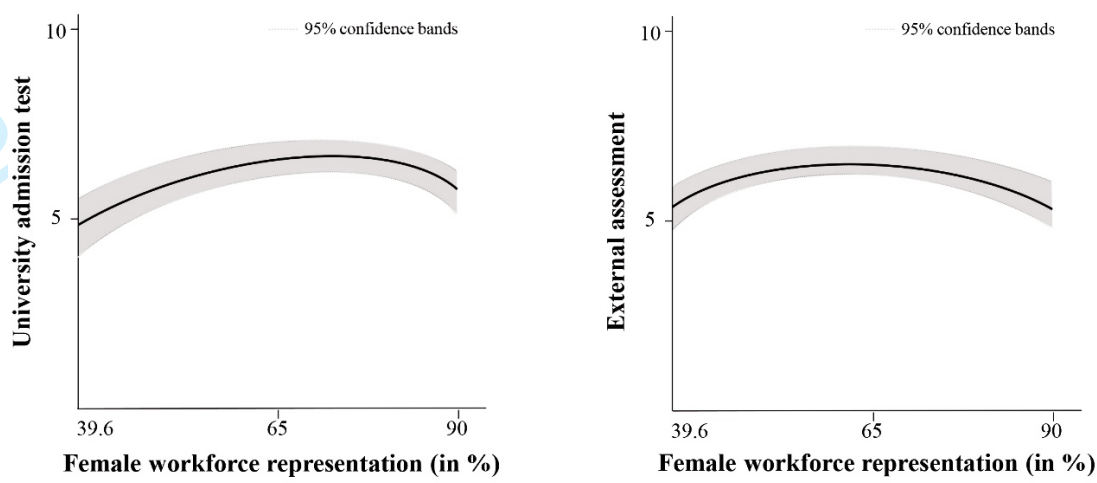


Figure 3. Academic performance and workforce gender diversity by female workforce representation.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

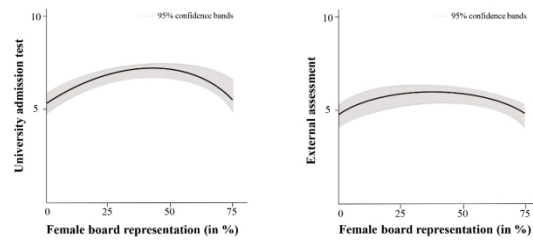


Figure 2. Academic performance and board gender diversity by female board representation.

705x397mm (87 x 87 DPI)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

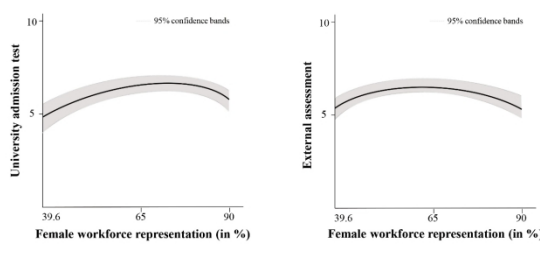


Figure 3. Academic performance and workforce gender diversity by female workforce representation.

686x385mm (87 x 87 DPI)

Table I*Means, Standard Deviations, VIF values and Correlations*

	Mean	S.D.	VIF	1	2	3	4	5	6	7	8	9
1. University admission test	6.2	0.71	-									
2. External assessment	5.61	0.89	-	0.440**								
3. Organization type	0.59	0.49	1.802	-0.147	-0.432**							
4. Organization size	41.76	18.81	1.430	0.233*	-0.093	0.608**						
5. Students composition	16.05	14.03	1.454	-0.493**	-0.608**	0.132	-0.088					
6. Staff instability	31.97	24.27	1.245	-0.248**	-0.020	0.209*	-0.002	-0.070				
7. Female board representation	45.38	24.64	1.330	0.431**	0.250*	-0.124	0.042	-0.366**	-0.256*			
8. Female board representation squared	19.11	16.90	1.246	-0.302**	-0.297**	-0.004	-0.136	0.243*	0.028	-0.175		
9. Female workforce representation	64.19	9.87	1.443	0.466**	0.110	0.126	0.104	-0.217*	-0.142	0.266*	-0.310**	
10. Female workforce representation squared	42.18	13.09	1.182	-0.161	-0.149	0.051	-0.082	0.111	0.182	-0.142	0.056	0.207*

N= 105; * $p < 0.05$; ** $p < 0.01$.

Table II*Results of Hierarchical Regression Analysis (dependent variable=University admission test)*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Organization type					-0.174 (0.163)	-0.363* (0.159)	-0.341* (0.158)
Organization size					0.013** (0.004)	0.013** (0.004)	0.013** (0.004)
Students composition					-0.018** (0.007)	-0.019** (0.006)	-0.015* (0.006)
Staff instability					-0.004 (0.003)	-0.003 (0.003)	-0.002 (0.003)
Female board representation	1.333*** ⁽¹⁾ (0.293) ⁽²⁾		1.216*** (0.288)		0.786** (0.292)		0.560* (0.279)
Female board representation squared			-0.164* (0.064)		-0.108 [†] (0.061)		-0.037 [†] (0.060)
Female workforce representation		3.337*** (0.664)		3.741*** (0.652)		2.959*** (0.639)	2.568*** (0.677)
Female workforce representation squared				-0.142** (0.048)		-0.076 [†] (0.044)	-0.062 [†] (0.044)
R^2	0.185	0.217	0.241	0.287	0.418	0.481	0.509
ΔR^2	0.185***	0.217***	0.241***	0.287***	0.155**	0.217***	0.167***
Adjusted- R^2	0.176	0.208	0.225	0.271	0.374	0.443	0.458
F-test	20.703***	25.216***	14.317***	18.098***	9.570***	12.379***	10.090***

⁽¹⁾ Unstandardized coefficients; ⁽²⁾ Standard errors in brackets.*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; [†] $p < 0.10$.

Table III*Results of Hierarchical Regression Analysis (dependent variable=External assessment of knowledge and skills)*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Organization type					-0.967*** (0.191)	-1.066*** (0.200)	-1.018*** (0.200)
Organization size					0.009 [†] (0.005)	0.009 [†] (0.005)	0.008 (0.005)
Students composition					-0.027*** (0.007)	-0.028*** (0.007)	-0.025** (0.007)
Staff instability					0.005 (0.003)	0.006 [†] (0.003)	0.005 (0.003)
Female board representation	0.967* ⁽¹⁾ (0.390) ⁽²⁾		0.787* (0.384)		0.275 (0.315)		0.086 (0.327)
Female board representation squared			-0.224 [†] (0.085)		-0.185** (0.066)		-0.158* (0.070)
Female workforce representation		1.334 (0.929)		1.665 [†] (0.931)		1.446 [†] (0.740)	0.857 (0.790)
Female workforce representation squared				-0.128 [†] (0.067)		-0.073 [†] (0.050)	-0.058 (0.051)
R^2	0.063	0.022	0.129	0.060	0.535	0.516	0.546
ΔR^2	0.063*	0.022	0.129**	0.060 [†]	0.351**	0.477***	0.058 [†]
Adjusted- R^2	0.052	0.012	0.110	0.039	0.501	0.480	0.498
F -test	6.152*	2.092	6.723**	4.871 [†]	15.558***	14.212***	11.561***

⁽¹⁾ Unstandardized coefficients; ⁽²⁾ Standard errors in brackets.*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; [†] $p < 0.10$.

Table IV

*Results of Hierarchical Regression Analysis with dummy variables according to Kanter
(dependent variable = University admission test)*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
State school			-0.197 (0.164)	-0.403* (0.163)	-0.401* (0.161)
Number of teachers			0.012** (0.004)	0.015*** (0.004)	0.015*** (0.004)
Foreign students (in %)			-0.020** (0.007)	-0.020** (0.006)	-0.016* (0.007)
Staff instability (in %)			-0.005 (0.003)	-0.003 (0.003)	-0.003 (0.003)
Uniform board	-0.985*** ⁽¹⁾ (0.193) ⁽³⁾		-0.634** (0.201)		-0.432* (0.196)
Skewed board	-0.626* (0.092)		-0.408* (0.087)		-0.332* (0.099)
Tilted board	-0.300* (0.161)		-0.310* (0.151)		-0.297* (0.140)
Prevalent board	-0.127 (0.197)		-0.196 (0.186)		-0.160 (0.172)
Tilted workforce		-0.735 (0.649)		-0.504 (0.591)	-0.338 (0.595)
Prevalent workforce		0.654*** (0.143)		0.580*** (0.134)	0.522*** (0.134)
R^2	0.234	0.213	0.423	0.476	0.521
ΔR^2	0.234***	0.213***	0.167**	0.277***	0.045 [†]
<i>Adjusted-R²</i>	0.208	0.195	0.372	0.437	0.465
<i>F-test</i>	9.078***	12.149***	8.283***	12.104***	9.318***

⁽¹⁾ Unstandardized coefficients; ⁽²⁾ Standard errors in brackets.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; [†] $p < 0.01$.