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Female corporate leadership in Latin America and the Caribbean region

Representation and firm-level outcomes

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Abstract

Purpose – Despite gender parity in the general working population, the higher up one looks in ranks within the firm the fewer women one finds. This under-representation of women in top positions at firms is purportedly even more acute in Latin America and the Caribbean (LAC). LAC is a large and increasingly important region of the world where women are well-represented in the workforce and are comparatively better educated than men. Documenting if this resource is utilized at full potential is therefore of crucial importance. The purpose of this paper is to document the level and impact of female representation at the executive level in the region, as no systematic study exists on this topic.

Design/methodology/approach – The authors collect an original database of publicly listed companies to determine prevailing gender ratios among board members and executives in LAC region. The authors then estimate whether companies with women board members are more likely to appoint women executives. Finally, the authors estimate whether measures of female leadership at the firm are correlated with company performance.

Findings – The authors find that women are as under-represented in LAC as in the USA, but much less so in the Caribbean. The authors find that companies with women board members are more likely to appoint women executives in LAC. The authors find that measures of female leadership at the firm are correlated with company performance but only regarding board membership and only when the proportion of women on the board is greater than 30 percent. Again composition effects are important. Overall, the authors conclude that the LAC region exhibits empirical regularities about under-representation of women in leadership positions at the firm that are very similar to those found for high-income countries in Europe and North America.

Originality/value – The authors are the first and so far unique systematic study exists able to document the level and impact of female representation at the executive level in the region.

Keywords Gender gap, Glass ceiling, Executive gender, Gender quotas, Women board members

Paper type Research paper

1. Introduction

Women are an increasingly important resource in the labor market. More women work today than at any time in history, and women are now acquiring education at a higher rate than men. In the USA, for example, women make up nearly 50 percent of the workforce,

JEL Classification — J16, J7, M12, M5

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and the proportion of women with a college degree has been higher than that of men since the generation born in the mid-1950s[1]. What is noteworthy for our purposes is that these patterns persist in labor markets across the hemisphere. In Latin America and the Caribbean (LAC) region, the average workforce is 42 percent female[2], and since the early 1990s more women than men have been enrolled both in secondary and in tertiary education[3].

Despite this growing gender parity in the general working population, the higher up one looks in the ranks the fewer women one finds. For example, 2012 US data show that women make up more than 50 percent of white collar workers but under 5 percent of high-level executives[4]. Other high-income countries show similar patterns[5]. Under-representation of women in top positions is purportedly even more acute in Latin America. The Latin Business Chronicle reported in 2012 that 433 of the top 500 Latin American companies had no women senior executives and only nine had a woman CEO (Bamrud and Calderon, 2012). In 2013, Credit Suisse found that 56 percent of companies in Latin America had no women board members at all and only 2 percent had a woman CEO (Dawson *et al.*, 2014). However, if we consider a broader set of professions including all management positions across both the public and the private sector (legislators, senior officials, corporate managers, and general managers) and if we focus on Caribbean countries, the picture is more nuanced. Several countries in the region have comparatively high shares of women when considering all management positions and Jamaica, Colombia, and Saint Lucia are the only three countries out of the 128 surveyed with a higher share of women than men. Yet once those shares are broken out by management level, we observe that women are best represented in middle management but heavily under-represented at the level of general managers and chief executives (International Labour Organization, 2015).

This upper level of management is where we focus our analysis. Given that women are well-represented in the workforce in LAC and are comparatively better educated than men, theory supposes that such human capital comes imbued with economic opportunity. Documenting the utilization of this resource relative to its full potential is therefore of high importance, yet no systematic study of the region has done so to date. The prevailing corporate gender diversity research has focused heavily on Europe and the USA. By extending the scope of the analysis to LAC, we can begin to assess the broader validity of empirical regularities identified in a small group of high-income countries.

A previously unexplored data set of publicly listed companies[6] enables us to circumvent the main obstacle that has hampered progress in the past: the lack of representative and comparable data for a large number of LAC countries. Our data set contains the names and titles of the top executives from a wide swath of the universe of listed firms in the region. As a result, we are able to build hierarchical executive rankings by gender at the firm level. The data also include information on board membership, allowing us to study whether companies with more women on the board tend to have more women executives. Finally, our data include a relatively rich list of balance sheet information, from which we can estimate whether companies with more women in leadership positions exhibit higher profits conditional on region, sector, and firm characteristics. For comparison with our results from LAC, we extract data for the USA as well. Since the USA shares similar corporate governance structures as LAC, is a primary trading partner for the region, and has been studied extensively by previous literature, it serves as a natural benchmark.

Our results show that women are in fact under-represented in LAC, with an average of 8.5 percent women board members and 9.2 percent women executives per company, and 4.2 percent women CEOs across the region. These numbers are highly comparable to those in the USA, where we find 9 percent women board members, 12 percent women executives, and 4.2 percent women CEOs. Once we separate LAC into subregions, we find that the proportion of female executives in Caribbean countries is much higher than elsewhere, although even there women remain under-represented relative to their share in the labor force.

After documenting the under-representation of women in leadership positions, we study what the impact of such under-representation might be. Following previous literature, we focus on two effects: the association between the proportion of women board members and the proportion of women top executives[7], and the correlation between these two measures of female leadership and the performance of the firm[8].

Our estimation results for LAC countries are broadly in line with previous results for high-income countries. There is a positive correlation between female board membership and the probability of having female executives, with a reduction in magnitude when conditioning on firm-level controls. There is mixed and imprecisely estimated evidence of a link between representation of women in leadership positions and firm performance. While our data very clearly do not allow for a causal interpretation of these estimation results, a robustness analysis we perform in order to attenuate estimation bias confirms the broader picture above[9]. The analysis nonetheless remains limited to a subset of companies and only partially reduces the overall endogeneity problem. Our regression analysis should therefore be considered descriptive, albeit describing a phenomenon never before documented in the LAC region.

The remainder of the paper is organized as follows. Section 2 discuss the relevant related literature. Section 3 describes the data and the sample selection process. Section 4 presents descriptive statistics for the level of female representation in corporate leadership in LAC. Section 5 presents the econometric analysis, including the empirical specification, the estimation results, and the robustness analysis. Section 6 concludes. A Web Appendix where we collect additional results and data information is also available[10].

2. Related literature

The literature on female corporate leadership presents ample empirical evidence regarding the under-representation of women in leadership positions. Many contributions focus on US firms: Dezso and Ross (2011) use 15 years of panel data for the top management teams of S&P 1,500 firms, finding that only 8.5 percent have more than one woman on the team; Adams and Ferreira (2009) use similar data but focus on boards of directors, finding an overall proportion of female directors of 9.3 percent; finally, Albanesi *et al.* (2015) use Standard & Poor's ExecuComp data set to show that women are a small but increasing fraction of top executives, rising from 1.6 percent in 1992 to 7 percent in 2004.

Other high-income countries show similar patterns. Terjesen *et al.* (2009) reviews a variety of results showing that the proportion of women directors ranges from barely above 0 percent in Japan to more than 20 percent in Slovenia. Green and Homroy (2015) focus on boards of listed European firms, reporting an average of 18.5 percent female board members. Specific country studies for Denmark (Smith *et al.*, 2006), Italy (Flabbi *et al.*, 2016), Norway (Ahern and Dittmar, 2012) and (Matsa and Miller, 2013), and Portugal (Cardoso and Winter-Ebmer, 2010) broadly confirm this picture.

Evidence on the under-representation of women in corporate leadership positions in LAC countries is much more scarce. In their cross-country review, Terjesen *et al.* (2009) also look at a handful of LAC countries. They report a proportion of women board members ranging from about 4 percent in Argentina to 8 percent in Brazil. Non-academic private-sector studies have looked at top Latin American companies: Bamrud and Calderon (2012) reports that about 13 percent of the top 500 companies have at least one woman among their top executives; Dawson *et al.* (2014) look at a larger sample of companies, finding that only 2 percent have a female CEO.

Overall, previous studies indicate that under-representation of women is more acute in LAC than in most high-income economies, although the trend is positive. A recent private sector study (Mercer, 2016) places Latin America among the regions that may potentially lead the world in terms of female representation at the professional level and above.

According to their estimates, women in the region accounted for 17 percent of management in 2015, but are projected to reach 44 percent in 2025. The main drivers of such substantial change are the current hiring, promotion, and retention rates.

Caribbean countries are, in general, an exception in the region. Commonwealth (2015) reports a share of female leaders in the Caribbean which is among the highest in the world: in Jamaica, 93 percent of listed companies analyzed have at least one woman on the board, and the proportion of female executives is almost 30 percent; in the Bahamas the numbers are, respectively, 70 percent and almost 20 percent. One proposed mechanism for the increased number of women in leadership roles in the Caribbean is that specific local conditions related to race, class, and gender relations tended to benefit educated women during the economic transformation (Mullings, 2005).

Moving from evidence on under-representation to its effects, the literature focuses on two main channels: the relationship between the proportion of female board members and the proportion of female executives, and the relationship between female leadership (either as board members or executives) and firm performance[11].

The first channel – the relationship between board members and executives – is important because board members are responsible for monitoring and hiring senior management. If boards with very few women are less likely to appoint women as executives then under-representation on boards may reinforce under-representation among executives. These are the so-called spillover effects (Armstrong and Walby, 2012), and their presence has been recently studied in the context of the quotas that have been mandated in many European countries. Matsa and Miller (2013) study the impact of introducing quotas for the boards of Norwegian companies starting in 2006. They find that new female directors appear to select, if not necessarily women, definitely like-minded executives. This is particularly true with respect to attitudes toward firing workers. Bertrand *et al.* (2014) also use the Norwegian quota policy but look at a longer time span. They estimate that the policy improved the representation of female employees among the top executives (defined as the top five highest earners in the firm).

LAC countries have not implemented similar quota policies, but the issue of balanced representation on boards is becoming increasingly salient. The 2016 Egon Zehnder Latin American Board Diversity Analysis, which surveyed 155 publicly listed companies in five Latin American countries, finds that 72 percent of board chairs think that having women on the board affects its performance. Very few, however, believe in government-imposed gender quotas as a means for bringing about such parity, with 88 percent of board chairs and even 64 percent of female board members opposed to the idea. In general, though, the survey reveals a growing consensus among the business elite that boardroom gender diversity is an essential component of modern corporate governance. This view is consistent with a survey conducted by McKinsey in 2013 of 547 top executives in the six largest countries of LAC.

The second channel – the relationship between female leadership and firm performance – is important for judging the costs and causes of female under-representation. If having more women in leadership positions would improve firm performance, then their under-representation among the top ranks implies significant efficiency costs. At the same time, if women are estimated to be as skilled at or better than men in running firms, then under-representation cannot be attributed to any lack of ability (Flabbi *et al.*, 2016).

The evidence regarding the impact of female executives on performance is mixed. Dezso and Ross (2011) find that female representation in top management improves firm performance, but only if the firm's strategy is focused on innovation. Flabbi *et al.* (2016) also find that female executives improve performance only under certain conditions, in their case, if the proportion of women in the firm's workforce is at least 20 percent. In contrast, Albanesi *et al.* (2015) find no link between firm performance and the gender of top executives.

The evidence on female representation on the board and firm performance is also mixed. Matsa and Miller (2013) find that Norwegian firms with more women on the board exhibit lower short-term profits. Smith *et al.* (2006) find a positive conditional relationship between representation of women on the board and firm performance in Danish firms. Gregory-Smith *et al.* (2014) use data on FTSE350 companies, finding no support for the argument that gender diverse boards enhance corporate performance. There is no similar evidence available for LAC countries, although a recent study (Pletzer *et al.*, 2015) conducted a meta-analysis of 20 papers from peer-reviewed academic journals. The papers covered ten developing countries and six low income countries, yet none in LAC. Estimates of a relationship between board gender diversity and financial outcomes in the meta-analysis are non-existent: there is a near-zero, nonsignificant correlation ($r = 0.01$) between the two variables.

3. Data

Outside the USA and Europe, aggregated information about the top management of individual firms is scarce. Although some firms may list their top executives and members of the board in their annual reports, such reports can be cumbersome to obtain and onerous to examine for leadership information, making it extremely difficult to collect a sample of companies large and representative enough to conduct a meaningful empirical analysis.

By working with an expansive database of public companies (Osiris, maintained by Bureau van Dijk) which lists both financial information and the names of up to 50 top executives and board members, we are able to collect an exhaustive sample of listed companies for which we can assign a gender to each top executive. We can conduct the exercise only for listed firms, and therefore are unable to collect a sample representative of the entire population. Still, listed firms in most of the region are highly relevant in terms of their contribution to GDP, and they represent the economic activity of their countries at least as well as, if not better than, ExecuComp does for the USA.

Another advantage of our data is the presence of reliable indicators for board membership and for the top senior executive at the firm. Moreover, the raw data report balance sheet information, allowing us to introduce firm-level controls and to perform the analysis of the link between representation and performance. Finally, the same data source also covers non-LAC countries, allowing us to compare LAC to other regions.

In the paper, we focus on comparisons with the USA, which we chose for three reasons. The first is geographic proximity. The second is trade volume: the USA is the primary trading partner for the region. The third is corporate structure. LAC countries follow the Anglo-American model of a one-tier board structure, composed of both executive and non-executive members, which delegates day-to-day business to the management team (deJonge, 2015). Board composition in the region is covered by laws, regulations and codes requiring in most countries a sufficient number or a fixed percentage of independent directors. Moreover, in the last 15 years, several countries have introduces mandatory audit committees to support the work of the board, making governance structures increasingly similar to those in the USA (Carolina and Andreas, 2011). LAC is also closer to the USA than to Europe in so far as mandatory regulations on gender diversity on boards are concerned[12]: as in the USA, no country in the LAC region has so far introduced this type of legislation. Chile is the only country where the issue has been discussed in the policy agenda and where some limited regulatory initiatives have recently been enacted[13].

3.1 Data source and sample extraction

Our data source is Osiris, a database maintained by Bureau van Dijk containing information for about 70,000 publicly listed companies worldwide. The aim of the database is to include

all publicly listed companies in the world and to report financial and background information for each of them. Specifically, we subscribed to a one-time cross-sectional extraction of all the listed companies available in Osiris. The information is updated up to December 2013. In addition to financial information, Osiris contains a contacts section where companies list the names and titles of up to 50 board members and managers holding high-level executive positions at the firm.

We cross-checked the Bureau van Dijk claim of extensive coverage of listed firms by comparing the total market cap of companies in our data to the reported market cap for the exchanges on which they are listed. The results, reported in Table VII of the Web Appendix, corroborate the claim: we are very close to having the entire population of listed companies in both regions.

To obtain the sample we use in our analysis, we began with all companies listed on exchanges in Latin America, the Caribbean, and the USA. From that set we removed companies with no reported board members or executives or with missing sector information, leading to a loss of about 7.4 percent of the sample. We also removed companies from Bermuda, the Cayman Islands, and the Virgin Islands (British), as their corporate legal codes are such that listed companies might not reflect local conditions. Specifically, they are places where firms may incorporate for tax planning reasons and not because they are actually operating there[14]. After cleaning, the resulting sample held 7,446 total companies, including 1,256 from 31 countries in LAC.

3.2 Female executives and firm leadership indicators

The way the data are collected presents two challenges for our analysis. First, at the time our sample was drawn, Osiris did not directly identify the gender of reported board members and executives. We therefore built our own indicator to identify whether the listed contact was male or female. We started by relying on the listed salutation, such that Mr was recorded as male and Miss and Mrs as female. When no salutation was reported, we searched for all other people in the database with the same first name as that person. If an overwhelming majority of those people shared the same gender, we assigned that gender to the person with missing data. For people with missing data who did not share the same first name as others in our sample, we applied a similar procedure using the online database of names and gender hosted at genderize.io. People with missing or ambiguous first names were removed from the sample, leading to a loss of about 15 firms. In total, we identified the gender and position for 75,709 individuals: 66,379 men and 9,330 women, including 10,642 men and 1,248 women from the 1,256 LAC companies[15].

The second challenge, common to all the literature using similar data sources, is the construction of indicators of the actual leadership structure at the firm. We are interested in three categories: board members, senior executives, and the top-ranked executive in each company (from now on, the company's CEO). Starting from the raw data, we use the following definitions to build each category. Anyone noted as being on the board of directors, the advisory board, the supervisory board, the executive board, or any board committees is considered a board member. Anyone listed as a member of senior management as well as anyone holding a senior executive position in an operational area of the company, such as the legal department or finance and accounting is considered a (senior) executive. In total, we identified 63,819 individuals for the USA and 11,890 individuals for LAC who are board members and/or executives. Since one person can hold both an executive position and a board position within a firm, these categories overlap to some extent. For example, in LAC we observe 8,710 board members and 4,958 executives, leading to a total of 13,668 positions.

Identifying the company's CEO was more challenging. The Osiris data contain specific job titles, yet because titles vary by region and company, further work was necessary to

determine the top executive. We determined it on an iterative basis, searching for a series of terms such as chief executive officer or president in each person's job title. When this process resulted in multiple CEOs or no CEOs being identified, we assigned the CEO title to the people identified by Osiris as the highest executive. For companies where we could not determine a unique CEO we recorded that information as missing. We were able to identify a CEO for 6,489 (87 percent) of the companies in the sample, including 853 companies in LAC[16].

A complete list of descriptive statistics for the sample we use in our analysis is reported in Tables I-V in the Web Appendix (see footnote 10), aggregated by region and subregion. Interestingly, profit margins and returns on total assets are on average much higher in LAC. For example, the mean profit margin in the USA is 5 percent compared to nearly 17 percent in LAC. One possibility to consider is that there may be differences in underlying methods of accounting across the regions, which we will control for with regional fixed effects. In the next section of the paper we present in more detail descriptive statistics on female leadership at the firm, providing the first contribution of the paper: measuring the degree of representation of women in executive positions in LAC.

4. Female leadership: descriptive statistics

According to our estimation based on the Osiris data, overall levels of women board members and executives in LAC are low, yet at the same time they are at or near those found in the USA (Figure 1). In LAC, an average of 8.5 percent of board members and 9.2 percent of executives per company are women, and 4.2 percent of companies have a female CEO. By comparison, the averages for the USA are 9 percent board members and 12 percent executives. As in LAC, 4.2 percent of CEOs are women. When the numbers are broken out into subregions, the notable outlier is the Caribbean, where on average 18 percent of board members and 29 percent of executives are women[17]. The divergence does not, however, carry over into the CEO position, where we find only 3.1 percent women.

These average shares of women leaders in the region may be highly influenced by the fact that the majority of companies have no women at all: as reported in Figures 2 and 3, 63 percent of companies in LAC and 56 percent in the USA have no women board members, and 73 percent of companies in LAC and 56 percent in the USA report no women executives. Again the notable exception is the Caribbean, where 74 percent of companies have at least one woman board member and 64 percent have at least one woman executive.

Another reason to look not simply at the presence of female leaders at the firms but also at their proportion is the theory that the effect of women leaders is not monotonic, owing to a perception of a sole women being a mere "token" board member and thus being treated in a way that impedes the effective execution of her responsibilities. The critical mass hypothesis suggests that boards need multiple women, theorized to be a share of around 30 percent, in order for those women to be perceived as regular board members as opposed to women board members (Kanter, 1977). Figures 2 and 3 report not only firms with a positive proportion of executives and board members but also if those proportions are above the 30 percent threshold. By this metric, LAC performs better than the USA and, as shown by the disaggregation into subregions, the result is not simply a composition effect driven by the Caribbean. While the Caribbean has the highest proportion – 22 percent of companies have more than 30 percent female executives – both the Andes and the Southern Cone have values higher than the 6.5 percent reported for the USA.

The levels of under-representation found by our analysis generally align with previous rough estimates based on small samples of large companies in the region. For example, looking at the 100 largest companies in the region, Corporate Women Directors International reported that 6.4 percent of board members in Latin America were women, and about 50 percent of companies had no women board members (Godoy and Sambo, 2015). An ILO

Table I.
Probability of at least one woman executive as a function of share of women on the board (LAC and USA)

Regions	Latin America and Caribbean (LAC)						USA					
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. on board	0.240***	0.154***	0.161***				0.162***	0.0466***	0.0456**			
	(0.0361)	(0.0379)	(0.0440)				(0.0143)	(0.0157)	(0.0180)			
30%+ w. on board	0.128***	0.0913*	0.0778				0.205***	0.129***	0.102***			
	(0.0475)	(0.0476)	(0.0640)				(0.0298)	(0.0299)	(0.0348)			
% women on board				0.254***	0.167**	0.139				0.571***	0.270***	0.254***
				(0.0755)	(0.0768)	(0.115)				(0.0562)	(0.0590)	(0.0699)
Controls												
Subregion	No	Yes	Yes	No	Yes	Yes	na	na	na	na	na	na
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Tturnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	963	945	642	963	945	642	5,106	5,075	3,881	5,106	5,075	3,881

Notes: Standard errors in parentheses. Estimated marginal effects from probit models reported. Executive is restricted to people not also on the board. Those with dual appointments are considered board members. Detailed definitions of the controls are provided in the main text and in appendix. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table II.
Probability of at least one woman executive as a function of share of women on the board (LAC subregions)

Regions	Andes			Central America			Caribbean			Southern Cone		
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. on board	0.364***	0.252***	0.339***	0.185**	0.0938	0.113	0.365***	0.478***	0.391**	0.0681	0.0501	0.0869
	(0.0796)	(0.0923)	(0.120)	(0.0899)	(0.0955)	(0.112)	(0.136)	(0.132)	(0.170)	(0.0455)	(0.0466)	(0.0559)
30%+ w. on board	0.274**	0.306**	0.410**	0.333	0.684***	-	0.180	0.195	−0.006	0.0311	0.0275	0.0348
	(0.127)	(0.130)	(0.192)	(0.254)	(0.127)		(0.173)	(0.174)	(0.189)	(0.0505)	(0.0514)	(0.0731)
Controls												
Country	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Turnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	179	166	92	113	96	75	71	63	35	600	591	402

Notes: Standard errors in parentheses. Estimated marginal effects from probit models reported. Executive is restricted to people not also on the board. Those with dual appointments are considered board members. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Regions	Latin America and Caribbean (LAC)						USA					
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. on board	−0.712	−1.723	−3.141*				7.807***	−0.757	−1.634**			
	(1.670)	(1.647)	(1.639)				(0.794)	(0.814)	(0.780)			
30%+ w. on board	5.130**	5.636**	6.925**				5.276***	1.059	−1.278			
	(2.476)	(2.349)	(2.740)				(1.614)	(1.503)	(1.426)			
% women on board				5.707	8.340*	11.14**				21.71***	2.558	−3.184
				(4.600)	(4.387)	(5.281)				(3.242)	(3.102)	(3.012)
Controls												
Subregion	No	Yes	Yes	No	Yes	Yes	na	na	na	na	na	na
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Turnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	1,086	1,086	754	1,086	1,086	754	4,253	4,248	3,581	4,253	4,248	3,581
R^2	0.005	0.182	0.402	0.001	0.179	0.395	0.022	0.209	0.273	0.010	0.208	0.272

Notes: Standard errors in parentheses. Estimated coefficients from OLS models reported. Profit margin defined as profit before tax/operating revenue. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table III.
Company profitability (profit margin) as a function of share of women on the board (LAC and USA)

Table IV.
Company profitability (profit margin) as a function of share of women executives (LAC and USA)

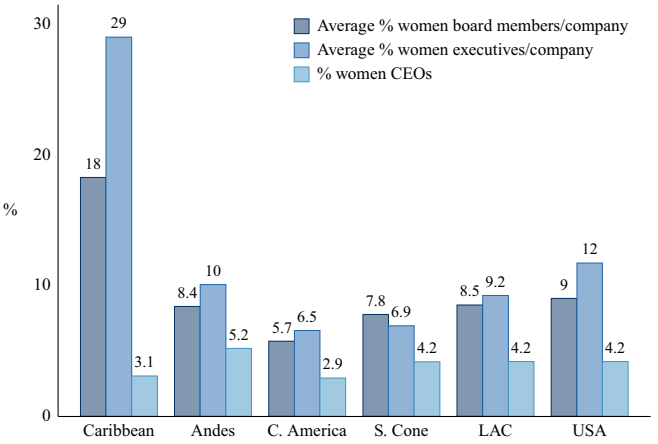
Regions	Latin America and Caribbean (LAC)						USA					
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. executive	1.377	−1.548					6.143***	−0.396				
	(2.241)	(1.997)					(0.848)	(0.768)				
30%+ w. executive	3.784*	1.259					2.162*	0.211				
	(2.203)	(2.346)					(1.208)	(1.053)				
% women executive			6.306	2.501					5.005**	−0.357		
			(4.058)	(4.725)					(2.508)	(2.161)		
Female CEO					4.883	2.827					0.302	−0.0005
					(5.007)	(5.560)					(1.986)	(1.664)
Controls												
Subregion	No	Yes	No	Yes	No	Yes	na	na	na	na	na	na
Sector	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Board size	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Total assets (log)	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Market cap (log)	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Turnover ratio	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Current ratio	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Solvency ratio	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,088	731	1,088	731	771	542	4,286	3,575	4,286	3,575	3,892	3,248
R^2	0.003	0.394	0.002	0.394	0.001	0.408	0.012	0.271	0.001	0.271	0.000	0.265

Notes: Standard errors in parentheses. Estimated coefficients from OLS models reported. Profit margin defined as profit before tax/operating revenue. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table V.
Company profitability (profit margin) as a function of share of women on the board (LAC subregions)

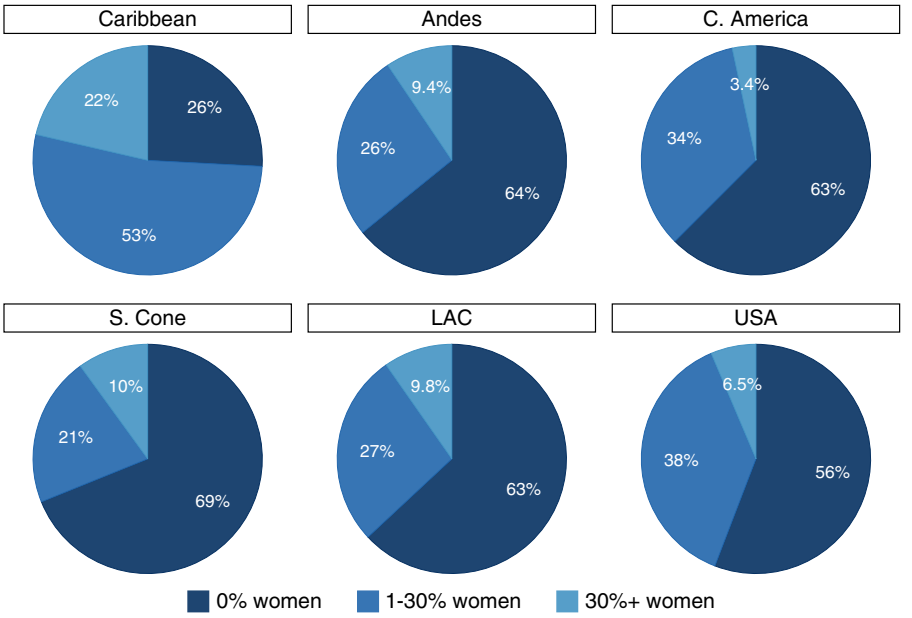
Regions		Andes			Central America			Caribbean			Southern Cone	
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. executive	−1.434	−4.949	−3.481	−3.565	−5.506	−2.916	0.882	−1.450	−12.09	0.194	1.309	−0.858
	(3.067)	(3.438)	(4.634)	(3.882)	(3.775)	(4.166)	(5.990)	(6.287)	(7.647)	(2.542)	(2.517)	(2.265)
30%+ w. executive	−1.241	1.031	1.221	−2.332	−7.742	−1.568	15.75**	15.71**	9.812	6.091*	7.348**	6.799*
	(4.688)	(4.620)	(8.006)	(10.08)	(9.594)	(17.16)	(7.188)	(7.218)	(8.121)	(3.481)	(3.286)	(3.490)
Controls												
Country	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Turnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	255	255	137	143	143	96	86	86	55	602	602	466
R^2	0.001	0.223	0.449	0.006	0.422	0.636	0.075	0.601	0.734	0.005	0.240	0.458

Notes: Standard errors in parentheses. Estimated coefficients from OLS models reported. Profit margin defined as profit before tax/operating revenue. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$



Source: Authors' estimations based on data from Bureau van Dijk's Osiris (accessed September 2013)

Figure 1.
Representation of women (average per company)

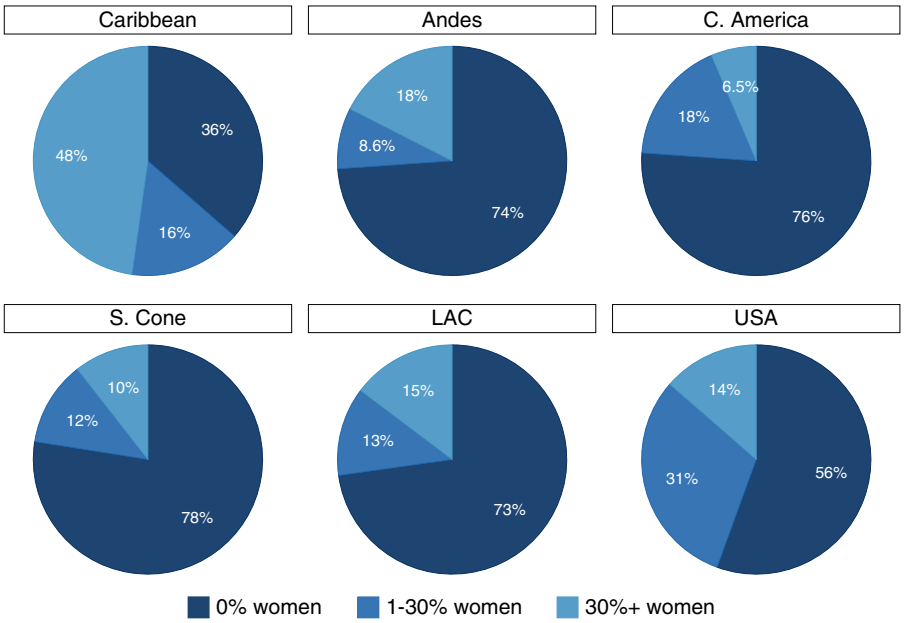


Source: Authors' estimations based on data from Bureau van Dijk's Osiris (accessed September 2013)

Figure 2.
Average share of women board members per company

survey of 29 companies found that half had fewer than 30 percent women board members, though only two reported having no women at all (International Labour Organization, 2015).

The main conclusion we draw from our systematic analysis of female representation among senior executives and board members of listed companies in LAC is the clear split between Latin American companies and Caribbean companies. While the share of female



Source: Authors' estimations based on data from Bureau van Dijk's Osiris (accessed September 2013)

Figure 3.
Average share of women executives per company

leaders in the Caribbean is among the highest in the world, with values higher than the USA across the board, the share in Latin America is much lower. Even given this dichotomy, the overall trend is one of under-representation, with the majority of firms having no female executives and no female board members among their ranks. A second important conclusion is that the average for the region is quite comparable to values found for the USA. Although some countries, in particular those in the Central American subregion, register extremely high levels of under-representation, the overall picture is of a region where under-representation of women in leadership positions at the firm is comparable to levels experienced by the closest neighboring high-income country.

5. Female leadership: econometric analysis

5.1 Specification

After documenting the under-representation of women in leadership position at the firm in LAC, we study what the impact of this under-representation might be. Following previous literature, we focus on two effects. First is the correlation between two different measures of female leadership: the proportion of women among board members and the proportion of women among top executives. Second is the correlation between the two measures of female leadership and the firm's performance. The first effect is important for judging the presence of spillover effects (Armstrong and Walby, 2012). Since the board of directors is responsible for monitoring and hiring senior management, if boards with few women are less likely to appoint women as executives then the under-representation on boards may reinforce the under-representation among executives too. The second effect is important for judging the costs and causes of female under-representation (Flabbi *et al.*, 2016). If women in leadership positions have a positive impact on firm performance, their under-representation among the top ranks has significant efficiency costs. Moreover, if women are estimated to be

equally good or better than men in running firms, then lack of ability can be ruled out as one of the channels responsible for generating under-representation.

We estimate these two effects in the following econometric setting. The unit of observation is a given firm i observed in a given country or region j. We are interested in the impact of female leadership measures (denoted by $FLEAD_{ij}$) on the probability that the firm has at least one woman executive (denoted by $y_{ij} = 1$) and on the firm's profit margin (denoted by π_{ij}). These two outcome variables are the empirical specification of the two effects we want to study: impact of female board membership on the proportion of female executives and impact of female leadership on firm performance. We have chosen these two specific outcomes for two reasons. First, both variables are well measured for almost all of the firms available in the estimation sample, reducing the number of missing observations. Second, they are reasonable proxies for the outcomes we want to study and they have been used in previous literature[18].

We model the first empirical specification as a probit and the second as a linear regression, formally:

$$P(y_{ij} = 1) = \Phi\left[\alpha_1 FLEAD_{ij} + \alpha_2 F_{ij} + \alpha_3 W_{ij} + \alpha_4 L_{ij} + \alpha_5 C_{ij}\right] \tag{1}$$

$$\pi_{ij} = \beta_1 FLEAD_{ij} + \beta_2 F_{ij} + \beta_3 W_{ij} + \beta_4 L_{ij} + \beta_5 C_{ij} + \varepsilon_{ij} \tag{2}$$

where Φ is the cdf of the standard normal and ε_{ij} is an error term. We are interested in the marginal effects of the leadership measures on the outcomes of interest:

$$\frac{\partial P(y_{ij} = 1)}{\partial FLEAD_{ij}} = \alpha_{1j}\phi\left[\alpha_1 FLEAD_{ij} + \alpha_2 F_{ij} + \alpha_3 W_{ij} + \alpha_4 L_{ij} + \alpha_5 C_{ij}\right] \tag{3}$$

$$\frac{\partial \pi_{ij}}{\partial FLEAD_{ij}} = \beta_1 \tag{4}$$

As emphasized by the notation, we assume the same determinants in both specifications but we change the functional forms to take into account the fact that the first variable is a probability while the second is a standard continuous variable. On top of our regressors of interest (*FLEAD*), we assume that the outcomes are determined by four additional factors: characteristics of the firm (F), characteristics of the workforce at the firm (W), characteristics of the firm's leadership aside from gender composition (L), and characteristics of the country or region the firm is operating in (C).

The firm characteristics available in our data set are mainly from balance sheet information. We have reliable measures of total assets for most firms and information on market capitalization and firm stability (turnover ratio, current ratio, and solvency ratio) for many but not all firms. Since previous literature on board compositions has shown its relevance[19], we also add a normalized measure of board size among the firm characteristics we control for. We normalize with respect to total assets so that the regressor becomes the number of board members per million dollars of positive assets. Finally, we add dummies to provide the usual controls for the sector the firm is operating in.

The workforce characteristics available in our data are extremely limited. We do not have reliable information on workforce composition and even the total number of workers is missing for many firms. As a result, workforce composition and characteristics should be considered in our econometric model as omitted variables that may generate endogeneity. For example, a firm already employing a high proportion of highly educated women may be more likely to promote women to executive positions and to nominate more women for the board. Since we do not observe the high proportion of highly educated women in the firm,

this characteristic will be captured by the error term generating a correlation with the female leadership variable of interest.

We also do not have good controls for the additional characteristics of firm leadership. The questionnaire used to collect the raw data occasionally asked about the education of the executives and in some instances information on previous employment or previous rank held. However, the information was not collected in a systematic fashion on a representative number of firms and therefore we cannot add it among the controls in our specification. This omission is another source of endogeneity. For example, when interpreting estimation results from the performance Equation (2) we cannot know if the positive effect of a female executive is due to the executive being female or to the executive being highly skilled and able. The only case in which this source of endogeneity may be negligible is when men and women are selected exactly in the same way in executive positions, an assumption unlikely to be true[20].

Finally, we use fixed effects to account for differences induced by characteristics of the country or the subregion the firm is operating in. To implement this, the last vector of controls in Equations (1) and (2) (denoted with C) is defined as a series of regional or country dummies. Some of the regional effects are also captured by allowing region-specific coefficients αs and βs. These effects are always at a broader level of aggregation than the country or regional dummies. This means that when estimating on the pooled LAC sample, the coefficients will be LAC-specific and the dummies will be at the level of the subregion. When estimated separately by LAC subregion, the coefficient will be subregion-specific and the dummies will be at the level of the country.

As enumerated above, we have two main sources of endogeneity in our specifications that we cannot solve. Our analysis should accordingly be interpreted as estimating conditional correlations and not causal effects. In Section 5.4 where we discuss robustness, we study the sensitivity of our main results to two strategies that may address some sources of endogeneity: an instrumental variable (IV) strategy and a first-difference regression strategy. However, we are able to implement these strategies only on a subset of countries and for a limited number of firms.

5.2 Results: board representation and women executives

The main estimation results relating board gender composition and women executives are presented in Tables I and II. Complete results are reported in the Web Appendix to the paper. Table I reports separate estimates for LAC and the USA and Table II reports separate estimates for each LAC subregion.

Focusing first on Table I, we show results using two measures of female representation on boards and three empirical specifications. The first measure of representation is the simplest possible: percentage of women among board members. The second measure splits the percentage in a set of three dummies indicating if there are 0 percent women; between 1 and 30 percent women; and more than 30 percent women on the board (with 0 percent used as the excluded category). This measure is inspired by the critical mass hypothesis we mentioned in our descriptive section: we want to allow for different thresholds to have differential impacts on outcomes. We tried different variables to capture this but the 30 percent threshold delivers the best performance[21]. Moreover, it is in line with recent mandatory quota policies implemented in many European countries[22].

The three empirical specifications follow the discussion presented in Section 5.1. The first – columns (1) and (4) for LAC and columns (7) and (10) for the USA – presents the unconditional correlation, i.e. we only regress on variables of interest without any controls. This is essentially a reference point that amounts to simple but relevant descriptive statistics. It also provides a comparison to gauge how many observations we lose due to missing values of the controls. The second specification – columns (2) and (5) for LAC and columns (8) and (11) for

the USA – adds the most parsimonious set of controls possible in order to minimize loss of observations: we add the regional fixed effect, the sector dummies, the relative board size variable and the total assets measure. Finally, the third specification – columns (3) and (6) for LAC and columns (9) and (12) for the USA – adds the remaining controls for firm characteristics: market cap, turnover ratio, current ratio, and solvency ratio. In all specifications, this largest set of controls leads to a significant loss of observations, on the order of 30 percent for LAC and 25 percent for the USA.

Columns (1) and (4) show that LAC companies with women on the board are far more likely to also have non-board member women executives. The marginal effect is statistically significant in each specification and the magnitude is substantial, with values above 20 percent. Introducing controls for region, sector, board size, and total assets (columns (2) and (5)) reduces the magnitude but still returns statistically significant effects. Adding the whole set of controls for firm characteristics (columns (3) and (6)) leads to an additional reduction in magnitude and to larger standard errors, so much so that the marginal effects are not significantly different from zero. The estimation results do not support the critical mass hypothesis in LAC: the coefficient on the 30 percent+ dummy always has a smaller magnitude than the one on the 1-30 percent dummy.

When comparing LAC with the USA, we find qualitatively the same empirical regularities: positive effects that become smaller and less precisely estimated as we add controls. But there are some differences. In particular the magnitudes are always higher, the estimates in the specification with full controls are still significant, and the 30 percent+ threshold always delivers larger magnitudes.

When comparing our US estimates with previous literature, we find qualitatively similar results, lending some credibility to our estimation strategy and data extraction procedure. Matsa and Miller (2011) study board members and executives in the USA estimating a 10 percentage point greater share of women on the board of directors with a 1.4 percentage point greater share of female executives in the following year. Controlling for industry and bank-level fixed effects, a much better control for firms characteristics than the ones we use, they also find a reduction in the magnitude of the impact but still significant effects. Finally, they also find support for some threshold effects.

Digging deeper into the LAC results we check whether important composition effects by subregion may be at work. Table II presents the results. We only report one measure of female leadership in the interest of concision but the main results carry over when we use the overall proportion of women on the board or the total number of women on the board.

Unconditional correlations are again positive but when controls are factored in significance is achieved only for the Caribbean sample. The smaller sample size may be one of the reasons for this result but it is worth pointing out that the Southern Cone is the only subregion registering no significant effects despite being the one with the largest number of observations. Even on regions and specifications where the effects are significant, the magnitudes are quite different, confirming that there is important heterogeneity between subregions.

A few recent studies have used the introduction of mandatory quotas in some European countries[23] to get closer to identifying causal effects. They may provide a useful comparison for interpreting our results. One of the most complete studies so far by Bertrand *et al.* (2014) was unable to conclude that the impact of a quota mandating at least 40 percent female board members in Norway had any causal effect on positions in the companies aside from seats on the board. A large survey looking at a larger set of outcomes (Terjesen *et al.*, 2009) reports some positive correlation but no solid evidence of causal impacts. This corroborates the hypothesis that our estimates may be capturing simple correlations due to omitted variables and not genuine causal effects.

The main conclusion we draw from estimating the relationship between female board membership and the probability of female executives at the firm is that LAC companies

exhibit the same empirical regularities found in high-income countries: a positive correlation between the two variables with a reduction in magnitude when conditioning on firm-level controls. The specific comparison with respect to the USA using the same data source and the same specifications indicates that the effects for LAC are smaller but comparable in magnitude and they do not exhibit the monotonicity necessary to support the critical mass hypothesis. Finally, the aggregated LAC effects mask relevant composition effects: companies from the Andes and Caribbean regions are important drivers of LAC average effects but most of the other regions' companies also exhibit positive effects with magnitudes of economic, if not statistical, significance.

5.3 Results: female leadership and firm performance

The main estimation results relating female leadership to firm performance are presented in Tables III-VI. The Tables are organized as in the previous section: we present separate estimates for LAC, the USA and for each LAC subregion; we use three empirical specifications (no controls; a parsimonious set of controls; the full set of controls), and we use two different measures of female leadership (simple proportion and dummies by threshold). We add regressions to study the impact of female representation not only among board members but also among executives. These differ from the previous section because, as shown in Equation (2), we now run simple linear regressions instead of probits. Complete results are in the Web Appendix.

Table III reports a positive and significant impact of female board membership on profit margin for the pooled sample of LAC companies. In the specification with the full set of controls (column (3)) having more than 30 percent women on the board with respect to having no women on the board increases the profit margin by a significant and large margin. The magnitude is 7 percentage points out of a mean of the dependent variable of about 14 percentage points. Economic and statistical significance is confirmed when using the simple overall proportion of women on the board. The USA exhibits similar results only in the specifications with a limited set of controls. When the full set of controls is added results are negative and not significantly different from zero.

Table IV reports results using the share of women executives as the measure of female leadership. We report only two specifications (no controls and full set of controls) because we add a measure of female leadership: the presence of a female CEO. Results for executives are different from those for board members: while most coefficients are positive with large magnitudes they are never significantly different from zero (The only exception is the 30 percent threshold in the regression without controls). Results for the USA are similar: some coefficients are positive but they are significantly different from zero only in specifications without controls.

Tables V and VI report results for LAC subregions. Estimates on female board membership show some threshold effects: both Caribbean and Southern Cone companies show positive and significant effects on the 30 percent dummy. The Andes show positive but not significant effect when the full set of controls is introduced while Central America displays a negative and insignificant effect. Once again, the overall LAC estimates average out significant differences between subregions. Estimates on the share of female executives confirm the aggregate result of no significant effects with one exception: a positive significant effect for the 30 percent dummy in the Southern Cone sample without controls.

There is a growing literature linking female leadership measures and firm performance. A first set of evidence comes from advocacy groups such as Catalyst. A frequently cited study conducted one-tailed *t*-tests comparing differences in means of performance measures between the top quartile and the bottom quartile of Fortune 500 companies by share of women on the board (Carter and Wagner, 2011). Results for two measures were statistically significant at the 10 percent level (return on sales and return on investment capital) but there

Table VI.
Company profitability (profit margin) as a function of share of women executives (LAC subregions)

Regions	Andes			Central America			Caribbean			Southern Cone		
Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1-30% w. executive	7.369	5.577	6.644	−0.507	−5.764	−7.697*	−8.828	−16.25*	−12.94	2.903	2.343	0.605
	(5.365)	(5.622)	(6.660)	(4.508)	(4.552)	(4.361)	(7.521)	(8.920)	(10.59)	(3.079)	(3.028)	(2.622)
30%+ w. executive	−3.233	−0.647	−7.174	1.244	−7.356	6.152	1.904	−8.330	−12.33	7.275**	4.820	1.260
	(3.995)	(4.150)	(5.926)	(6.936)	(7.097)	(10.59)	(5.643)	(5.801)	(7.847)	(3.581)	(3.498)	(3.380)
Controls												
Country	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Turnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	246	230	127	148	138	93	83	82	54	611	590	457
R^2	0.012	0.244	0.480	0.000	0.390	0.653	0.027	0.574	0.655	0.008	0.238	0.457

Notes: Standard errors in parentheses. Estimated coefficients from OLS models reported. Profit margin defined as profit before tax/operating revenue. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

was no evidence that return on equity differed by boardroom gender diversity. A second set of tests comparing companies with no women on the board to those with three or more women likewise found tentative evidence that average returns were higher when women were better represented. In another comparison of means, a study by Credit Suisse found that companies with at least one woman on the board had a 4 percentage point higher return on equity than those with no women, controlling for sector (Curtis *et al.*, 2012). This set of results looking at unconditional correlations is generally consistent with what we find in our regressions without controls in Table III.

A second set of evidence comes from academic studies looking at a wide range of firm performance measures. Wolfers (2006) found weak evidence that there were no differences in returns to holding stocks of companies led by women vs men. Analyzing the effect of the quota in Norway, Matsa and Miller (2013) found that firms with more women on the board exhibited lower short-term profits because they were less likely to undergo workforce reductions. Using a firm-level fixed effects model, Dezso and Ross (2011) found that S&P 1,500 firms did perform better when women were better represented, but only in cases where the firm's strategy was focused on innovation. A study of Danish firms did find a positive conditional relationship between representation of women on the board and firm performance, with results varying depending on the qualifications of those women (Smith *et al.*, 2006). Another study of Danish firms found no evidence that the share of women on the board was linked to firm performance as measured by Tobin's *Q* (Rose, 2007). A similar study for US firms found no significant relationship between board gender diversity and firm return on assets or Tobin's *Q* (Carter *et al.*, 2010). Albanesi *et al.* (2015) also found no significant effect using US data when controlling for firm fixed effects. Flabbi *et al.* (2016) looked at matched employer-employee data from Italy to show the impact of female executives and female CEOs on long-term measure of firm performance. Their regressions – controlling for firm fixed effects and for unobserved executive heterogeneity – showed no impact on firm performance unless the proportion of female workers at the firm was high. Gregory-Smith *et al.* (2014) used data on all companies listed on the FTSE350 between 1996 and 2011. Running fixed effects regressions they found no support for the argument that gender diverse boards enhanced corporate performance. Green and Homroy (2015) used data on board composition and director networks for listed European firms, a data set which shares our sample selection criteria. They found positive and significant effects of female representation on firm performance, as measured by return on assets. They used fixed effects and IV to reduce endogeneity bias and they additionally showed that female membership in committees involved explicitly in firm governance was crucial to produce the positive effects. Finally, Adams and Ferreira (2009) used panel data on S&P 1,500 companies to study the impact of gender diversity in boards on performance and governance. There was a positive impact on governance, while the impact on performance was positive in simple OLS but became negative when firm fixed effects were introduced.

Our reading of this previous literature is that existing empirical studies on high-income countries have found mixed evidence of a link between representation of women and firm performance, with only very few studies finding a significant impact when firm fixed effects are introduced. The main conclusion we draw from our estimates is that similarly mixed evidence exists for LAC countries. The strongest result relates to the impact of crossing the 30 percent threshold in female representation on boards: this coefficient is estimated to be positive and significant on the pooled sample of LAC companies. Estimates by subregion indicate that this aggregate result is driven by companies in the Caribbean and Southern Cone regions.

5.4 Robustness analysis

As described in Section 5.1, our female leadership measures are endogenous due to omitted variable bias and sample selection. While we can control for some sources of endogeneity by

adding our observed controls to the specification, we cannot control for workforce composition and for selection of executives and board members on characteristics other than gender. We propose two strategies that might alleviate the bias induced by endogeneity. However, due to data availability, we are able to implement these strategies only for a subset of countries and for a limited number of firms.

5.4.1 First-differencing. The first strategy follows the large literature estimating firm fixed-effects regressions[24]. In a firm fixed-effects setting, identification is obtained by using variation over time within the same firm. The firm fixed-effect captures unobserved firm-specific components that may induce bias, such as workforce composition as discussed in Section 5.1.

Since we collected the data using one cross-sectional extraction from Osiris, we are not able to build a complete panel data set. Moreover, Bureau van Dijk does not have a systematic procedure in place to build longitudinal data sets extracted from Osiris. However, we have managed to combine Osiris with data extracted from another database maintained by Bureau van Dijk (Bankscope) in order to link at least one other point-in-time observation to a small subset of our firms. Bankscope, which was discontinued in January 2017, was a database similar to Osiris except it focused exclusively on the financial sector. We began with the same sample of LAC firms from Osiris as examined in the primary analysis. That information came from the December 2013 data update and constitutes the second period of our two-period panel. For the first period, we use the October 2012 data update of Bankscope, applying the same procedure for identifying the gender of board members and executives as we did for Osiris. We then match the firms appearing in both samples to form the panel, relying on firm name, Central Index Key number, International Securities Identification Number, and Bureau van Dijk's own unique firm identifier to verify matches. With the sample accordingly restricted to the financial sector (as implied by Bankscope) and to listed firms (as implied by Osiris), the set of LAC firms for which we can potentially have an observation in each period is 76 companies. However, only about 50 of them have all the relevant information necessary to run the regressions. These are the firms we study in the robustness exercise.

In terms of econometric specification, we adopt the following procedure. Given that we have two point-in-time observations we run first-difference regressions. Since first differences using probit are ambiguously specified, we run linear probability models when studying the correlation between female board membership and female executives. Given the small sample size and the focus of the paper, we report estimates only for the pooled sample of LAC countries and only using the simplest board membership measure as our female leadership variable.

Table VII reports the results. Columns (1)-(4) focus on the impact of the percentage of women on the board on the probability of at least one woman executive. Columns (5)-(8) focus on the impact on profit margin, the measure of firm performance we use in our baseline regressions. The first two columns of each set of regressions are standard OLS and are reported for comparison. The second two columns are the first-difference regressions of interest. To save space, we only present regressions with no controls and with the full set of controls.

Estimation results from the linear probability model are essentially unaffected by first-differencing: the positive impact remains positive, significant, and of similar magnitude. Point estimates in the firm performance regressions are strongly affected by first-differencing, however they are very imprecisely estimated and are never significantly different from zero, neither in the OLS nor in the first-difference regressions. Even with some notable exceptions (Green and Homroy, 2015), the lack of any significant impact between female leadership and firm performance when firm fixed-effects are introduced is the most common result found in the literature.

Table VII.
Robustness: panel specifications (LAC)

Dependent var.	Probability of at least one woman executive				Company profitability (profit margin)			
Estimation	OLS		First differences		OLS		First differences	
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% women on board	1.556*** (0.442)	1.786*** (0.452)	1.560*** (0.492)	1.659*** (0.471)	11.75 (25.81)	23.83 (27.27)	−2.249 (17.03)	1.176 (16.90)
Controls								
Subregion	No	Yes	No	Yes	No	Yes	No	Yes
Sector	No	Yes	No	Yes	No	Yes	No	Yes
Total assets (log)	No	Yes	No	Yes	No	Yes	No	Yes
Observations	49	47	49	47	46	46	46	46
R^2	0.209	0.272	0.176	0.230	0.005	0.042	0.000	0.054

Notes: Standard errors in parentheses. First differences involve panel data with two observations per firm about 18 months apart. The full controls specifications is not reported because of lack of observations due to missing values in the controls. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Overall, results confirm what we found in the previous section: there are some positive and significant correlations between diversity in board membership and female executive representation but weak or no association between female leadership and firm performance.

5.4.2 IV. The second strategy we implement also follows a common solution found in the literature: IV[25]. We use the country-level proportion of women among the tertiary educated who participate in the labor market as an instrument for the percentage of women on the board. The instrument is correlated with the variable of interest (identifying assumption) because a very low supply of qualified women hampers the possibility of nominating women on board. At the same time, the instrument should not be correlated with the error term (exogeneity assumption) because it is a variable aggregated at the country level while the source of endogeneity is unobserved heterogeneity at the firm level.

Still, we have two problems using this instrument and that is why we relegate it to a robustness exercise. The first and most important problem is that when instrumenting directly the percentage of women on the board with the percentage of women among the tertiary educated we have a lot of zeros in the variable to be instrumented (some firms have no female executives) and none in the instrument (each country has a positive proportion of women among the tertiary educated participating in the labor market). This mismatch leads to a very weak first stage. Therefore, we recode the original variable to create a new IV that may alleviate this problem. The new instrument remains equal to the original variable for observations with a positive proportion of females on the board but it is recoded to zero otherwise. This is equivalent to instrumenting only the "intensive margin" decision (what proportion of women to appoint once it is decided to appoint some of them) and not the "extensive margin" decision (whether any woman at all are appointed to the board). As a result, the IV will correct only a portion of the endogenous assignment and can only reduce but not eliminate the bias.

The second problem relates to data availability. To compute the percentage of women among the tertiary educated, we use the set of available and representative household surveys conducted in LAC countries. The data were collected, cleaned, and harmonized by researchers at the Inter-American Development Bank[26]. However, household surveys are not available for all Caribbean countries in our estimation sample but only for Jamaica, Bahamas, Barbados, Guyana, and Trinidad and Tobago. We therefore have a less representative sample of firms in this subregion than in our baseline results despite this region being very important for explaining the aggregate LAC results.

In terms of econometric specification, we implement IV probit when estimating on the probability of at least one woman executive and two-stage least squares (2SLS) when estimating on company profitability. Again, the first three columns of each set of estimations present the baseline specification to provide a comparison and the last three columns implement the robustness strategy, which in this case is the IV estimator.

Results are presented in Table VIII. The marginal effect of the percentage of women on the board on the probability of at least one woman executive is positive and significant in all three IV probit regressions. The effect has a larger magnitude than in the baseline probit in all three specifications but shares the sign and significance of the baseline probit. This is not the case in the company profitability regressions. While OLS shows some positive and, in some specifications, significant effects, 2SLS is never significantly different from zero. In the full controls specification, the effect even changes sign, becoming negative.

The overall results from this robustness exercise support the empirical regularities we found in the baseline regressions. There is a positive and significant correlation at the firm level between the proportion of women on the board and the proportion of women executives. The association appears even stronger when some of the endogeneity bias is removed. In contrast, the association between female leadership and firm performance is tenuous, with imprecise point estimates that shift from negative to positive depending on the specification.

Table VIII. Robustness: instrumental variable specifications (LAC)

Dependent var.	Probability of at least one woman executive						Company profitability (profit margin)					
Estimation	Probit			IV Probit			OLS			2SLS		
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% women on board	0.247**	0.171**	0.139	0.688**	0.448**	0.517**	6.794	8.517**	12.37**	6.429	2.831	−2.226
	(0.0756)	(0.0767)	(0.119)	(0.258)	(0.182)	(0.297)	(4.593)	(4.321)	(5.214)	(5.285)	(7.452)	(5.149)
Controls												
Subregion	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sector	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Board size	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Total assets (log)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Market cap (log)	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Turnover ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Current ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Solvency ratio	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	951	933	604	951	933	604	1,068	1,068	749	1,068	1,068	749
R^2							0.002	0.199	0.410	0.002	0.198	0.403
First stage F				309.1	50.82	27.63				639.7	32.88	19.31

Notes: OLS, ordinary least squares; 2SLS, two-stage least squares. Standard errors in parentheses. Standard errors when using instruments are clustered at the country level. Instrument = proportion of women among the tertiary educated at the country level if % women on board is positive. Some Caribbean countries not present, see main text for details. Both pobit and IV probit are maximum likelihood estimators. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

6. Conclusion

Taking advantage of a previously unexplored aspect of a data set collecting firm-level observations, we estimated the degree of representation of women in leadership positions at the firm for a relevant and under-studied region of the world: LAC. The analysis is of interest to scholars and policy makers focusing on LAC, and also expands the general understanding of the under-representation of women at the executive level. A quite large set of empirical evidence now exists for the USA and Europe and it is important to understand if the empirical regularities found in those high-income regions persists in a middle-income region such as LAC.

The data we used guaranteed very good coverage of the universe of listed companies, allowing for good identification of rank by gender within the firm, for the inclusion of relevant firm-level controls, and for direct comparison with the USA. We looked at three empirical regularities: the proportion of female leaders in the firm; the link between female representation on boards and the proportion of female executives; and the link between female leadership in the firm and firm performance.

First, we found that women are under-represented in corporate leadership positions in LAC but that the extent of the under-representation is highly comparable to that observed for the USA using the same sample selection mechanism and the same data source. In the region, an average of 8.5 percent of board members and 29 percent of executives are female. We also found that women tend to be well-represented in the Caribbean relative to other regions: an average of 18 percent of board members and 29 percent of executives are female for the sample of Caribbean companies. Still, these proportions indicate that women are less well-represented compared to their share of the population and workforce.

Second, when we looked at the connection between women on the board and women executives, we found that companies with more women on the board did tend to also have a higher probability of hiring at least one woman executive. However, our data could not determine whether those appointments occurred concurrently or consequentially and our estimates could not identify any causal mechanism. Still, these results indicate that LAC companies exhibit the same empirical regularity found in high-income countries: a positive correlation with a reduction in magnitude when conditioning on firm-level controls. Comparison with the USA indicated that estimates for LAC were smaller but of similar magnitude. It is worth noting that the aggregate LAC effects mask relevant composition effects: companies from the Andes and Caribbean regions are important drivers of LAC average effects. We performed a robustness analysis to check if the main results of the paper survived correcting for some of the endogeneity present in our specification. We implemented a first-difference estimator and an IV estimator on the pooled LAC sample. We found that the main results survived, and when using the IV estimator, were actually stronger, showing higher statistical significance and magnitude.

Third, when we looked at the link between women in leadership position at the firm and firm performance, we found weak, mixed, and imprecisely estimated relations. Again, these results confirm empirical regularities found for high-income countries in Europe and North America. The strongest result we found related to the impact of crossing the 30 percent threshold in female representation on the board: this coefficient was estimated to be positive and significant when using the whole sample of LAC companies. But again, the aggregate result was driven by composition effects, in this case the impact of Caribbean and Southern Cone companies. Although this result may give some support to the so-called critical mass hypothesis, we caution that in this set of regressions our data did not allow for the identification of any causal relationship. Our robustness analysis using IV and panel data did not help on this front. We obtained very imprecisely estimated effects which were rarely significantly different from zero.

The main conclusion from our investigation is that companies in LAC exhibit very similar empirical regularities, both in sign and magnitude, as companies in high-income

countries. Regarding the under-representation of women in leadership positions, our results indicate that the issue in LAC is on a scale consistent with other regions. There are exceptions to this general picture: Caribbean companies exhibit empirical regularities much closer to the most gender-balanced countries in the world than to the average high-income country, whereas the opposite is true for Central American companies. These results may inform the debate surrounding the implementation in LAC of gender-focused policies and solutions similar to those considered in high-income economies.

Notes

1. Data from Current Population Survey.
2. International Labour Organization, using World Bank population estimates.
3. According to the UNESCO Institute for Statistics (2012, accessed via the World Development Indicators) there are 107 females for every 100 males enrolled in secondary education in the LAC region, and 128 females for every 100 males enrolled in tertiary education.
4. Data from Current Population Survey and ExecuComp. For studies looking at under-representation of women in leadership positions in US firms see for example, Dezso and Ross (2011), Carter *et al.* (2010), Adams and Ferreira (2009) and Albanesi *et al.* (2015).
5. See, for example, Smith *et al.* (2006) on Denmark; Flabbi *et al.* (2016) on Italy; Ahern and Dittmar (2012) and Matsa and Miller (2013) on Norway; Cardoso and Winter-Ebmer (2010) on Portugal; Green and Homroy (2015) on listed European firms; the review by Terjesen *et al.* (2009) on a variety of high-income countries.
6. Osiris, a database maintained by Bureau Van Dijk containing information for publicly listed companies.
7. See, for example, Armstrong and Walby (2012) studying the presence of spillover effects; Bertrand *et al.* (2014) assessing recent policy interventions in Europe; Kanter (1977) studying the critical mass hypothesis; and the research agenda proposed in the survey by Terjesen *et al.* (2009).
8. A fairly large literature now exists estimating this important empirical association. See, for example, Dezso and Ross (2011), Carter *et al.* (2010), Adams and Ferreira (2009) and Albanesi *et al.* (2015) on the USA; Matsa and Miller (2013) on Norway; Flabbi *et al.* (2016) on Italy; and Green and Homroy (2015) on European firms.
9. We use first-difference and IV estimators. See Section 5.4 for details.
10. https://sites.google.com/site/lucaflabbi/home/research/AbrahamsFlabbiPiras2017WebAppendix.pdf
11. An equally important literature has looked at the impact on gender gaps in wages. See, for example, Cardoso and Winter-Ebmer (2010), Albanesi *et al.* (2015) and Flabbi *et al.* (2016). We do not discuss this literature further because we could not conduct similar analyses using the data at our disposal.
12. Germany established a 30 percent quota for women on supervisory boards in March 2015. Norway, Spain, Iceland, and France have laws requiring at least 40 percent women on the boards of public companies. Austria, Belgium, Denmark, Ireland, Italy, and the Netherlands have quota legislation as well, with quotas ranging from 20 to 40 percent (European Parliament – DG Internal Policies, 2013).
13. In January 2015, a bill to establish a gender quota for the boards of state-owned companies was introduced in Congress. The bill is outside the observation period of our sample.
14. For example, Osiris records 851 listed companies in the Cayman Islands and 673 in Bermuda, compared to 378 for all of Brazil.

15. In many cases, a company listed the same person multiple times, once for each position held. To avoid double counting, whenever the same full name appeared more than once on a company's list we condensed that person into one observation by combining all titles and positions. In the few cases where it was impossible to determine whether two listed contacts were the same person we removed them from the sample.

16. An alternative and promising procedure used in the literature to build firm leadership rankings is to follow transitions and career progressions between different job titles (Gayle *et al.*, 2012). However, we cannot implement this procedure here because we do not observe panel data on individual executives.

17. We present most of our results aggregating the LAC countries into one group (which we call LAC) or in the four subregions most frequently used in the literature: Caribbean, Andes, Central America, Southern Cone. The list of countries included in the final sample are: Caribbean: Anguilla, Bahamas, Barbados, Curacao, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Trinidad and Tobago; Andes: Bolivia, Colombia, Ecuador, Peru, Venezuela; Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama; Southern Cone: Argentina, Brazil, Chile, Paraguay, Uruguay.

18. See, for example, Matsa and Miller (2011, 2013), Flabbi *et al.* (2016) and the numerous works cited in the review by Terjesen *et al.* (2009).

19. See, for example, Boone *et al.* (2007).

20. See, for example, the data on promotion patterns reported by Gayle *et al.* (2012) for the USA and the data on human capital profiles reported by on Singh *et al.* (2008) for the UK.

21. In a working paper version of the paper Abrahams *et al.* (2016), we report results using absolute values of board members instead of percentages: specifically we use a set of three dummies indicating if there are no women; one or two women; or more than two women on the board. The 30 percent threshold delivers sharper results and it is less dependent on board and firm size than the absolute number of board members specification.

22. See, for example, Armstrong and Walby (2012), Matsa and Miller (2013) and Bertrand *et al.* (2014).

23. In March 2015, Germany established a 30 percent quota for women on supervisory boards. Norway, Spain, Iceland, and France have laws requiring at least 40 percent women on the boards of public companies. Austria, Belgium, Denmark, Ireland, Italy, and the Netherlands have quota legislation as well. Penalties for non-compliance range from nothing (Austria, Spain, the Netherlands) to dissolution of the corporation (Norway) (European Parliament – DG Internal Policies, 2013).

24. Examples include Dezso and Ross (2011) and Adams and Ferreira (2009) for S&P 1,500 firms; Flabbi *et al.* (2016) using matched employer-employee data from Italy; Gregory-Smith *et al.* (2014) for FTSE350 companies, and Green and Homroy (2015) for listed European firms.

25. For example, Green and Homroy (2015), Adams and Ferreira (2009) and Gregory-Smith *et al.* (2014) use an instrument based on the fraction of male board members that also sit on other boards with at least one woman; Flabbi *et al.* (2016) use Bartik-like instruments based on the aggregate growth in the proportion of female executives at the region-year level.

26. The original variables refer to survey year 2012 and they are reported in the Web Appendix together with data sources for each country.

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