Foreign acquisitions and female employment in manufacturing firms: an empirical analysis for Chile[+]

Karol Fernández Delgado*

This paper analyses the effect of foreign ownership on female employment using micro-level data from the Chilean Manufacturing Survey. Particularly, it examines whether foreign-acquired firms hire proportionately more female workers than domestic firms. To control for the possible endogeneity of the foreign acquisition decision, we use propensity score matching combined with a difference-in-differences approach. In addition, we compare firms operating in the same industry-year. Our results show that foreign ownership increases the share of female workers within the firm. One year after acquisition the share of female workers is 1.64 percentage points higher in acquired firms than in non-acquired firms, and this figure increases to 3.55 percentage points two years after acquisition. When we separate female workers into skilled and unskilled categories, we observe that the positive effect of foreign acquisition is present only for skilled women. One year after acquisition, the share of skilled women is 4.60 percentage points higher in acquired firms than in non-acquired ones, and two years after acquisition this figure increases to 6.63 percentage points. We also present evidence that foreign acquisition increases the share of skilled women only when the acquired firm was not an exporter before its acquisition, supporting Becker's (1957) theory on taste-based discrimination.

* Karol Fernández Delgado (karoltatiana.fernand@edu.uai.cl) is at the Universidad Adolfo Ibañez, Santiago, Chile.

1. Introduction

Are foreign-owned firms more female-friendly than domestic firms? Although a large body of empirical literature examines the impact of multinationals on several aspects of firms (skill composition, wages, productivity, among others), gender issues are generally ignored. We shed light on this neglected topic by empirically evaluating whether foreign-owned firms hire proportionally more female workers than their domestic counterparts, using plant-level data from Chilean manufacturing.[1] Namely, we investigate whether, upon being acquired, foreign plants hire more female workers than they would have done had they remained domestic.

A potential problem when estimating the causal effect of foreign acquisitions on the share of female employees is the possible endogeneity of firms being acquired. Foreign-acquired firms might exhibit characteristics that systematically differ from those of non-acquired firms, which implies that the acquired firms are not randomly selected. As a consequence, estimates that do not consider this non-randomness will be biased (because of selection bias). For this reason, we use propensity score matching combined with a difference-in-differences technique, as suggested by, for example, Blundell and Costa Dias (2000). The aim of this procedure is to find a group of non-acquired firms with similar characteristics to the group of acquired firms and then compare the share of female employees within acquired and non-acquired firms. The matched control firms are assigned only from the same year and the same sector as the foreign-acquired firm.

The underlying question of this study is why foreign firms should be expected to hire more women than domestic firms. The basic explanation is related to Becker's (1957) seminal theory on taste-based discrimination, which predicts that, under some conditions, competitive pressures will work to reduce discriminatory or other inefficient management practices, because discrimination comes at a cost to the firm owner. Thus, as explained by Heyman et al. (2013), if competition is strong, discriminating firms will be competed out of the market or may change their behaviour as competition increases the costs incurred by discriminating firms. Since foreign firms usually operate in more competitive markets, they cannot afford taste-based discrimination. Therefore, one can expect the share of female employees to increase after a foreign acquisition has taken place, and this effect should be larger when market competition was weak before the acquisition. We present evidence supporting this explanation.

---

[1] Although a plant is not necessarily a firm, Pavcnik (2002) points out that more than 90 per cent of Chilean manufacturing firms are single plants. For this reason, hereafter, we use the words "plant" and "firm" interchangeably.

An alternative explanation for the potential of foreign direct investment (FDI) to increase female employment is given by Lawler and Bae (1998). According to them, cultural differences in terms of gender equality between the multinationals' home countries and the host countries may explain why foreign firms are more female-friendly than domestic plants. Culture is defined as "the beliefs, attitudes, norms, role expectations, and values widely shared by the members of a particular group", which "can influence behaviour in a variety of ways", including a firm's management practices relating to the role of women in the labour market (Lawler and Bae, 1998: 129). Therefore, when the multinational's home country promotes employment, training and promotions for female workers, the parent firm may transfer its gender policies to its subsidiaries in the host country.

Chile is a suitable choice for studying the effects of FDI on female employment for two reasons. First, the country has received significant inflows of FDI since the early 1970s. Second, it exhibits a large amount of discrimination against women in the labour market. Incoming FDI has maintained an upward trend since 1973, leading to Chile gaining widespread international recognition for its success in attracting FDI. Since 1990, Chile has been one of the emerging market economies with the greatest FDI inflows relative to GDP (table A.1). Indeed, as a share of GDP, the net FDI inflows to Chile are greater than those into all the BRIC economies (Brazil, the Russian Federation, India and China) and Mexico.

Discrimination against women in the labour market is clearly reflected in the size of the wage gap between men and women – controlling for educational levels, experience, economic activity, location, work intensity and occupation – as well as in the attitude towards women doing paid work. According to data from the International Labour Organization (ILO, 2015), the unexplained gender wage gap in Chile reached 22.2 per cent in 2011, and the gap widens for the top-earning women. In addition, attitudes towards women being remunerated for work are still very negative in the country. According to the United Nations Development Programme (UNDP, 2010), survey data in Chile show that, in 2002, only 23 per cent of all survey respondents approved of women working full-time, regardless of the family situation (i.e. whether or not they have children and irrespective of the children's ages); 37 per cent took an intermediate view, with their approval depending on the age of the woman's children; and the remaining 38 per cent disapproved of women doing paid work under any (family) circumstances. A significant improvement was observed in 2009 when 38 per cent of all survey respondents approved of women doing paid work, 39 per cent expressed an intermediate view\, and 23 per cent disapproved.

When we compare Chile with other countries from the region, we observe that its performance in terms of gender equality is still insufficient. This fact is evident when we analyse the Gender

Empowerment Measure (GEM) (table A.2), which the UNDP constructs to measure female participation in economic and political decisions. The higher the GEM, the more empowered are women. The index is constructed for 109 countries worldwide, among which Chile ranked 75th in 2009, and 19th among 23 countries from Latin America and the Caribbean. When we compare Chile with other countries from the region, we observe considerable differences in terms of women's access to power. For instance, women's share of seats in Parliament is 13.9 per cent, in contrast to Argentina, with 37.7 per cent, and Mexico, with 36 per cent.

We use plant-level data from the National Annual Manufacturing Survey (Encuesta Nacional Industrial Anual, ENIA) collected by the Chilean Institute of Statistics (Instituto Nacional de Estadísticas, INE), over the period 1995–2006. The survey covers the universe of Chilean plants in manufacturing with at least 10 employees. The sample contains more than 5,000 plants per year. The ENIA contains information on different aspects of firm structure, such as ownership, sector, production inputs and outputs, and exports. More importantly for our purposes, it includes information about the total number of (full-time) employees, separated by occupation and gender.

We find a positive effect of foreign ownership on increasing the proportion of female workers. Our results show that one year after acquisition the share of female workers is 1.64 percentage points higher in foreign-acquired firms than in non-acquired firms, and this figure increases to 3.55 percentage points two years after acquisition. When we separate female workers into skilled and unskilled categories, we observe that the positive effect of foreign acquisition is present only for skilled women. One year after acquisition, the share of skilled women is 4.60 percentage points higher in foreign-acquired firms than in non-acquired ones, and it rises to 6.63 percentage points two years after acquisition. In addition, we present evidence that foreign acquisition increases the share of skilled women only when the acquired firm was not an exporter before its acquisition, supporting Becker's theory on taste-based discrimination, but only when considering skilled female workers.

As a check of the robustness of our results, we evaluate the impact on female employment of domestic takeovers; that is, a change in ownership from foreign to local investors. We find that when ownership reverts to domestic hands, the change in the share of women among workers is not statistically different from zero for either skilled or unskilled women or women overall. This result suggests that domestic owners do not affect the gender structure of the labour force when they retake control of the firm, confirming that foreign ownership does have a positive effect on increasing the share of female employees.

The contribution of our study is twofold. First, our analysis relies on foreign acquisitions, which makes our identification strategy stronger in comparison with

previous works. Second, we are also able to distinguish between skilled and unskilled workers, which allows us to confirm the existence of differences in the hiring practices by gender according to the skill level of workers.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 outlines our empirical strategy. Section 4 presents our estimates of the propensity score. Section 5 discusses the results from the difference-in-differences analysis on the matched sample. Section 6 presents the robustness checks. Section 7 evaluates Becker's theory on taste-based discrimination, using information about exporting firms. Section 8 draws some conclusions.

2. Related literature

This paper relates to two strands of the economic literature. The first strand examines the impact of trade liberalization and FDI on gender labour outcomes, particularly the wage gap and women's share of employment. The second strand documents the relation between market competition and taste-based discrimination.

The literature analysing the impact of trade liberalization and FDI on female labour outcomes is still limited and the conclusions are mixed.[2] Juhn et al. (2014) use data from Mexico to conclude that trade liberalization improves women's labour outcomes in the blue-collar tasks but does not affect women in the white-collar tasks. Tejani and Milberg (2016) use a sample of 60 high-income developed countries and middle-income developing countries over the period 1985 to 2007 to study the effects of trade liberalization on the female share of employment in manufacturing. They find that the relative employment of women increased in developing countries but decreased in the high-income ones.

Meanwhile, other authors have found that international trade increases gender wage gaps. That is the case of Bøler et al. (2018) for Norway. They argue that exporter firms require greater commitment from their employees. If women are less flexible (or perceived as such), exporters will exhibit a larger gender wage gap than non-exporters. Using matched employer-employee data from the Norwegian manufacturing sector over 1996–2010, they find that starting to export increases the gender wage gap for highly educated women by about three percentage points. Other authors have also reported an increase in the gender wage gap due to trade liberalization (e.g. Berik et al., 2004) for Taiwan Province of China and the Republic of Korea, and Menon and van der Meulen Rodgers, 2009 for India).

---

[2] An extensive literature survey about the effects of trade liberalization on female discrimination appears in Aguayo-Tellez (2011).

More closely related to our paper are studies on the impact of FDI on female labour outcomes. Oostendorp (2009), using an industry-level panel of developed and developing countries and an instrumental variable approach, finds that the gender wage gap tends to decrease with increasing FDI inflows in richer countries, but not in developing economies. Heyman et al. (2013) evaluate the impact of foreign takeovers on the gender wage gap and on the gender composition of the labour force in Sweden, using linked employer-employee data. They find no change in female relative wages following a takeover, and only a small increase in the share of female workers when market competition is very weak (close to a monopoly) in the sector where the takeover takes place.

Chen et al. (2013) find that foreign firms in China, particularly those with a strong export orientation, have a greater propensity to hire women, though the gender wage gap tends to be significantly larger when compared with that of domestic firms. Siegel et al. (2018) use firm-level data from the Republic of Korea to conclude that multinationals are significantly more likely to have female managers and to implement policies that are beneficial to female employees, such as maternity leave, childcare facilities and financial support for childcare. Using anecdotal case studies for female Japanese managers, Bozkurt (2012) concludes that multinationals offer better opportunities for high-skilled Japanese women to progress in managerial careers than do domestic firms. Similar conclusions are found by Kodama et al. (2018), who examine the effect of foreign ownership on gender-related employment outcomes and work practices in Japan. Foreign firms are found to have a greater share of women among workers, managers, directors and board members, and also to offer more facilities in terms of flexibility, childcare subsidies and telecommuting. The authors conclude that the difference in gender-related outcomes is driven mostly by older foreign affiliates, where the foreign parent owns a larger share of the firm. These patterns are interpreted by the authors as a signal that transplanting corporate culture from abroad takes time and is facilitated by having greater control over operations. Tang and Zhang (2017), using data for Chinese manufacturing firms over the period 2004–2007, find that foreign firms from countries with lower gender inequality tend to hire proportionately more women and are more likely to appoint female managers.

The second strand of the literature related to this paper documents the relation between market competition and taste-based discrimination. Previous research on the relation between market competition and labour market discrimination against women finds supporting evidence for competition reducing gender discrimination. For instance, using industry-level data from the United States manufacturing sector, Black and Brainerd (2004) compare the change in the gender wage gap between 1976 and 1993 in concentrated versus competitive manufacturing industries, using a difference-in-differences approach. The authors find that the gender wage gap narrowed in concentrated industries that experienced a reduction in tariffs, but not

in competitive industries, and they interpret this result as supporting Becker's taste-based discrimination theory. Meng (2004) finds that Australian firms that are more likely to have narrower gender earnings gaps are those subject to strong market competition. Similar conclusions are reached by Hellerstein et al. (2002) for the United States and by Zweimüller et al. (2008), who use a cross-country sample. More recently, Paz and Ssozi (2020) use industry-level Brazilian census data to estimate Becker's taste-based discrimination model. More precisely, they consider changes in competitiveness induced by internal trade shocks (import penetration from China and the rest of the world) on the share of female workers and on the male-female wage gap in the manufacturing sector of Brazil. They find that the Chinese import penetration increased the female share and narrowed the male-female wage gap (except for more educated workers). Import penetration in the rest of the world raised the female share among workers with college degrees but widened the wage gap, except for those with college degrees.

Our study differs from the previous literature in two respects. First, we advance in the empirical methodology by using a difference-in-differences approach combined with propensity score kernel matching to deal with potential endogeneity.[3] Second, we also evaluate the effects of foreign ownership on the employment shares of both skilled and unskilled female workers. Data provided by the Chilean National Institute of Statistics (INE, by its Spanish acronym) suggest that the higher the level of qualifications of a Chilean woman, the greater is the discrimination she suffers in the labour market, measured by the gender wage gap (INE, 2016). The greatest gap (39.6 per cent) is observed for women with postgraduate studies. In contrast, women with only primary education have a smaller wage gap (15.5 per cent). For this reason, we consider that the effect of foreign ownership on the gender composition of labour force may differ according to the skill level of the women concerned.

3. Empirical methodology

The aim of our empirical analysis is to assess the effect of foreign ownership on the share of female workers relative to total employment.[4] We proceed as follows: First, we focus on firms that have changed their ownership status from domestic to foreign; that is, domestic firms that have been acquired by foreign investors.[5]

---

[3] The recently published work of Kodama et al. (2018) also applies this methodology, using nearest-neighbour matching rather than kernel matching.

[4] Note that our database does not have information about wages disaggregated by gender; thus we are unable to estimate the gender wage gaps.

[5] As a robustness check we also consider domestic acquisitions; that is, firms whose ownership has changed from foreign to domestic. Section 6.2 shows that when ownership reverts to domestic hands, the share of female workers within the firm is unchanged.

We define a foreign acquisition as a situation in which foreign participation has increased to more than 10 per cent.[6] Our core estimates are restricted to the set of manufacturing firms that switched from domestic to foreign ownership and remained in the data sufficiently long to be observed one year before acquisition, in the acquisition year and two consecutive years after the acquisition.

We then use a difference-in-differences approach to compare the average share of female workers observed in the foreign-acquired firms (the treatment group) with the share of female workers in the firms that remain under domestic control (the control group). However, this comparison may be biased due to the non-random selection of the sample.

Empirical evidence suggests that acquisition is not an exogenous decision and that, on the contrary, foreign investors "cherry pick" the best domestic firms as their targets (Arnold and Javorcik, 2009; Almeida, 2007). To address the selection issue, we combine the difference-in-differences approach with propensity score matching. As stated by Arnold and Javorcik (2009), the advantage of this approach is that "we eliminate the influence of all observable and unobservable non-random elements of the acquisition decision that are constant or strongly persistent over time". This technique has been used by researchers to analyse the effects of foreign acquisitions on other variables. For instance, Girma and Görg (2007) evaluate the effect of foreign acquisitions on wages in the United Kingdom, and Arnold and Javorcik (2009) examine plant performance outcomes for Indonesian firms.

The aim of the propensity score matching is to construct the unobserved counterfactual of how the acquired firm would have performed in the absence of ownership change. This is done by matching each foreign-acquired firm with a group of comparable non-acquired firms with similar pre-acquisition characteristics, such as productivity, size, exporter status, and the like. Since this procedure would imply comparing acquired and non-acquired firms across a large number of variables, Rosenbaum and Rubin (1983) suggest the use of the conditional probability of receiving treatment given some pre-treatment variables (named propensity score) to perform the matching. In our context, the propensity score is the predicted probability of a firm receiving FDI. This procedure reduces the dimensionality of the matching process to a single index, namely the propensity score.

In section 4 we estimate the probability of a firm being acquired by foreign investors using a probit model. As explanatory variables in the probit model we include observable firm characteristics such as total factor productivity (TFP), firm size,

---

[6] Empirical literature usually follows the OECD Benchmark Definition of FDI, which establishes that a firm can be considered as foreign if at least 10 per cent of its capital is owned by foreign investors (OECD, 1999). See, for example, Javorcik (2004).

share of imported inputs, exporter status and share of female workers within the firm.

Having obtained the propensity score, we employ kernel matching, in which multiple control observations (non-acquired firms) within the common support[7] are used and the weight given to each is determined by the distance in the propensity score from the acquired firm. Note that the matching is performed in the pre-acquisition year. Different from one-to-one matching estimators (such as nearest neighbour), kernel matching uses the weighted averages of all firms in the control group to construct the counterfactual outcome. Higher weight is given to controls whose propensity score is closer to that of the acquired firm, while lower weight is given to more distant controls. Thus, one major advantage of this approach is the lower variance that is achieved because more information is used. A drawback of kernel matching is that possibly observations are used that are bad matches. Hence, the proper imposition of the common support condition is of major importance (Caliendo and Kopeinig, 2008).

To identify the treatment effect, the so-called balancing property of the propensity score must be fulfilled. This implies that observations with the same propensity score must have the same distribution of characteristics, independently of treatment status. In other words, for a given propensity score, exposure to treatment is random and therefore acquired and non-acquired firms should be, on average, observationally identical (Becker and Ichino, 2002). Our estimated propensity score satisfies the balancing property.[8] Moreover, following Arnold and Javorcik (2009), we restrict the matched control observations to the same sector and year as the acquired firm.[9] This, in the authors' terms, "eliminates the possibility that differences in productivity or other aspects of plant operations observed across sector-year combinations exert influence on our estimated effects" (Arnold and Javorcik, 2009: 44).

3.1 Data description

The data used in this paper come from the Annual National Manufacturing Survey (ENIA, by its Spanish acronym) carried out by the INE. This survey is a census that includes all Chilean manufacturing plants with at least 10 workers and three

---

[7] The common support is bound by the lowest propensity score of a treatment observation and the highest propensity score of a control observation.

[8] Appendix B presents our balancing tests.

[9] Our matching procedure is implemented in Stata 12 using the procedure described in Arnold and Javorcik (2009), which guarantees that treated and control firms come from the same year and sector. We thank the authors for kindly sharing their code.

months of operation in the year of reference. It covers approximately 5,000 plants per year. The data constitute an unbalanced panel covering the period 1995–2006. This survey is well known in the literature and has been used by several authors.[10]

This survey captures detailed information on aspects of an establishment's characteristics, such as ownership structure, the five-digit ISIC sector, size, gross nominal output, value added, investment, intermediate inputs, capital stock and employment. It also reports the total number of (full-time) employees,[11] separated by occupation and gender. We group workers into two categories: skilled and unskilled. Skilled workers include the following occupations: owners, managers, administrative personnel and specialized workers. Unskilled workers comprise non-qualified workers directly or indirectly involved in the production process, sellers, personal service workers and home workers.

The data were subjected to the following initial cleaning process. We excluded four industries – tobacco (ISIC 314), petroleum refining (ISIC 353), wholesale trade (ISIC 610) and business services (ISIC 832) – from the sample because of a lack of representation (fewer than five firms operating in the sector). Furthermore, we kept only those firms for which information on the key variables was available.[12]

3.2 Foreign-acquired firms

In total, 158 firms in our sample were foreign-acquired, of which 71 firms (45 per cent) were fully acquired by foreigners; that is, foreigners acquired 100 per cent of a firm's total assets. Indeed, 57 per cent (90 out of 158) of the acquisitions resulted in foreign control of the firm (i.e. foreigners owning more than 51 per cent of the property) (figure 1).

---

[10] See, for instance, Pavcnik (2002) and Levinsohn and Petrin (2003).

[11] Unfortunately, we do not have data about part-time workers, which could provide important information for our analysis as part-time jobs may be an important employment alternative for women.

[12] The share of firm-year observations that were dropped represents 29 per cent of the original sample. Nevertheless, the representation of dropped observations in the total output is only 2 per cent.
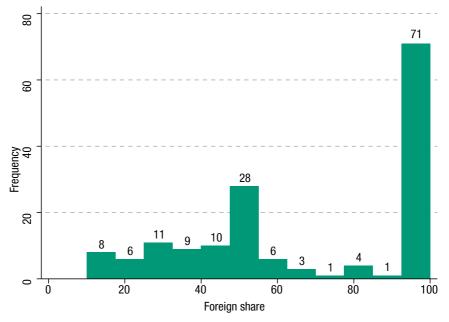
Figure 1: Foreign property share in acquired firms (number of firms)

Source: ENIA.

Regarding the sectors in which acquisitions took place, in table 1 we observe that the industries in which most of the acquisitions were concentrated were the manufacture of food and beverages (37 per cent of total acquisitions) and the manufacture of chemicals, coal, rubber and plastic products (22 per cent of total acquisitions). Other industries in which acquisitions also took place were the manufacture of wood and wood products (11 per cent of total acquisitions), textile, wearing apparel and leather industries (9 per cent of total acquisitions), and the manufacture of fabricated metal products, machinery and equipment (9 per cent of total acquisitions).

One alternative explanation for the disparate outcomes in labour markets between male and female workers in foreign-acquired firms could be that foreign firms target intrinsically female-friendly industries. Table 1 includes the share of female workers within each sector (column 3) and the industry rank position in terms of industry-level female share of employment in the initial period (column 4). As can be observed, there is no clear pattern indicating that foreigners target industries with higher concentrations of female workers. The two sectors where most of the acquisitions take place have 25 per cent and 15 per cent of female workers, respectively.

Table 1: Foreign-acquired firms by industry

	Number of acquired firms	Percentage	Share of female workers	Rank
Manufacture of Food, Beverages and Tobacco	58	37	25	3
Textile, Wearing Apparel and Leather Industries	15	9	37	2
Manufacture of Wood and Wood Products, Including Furniture	18	11	8	7
Manufacture of Paper and Paper Products, Printing and Publishing	7	4	21	4
Manufacture of Chemicals and Chemical, Petroleum, Coal, Rubber and Plastic Products	35	22	15	5
Manufacture of Non-Metallic Mineral Products, except Products of Petroleum and Coal	5	3	5	9
Basic Metal Industries	4	3	6	8
Manufacture of Fabricated Metal Products, Machinery and Equipment	15	9	10	6
Other Manufacturing Industries	1	1	46	1
Total	158	100		

Note: Ranking goes from 1 to 9, where 1 corresponds to the sector with the highest share of women among all workers.
Source: ENIA.

4. Estimation of the propensity score

This section describes the estimation of the propensity score, which in our case is the probability of a firm being acquired by foreign investors. As a first step in our analysis, we need to obtain the probability of a local firm being acquired by foreign investors (our propensity score). We do so by estimating a probit model. The selection of explanatory variables is based on previous studies, such as Arnold and Javorcik (2009) and Alfaro and Chen (2012). In particular, we incorporate variables related to the production structure of the firm, such as (ln) TFP,[13] size (measured by the (ln) total number of workers), capital per worker (ln), the share of women among total workers as well as among total skilled workers. We also include variables capturing the openness of the firm to foreign markets (exporter dummy and share of imported inputs). In addition, we consider that the presence of other foreign firms

---

[13] We estimate TFP following the generalized method of moments suggested by Wooldridge (2009). This methodology controls for both endogeneity and selection biases. It also corrects the collinearity problem outlined by Ackerberg et al. (2015) of the two-steps estimation techniques suggested in Olley and Pakes (1996) and Levinsohn and Petrin (2003).

in the sector[14] may motivate foreign investors to acquire a local establishment. The complete list of explanatory variables with their means and standard deviations appears in table 2.

Table 2: Summary statistics			
	Mean	**Standard deviation**	**Number of observations**
ln(TFP)	8.892	1.395	56,598
ln(Employment)	3.466	1.114	62,473
Female labor share (%)	23.71	22.9	62,473
Skilled female labour share (%)	28.95	25.25	62,702
Share of imported inputs (%)	7.355	19.53	62,224
Exporter dummy	0.202	0.402	62,702
ln(Capital per worker)	8.333	1.691	57,259
Foreign presence in the sector	0.145	0.159	62,702

The results from the probit model are presented in table 3. As expected, more productive, larger and more capital-intensive plants are more attractive to foreign investors. Plants with a larger share of female workers are also more attractive for foreign investors (although the variable is significant only at the 10 per cent level). In addition, we find that a firm's openness to international markets (measured by the share of imported inputs and a dummy for exporter status) as well as the presence of other foreign firms in the sector are important determinants of the acquisition decision. In contrast, the share of skilled female workers within the firm seems not to be important in the identification of an acquisition target. Finally, we include a time trend, which is statistically significant.

On the basis of the predicted probability of being acquired by foreign investors (the propensity score), we perform our matching procedure. The balancing property of the propensity score is tested and satisfied.[15] In other words, there is not a statistically significant difference in the means of the variables considered between the acquired (treated) firms and the matched controls (non-acquired firms). Therefore, we can be confident that our propensity score is appropriate to perform the matching.

---

[14] Following Javorcik (2004), we define the extent of the foreign presence in the four-digit sector j at time t as the foreign equity participation, averaged over all firms in the sector, weighted by each firm's share in sectoral output. That is, $\frac{\sum_{i:i\in j} foreign_{share_{it}} \times y_{it}}{\sum_{i:i\in j} y_{it}}$.

[15] The main idea behind balancing tests is to check if at each value of the propensity score, the pre-acquisition variables used to estimate the propensity score X_{t-1} have the same distribution for the treatment and comparison groups. Balancing tests proposed in the literature mainly evaluate equality of means and variance. The balancing tests are presented in appendix B.

Table 3: Probit results. Predicting foreign acquisitions	
ln(TFP) $_{t-1}$	0.0539***
	(0.0202)
ln(Employment) $_{t-1}$	0.155***
	(0.0289)
Female labor share $_{t-1}$	0.00288*
	(0.00169)
Skilled female labor share $_{t-1}$	-0.00413**
	(0.00185)
Imported inputs share $_{t-1}$	0.337***
	(0.108)
Exporter dummy $_{t-1}$	0.217***
	(0.0693)
ln(Capital per worker) $_{t-1}$	0.102***
	(0.0242)
Foreign presence in the sector $_{t-1}$	0.455***
	(0.161)
Time trend	-0.0744***
	(0.0103)
Number of observations	44 607
Pseudo R^2	0.149
Chi^2	321.6

Note: Standard errors in parentheses.
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.
The model includes an intercept that is not reported.

5. Results from the difference-in-differences propensity score matching

We now present the difference-in-differences matching estimates. These estimates give the effects of foreign ownership on the share of female employees (total, skilled and unskilled) in a firm's workforce. Table 4 reports the average treatment effect on the treated group of firms (ATT). We present bootstrapped standard errors.

Looking at the share of women among all workers (first column of table 4), we observe a positive and significant effect – at the 10 and 5 per cent significance levels, respectively – for the first and second years after acquisition. One year after acquisition, the total share of female workers within foreign-acquired firms rises by about 1.64 percentage points, and two years after acquisition this figure increases to 3.55 percentage points. These magnitudes are economically meaningful. Considering that the average share of women among total workers in our data set is 23.63 per cent, the estimates imply that foreign acquisitions raise the participation of females by nearly 7 per cent one year after acquisition and by 15 per cent two years after acquisition with respect to the average.

Table 4: Matching results for the share of female workers			
	(1) All women (%) ATT	(2) Skilled women (%) ATT	(3) Unskilled women (%) ATT
Acquisition year	-0.7800	0.9933	-1.3709
	(0.642)	(1.158)	(1.347)
One year later	1.6395*	4.6016***	-0.8481
	(0.871)	(1.433)	(1.424)
One year later	3.5555***	6.6330***	0.6580
	(0.855)	(1.018)	(1.449)
Number of acquisitions	158	158	158

Note: Bootstrapped standard errors in parentheses (300 repetitions).
*, ** , *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

When considering the ratio of skilled female employees to total skilled workers (second column of table 4), we can observe that, in the year of acquisition, the ATT is not statistically different from zero. However, in the following two years the effect of foreign acquisition is positive and significant at the 5 per cent level. One year after acquisition the ATT is equal to 4.60 percentage points. That is, after considering the initial difference between the two groups, the share of skilled female workers in the foreign-acquired plants is 4.60 percentage points higher than it is in non-acquired plants In the following year (two years after acquisition) the figure increases to 6.63 percentage points. In terms of magnitude the observed effect is larger for the share of skilled women than when including all women. Once again, the estimates are economically meaningful. The average share of skilled female workers in our sample is 29 per cent. Therefore, foreign acquisition increases the share of women among skilled workers by 15.9 per cent one year after acquisition and 22.9 per cent two years after with respect to the average share.

Next, we evaluate the effect of foreign ownership on the share of unskilled women – the ratio of unskilled female workers to total unskilled workers – (table 4, column 3). In this case, we observe that the effect of foreign ownership is not statistically different from zero for any of the years under consideration.

These results suggest that foreign ownership increases the share of female workers within the firm. However, the effect seems to be important (and significant) only among skilled women. Our results are consistent with two possible explanations: (i) foreign firms being exposed to more competition and hence being less able to discriminate and (ii) foreign firms' attitudes towards women reflecting the culture of their home country. Unfortunately, we do not have information to test (ii), but the evidence on exporters (see section 7) points towards (i).

5.1 What about male workers?

Our baseline results show an increase in the share of female workers within foreign-acquired firms. The effect is stronger for skilled females. However, these findings may be due to the hiring of more female workers or because of the firing of male workers. To evaluate this possibility we perform our matching process using the (ln) total number of female and male workers as our variables of interest.

In the results (table 5), there is a positive and statistically significant effect for the total number of female workers. One year after acquisition, the total number of female workers increases by about 0.19 per cent, and two years later by 0.27 per cent. The skilled female workers increase by 0.17 per cent one year after acquisition and by 0.22 per cent two years later. In the case of unskilled female workers we only find a positive and significant effect after two years of foreign control, equal to 0.19 per cent. We do not find a statistically significant effect for male workers, whether skilled or unskilled.

Table 5: Matching results for the total female and male workers (ln)						
	(1) All		(2) Skilled		(3) Unskilled	
	Women	Men	Women	Men	Women	Men
Acquisition year	0.0246	0.0240	0.0394	-0.0106	0.022	0.0417
	(0.0698)	(0.0311)	(0.0585)	(0.0551)	(0.0868)	(0.0822)
One year later	0.1929***	0.0594	0.1780***	0.0123	0.1169	0.0977
	(0.0532)	(0.0444)	(0.0635)	(0.0425)	(0.0936)	(0.0704)
One year later	0.2702***	0.0385	0.2217***	-0.0303	0.1891**	0.1216
	(0.0857)	(0.0626)	(0.0493)	(0.0592)	(0.0919)	(0.0753)
Number of acquisitions	158	158	158	158	158	158

Note: Bootstrapped standard errors in parentheses (300 repetitions).
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

In sum, the increase in the share of female workers within foreign-acquired firms reported in our baseline results may be explained by a greater rate of hiring female workers. After taking control of domestic firms, foreign firms seem not to alter the number of male workers.

6. Robustness checks

In order to evaluate the robustness of our above results, we conduct three checks. First, we strengthen our definition of foreign acquisition. Second, we evaluate the effect of domestic acquisitions on the share of female workers. Third, we apply alternative empirical strategies.

6.1 An alternative definition of foreign acquisition

As a first way of checking the robustness of our results, we change our definition of foreign acquisition. We now define a foreign acquisition as a situation in which foreign participation in a firm's equity reaches 50 per cent and perform a new matching process. Since this definition is tighter, the number of foreign-acquired firms decreases to 131.

Table 6: Matching results under an alternative definition of foreign acquisition			
	(1) All women (%) ATT	(2) Skilled women (%) ATT	(3) Unskilled women (%) ATT
Acquisition year	-0.3261	1.2154	-1.0352
	(0.7066)	(1.1937)	(1.8628)
One year later	1.7954***	3.5735***	-0.6659
	(0.7147)	(1.5730)	(1.3099)
One year later	3.8893***	5.9543***	1.0765
	(1.01518)	(1.5730)	(1.3099)
Number of acquisitions	131	131	131

Note: Bootstrapped standard errors in parentheses (300 repetitions).
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

The matching results are presented in table 6. When we consider the total share of all female workers in the firm (table 6, column 1), we observe a positive and significant effect at the 1 per cent level for the second and third years under foreign control. In both years, the magnitude of the effect is somewhat greater than when we use the benchmark definition of foreign acquisition: 1.80 versus 1.64 percentage points one year after acquisition, and 3.88 versus 3.55 percentage points for the following year. In the case of skilled female workers (table 6, column 2), we observe that, for the acquisition year, the effect of foreign ownership is not statistically different from zero. One and two years after foreign acquisition, the effect of foreign ownership is significant at the

1 per cent level, and the magnitude of the effect is very similar than our previous estimates. Finally, the effect of foreign ownership on the share of unskilled female employees is not statistically different from zero for the year of acquisition and the following years (table 6, column 3).

In sum, our main results are valid even when we use a tighter definition of foreign acquisition. Namely, foreign ownership increases the total share of women working within the acquired firms for the two first years after acquisition. The magnitude of the effect depends on the definition of foreign acquisition applied. Similarly to when we used the benchmark definition of foreign acquisition, the effect of foreign ownership is higher when we consider only skilled women. For unskilled women, the effect of foreign ownership is not statistically different from zero regardless of whether we use our benchmark definition or the tighter definition of foreign acquisition.

6.2 Just a matter of acquisition?

We are also interested in determining whether the observed effects on female employment are due to foreign ownership or just because of the change in ownership. To do so, we follow exactly the same procedure as before (for details, see section 3), but this time we consider domestic acquisitions; that is, a change in ownership from foreign to local investors. We define a domestic acquisition as a situation in which a domestic investor becomes the owner of more than 90 per cent of the firm's property. Foreign firms are now our control group. In this case we have 175 domestic takeovers.

As a first step we estimate a probit model to obtain the probability of a foreign firm being acquired by domestic investors (our propensity score). We include the same explanatory variables in the probit model as in the case of foreign acquisitions, except for the presence of foreign firms in the sector. Using our estimated propensity score, we performed the kernel matching, and then estimate the impact of domestic takeovers on the female employment share.

As shown in table 7, when ownership reverts to domestic hands, the change in the share of female workers within the firm is not statistically different from zero for either skilled or unskilled women or women overall. This result suggests that domestic owners do not affect the gender structure of the labour force when they retake control of the firm, which confirms our finding that foreign ownership does have a positive effect in increasing the share of female employees. Therefore it is not just a change in ownership that explains this positive impact.

Table 7: Matching results for domestic acquisitions

	(1) All women (%) ATT	(2) Skilled women (%) ATT	(3) Unskilled women (%) ATT
Acquisition year	0.7407	-0.1487	3.3232
	(0.8190)	(1.8796)	(2.0239)
One year later	-0.7691	-1.9678	0.6039
	(0.5824)	(1.1705)	(1.4241)
One year later	-1.2583	-1.7787	-0.4632
	(1.7258)	(1.3686)	(1.2749)
Number of acquisitions	175	175	175

Note: Bootstrapped standard errors in parentheses (300 repetitions).
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

6.3 Alternative empirical strategies: fixed effects and propensity score weighting

As alternatives to our difference-in-differences matching estimates, we apply two empirical strategies to estimate the effect of foreign ownership on the share of a firm's employees (both skilled and unskilled) who are women. First, we use the panel structure of our database and estimate a fixed effects regression. We estimate the following regression:

$$Female_{share_{it}} = \alpha + \gamma acquired_{it} + \sum_{j} \beta^{j} X_{i,t-1}^{j} + d_t + \eta_i + \varepsilon_{it} \qquad (1)$$

where *Female_Share$_{it}$* represents the share of skilled (unskilled or all) women employed by firm *i* in time period *t*, and *acquired* is an indicator variable taking the value of one in the period in which a change in ownership from domestic to foreign investors is recorded and in subsequent periods. $X_{i,t-1}^{j}$ is a set of *j* (lagged) firm-level control variables, such as the (ln) firm size, (ln) capital intensity, the share of women among skilled workers, and (ln) TFP. Finally, dt and ηi are firm and time period fixed effects and εit is the error term.

Including a firm fixed effect helps us to control for selection based on time-invariant firm characteristics, while the inclusion of the vector $X_{i,t-1}^{j}$ controls for selection on time-varying observables.[16] This strategy ensures that the estimates of the parameter γ reflect only changes in the share of female workers associated with

---

[16] The variables included as controls are the following: (1) (ln) total employment; (2) (ln) TFP (to control for time varying selection on firm size and productivity, respectively); (3) exporter status; (4) share of imported inputs; (5) foreign presence in the sector (to control for time-varying selection on the

foreign acquisitions. We expect γ to be positive, that is, firms to employ a larger share of women after a foreign owner has taken control.

Second, as suggested by Guadalupe et al. (2012), we conduct a propensity score weighting regression to reflect differences in the probability of a firm being acquired based on prior characteristics. The estimated probability of being acquired, or the propensity score, $\hat{p}(X_{i,t-1})$ can be used to reweight the data. The idea of this approach is that plants that are underrepresented in the treated or control group are up-weighted and plants that are overrepresented in one of the groups are down-weighted. In order to estimate the average treatment effect of foreign ownership, i.e. the ATT, we follow Nichols (2008) and assign a weight equal to one $\hat{p}(X_{i,t-1})/(1-\hat{p}(X_{i,t-1}))$ to all acquired firms and a weight equal to to all potential controls (firms remaining under domestic control).[17]

6.4 Foreign-acquired firms hire more female workers

The results from the fixed effects and propensity score weighting estimations are presented in table 8 and confirm our difference-in-differences matching results: foreign acquisition has a positive and significant impact on the share of female workers in the firm. The first column in each panel includes only firm and year fixed effects; the second adds the set of lagged controls; the third presents the propensity score re-weighted estimates.

The fixed effects specifications in columns 1 and 2 of panel A show that the share of skilled female workers is positively and significantly associated with foreign ownership. Column 1a shows that the share of skilled female workers in foreign-acquired firms is about 2.7 per cent higher than in firms that stay under domestic control. This estimate is robust to controlling for lagged firm characteristics (column 2a). In the case of unskilled women, the fixed effects specifications (columns 1b and 2b) show that the effect of foreign ownership is not statistically significant. Similarly, the effect of foreign ownership on the share of all women is not statistically different from zero when we use the fixed effects specifications (columns 1c and 2c).

Columns 3a and 3b present the propensity score re-weighted regressions for the shares of skilled and unskilled employees, respectively. In the case of skilled female workers (column 3a), we observe that the coefficient of 1.38 is lower than in earlier columns but is still highly significant, implying that firms

---

international presence of these firms and potentially related productivity effects not captured by other variables); and (6) (ln) capital per worker (to control for time-varying capital intensity of the firm).

[17] A discussion of alternative weights is presented by Nichols (2008).

Table 8: Fixed effects and propensity score weighting regressions results

Panel A: Share of skilled female workers

	(1a)	(2a)	(3a)
Acquired	2.680***	2.715**	1.377***
	(0.957)	(1.208)	(0.271)
Number of observations	60,401	44,607	44,640
R^2	0.008	0.007	0.872

Panel B: Share of unskilled female workers

	(1b)	(2b)	(3b)
Acquired	-1.179	-0.947	1.042***
	(0.873)	(1.110)	(0.282)
Number of observations	60,401	44,607	44,640
R^2	0.008	0.008	0.919

Panel C: Share of all female workers

	(1c)	(2c)	(3c)
Acquired	-0.177	0.373	0.521***
	(0.503)	(0.575)	(0.174)
Number of observations	60,401	44,607	44,640
R^2	0.003	0.002	0.958
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Selection controls		Yes	
Propensity score weighting			Yes

Note: Standard errors are clustered by firms (in parentheses).
Selection controls described in footnote 17.
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

employ a higher share of skilled female workers following foreign acquisition. In the case of unskilled women (column 3b), we now observe a positive and significant effect of 1.04 per cent after foreign acquisitions. Finally, the share of women among all workers (column 3c) is 0.5 per cent higher after foreign acquisition.

These results confirm our findings from the difference-in-differences matching estimates. Foreign-acquired firms hire relatively more female workers than they would have done had they remained domestic. The impact is higher when considering only skilled women.

7. Competition and taste-based discrimination

As previously stated, theories of taste-based discrimination (Becker, 1957) suggest that market competition will reduce discriminatory practices due to the costs to firms' owners. Assuming that the differences in hiring practices for men and women occur because of discrimination, one can expect that, as competition increases, the number of female employees within firms should also increase.

Since exporting firms are exposed to greater competition, they may be less discriminatory. Hence, foreign acquisitions of exporting firms should not lead to big changes in female employment. As a way to test our hypothesis that stronger competition reduces female discrimination in the labour market, we perform a difference-in-differences estimation between foreign-acquired firms and non-acquired firms including exporter status at $t-1$, i.e. the year before acquisition, as an explanatory variable. This variable takes a value of 1 if the firm was an exporter the year before its acquisition and 0 otherwise.[18] We also include a post-acquisition dummy (post-acquisition) taking the value of 1 for all years following acquisition, and an acquisition dummy (acquired), which is equal to 1 for foreign-acquired firms and 0 otherwise, as well as interaction terms between exporter status, the post-acquisition periods and acquired firms. We include all years available for the matched sample.

In table 9 we can observe that the share of skilled female workers within acquired firms increases in the post-acquisition years by an amount equal to 3.71 percentage points. However, when the acquisition dummy is interacted with the post-acquisition variable and the exporter status at $t-1$, the effect is negative (–4.69 percentage points) and significant at the 5 per cent significance level. Therefore, if our hypothesis that foreign acquisition does not affect the share of female employees within exporting firms is correct, the sum of these two coefficients must be equal to zero. An F-test shows that this is true in our case (see bottom of table 9). For unskilled female workers and for the total share of female workers, this effect is not observed.

---

[18] The total number of foreign-acquired firms that were non-exporters at $t-1$ is 55 (out of 158), which represents about 35 per cent of the total acquired firms.

Table 9: Effects of exporting status on female employment within foreign-acquired firms

	(1) Skilled women	(2) Unskilled women	(3) All women
Post-acquisition	1.242	-2.238	-0.434
	(1.552)	(1.731)	(1.095)
Post-acquisition*Acquired	3.712**	0.867	-0.174
	(1.611)	(2.217)	(0.774)
Exporter at t-1	0.408	-0.490	-0.119
	(0.469)	(0.403)	(0.278)
Exporter at t-1*Post-acquisition*Acquired	-4.693**	-0.0918	-0.0989
	(2.005)	(2.535)	(1.211)
Constant	30.41***	21.31***	25.29***
	(0.0945)	(0.0829)	(0.0562)
Observations	34,805	34,805	34,805
F-test _b[Post-acquisition*Acquisition]+_b[Exporter at t-1*Post-acquisition*Acquired]=0			
	F-stat	*p*-value	
	0.55	0.4591	

Note: Standard errors are clustered by firms (in parentheses).
*, **, *** indicate statistically significance at 1, 5, and 10 per cent level, respectively.

8. Conclusions

A large body of empirical literature underscores that multinationals have more skilled labour forces and pay higher wages than domestic firms. However, the issue of gender inequality is generally ignored. This paper aimed to shed some light on this issue by examining the causal relationship between foreign ownership and a plant's share of female workers, using a census of Chilean manufacturing plants. We identify causality by controlling for the possible endogeneity of plant ownership status, using a difference-in-differences approach in combination with propensity score matching (kernel matching).

Our results can be summarized as follows. First, the evidence on foreign acquisitions shows that foreign ownership leads to a significant increase in the share of skilled female workers at the acquired plants. The improvements become visible one year after the acquisition and continue in the subsequent period. Two years after acquisition, the share of skilled female employees is 6.63 percentage points higher in the acquired plants than in the control group. When considering the share of unskilled female workers, we observe that the effect of foreign ownership is not statistically different from zero for any of the years under consideration. These results highlight the importance of considering skills differences when evaluating the impact of foreign ownership on female employment.

Second, we present supporting evidence for the argument that competition may be the driving force behind the rise in the share of female employees after foreign acquisitions. Since exporting firms are exposed to greater competition, they may be less discriminatory. Hence, foreign acquisitions of exporting (domestic) firms should not lead to big changes in the share of female employees, which is exactly what we found; that is, exporters already act less discriminating prior to their foreign acquisition. This finding is consistent with the view that lack of discrimination may be a source of competitive advantage. In addition, exporters may be more concerned about international reputation, which may motivate them to be less discriminatory than non-exporters.

Our results suggest that FDI may be a key channel to avoid waste of talent, by offering more job opportunities to skilled women. In this sense, we present evidence of a further channel through which FDI can stimulate the economic growth of host countries. This conclusion has important policy implications. Policies encouraging FDI may contribute not only to stimulate economic growth but also to close gender gaps in host countries.

References

Ackerberg, D., K. Caves, and G. Frazer (2015). "Identification Properties of Recent Production Function Estimators," *Econometrica*, 83(6), pp. 2411-2451.

Aguayo-Tellez, E. (2011). "The Impact of Trade Liberalization Policies and FDI on Gender Inequalities: A Literature Review," World Development Report background paper, World Bank.

Alfaro, L., and M. X. Chen (2012). "Surviving the Global Financial Crisis: Foreign Ownership and Establishment Performance," *American Economic Journal: Economic Policy*, 4(3), pp. 30-55.

Almeida, R. (2007). "The Labor Market Effects of Foreign Owned Firms," *Journal of International Economics*, 72(1), pp. 75-96.

Arnold, J. M., and B. S. Javorcik (2009). "Gifted Kids or Pushy Parents? Foreign Direct Investment and Plant Productivity in Indonesia," *Journal of International Economics*, 79(1), pp. 42-53.

Becker, G. (1957). *The Economics of Discrimination*. Chicago University Press.

Becker, S. O., and A. Ichino (2002). "Estimation of Average Treatment Effects based on Propensity Scores," *Stata Journal*, 2(4), pp. 358-377.

Berik, G., Y. van der Meulen Rodgers and J. E. Zveglich (2004). "International Trade and Gender Wage Discrimination: Evidence from East Asia," Review of Development Economics, 8(2), 237-254.

Black, S. E., and E. Brainerd (2004). "Importing Equality? The Impact of Globalization on Gender Discrimination," *Industrial and Labor Relations Review*, 57(4), pp. 540-559.

Bøler, E. A., B. S. Javorcik and K. H. Ulltveit-Moe (2018). "Working across Time Zones: Exporters and the Gender Wage Gap," *Journal of International Economics*, 11, pp. 122-133.

Blundell, R., and M. Costa Dias (2000). "Evaluation Methods for Non-Experimental Data," *Fiscal Studies*, 21(4), pp. 427-468.

Bozkurt, O. (2012). "Foreign Employers as Relief Routes: Women, Multinational Corporations and Managerial Careers in Japan," *Gender, Work & Organization*, 19(3), pp. 225-253.

Caliendo, M., and S. Kopeinig (2008). "Some Practical Guidance for the Implementation of Propensity Score Matching," *Journal of Economics Surveys*, 22(1), 31-72.

Chen, Z., Y. Ge, H. Lai and C. Wan (2013). "Globalization and Gender Wage Inequality in China," *World Development*, 44(C), pp. 256-266.

Girma, S., and H. Görg (2007). "Evaluating the Foreign Ownership Wage Premium using a Difference-in-Differences Matching Approach," *Journal of International Economics*, 72(1), pp. 97-112.

Guadalupe, M., O. Kuzmina and C. Thomas (2012). "Innovation and Foreign Owner," *American Economic Review*, 102(7), pp. 3594-3627.

Hellerstein, J., D. Neumark and K. R. Troske (2002). "Market Forces and Sex Discrimination," *Journal of Human Resources*, 37(2), pp. 353-380.

Heyman, F., H. Svaleryd and J. Vlachos (2013). "Competition, Takeovers, and Gender Discrimination," *ILR Review*, 66(2).

ILO (2015). *Global Wage Report 2014/15*. International Labour Organization.

INE (2016). *Genero e ingreso*. Instituto Nacional de Estadísticas.

Javorcik, B. S. (2004). "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages," *American Economic Review*, 94(3), pp. 605-627.

Juhn, C., G. Ujhelyi and C. Villegas-Sanchez (2014). "Men, Women, and Machines: How Trade Impacts Gender Inequality," *Journal of Development Economics*, pp. 179-193.

Kodama, N., B. S. Javorcik and Y. Abe (2018). "Transplanting Corporate Culture across International Borders: FDI and Female Employment in Japan," *World Economy*, pp. 1-18.

Lawler, J. J., and J. Bae (1998). "Overt Employment Discrimination by Multinational Firms: Cultural and Economic Influences in a Developing Country," *Industrial Relations: A Journal of Economy and Society*, 37(2), pp. 126-152.

Levinsohn, J., and A. Petrin (2003). "Estimating Production Functions Using Inputs to Control for Unobservables," *Review of Economic Studies*, 70(2), pp. 317-341.

Meng, X. (2004). "Gender Earning Gap," *Labour Economics*, 11(5), pp. 555-573.

Menon, N., and Y. van der Meulen Rodgers (2009). "International Trade and the Gender Wage Gap: New Evidence from India Manufacturing Sector," *World Development*, 37(5), pp. 965-981.

Nichols, A. (2008). "Erratum and Discussion of Propensity-Score Reweighting," *Stata Journal*, 8(4), pp. 532-539.

OECD (1999). *OECD Benchmark Definition of Foreign Direct Investment*. 3rd edition. OECD Publishing.

Olley, G. S., and A. Pakes (1996). "The Dynamics of Productivity in the Telecommunications Equipment Industry," *Econometrica*, 64(6), pp. 1263-1297.

Oostendorp, R. H. (2009). "Globalization and the Gender Wage Gap," *World Bank Economic Review*, 23(1), 141-161.

Pavcnik, N. (2002). "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants," *Review of Economic Studies*, 69(1), pp. 245-276.

Paz, L. S, and J. Ssozi (2020). "The Effects of Chinese Import on Female Workers in the Brazilian Manufacturing Sector," *Journal of Development Studies*, pp. 1-17.

Rosenbaum, P., and D. Rubin (1983). "The Central Role of the Propensity Score in Observational studies for Causal Effects," *Biometrika*, 70(1), pp. 41-55.

_____ (1985). "Constructing a Control Group using a Multivariate Matched Sampling Method that Incorporates the Propensity Score," *American Statistician*, 39, pp. 33-38.

Siegel, J., L. Pyun and B. Y. Cheon (2018). "Multinational Firms, Labor Market Discrimination, and the Capture of Outsider's Advantage by Exploiting the Social Divide," *Administrative Science Quarterly*, April, pp. 1-28.

Tang, H., and Y. Zhang (2017). "Do Multinationals Transfer Culture? Evidence on Female Employment in China," Article No. 6295, CESifo.

Tejani, S., and W. Milberg (2016). "Global Defeminization? Industrial Upgrading and Manufacturing Employment in Developing Countries," *Feminist Economics*, 22(2), pp. 24-54.

UNCTAD (2014). *World Investment Report 2014*. United Nations.

UNDP (2009). *Human Development Report 2009: Overcoming Barriers: Human Mobility and Development*. United Nations Development Programme.

_____ (2010). *Informe sobre el Desarrollo Humano en Chile 2010: Género los Desafíos de la Igualdad*. United Nations Development Programme, Santiago, Chile.

_____ (2014). *Human Development Report 2014: Sustaining Human Progress Reducing Vulnerabilities and Building Resilience*. United Nations Development Programme.

Wooldridge, J. M. (2009). "On Estimating Firm-Level Production Functions using Proxy Variables to Control for Unobservables," *Economics Letters*,104(3), pp. 112-114.

Zweimüller, M., R. Winter-Ebner, and D. Weichselbaumer (2008). "Market Orientation and Gender Wage Gaps: An International Study," *Kyklos*, 61(4), pp. 615-635.

Appendix

Complementary Tables

Table A1: Slected emerging market economies: net FDI inflows (percentage of GDP)				
	1980	**1990**	**2000**	**2013**
Brazil	1.00	0.25	5.08	2.85
Chile	**0.72**	**1.97**	**6.46**	**7.26**
China (mainland)	0.02	0.86	3.41	1.33
India	0.04	0.07	0.77	1.47
Russian Federation	n.a.	n.a.	1.05	3.70
Developing Economies	0.29	0.89	3.77	2.84
Latin America	0.83	0.78	4.55	5.03

Source: UNCTAD (2014).
Note: n.a. Not available.

Table A2: Selected countries: gender inequality indicators 2009						
	Chile	**Trinidad Tobago**	**Argentina**	**Brazil**	**Mexico**	**Peru**
GEM	**0.53**	0.80	0.70	0.50	0.63	0.64
Ranking in the GEM	**75**	14	24	82	39	26
Seats in parliament held by women[a,b]	**13.9**	26.0	9.6	9.6	36.0	21.5
Female senior officials and managers[a]	**23**	43	23	35	31	29
Female professional and technical workers[a]	**50**	53	54	53	42	47
Ratio of estimated female to male earned income	**0.42**	0.55	0.51	0.60	0.42	0.59

Source: UNDP (2009) and UNDP (2014).
Note: Data as of 28 February 2009, unless otherwise specified.
[a] Percentage of total.
[b] Data as of 2003.

Testing the reliability of the propensity score

Propensity score matching provides a reliable estimate of the effect of foreign ownership on the share of female workers if, conditional on the propensity score, the potential outcomes of the matched sample are independent of whether or not acquisition takes place. If this assumption is satisfied, then the pre-acquisition variables X_{t-1} used to estimate the propensity score, should have the same distribution for the acquired and non-acquired groups. As emphasized by Rosenbaum and Rubin (1983), a lack of balance usually indicates a misspecification of the model used to estimate the propensity score.

In order to assess whether our data satisfy this condition, we conduct some tests jointly, known as balancing tests. Since there is no consensus in the literature about which of the multiple versions of the balancing test is most appropriate in terms of its statistical properties, we perform a number of such tests that are suggested.

First, we employ a test suggested by Rosenbaum and Rubin (1985). It examines the standardized differences (or bias) between the treated group and the group of controls using the kernel matching process for all the variables included in the estimation of the propensity score. The difference between nearest neighbour matching and kernel matching is that in the former, unmatched control group observations are discarded and given zero weights, with some firms of the control group observations serving as the counterfactual for more than one treatment observation (so they have weights greater than one). In the latter case, no control group firms are given a zero weight, with firms from the control group who are more similar to treated firms (in terms of their propensity score) given more weight and control firms who are less similar to treated firms given less weight. The bias for a variable X is the difference between its (weighted) mean for the foreign-acquired firms and that for the matched control group sample, divided by the square root of the average of the variances of X in the treatment and comparison groups. If our balancing condition is satisfied, then the standardized difference will be low. Since there is no formal criterion for how small a standardized bias should be, we follow Rosenbaum and Rubin (1985) and consider a bias lower than 20 (in absolute value) as sufficient to satisfy the balancing condition. As shown in the first column of table B.1, all the variables satisfy this condition.

The second test we apply is also suggested by Rosenbaum and Rubin (1985). It is a simple t-test of the equality of the (weighted) means of the pre-acquisition variables between the treatment group and the control group. This test indicates that there is no statistically significant difference between the (weighted) means of any of the variables included in the matching process between the treated and comparison groups.

The results from these tests suggest that the balancing condition is satisfied overall in our matching process.

Table A3: Balancing tests

	(1) Bias	(2) Treated group mean	(3) Control group mean	(4) t stats	(5) p-value
ln(TFP) $_{t-1}$	5.1	8.86	8.78	0.1810	0.670
ln(Employment) $_{t-1}$	12.7	3.74	3.60	1.4117	0.235
Female labor share $_{t-1}$	4.2	26.10	25.13	0.0545	0.815
Skilled female labor share $_{t-1}$	-8.3	29.31	31.12	0.2179	0.641
Imported inputs share $_{t-1}$	14.7	0.12	0.08	2.5570	0.110
Exporter dummy $_{t-1}$	1.8	0.22	0.22	0.0525	0.819
ln(Capital per worker) $_{t-1}$	9.6	8.47	8.32	0.3241	0.569
Foreign presence in the sector $_{t-1}$	9.5	0.17	0.15	0.9783	0.323
Number of observations (weighted)	158	158	158		

Source: UNDP (2009) and UNDP (2014).
Note: Data as of 28 February 2009, unless otherwise specified.