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Female-Led Firms and Gender Wage Policies

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Abstract

Using a longitudinal data set covering the period 1987–2000, the authors explore the impact of female employers and gender segregation on wages in Portugal. In the context of Becker's (1957) taste for discrimination theory, they investigate whether the gender of a firm manager affects gender wage differences. They find that females benefit from higher wages in female-led firms than in male-led firms. Further, when females lead, the wage gap between female and male workers is reduced by 1.5%, regardless of the gender composition of the workforce. At the same time, the higher the share of females in a firm, the lower the wages overall for both female and male workers. The authors' results are compatible with the notion that job promotion is an important factor in wage increases. The more females are mentored and promoted, the less men will be. However, as more females in the firm compete for promotion, opportunities for both females and males to be promoted diminish.

FEMALE-LED FIRMS AND GENDER WAGE POLICIES

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Females get lower pay than males for equal work, with numerous studies conducted over the years exploring possible reasons for this gender wage gap. In their meta-analysis of 263 international gender pay gap studies, Weichselbaumer and Winter-Ebmer (2005: 483) found, for example, that during the 1990s, females earned on average 26% less than males.

When decomposing this earnings gap into a productivity-related component and an unexplained component, the authors found an unexplained gender pay gap of 19%. This pay gap has shrunk since the 1970s—taking different methods of data collection and analysis into account—by only 0.17 percentage points per year. Studies have explained these trends to a certain degree, in the context of labor market institutions and general inequality (Blau and Kahn 2003), as well as of competition and equal treatment laws (Weichselbaumer and Winter-Ebmer 2007).

Surprisingly, less explored are the roles that supervisors, managers and entrepreneurs play in these trends. Notably, Becker's (1957) taste for discrimination theory ascribes to employers a paramount role. Since employers set wages, examining male and female employers would presumably help to explain taste-based discrimination. Policy measures in various countries exemplify this issue. Though

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in the past equal opportunity and equal treatment laws dominated political agendas, the imposition of gender quotas or gender parity in top positions has replaced them. Promoting or hiring more females to top and influential positions is intended to have both a direct impact on female employment and wages—particularly at the top end—and an indirect one, since female decision makers might hire more subordinate females and pay them better wages.

Despite these arguments, the empirical literature on the impact of female employers on gender-based hiring and pay gaps is sparse, especially in the discipline of economics. In this paper, we focus on the impact of female leadership on the wages a firm pays to its male and female workers and investigate whether the gender of the manager of a firm has a significant effect on gender wage differences. In particular, we want to test the hypothesis that female-led firms tend to protect and mentor female employees by paying them higher wages than male-led firms would.

We use a longitudinal matched employer-employee dataset covering the entire manufacturing and non-public service sector in Portugal for a period of more than ten years. The longitudinal character of our data allows us to control for firm unobserved attributes that might be correlated with the gender of the employer by using firm fixed effects. The impact of female managers is thus identified by situations where a change in management resulted in a different gender of the manager; uncontrollable structural firm attributes could thus be eliminated. Additionally, we perform extensive robustness checks, such as restricting the analysis to new firms, which are not constrained by past policies and regulations when setting their wage policy.

Gender of the Employer and Gender Pay Gap: Previous Literature

Both the role of employer preferences in wage setting and its influence on the gender pay gap have been highlighted as early as the late 1950s when Becker (1957) introduced his theory of taste for discrimination. If we assume that female employers have less of a taste for discrimination than do male

employers, Becker's model would predict that employers with the lowest taste for discrimination—among them many female employers—will hire more female workers, but at the ongoing equilibrium wage. In a market with homogeneous workers, female-led firms would not necessarily pay higher wages to females. In practice, of course, workers and jobs are far from homogeneous and job descriptions are typically not unambiguously defined so that female employers can always place women in somewhat more favorable positions, with somewhat higher pay. Explicit positive preferences for females in the form of mentoring (Brown and Scandura 1994) might take the form of helping females to climb up the corporate ladder, leading them into on-the-job training and networks. Such practices might be considered to favor females, but they do not necessarily explain higher wages for females in female-led firms. In the case of discrimination in the labor market, reduced discrimination could accomplish the same goal.

Wage differentials between women and men are often also associated with segregated workplaces. Gender segregation is interpreted in many studies as a signal of bad jobs. Firms with a high share of minorities or females generally pay lower wages (Pfeffer and Davis-Blake 1987). Insofar as this phenomenon describes different job- or worker-quality in such firms, segregation—that is, the share of female workers—across firms can be interpreted as a confounding factor in studies of wage determination. Jobs in more female-dominated workplaces might be different from those in male-dominated workplaces; in particular, they might differ in characteristics typically unobservable to the econometrician. Moreover, the number of females in the firm might indicate the extent to which the firm is female-friendly, a variable for which we might want to control. Alternatively, because mentoring is costly and time-consuming, it might not be possible to mentor all females equally in the firm. We would thus observe that female-led firms with a higher share of women in the workforce have more difficulty mentoring and protecting female workers. The

allocation of more females to top positions in the firm would presumably have a direct impact on the gender employment and wage structures, reducing the "glass ceiling" (see Albrecht et al. (2003) and Arulampalam et al. (2005) for evidence on increasing gender pay gaps further up the wage distribution). At the same time, it would presumably have an indirect impact since female decision-makers may hire more females and pay them better wages.

Despite the relevance the gender of the employer may have to worker outcomes, the issue has received little empirical scrutiny, particularly in economics. This topic has been taken up, however, by social psychologists, who distinguish between the similarity–attraction paradigm (Byrne 1971) and the self-enhancement drive (Graves and Powell 1995). Whereas the former claims that individuals who are similar are attracted to each other, the latter argue that groups of lower-status individuals tend to identify with members of the higher-status group. Nearly all studies in management and social psychology relate to hiring decisions, experiments, or evaluations of recruiters (e.g., Graves and Powell (1995); Bon Reis et al. (1999); Heilman et al. (1988); and Goldberg (2005)), with mixed results. One extensive study by Bagues and Esteve-Volart (2007) investigated recruitment committees for Spanish public service positions and found that female recruiters treat female candidates more unfavorably. Giuliano et al. (2006) analyzed the impact of demographic differences between manager and worker on worker quits, dismissals, and first promotion, using duration models based on data on one large U.S. firm. They found that gender and ethnicity differences between worker and manager have a relevant impact on worker outcomes—though larger in the case of ethnicity—and that such impact may be positive, if the manager occupies a "lower status" than the worker being supervised. Economists have studied the influence of gender on their own profession in some detail. Broder (1993), for example, found that female reviewers of economics proposals for National Science Foundation grants graded proposals from females lower than they did those for males. Blank (1991),

however, found no gender-based differences in the way referees for the *American Economic Review* evaluated manuscripts submitted for publication. In another study, Hilmer and Hilmer (2007) and Neumark and Gardecki (1998) investigated mentoring by economics PhD advisors: working with a female advisor relative to a male one had practically no effect on early-career outcomes of young female economists.

The impact of gender segregation across firms on wages has been given some attention in economics, with mixed results. Carrington and Troske (1995) and Bayard et al. (2003) showed that the concentration of women into lower-paying establishments in the United States contributes to the gender pay gap. Carrington and Troske (1995), likewise, demonstrated that a higher proportion of women in a firm is associated with lower wages, both for females and for males; however, results by Vieira et al. (2005), using data on Portugal, indicate that a higher concentration of women in a firm is associated with lower females' wages but higher males' wages. Concentrating specifically on the gender of the managers, a few studies have dealt with the wage gaps for managers themselves (e.g., Bertrand and Hallock (2001); Bell (2005); Jurajda et al. (2006); and Lausten (2005)), whereas Smith et al. (2005) dealt with the effects of female managers on firm performance.

We are aware of only three studies that investigate the wage effects of female managers. For example, Bell (2005) showed that in firms led by women (CEOs, chairs, and directors), the gender gap between female and male executives has narrowed. Cohen and Huffman (2007) used aggregate data on female managers in particular industries to examine wages of non-managerial workers and found that industries with a higher percentage of female managers pay lower wages to both sexes. Hultin and Szulkin (2003) found for Sweden that a strong male representation among organizational managers is correlated with wider gender wage gaps. There is, therefore, still a long way to go to grasp the relationship between the gender of the employer and the gender pay gap, but the available data in Portugal may help us to shed some new light on the issue.

Data Set and Concepts Used

Data set

Our study is based on a linked employer–employee dataset gathered annually by the Ministry of Employment in Portugal that covers the population of private firms with wage-earners in the manufacturing and service industries. The years 1987 to 2000 are used.[1] Given the legally binding nature of the inquiry, the response rate is extremely high.

Reported data include the firm's location, industry, employment, sales, ownership, and legal setting; the worker's gender, age, occupation, professional status, schooling, employment start date, skill, monthly earnings, and duration of work. For owners of the firm, labor earnings and hours of work are not reported.

Full-time wage-earners aged 16 to 65 and company owners are the focus of our attention. Firms in manufacturing and services in mainland Portugal, employing at least 10 full-time wage earners in at least one of the years, were kept for analysis. We have set this minimum firm-size threshold, given our aim of analyzing the gender pay gap inside the firm, to ensure that both minimum-employee and gender diversity objectives would be met. The size restriction means that we had to drop a large share of firms in Portugal—but only a small share of the workforce—as reported in Appendix Table A1.

Identification of Female-Led Firms

To identify the person(s) leading the firm, we considered the following variables:

1. Owner of the firm. The variable *professional status* is coded as one of the following: owner, wage-earner, unpaid family member, or member of a cooperative. Owners are reported if they are actually "performing functions in the firm." Thus, if the owner is actively engaged working for the firm, his/her identification is straightforward.

2. Top manager. The variable *occupation* is coded at the six-digit level using the Portuguese Classification of Occupations version 1994. Top managers were defined either as "corporate directors and chief executives" (code 121) or "directors of small firms" (code 131).

3. Middle manager. Also using the variable *occupation*, middle managers were defined as "other managers" (codes 122 and 123), which includes directors of production, finance and administration, marketing, sales, human resources, and so on.

4. Best wage in the firm. The top wage earner in the firm was identified.

The first criterion—owner of the firm—provides an unambiguous identification of the person(s) leading the firm. Almost half the firms report information on their owner(s), and one-fourth reports just one owner. In these cases, the share of females in the firm leadership was quantified using simply the gender composition of the owner(s).

Given that the dataset reports very detailed occupations, we have a clear idea of the tasks performed by each individual. Almost all owners are declared as managers of the firm (7% are top managers, that is, corporate directors or directors of small firms, and 85% are middle managers), suggesting these occupations as the key ones in terms of firm leadership. Firms whose owner is reported to be working in the firm tend not to have wage-earners as top managers.[2] Therefore, whenever the firm owner was not reported, we followed an alternative procedure to identify the firm leader(s), relying on its salaried managers. We relied first on the top manager; if the firm had no top managers, we then considered middle managers. For firms whose leadership could not be identified using either the owner or manager criteria, we considered a third criterion, the best paid worker(s) as the one(s) leading the firm. The share of females leading the firm was then collapsed into a dichotomous

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[1] However, for 1990 no worker data are reported.

[2] Just 1% of the firms whose owners are present have wage-earners as top managers.

classification: female- and male-led firms.[3]

To summarize, the procedure we implemented is as follows. Beginning with the owners, a firm was defined as female-headed if more than 50% of its owners were female (likewise, it was identified as male-headed if more than 50% of its owners were male; it was not classified if insufficient information was available, such as if exactly half the owners were male and half were female or no owners were reported). For firms with insufficient information on the above criterion, we followed a similar procedure using the variable *top management*. Next, we extended the procedure to middle managers and finally, if none of the above criteria were conclusive, females among the top wage in the firm were considered. Table 1 reports the classification of firms into male- and female-led as these criteria were considered in succession. Appendix B reports the results of robustness checks on our classification of firms into female- and male-led once we put into place alternative procedures.

Firms not classified as either male- or female-led were dropped from the analysis. Moreover, some firms change classification over time. Since wage and other firm outcomes may reflect the choices of past management, especially in a regulated labor market such as that in Portugal, firms that change classification may bring noise into the analysis, a problem that is particularly acute if the firm changed classification more than once. Therefore, in the first analysis that follows, only firms that either never changed classification or changed classification only once, maintaining the same classification afterwards, were kept for analysis.[4] This condition led to dropping 24% of the observations on male-led firms and dropping 49% of the observations on female-led firms. As robustness checks, we will report results on alternatives for firm selection.

Wages

Gross monthly earnings are defined as monthly base-wage plus seniority-indexed components of pay and other regularly paid benefits. Wages were deflated using the Consumer Price Index (base 2000), with wage outliers having been dropped.[5] Whenever the firm leader was identified as the worker with the best wage in the firm, that worker was dropped from the analysis in order to avoid a mechanical relationship between the gender of the firm leader and the worker's gender pay gap. Appendix Tables A2 and A3 provide descriptive statistics on the firm and worker datasets.

Female-Led Firms and Male-Led Firms in Portugal

Women tend to lead smaller firms, with a strong sectoral concentration in clothing, education, and health and social services. Female-led firms tend to have a younger and better educated labor force, and they employ predominantly females. Moreover, the leadership of female-led firms is younger and better educated (see Appendix Table 2A). The share of female-led firms in Portugal increased from approximately 13% in 1987 to 19% in 2000, while their employment share increased from 7% to 14% over the period.

Figure 1 provides a visual description of the trend in wage policies for male- and female-led firms. Male-led firms pay on average higher wages than female-led firms, for both males (Panel (a)) and females (Panel (b)), which could be due to their different sectoral and firm-size composition. The gap between the two types of firms seems to be larger for male workers. Panel (c) illustrates the aggregate wages in male- and female-led firms. The higher differential reflects the gender-

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[3] Results do not change qualitatively if we use the share of female managers instead, as reported below in the robustness checks.

[4] We will refer to this sample of firms as "all firms," in the tables and text that follow.

[5] Wages below half the national minimum wage or above 20 times the percentile 99 were dropped. Outliers in wage growth (log wage change below −.5 or above 1.5) led to dropping the full history of the worker, since mistakes coding the wage in one year usually led to outliers in wage growth that carry over to the year afterwards (with opposite sign), and thus the whole history of the worker was judged unreliable, even when not captured as an outlier.

Table 1. Successive Criteria Used to Identify the Firm Leadership and its Degree of Femaleness

Criterion	Female-led	Male-led	Insuff. Info (*)
Owners	23,372	131,778	231,218
Top managers	24,442	138,398	223,528
Middle managers	33,791	178,584	173,993
Top wages	83,666	298,680	4,022

Note: The (*) signified that information on the criterion is either missing or pointing exactly to half males and half females in the firm leadership.
Source: Computations based on Portugal, MTSS (1987–2000).

based employment segregation—female-led firms employ females to a much larger extent. Comparing Panels (a) and (b) reveals that there is a large gender wage gap. Average females' and males' wages are plotted in Panel (d), which shows that the raw gender wage gap in Portugal remained roughly stable over time.

Gender Wage Differentials: Can Female-Led Firms Make A Difference?

To explore gender wage differentials, we use augmented Mincer-type (log) wage regressions for males and females separately, concentrating in particular on the influence of the gender of the manager as well as on the segregation of the workforce. Table 2 presents OLS estimates using all firms that either never changed ownership type or changed only once. Table 3 further includes firm fixed effects to control for unobserved and unobservable firm differences which might influence wage setting. The impact of female managers is identified now only by changes in the gender of the manager within a firm. The summary tables provide a comparison of the most relevant coefficients estimated under alternative specifications. The regressions additionally include controls for age, tenure, and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and the year.[6] A wider set of estimated coefficients is presented in Appendix Tables A4 and A5, for our preferred specification (wage regression with firm fixed effects).

At first glance, females do not seem to

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[6] Note that in such a large dataset some firms are observed changing size, major industry, region, legal setting, or the origin of their capital.

profit from having a female boss. Column 1 of Table 2, for example, shows a negative effect for females in female-led firms. We learn from column 2 that this result seems to be due to the fact that there tends to be a higher share of females in female-led firms, which is typically a sign for lower pay. Correcting for this and looking at the interaction effect (column 3), we see that female-led firms do pay a premium to the first female worker of almost 3%, but this advantage becomes smaller the more females there are in the firm. If 80% of the workforce is female, women still earn a wage premium of 1% if they are led by a female boss, when compared to being led by a male boss.

For males, the impact of a female manager is definitely detrimental. In all specifications, males earn wages between three and six percentage points lower than females in female-led firms than they do in male-led firms. Conversely, a larger share of female co-workers is associated with higher males' wages. Our results confirm previous studies on segregation effects in Portugal (Vieira et al. 2005)—females earn lower wages in firms with a predominantly female workforce whereas males enjoy higher wages, which might be interpreted as an effect of segregation according to task. Males do get the better jobs as supervisors or middle managers. The more females there are in the workplace, the better the chances are for the remaining males to reach a supervisory level (see column 2). These effects are considerable. The male–female wage differential in an almost completely female workforce is 20% higher compared to an almost completely male workforce.

Our results in Table 2 go beyond these insights. Distinguishing between female- and male-led firms, we find in column 3 that the overall pattern just described—a larger share of female co-workers having a positive impact on males' wages and a negative impact on females' wages—holds in male-led firms, whereas in female-led firms both males and females earn lower wages the larger the proportion of female workers (see the negative interaction coefficient). This result could be due to structural differences between firms with a

Figure 1. Monthly Wages–Male, Female, and Overall

Panel A: Male Wages

Panel B: Female Wages

Panel C: Both Genders

Panel D: Relative Wages
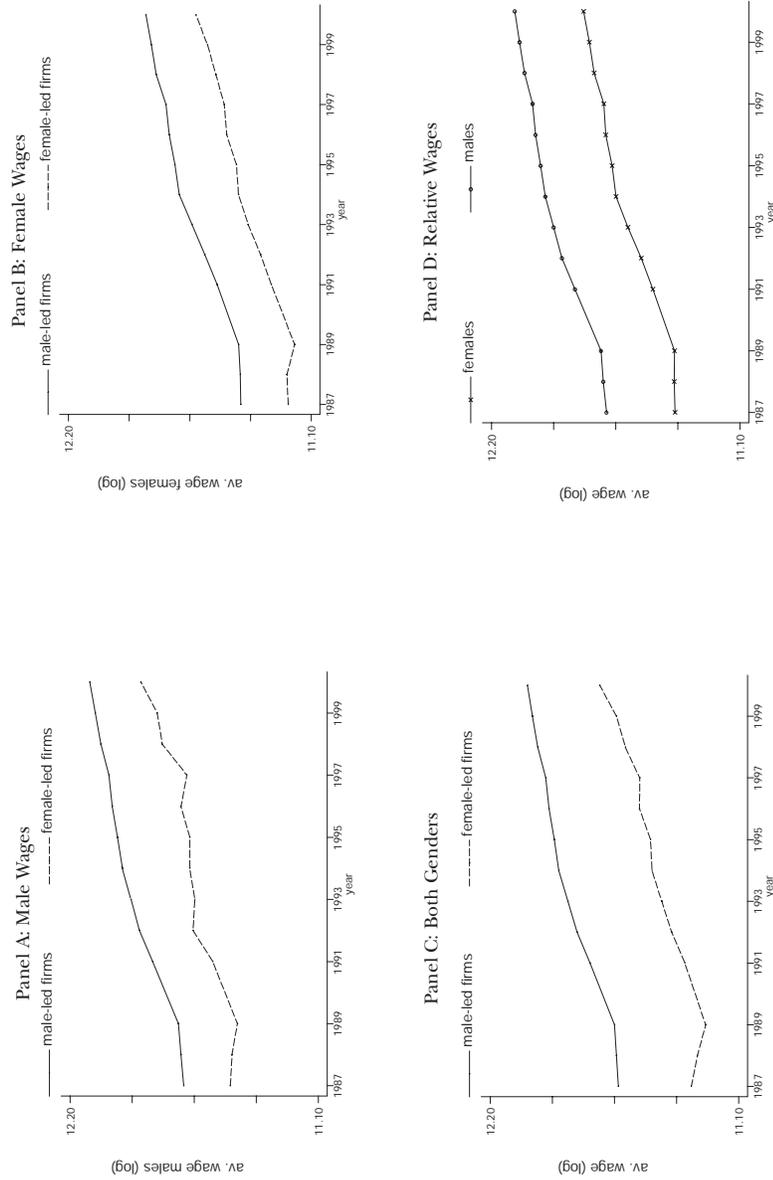
Notes: Panels A to C: the average real monthly wage at the firm level (male, female, and overall) was averaged for the two groups of firms using as weights the male, female, and overall employment in the firm, respectively; log wages are plotted. Panel D: the average real monthly wage for males and females was computed; log wages are plotted.

Source: Computations based on Portugal, MTSS (1987–2000).

Table 2. Summary of Wage Regression, Ordinary Least Squares, All Firms

A: Female Workers	(1)	(2)	(3)
female-led firm	-.016	.010	.030
	(.0005) ***	(.0005) ***	(.002) ***
share females		-.139	-.136
		(.0009) ***	(.0009) ***
fem.-led * share fem.			-.025
			(.002) ***
Obs.	2855643	2855643	2855643
R²	.702	.705	.705
F-statistic	132009.8	131188.6	128722.5
B: Male Workers	(1)	(2)	(3)
female-led firm	-.052	-.060	-.028
	(.0008) ***	(.0008) ***	(.001) ***
share females		.055	.061
		(.0009) ***	(.0009) ***
Fem.-led * share fem.			-.082
			(.003) ***
Obs.	5674418	5674418	5674418
R²	.638	.638	.638
F-statistic	195698	192121.5	188539.2

Note: Includes controls for age, tenure and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
***Statistically significant at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

Table 3. Summary of Wage Regression, Firm Fixed Effects, All Firms

A: Female Workers	(1)	(2)	(3)
female-led firm	.008	.011	.029
	(.0008) ***	(.0008) ***	(.002) ***
share females		−.097	−.093
		(.002) ***	(.003) ***
female-led * share fem.			−.025
			(.003) ***
Obs.	2855643	2855643	2855643
R²	.805	.805	.805
F-statistic	36498.11	35845.37	35170.93
B: Male Workers	(1)	(2)	(3)
female-led firm	−.007	−.007	−.004
	(.001) ***	(.001) ***	(.002) **
share females		−.017	−.017
		(.002) ***	(.002) ***
female-led * share fem.			−.009
			(.004) ***
Obs.	5674418	5674418	5674418
R²	.754	.754	.754
F-statistic	81307.51	79745.49	78240.99

Note: Includes controls for age, tenure and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
**Statistically significant at the .05 level; ***at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

male- versus female-dominated workforce.

Combining the effect of female managers and female workforce, we see that women profit less—perhaps they receive less mentoring and protection from a female supervisor—if there are many female coworkers around. For males, the detrimental impact of a female boss is amplified if the firm's workforce is also female-dominated. In a firm with 50% females, males working under a female manager earn 7 percent less than if they were working under a male manager;[7] in a firm with an 80% female workforce, they would earn 9.4% less.

Although we do control for a wide set of variables, the OLS results might suffer from a bias if male- and female-led firms differ according to unobserved characteristics. Therefore, we recourse to firm fixed-effects estimates. These results, in Table 3, confirm our main insights: females profit from a female boss and males lose out. Already column 1, notwithstanding the gender composition of the workforce, illustrates a clear picture: females gain 0.8% whereas males lose 0.7%. Thus, a female boss reduces the wage gap by 1.5%. Extending the analysis by also considering the composition of the workforce, we see that the results for females' wages are almost unchanged as compared to the OLS results, whereas for males' wages, the effects are still present, but somewhat smaller.

If one interpreted our results in the context of discrimination theories, one might conclude that female employers have less of a taste for discrimination compared to their male counterparts. Though Becker's taste for discrimination theory, as it relates to the employer, would predict higher numbers of female workers in female-led (less discriminatory) firms, Becker's co-worker discrimination theory would require higher wages for males to induce them to work in a female-dominated workforce. We do see this phenomenon in the OLS regressions, but it disappears in the fixed-effects results. The fixed effects seem to capture some structural differences among firms that were

responsible for the higher effect in the OLS model. The moderating effects of female dominance on both male and female wages in the presence of a female employer are consistent with a mentoring story. If female employers mentor females, they can do less of this if there are many females employed in the firm, and the remaining male workers will increasingly suffer.

Our results are also compatible with a model in which job assignment and job promotion are important factors that determine wages. If employers make decisions about promoting workers according to the expected duration of stay in the firm, the fear of pregnancy-related quits might lead to the statistical discrimination of females (Lazear and Rosen 1990; Winter-Ebmer and Zweimüller 1997). Because there is in general a fixed number of such supervisory jobs, the higher the number of potential candidates means the lower the odds that an individual person will obtain this job. This relationship would explain the pattern that in male-managed firms a higher share of females positively affects males' wages and negatively affects females' wages. Because females are discriminated against in promotion decisions, the higher the share of females, the less likely it is that one of them gets promoted; alternatively, the more females there are in a male-led firm, the easier it is for each individual male to finish first.

Female managers might either have better information about expected turnover or they might simply want to break this pattern by mentoring females better in order to promote them to supervisory jobs. If females do protect fellow females in promotion decisions, this would explain the positive effect of female managers on females' wages and the negative effect on males' wages. One consequence of this is that a higher female share in the firm reduces the chances for an individual woman to secure one of these rare jobs; the average wage of females must be lower. Likewise, for males, a higher share of females in the firm increases the competition for the remaining males and reduces their chances for securing a supervisory position.

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[7] Computed as –0.028-0.082*0.5.

Robustness Checks

Selection of sample

The main results from fixed-effects regressions demonstrate that female managers mentor female workers, in the sense that they pay them better wages than male managers would. However, the possibilities for mentorship get weaker the more female co-workers there are employed in the firm. Here we report several robustness checks by changing the selection of our samples.

Table 4 presents the results for newly founded firms. We consider one single year of observation for each firm, the year the firm was created.[8] It is highly likely that incumbent firms will have an established pay scale. If there are discriminatory aspects in these pay scales, then presumably many aspects of these pay scales might be persistent, notwithstanding a change in management. One could assume that newly founded firms would set a pay scale that is much more sensitive to current economic and social considerations, and in particular female managers may find it easier to escape traditional gender-based payment rules. This is one way to overcome the problem of the sluggishness of changes in the wage structure, which might hamper models with firm fixed effects.

The results for newly founded firms do confirm these expectations. Whereas the main pattern is unchanged, female workers do profit to a much greater extent from having female bosses compared to the previous results. Comparable female workers in newly founded female-led firms earn significantly higher wages than those in newly founded male-led firms. If half of the workforce is female, the gain is 6%; the gain is 2.3% if 20% of the coworkers are male (and 80% of the coworkers are female). Examining newly founded firms is also a way to tackle the endogeneity problem of the choice of a female manager. Using existing firms, even our fixed-effects specification

cannot rule out a possible endogeneity of changes in management. A large share of female workers or a more even wage structure might make it more probable that a female manager takes over. For newly founded firms, the logical structure is different: a firm is founded and then workers are hired and pay scales are set.

In our second robustness check, we included all the firms in our sample, regardless of whether the gender of their leadership changed once or more often. However, given that changes implemented by the new management may take some time to have an impact, we have excluded the year the firm changed type of leadership and the subsequent year from the analysis. This again allows some time for changes in management to take effect. Results are reported in Table 5. Also in this case, results are consistent with the ones previously reported.

In a third robustness check, we have measured the femaleness of the firm leadership as a continuous variable, instead of adopting a dichotomous partition into female- or male-led firms. The results, reported in Table 6, are remarkably robust to this change in the form of the measurement of our variable of interest.

Different types of firms

Firm size might be an important factor in determining the impact of management changes on wages. In particular, female-led firms are smaller, and therefore a comparison with male-led firms might be inappropriate. Moreover, firm size might be important regarding the speed with which changes in management can be realized. If mentoring is the primary explanation for the phenomenon, looking at the gender of the CEO alone might be misleading. In a large firm, mentoring might be delegated to much lower levels of management than the CEO. For this reason, looking at smaller firms might be very enlightening.

We have performed identical wage regressions separately for small and large firms. Since a firm may change size over the period under observation, we have considered its average size to define the two size categories. Table 7 reports the results

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[8]   Note that we can only report OLS results here, since the inclusion of a firm fixed effect wipes out the dummy variable of female management.

Table 4. Summary of Wage Regression, Ordinary Least Squares, Just New Firms

A: Female Workers	(1)	(2)	(3)
female-led firm	−.020	.019	.121
	(.003) ***	(.003) ***	(.012) ***
share females		−.214	−.189
		(.007) ***	(.007) ***
female–led * share fem.			−.122
			(.014) ***
Obs.	42561	42561	42561
R^2	.612	.621	.621
F–statistic	1314.587	1337.066	1315.87
B: Male Workers	(1)	(2)	(3)
female-led firm	−.031	−.033	−.011
	(.005) ***	(.006) ***	(.010)
share females		.010	.022
		(.010)	(.011) **
female–led * share fem.			−.059
			(.020) ***
Obs.	48534	48534	48534
R^2	.532	.532	.532
F–Statistic	1080.135	1059.384	1039.713

Note: Includes controls for age, tenure and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
**Statistically significant at the .05 level; ***at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

Table 5. Summary of Wage Regression, Firm Fixed Effects, Excluding Year *t* When Firm Changed Type of Leadership And Year *t* + 1

A: Female Workers	(1)	(2)	(3)
female-led firm	.014	.018	.017
	(.001) ***	(.001) ***	(.003) ***
share females		−.095	−.095
		(.003) ***	(.003) ***
fem.–led * share fem.			.0008
			(.004)
Obs.	2734332	2734332	2734332
R^2	.808	.808	.808
F–statistic	35321.18	34685.07	34030.63
B: Male Workers	(1)	(2)	(3)
female-led firm	−.007	−.006	−.007
	(.002) ***	(.002) ***	(.003) ***
share females		−.017	−.017
		(.003) ***	(.003) ***
fem.–led * share fem.			.001
			(.006)
Obs.	5575566	5575566	5575566
R^2	.755	.755	.755
F–statistic	80380.8	78836.48	77348.98

Note: Includes controls for age, tenure and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
***Statistically significant at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

Table 6. Summary of Wage Regression, Firm Fixed Effects, Femaleness of Firm Leadership
Measured as Continuous Variable (Instead of Dichotomous)

A: Female Workers	(1)	(2)	(3)
female-led firm (continuous)	.009	.012	.026
	(.0008) ***	(.0008) ***	(.002) ***
share females		−.098	−.093
		(.002) ***	(.003) ***
female-led (continuous) * share fem.			−.021
			(.003) ***
Obs.	2855643	2855643	2855643
R^2	.805	.805	.805
F–statistic	36498.99	35846.83	35172.11
B: Male Workers	(1)	(2)	(3)
female-led firm (continuous)	−.016	−.015	−.017
	(.0009) ***	(.0009) ***	(.001) ***
share females		−.014	−.015
		(.002) ***	(.003) ***
fem.–led (continuous) * share fem.			.007
			(.004) *
Obs.	5674418	5674418	5674418
R^2	.754	.754	.754
F–statistic	81316.32	79753.64	78248.94

Note: Includes controls for age, tenure, and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
*Statistically significant at the .01 level; ***at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

separately for firms with up to 100 workers and those with more than 100 workers, again using firm fixed effects.[9]

The general patterns stay the same, in that female employers favor female workers. It turns out that both male and female workers in small firms generally profit from the presence of female employers, but females profit to a much greater extent than males. Moreover, for men the effect turns negative once the share of females in the firm is above one-third, which is often the case. In large firms, we see the general pattern confirmed: females' wages are higher in female-led firms than they would be in male-led firms, whereas males' are lower in female-led firms than they would be in male-led firms. Consistent with our mentoring theory, females in smaller firms

profit more from a female manager than do those in larger firms.

Finally, we check the robustness of our results for sub-samples of the data by differentiating by the type of firm leader identified in the data—owner, top manager(s), other manager(s) or best wage in the firm.[10] Since there are now two potential changes in ownership—gender and type—we restrict ourselves to the case of newly founded firms, in which the type of firm leader is unambiguously identifiable.[11] Results are reported in Table 8. They are, by and large, very consistent with the previous pattern. With the exception of top managers, in which the number of observations is too small, females always profit considerably from having a female employer. For males, we find practically no effect in the case of owners and top managers and negative effects for other managers as well as for managers identified as earning the highest

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[9]   Note the small firm size structure in this economy. Indeed, even after we impose the constraint that the firm must employ at least 10 workers in at least one year, the mean firm size is 32 workers (the median is 12 and the 90-percentile is 52). This is consistent with the structure of the overall Portuguese private sector, where the average firm size is 9 workers and 83% of the firms have less than 10 workers (data referring to 2005).

[10]   For firms where the person with the highest wage is identified as the boss, this person is always excluded from the wage regressions.

[11]   In fact, if we restricted ourselves to firms where there is no change in the type of ownership, the changes in gender were in some cases too few.

Table 7. Summary of Wage Regression, Firm Fixed Effects, Separately for Small and Large Firms

	Small firms			Large firms		
A: Female Workers	(1)	(2)	(3)	(1)	(2)	(3)
Female-led firm	−.001 (.0009)	.003 (.0009) ***	.029 (.003) ***	.026 (.001) ***	.025 (.001) ***	.019 (.004) ***
share females		−.069 (.003) ***	−.063 (.003) ***		−.164 (.005) ***	−.165 (.005) ***
fem-led * share fem.			−035 (.004) ***			.008 (.006)
Obs.	1621216	1621216	1621216	1234427	1234427	1234427
R^2	.75	.75	.75	.813	.813	.813
F-statistic	18285.12	17953.34	17617.43	18288.13	17972.35	17633.29
B: Male Workers	(1)	(2)	(3)	(1)	(2)	(3)
Female-led firm	.001 (.001)	.0004 (.001)	.014 (.002) ***	−.018 (.002) ***	−.019 (.002) ***	−.037 (.003) ***
share females		.017 (.003) ***	.02 (.003) ***		−.122 (.005) ***	−.124 (.005) ***
fem-led * share fem.			−.041 (.005) ***			.051 (.008) ***
Obs.	2825907	2825907	2825907	2848511	2848511	2848511
R^2	.692	.692	.692	.741	.741	.741
F-statistic	31808.13	31197.55	30610.94	50094.55	49153.95	48228.04

Note: Small firms defined as having average size (over the period under analysis), below, or equal to 100 workers. The regression includes controls for age, tenure, and education of the worker, size, industry, region, legal setting, and origin of the capital of the firm, and year.
***Statistically significant at the .01 level.
Source: Computations Based On Portugal, MTSS (1987–2000).

wage in the firm. The result that female owners are positively associated with higher female wages is a reassuring sign that, in fact, the gender of the owner of the firm is the decisive factor and not a general female-friendly policy in a firm, which might also increase the likelihood of female managers.

Conclusion

In contrast to the textbook model of perfect competition, employers can influence pay setting and pay structure in non-perfect markets. This model should also apply to gender-based pay. Beginning with Becker (1957), economists have embraced the idea that pay differences between men and women could be explained by a taste for discrimination on the part of the employers. Depending on the extent of this distaste and the number of discriminating employers, a gender wage gap will materialize in equilibrium.

In this paper we have investigated the potential role the gender of the employer or manager could play. Using a large longitudinal data set for Portugal, we have shown that, indeed, a female-led firm raises women's but lowers men's wages compared to a male-led firm. These results are robust to a set of specification tests. First, we have identified the effect only in firms that changed the gender of the manager in order to control for unobserved firm-specific features; second, we used only start-up firms to allow for a newly decided pay structure; and third, we used firms that changed management more often. Our results are consistent with a situation in which job promotion is an important part of the pay scale and the number of such supervisory roles is limited. When female managers actively mentor and protect female co-workers, they may increase the latter's promotion chances and thus their expected wage. The higher the share of females in the firm, the lower the promotion chances for any individual, either female or male. Though an important factor in the structure of male-female wage differentials, the rise in female-led firms in Portugal is nonetheless too small to contribute significantly to the narrowing of the overall gender wage gap.

Table 8. Summary of Wage Regression, Ordinary Least Squares, Just New Firms, Separately for Each Criterion that Enabled Identification of Firm Leadership: Owners(s), Top Manager(s), Other Manger(s), or Best Wage

	Owners			Top Managers			Other Managers			Best Wage		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
A: Female Workers												
female-led firm	−.006 (.004)	.018 (.005)***	.041 (.020)**	.011 (.051)	.044 (.054)	.003 (.126)	−.006 (.012)	.04 (.013)***	.087 (.038)**	−.029 (.003)***	.017 (.004)	.099 (.016)***
share females		−.15 (.010)***	−.146 (.011)***		−.192 (.112)*	−.211 (.123)*		−.293 (.026)***	−.28 (.028)***		−.217 (.009)***	−.194 (.010)***
fem.–led * share fem.			−.026 (.023)			.071 (.194)			−.067 (.051)			−.097 (.019)***
Obs.	15732	15732	15732	711	711	711	5198	5198	5198	20920	20920	20920
R²	.471	.478	.478	.655	.656	.656	.677	.685	.685	.573	.584	.584
F-statistic	279.425	281.66	276.274	28.724	28.292	27.586	211.863	215.264	211.264	548.604	562.689	553.278
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
B: Male Workers												
female-led firm	−.0002 (.008)	−.0005 (.008)	.001 (.012)	−.022 (.051)	.004 (.053)	−.001 (.157)	−.073 (.018)***	−.069 (.019)***	−.037 (.035)	−.056 (.008)**	−.049 (.009)***	−.059 (.015)***
share females		.002 (.015)	.003 (.016)		−.151 (.097)	−.151 (.100)		−.023 (.029)	−.012 (.031)		−.032 (.015)**	−.038 (.016)**
fem.–led * share fem.			−.007 (.029)			.012 (.358)			−.078 (.072)			.025 (.029)
Obs.	19795	19795	19795	1255	1255	1255	7057	7057	7057	20427	20427	20427
R²	.425	.425	.425	.685	.686	.686	.603	.603	.603	.408	.408	.408
F-statistic	292.156	286.414	280.893	58.458	57.307	56.041	208.494	204.488	200.657	275.086	269.936	264.853

Note: Includes controls for age, tenure, and education of the worker; size, industry, region, legal setting, and origin of the capital of the firm; and year.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.
Source: Computations Based On Portugal, MTSS (1987–2000).

APPENDIX A

Appendix Table A1
Initial Sample Sizes: Number of Unit-Year Observations

Firm size restriction	Workers	Firms	Owners	Female owners
No size restriction	17,116,973	1,457,183	1,192,282	302,265
Firms ever having more than 10workers	13,202,761	386,368	297,982	63,291

Source: Computations based on Portugal, MTSS (1987–2000).

Appendix Table A2
Descriptive Statistics on the Firm

	Male-led Firms		Female-led Firms	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Firm size (log)	2.714	1.055	2.522	0.861
Firm age	23.859	19.237	22.647	36.582
Share females	0.255	0.251	0.797	0.272
Av. schooling (yrs)	6.283	2.327	6.908	2.454
Av. age	35.824	6.02	33.789	6.492
Av. age firm leader	43.312	9.741	38.021	10.178
Av. schooling firm leader	8.24	4.335	9.26	4.567
Female-led firm (continuous variable)	0.036	0.12	0.958	0.132
Legal setting				
sole proprietorship	0.067		0.104	
partnership	0.803		0.613	
joint stock	0.093		0.038	
other	0.035		0.245	
Ownership				
public	0.005		0.002	
foreign	0.036		0.019	
Location				
Center Coast	0.186		0.127	
Lisbon	0.354		0.348	
Inland and South	0.127		0.123	
Industry				
textiles	0.035		0.048	
clothing, leather	0.063		0.267	
wood, cork	0.072		0.018	
paper, printing	0.028		0.012	
chemicals	0.025		0.01	
stone, clay, glass	0.038		0.015	
basic metals	0.008		0.001	
metal prod, machin.	0.109		0.021	
elect., water	0.001		0.000	
construction	0.167		0.028	
wholesale trade	0.122		0.051	
retail trade	0.104		0.087	
restaurants, hotels	0.052		0.041	
transport, communic.	0.038		0.016	
banking, insurance	0.011		0.004	
real estate	0.02		0.018	
education	0.008		0.106	
health, social serv.	0.006		0.172	
other	0.051		0.067	
N	218980		40350	

Note: Reports firms that changed ownership type once or never.
Source: Computations based on Portugal, MTSS (1987–2000).

Appendix Table A3
Descriptive Statistics on the Worker

Variable	Males		Females	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*
Wage(log)	11.769		11.488	0.479
Female-led firm (dichotomous variable)	0.034		0.196	
Female-led firm (continuous variable)	0.081	0.2	0.235	0.378
Share females	0.207	0.189	0.571	0.281
Age	38.065	11.653	34.123	10.425
Tenure	10.038	9.521	8.261	8.408
Tenure < =1	0.126		0.137	
Education				
4 yrs	0.473		0.4	
6 yrs	0.191		0.212	
9 yrs	0.115		0.128	
12 yrs	0.127		0.166	
16 yrs	0.054		0.059	
Firm size (log)	5.032	2.101	4.625	1.846
Legal setting				
sole proprietorship	0.021		0.025	
partnership	0.505		0.562	
joint stock	0.373		0.28	
other	0.032		0.105	
Ownership				
public	0.134		0.067	
foreign	0.097		0.114	
Location				
Center Coast	0.134		0.154	
Lisbon	0.485		0.415	
Inland and South	0.077		0.09	
Industry				
textiles	0.051		0.107	
clothing, leather	0.028		0.19	
wood, cork	0.048		0.033	
paper, printing	0.024		0.019	
chemicals	0.04		0.028	
stone, clay, glass	0.04		0.028	
basic metals	0.018		0.004	
metal prod, machinery	0.141		0.081	
elect., water	0.028		0.009	
construction	0.149		0.018	
wholesale trade	0.081		0.068	
retail trade	0.057		0.067	
restaurants, hotels	0.024		0.049	
transport, communication	0.104		0.046	
banking, insurance	0.059		0.049	
real estate	0.013		0.012	
education	0.004		0.029	
health, social serv.	0.004		0.057	
other	0.045		0.051	
N	5674418		2855643	

Source: Computations based on Portugal, MTSS (1987–2000).

Appendix Table A4
Wage Regression, Firm Fixed Effects, Female Workers, All Firms

Variable	(1)	(2)	(3)
female-led firms	.008	.011	.029
	(.0008) ***	(.0008) ***	(.002) **
share females		-.097	-.093
		(.002) ***	(.003) ***
fem.-led * share fem.			-.025
			(.003) ***
age	.026	.025	.025
	(.00008) ***	(.00008) ***	(.00008) ***
age sq.	-.0003	-.0003	-.0003
	(1.10e-06) ***	(1.10e-06) ***	(1.10e-06) ***
tenure	.008	.008	.008
	(.00003) ***	(.00003) ***	(.00003) ***
tenure < 1	-.060	-.060	-.060
	(.0004) ***	(.0004) ***	(.0004) ***
educ: 4 yrs	.085	.085	.085
	(.0008) ***	(.0008) ***	(.0008) ***
educ: 6 yrs	.179	.179	.179
	(.0008) ***	(.0008) ***	(.0008) ***
educ: 9 yrs	.302	.301	.301
	(.0009) ***	(.0009) ***	(.0009) ***
educ: 12 yrs	.376	.375	.375
	(.0009) ***	(.0009) ***	(.0009) ***
educ: 16 yrs	.805	.804	.804
	(.001) ***	(.001) ***	(.001) ***
firm size (log)	.013	.012	.012
	(.0004) ***	(.0004) ***	(.0004) ***
sole proprietorship	.022	.024	.024
	(.007) ***	(.007) ***	(.007) ***
partnership	.054	.054	.055
	(.002) ***	(.002) ***	(.002) ***
joint stock	.041	.042	.042
	(.001) ***	(.001) ***	(.001) ***
other	.027	.027	.027
	(.003) ***	(.003) ***	(.003) ***
public	-.044	-.043	-.043
	(.001) ***	(.001) ***	(.001) ***
foreign	.001	.0009	.0008
	(.001)	(.001)	(.001)
Obs.	2855643	2855643	2855643
R^2	.805	.805	.805
F-statistic	36498.11	35845.37	35170.93

Note: Includes controls for industry (19 dummies), year, and region (3 dummies).
Source: Computations based on Portugal, MTSS (1987–2000).

Appendix Table A5
Wage Regression, Firm Fixed Effects, Male Workers, All Firms

Variable	(1)	(2)	(3)
female-led firms	-.007	-.007	-.004
	(.001)***	(.001)***	(.002)**
share females		-.017	-.017
		(.002)***	(.002)***
fem.-led * share fem.			-.009
			(.004)**
age	.044	.044	.044
	(.00007) ***	(.00007) ***	(.00007)***
age sq.	-.0004	-.0004	-.0004
	(8.39e-07) ***	(8.39e-07) ***	(8.39e-07)***
tenure	.008	.008	.008
	(.00002) ***	(.00002) ***	(.00002) ***
tenure < 1	-.050	-.050	-.050
	(.0004) ***	(.0004)	(.0004) ***
educ: 4 yrs	.145	.145	.145
	(.0006) ***	(.0006) ***	(.0006) ***
educ: 6 yrs	.241	.241	.241
	(.0007) ***	(.0007) ***	(.0007) ***
educ: 9 yrs	.346	.346	.346
	(.0007) ***	(.0007) ***	(.0007) ***
educ: 12 yrs	.434	.434	.434
	(.0007) ***	(.0007) ***	(.0007) ***
educ: 16 yrs	.963	.963	.963
	(.0008) ***	(.0008) ***	(.0008) ***
firm size (log)	.010	.010	.010
	(.0004) ***	(.0004) ***	(.0004) ***
sole proprietorship	.027	.028	.028
	(.006) ***	(.006) ***	(.006) ***
partnership	.054	.054	.054
	(.001) ***	(.001) ***	(.001) ***
joint stock	.049	.049	.049
	(.0009) ***	(.0009) ***	(.0009) ***
other	-.012	-.012	-.012
	(.002) ***	(.002) ***	(.002) ***
public	-.024	-.024	-.024
	(.0008) ***	(.0008) ***	(.0008)***
foreign	-.002	-.002	-.002
	(.0009)**	(.0009)**	(.0009)**
Obs.	5674418	5674418	5674418
R^2	.754	.754	.754
F-statistic	81307.51	79745.49	78240.99

Note: Includes controls for industry (19 dummies), year, and region (3 dummies).
Statistically significant at the .05 level; * at the .01 level.
Source: Computations based on Portugal, MTSS (1987–2000).

Alternative Procedure to Identify the Firm Leadership

We have checked the robustness of our classification of male- and female-led firms. Whereas the first criterion used to define the firm leadership–its owner–raises no doubts, the order in which the other variables are considered may be less consensual, and one could argue for instance that the best paid worker is more likely to be the firm leader, even if he or she does not formally hold the title of manager. We have therefore identified the person leading the firm using the criteria in the following alternative sequence: (1) owner of the firm; (2) top wage earner in the firm; (3) highest-level manager; (4) middle manager.

Appendix Table B1 reports the cross-classification using the two procedures. Almost all the firms (99%) classified as male -headed under procedure 1 receive the same classification under procedure 2. For female-headed firms, that share is 95%. The two procedures lead to very similar classifications of firms. It is more plausible, however, that a worker reported as manager will make the crucial decisions in the company–including setting the pay scales–compared to a specialized worker whose wage may be very high due to market constraints.[12] Indeed, it is a standard procedure in the literature to identify the firm leadership by looking at the top executive jobs (see Bell 2005; Smith et al. 2005; and Melero 2004). We have therefore proceeded in our analysis by using the first procedure described above, but results using the second procedure are very similar.

Appendix Table B1
Classification of Firms into Male- and Female-Led Using Alternative Procedures

Procedure 1	Male-led	Procedure 2 Female-led	Insuf. info.	Total
Male-led	296,031	2,649		298,680
Female-led	3,810	79,856		83,666
Insuf. info.			4,022	4,022
Total	299,841	82,505	4,022	386,368

[12] In firms that have top managers, wages higher than his or hers occur for occupations such as accountants, professionals of intermediate level in financial and commercial services, and salespersons.

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