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The Unfairness Trap: A Key Missing Factor in the Economic Theory of Discrimination

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Prior evidence linking increased female representation in management to corporate performance has been surprisingly mixed, due in part to data limitations and methodological difficulties, and possibly to omission of a fairness factor in the economic theory of discrimination. Using modified theory and panel data from a nationally representative sample of Japanese firms in the 2000s, we address several of these shortcomings. We find that increases in the ratio of female executives, the presence of at least one female executive, and the presence of at least one female section chief are associated with increases in corporate profitability in the manufacturing sector. North American multinationals operating in Japan also enjoy outsized benefits from hiring and promoting female managers. The results are robust to controlling for time effects and company fixed effects and the time-varying use of temporary and part-time employees. Some of the competitive benefit of employing female managers is shown to flow from compensation savings, but a much larger part arises from direct productivity increases. Prior economic theory on discrimination implied that those who hire inexpensive and underutilized female talent will see a performance benefit; we find, however, that due to possible social comparison costs, only companies whose compensation of female talent compares well with an external benchmark will see a significant performance benefit.

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I. Introduction

The dominant view of discrimination in economics is still that of Becker (1957/1971): that women and other excluded groups are valuable to firms in a market characterized by discrimination because their talent costs less. Becker further argues that, with time, competitive forces will drive discrimination out of the market, because discriminatory firms will be less profitable than those that hire workers solely on the strength of their talent. We view this theory as fundamentally incomplete; specifically, it fails to account for fairness-influenced productivity. Specifically, when Japanese firms start hiring female managers, but pay them a depressed market wage influenced by other firms' taste for discrimination, the economy can end up in what we call an "unfairness trap."

It is puzzling why an economy like Japan's has failed to reach the discrimination-free equilibrium that Becker predicted. This pattern cannot be explained by monopoly distortion or union power, the conventional explanations for why the predicted equilibrium does not arrive faster. Once fairness-influenced productivity is taken into account, a much fuller understanding is possible of why entire economies are slow to adjust to monetary incentives to reduce discrimination. And the lessons of this theoretical elaboration have something to contribute to economic theory in general, namely that if the process of adjustment is underspecified in the model, maladjustment or inept adjustment could explain why we do not see significant real-world movement toward the discrimination-free equilibrium based on strong monetary incentives that seems likely or inevitable.

Key tenets of the economic theory of discrimination revolve around tastes and the costs of indulging those tastes. The theory offers the following explanation for why we see wage differences even between different demographic groups whose human capital is indistinguishable. Becker assumed that the white and black U.S. labor forces were identical in productivity (1957/1971: 20). He also allowed for the possibility that the overwhelming majority of employers had a preference for discrimination (1957/1971: 39). In his view, what determines a given economy's initial distance from a discrimination-free wage rate and a discrimination-free labor market is a combination of the distribution of employers'

taste for discrimination, the form of each firm's production function (whether it benefits from scale and whether it really needs less expensive labor to be more productive), the degree of competition in each industry, and the relative size of the excluded group (1957/1971: 39). As Becker compellingly demonstrated in his formal theory, it is the "profits forfeited" that are the "costs or deterrent to discrimination"; whether those forfeited profits are large or very small is heavily determined by the exogenous factors just mentioned (1957/1971: 40).[1]

Becker sees a process of competitive adjustment to reduced discrimination, and in his theory the adjustment process is directionally clear: where the excluded group's wage rate is lower, firms that employ the excluded group will use their cost advantage to expand faster than firms that discriminate, forcing up the wage rate of the excluded group relative to that of the dominant group. The process itself, however, is of unknown duration and intensity.

What is missing from the economic theory of discrimination is specificity about the adjustment process and an accounting for the crucial factors of fairness and productivity in that adjustment process. The theory takes the market wage rate as a given, and implies that if the market wage rate for the excluded group is really low, firms should grab the opportunity to hire the excluded group at that wage. Note that the wage could be demonstrably lower for the excluded group because of the taste for discrimination of 80 or even 99.9 percent of the population of employers. But the focal firm in fact has a choice: to pay the exceedingly low market wage, or to pay something approaching an efficiency wage from the start. If the firm pays the low market wage at the outset, the excluded group could turn against the company for unfairness and underinvest in its own productivity and the joint productivity of the entire work team (Rabin, 1993). By instead paying an efficiency wage from the start, the firm will lose some of

[1] Becker states that his theory is easily adaptable to a situation in which the excluded group's productivity is systematically different from that of the dominant group (1957/1971: 43). This is true, since the cost of favoring the dominant group can readily be adjusted for productivity gaps between the two groups. It is the net cost, in the form of forfeited profits, of favoring the dominant group that matters (1957/1971: 43).

the immediate profit that Becker holds to be an important part of the adjustment process, but will gain long-term productivity benefits that are potentially much larger in economic size.

Firms that adhere strictly to Becker's logic could end up in what we call an unfairness trap. Those firms that choose not to discriminate—that hire the excluded group and pay them a market wage—will find themselves with the same or worse performance than those that discriminate. When enough firms in an economy behave this way, it can appear that hiring the excluded group does not boost company performance and can even hurt it. This outcome can perpetuate the discrimination practiced by most firms, and can persuade firms sitting on the fence to choose to continue to discriminate. And the firms that chose to forgo discrimination do not reap the benefits of doing so. Thus the nature of the adjustment process is key here. There has to be an additional accounting for fairness-influenced productivity if an entire economy like Japan's is to avoid the unfairness trap. Only by accounting for the unfairness trap can the economic theory of discrimination move toward completeness.

Can hiring the excluded group, typically women, as senior executives and middle-level managers help firms to become significantly more profitable? Despite Becker's groundbreaking theoretical prediction over five decades ago that firms would see higher profitability from actively employing the excluded group, the empirical evidence on this question has been mixed, mostly due to the data and methodological limitations of prior studies. In the U.S. context, for example, Deszö and Ross (2012) reported that hiring a female senior executive had a positive effect on corporate performance when companies that chose not to report R&D expenditures were excluded. Szymanski (2000) in turn showed that English soccer-league clubs with a higher proportion of black players outperformed other clubs on the playing field, even after controlling for their expenditure on players' salaries. The latter finding is encouraging for our study, but the question remains whether sports-league owners, who often derive most of their earnings from business activities in other industries, are an extreme case and much less likely to be profit-maximizing in their sports business.

The best-known study from Japan analyzing the effect of female workers on corporate performance produced inconclusive results. Kawaguchi (2007) found that having a higher proportion of female workers produced a profit benefit in the 1990s, but the firms that hired women did not grow faster over time and only 5 percent of the profit effect was due to gender discrimination. Houseman and Abraham (2001) showed that female workers in Japan were significantly more likely to be temporary workers; thus it could be that the profit benefit attributed to female labor in Kawaguchi's study was conflated with the effect of an increase in temporary workers as a percentage of all workers. Kodama et al. (2005) found that, after controlling for part-time workers, the total ratio of female employees did not have an impact on corporate profitability, but the study did not look at the effect on performance of female leaders/managers.

Without clear empirical evidence on Becker's profitability prediction and the mechanism behind it, many executives in Asia continue to believe that homogeneous leadership groups are maximally efficient, particularly in markets like South Korea and Japan where men have traditionally been viewed as more effective corporate and political leaders (Siegel, Pyun, and Cheon, 2013).

This paper utilizes Japanese government data that can help to overcome prior data limitations. We can separately examine the effects of employing women in leadership positions and in lower-level positions, and can control for some firms' use of more part-time workers than others and women's greater likelihood of working part-time. Unlike prior studies that had difficulty tracing the mechanism whereby hiring female managers helps firms to become more profitable, we can show that, in Japan at least, a principal mechanism is through fairness-influenced productivity gains. And we can corroborate the thesis, articulated in Siegel, Pyun, and Cheon (2013) for South Korea, that foreign multinationals can be an agent of change in the Japanese labor market, tipping the labor market toward a new equilibrium somewhat freer of gender discrimination.

Using a set of internal databases from the Japanese government on the demographics of Japanese firms, we test whether employing female managers led to higher performance in the 2000s. Section II

modifies prior theoretical models and seeks to show why a female presence in management might lead to significantly higher productivity for a firm as a whole. Section III describes the Japanese labor market as a context for female executives and managers. Section IV describes the data, models, and results. Section V discusses some robustness issues and draws some conclusions.

II. Theoretical Model

In this paper we examine the effect of increased female managerial representation on corporate performance in Japan. One key question is whether much of the potential benefit from increased female managerial representation is due to direct productivity effects. In the prior models of Becker (1957/1971) and Szymanski (2000), for a dollar of investment the employer received more output/profit from the excluded minority group—but solely because the excluded minority group was cheaper to hire at the same level of talent. Our model takes a departure from that single-path mechanism, and instead allows for the possibility that hiring a higher percentage of managers from the excluded minority group may also directly impact the productivity of the employees from the dominant group. Mathematically, this is a modest change, but it allows for improved understanding of how the market operates in a number of country contexts in which we believe that productivity effects explain most of the benefit from increased female managerial representation.

In the Japanese context, as we have also found in the South Korean context (Siegel, Pyun, and Cheon (2013)), we have compiled field-based evidence, and we can point to other field-based data which suggests that there are several sub-mechanisms through which the increased representation of female managers boosts overall productivity of the total managerial group. First, the male managers have over the years developed a subculture of male bonding that can lead to counterproductive practices. By way of one illustrative example from South Korea, the New York Times (see Onishi, 2007) profiled how having above a critical mass of female managers reduced the amount of time managers spent going out with colleagues for binge drinking, which in turn likely reduced hangovers and directly increased productivity

for the total managerial group. Second, in fieldwork compiled by Siegel, Pyun and Cheon (2013), female managers were not exposed to managerial paradigms/ways of organizing people that were taught to males in male-only educational and military institutions. This often led female managers to be more amenable to an open debate form of making crucial strategic decisions for the firm—as opposed to a command-and-control way of organizing. Third, female managers may be more informed about the needs of female consumers, and sometimes consumers more generally, leading to different and potentially valuable and novel ideas for approaching the market and raising willingness to pay—a significant factor for raising the firm's productivity.

These three mechanisms would not be explained by the prior models of Becker and Szymanski. Accounting for this direct productivity impact gives us a fuller picture of the negative effects of discrimination. One is not only bearing higher wage costs by not hiring talented-but-inexpensive minority workers, but one is hurting the productivity of the overall dominant group by not including minority workers. We have reason to ask whether this direct productivity impact is significant in the case of managerial leadership groups that regularly make strategic choices for how their entire firms will compete in the market.

The first and most influential formal economic model of discrimination is due to Becker (1957/1971). That model focused on the owner-manager's taste for discrimination and accompanying willingness to forego cheaper workers of similar talent and instead hiring members of the dominant social group. Szymanski (2000) offers a simplified version of the Becker model that relies on the same mechanisms. The stated goal of Szymanski (2000) was to show through a combination of theoretical and empirical analysis that an increased representation of black soccer players led to higher win-loss records for the same level of employment cost in England. In order to show why our proposed theoretical mechanisms is such a meaningful departure from the past models, we start with the past models as our base and then incorporate this new element of direct productivity effects on the dominant social group.

We begin with the simplified model of Szymanski (2000) in which every firm maximizes its objective function. The firm's objective function is a weighted average of profits (π) and a share of males (s) in management:

$$\Omega=\alpha s+(1-\alpha)\pi \ .$$

The importance of the share of males in the objective function—captured by α—reflects the taste for discrimination. The share s is characterized by

$$s=t_m/(t_w+t_m) \ ,$$

where t_m is the male talent, and t_w is the female talent. Notice that we follow Szymanski (2000) here in that we characterize the share in terms of talent. Profit depends on revenues and the costs:

$$\pi=R-cT \ ,$$

where $T=t_m+t_w$ is the total talent in the firm.

In the traditional models of discrimination (Becker, Szymanski) the revenue, R, depends on the total talent of the firm. In this model we introduce a novel element, where the revenues also depend on the share of the discriminated group. It reflects the possibility that the level of diversity influences productivity of the firm. When the labor force becomes more diverse, it may increase productivity of the whole group. Anecdotal evidence supports such possibility, as described earlier.[2]

We recognize in this paper that the firms may differ in the level to which they take advantage of diversity. Some firms are more welcoming to female managers, make effort in incorporating their new perspective, while other firms are not. We call this propensity *inclusion* or *fairness* factor, $\varphi\epsilon$ [0,1], with φ=1 denoting a fully inclusive firm (as inclusive for the minority group as for the majority group), and φ=0 denoting a firm which ignores minority group contributions.

Thus, the revenue that the firm achieves depends on the level of talent, share of the discriminated group and the fairness factor of the firm:

[2] Of course, it is also possible that diversity may decrease productivity. For example, if diversity implies that employees speak different languages, it may increase chances of miscommunication, and imposes additional cost of issuing instructions in multiple languages. In what follows we only consider the case where a certain level of diversity improves the productivity of the firm.

$$R(T,s,\varphi) = \rho(s,\varphi)*r(T),$$

where $r(T)$ is an increasing and concave function of T representing the benefit of having more talent in the firm, and $\rho(s,\varphi)$ is the productivity factor, which directly depends on the share of the discriminated group and fairness factor.[3] Function $\rho(s,\varphi)$ is increasing in φ, and single-picked in s, achieving maximum at $s=s^*$, where s^* represents share of males inappropriate labor pool. Specifically, in the following analysis, we adopt

$$\rho(s,\varphi)=[1-(s-s^*)^2](1+\varphi) .$$

In addition to being more inclusive, firms with higher φ are also willing to pay fairer wages to the discriminated group. In the traditional models of discrimination (Becker, Szymanski) cost of hiring a certain level of talent depends on the share of discriminated group among employees. It is less expensive to hire the same level of talent from among the discriminated group, as there the demand for those workers is lower. Let c_0 be the average cost of talent in the majority group. The same level of talent can be acquired from the discriminated group at $c_d < c_0$. Firms characterized by $\varphi > 0$ do not take the full advantage of this market condition. Instead, for a firm characterized by φ the cost of hiring a female manager is $c_f = c_d + \varphi\,(c_o - c_d)$. We can relate this situation to Rabin's (1993) fairness equilibrium: The employer does not take full advantage of offering lower wages to female managers, and in turn the managers feeling more appreciated are more willing to share their ideas, contributing to the increase in productivity, $\rho(s,\varphi)$. Therefore, for a given level of talent T, and share of males s, the average cost of talent is

$$c = \frac{(c_0\ t_m + c_f\ t_f)}{T} = c_0\ s + \left(c_d\ + \varphi\,(c_0 - c_d)\right)(1 - s) .$$

Formally, the firm's objective function is then

$$\Omega = \alpha\ s + (1-\alpha)\left[(1-(s-s^*)^2](1+\ \varphi)r(T) - T\left(c_0\ s + \left(c_d\ + \varphi\,(c_0 - c_d)\right)(1-s)\right)\right].$$

[3] For simplicity of exposition, we assume that the revenue function is separable in T. But this assumption is not necessary for the results.

The share of males, *s*, maximizing the firm's objective will satisfy the first order condition:

$$\frac{\alpha}{(1-\alpha)} = 2(s - s^*)(1 + \varphi)r(T) + T(c_0 - c_d)(1 - \varphi).$$

Notice, however, that for different fairness factors, φ, different share of males maximizes the objective function. Specifically, when there are two types of firms in the market: with high fairness, φ_H, and with low fairness, $\varphi_{L < } \varphi_H$, then low-fairness firms will find it optimal to hire fewer women than high-fairness firms. Moreover, low-fairness firms have lower productivity factor for the same level of talent or wages. This is for two reasons: First, because they end up with a less diverse labor force. Second, the minority workers effectively contribute less to productivity either because they do not feel treated fairly, or because their ideas are not being heard in a company with low φ. Moreover, a low-fairness firm optimally pays lower wages to workers from the discriminated group.

Thus, even when the taste for discrimination decreases in the economy, but the fairness factor remains low, the low wages for the discriminated group will persist. And the firms will not find it justified to increase the wages, as they will not see the productivity increase. If, however, the fairness factor is high when the taste for discrimination decreases, both the productivity and the wages for the discriminated group increase.

Notice that this effect is present only when there is some taste for discrimination, i.e., $\alpha > 0$. When $\alpha=0$, then the objective function becomes

$$\Omega = (1 - (s - s^*)^2](1 + \varphi)r(T) - T\left(c_0\ \mathrm{s} + \left(c_d\ + \varphi\ (c_0 - c_d)\right)(1 - \mathrm{s})\right).$$

The derivative of Ω with respect to *s* is

$$-2(s\text{-}s^*)(1+\varphi)\text{-}\mathrm{T}(c_0 - c_d)(1\text{-}\varphi),$$

which is negative for $s > s^*$. That is, without the taste for discrimination, the firm has no incentive to hire more men than their fraction in the labor force. Additionally, when $s < s^*$, the derivative is positive, and it is equal to 0 when $s=s^*$. The driver of this result is the intuitive fact that the difference c_0 - c_d at the market level depends on the market level supply of the discriminated group. If the demand is not

distorted, as all firms demand $s = s^*$, then $c_d = c_0$. And when $s > s^*$, then $c_d > c_0$. However, the firm takes c_d as given in its optimization decision.

The traditional models of discrimination in Becker (1957/1971) and Szymanski (2000) show that the taste for discrimination is costly because it induces the firm to pay higher wages for the same talent. However, in some environments, it is not possible—for social or legal reasons—to pay different wages for the same talent. Under the traditional theory of discrimination, in such environments there should be no gains to hiring management from the discriminated group. In our data, however, we find increased profits even if the wages for the same talent are almost equal for men and women. It indicates that there is increased productivity related to increased female managerial representation. Our modification of Szymanski's model explains why there are profit gains for increasing the share of females in management.

III. Japanese Context for Female Managers and Employees

Japan is one of a large number of countries from Asia, the Middle East, Africa, Latin America, and even parts of southern Europe where there is a sharp gender disparity in the managerial labor market. One can view this either from the perspective of representation in the labor market or in terms of pay disparity. We will focus our attention first on the year 2005, which represents the middle of our sample time period. In terms of labor market participation, Japan's female labor participation rate was 48% in 2005 according to the World Bank's World Development Indicators (WDI) database, which ranks Japan above Spain (46 percent), Italy (38 percent), and Belgium (46 percent), and above a wide cross-section of emerging and transition economies in Latin America, Africa, Asia, and Eastern Europe (including most prominently Mexico, Chile, South Africa, Nigeria, all of the Arab countries, India, and Poland), and just slightly below France (50 percent), Argentina (50 percent), Germany (51 percent), Hong Kong (52 percent), and Singapore (54 percent). Similarly, the female percentage share of all professional and technical workers in Japan stood at 46% in 2005, according to the United Nations Development Programme's (UNDP's) 2007/08 Human Development Report (which utilized data from Year 2005), and

that 46% figure was comparable to the female shares in Hong Kong (40 percent), Malaysia (40 percent), Mexico (42 percent) and Singapore (44 percent), the same as in Italy (also 46 percent), and just below that of Spain (48 percent) (Watkins, 2007).

The story for Japan when one looks at the gender wage gap is similar: the country is one of a large number of countries with a comparably large gender wage gap. The ratio of estimated female to male earned income in Japan according to the UNDP's Human Development Report was 0.45 in 2005, which is comparable to Italy (0.47). It is also similar to the comparable value for Chile (0.40), Mexico (0.39), and Malaysia (0.36). Data from the United Nations' Statistics Division encompassing the mid to late 2000s shows that women's wages in manufacturing as a percentage of men's wages in Japan was 61%, which was similar to that of Colombia and Hong Kong (both 60 percent), Brazil (also 61 percent), and Austria (62 percent), along with being higher than a broad range of other emerging and transition economies. The above-referenced UNDP Human Development Report, again using data from 2005, presents an overall index of female activity that placed Japan with a score of 66 percent, which is similar to South Korea (with its score of 68 percent), Italy (62 percent), Singapore (66 percent) and Spain (66 percent) (Watkins, 2007). Japan ranked on the UNDP's index only moderately higher than Chile (52 percent), Mexico (50 percent), and Malaysia (57 percent) (Watkins, 2007). In summary, the picture is of a Japan with significant gender disparities, but disparities that don't place Japan as an outlier but rather as one of many with a comparable level of potentially severe gender discrimination.

Rosenbluth (2007) shows together with a team of sociologists and political scientists that Japanese institutions do continue to hold women back in the labor market. For example, labor market institutions make it easier for firms to rely on relatively cheap part-time and temporary labor, where the labor is more often than not coming from women. In response to a labor market that shuts off opportunities when women marry or give birth to children, Japanese women have been shown to more and more often delay or even avoid marriage and childbirth as a result (Rosenbluth, 2007). Also, like in a great many countries around the world, in Japan there is a clear set of anti-discrimination laws on the

books, but those laws are rarely enforced are for the most part ineffective in constraining those firms that choose to discriminate against women (Mun, 2011), including those aspiring to positions of middle-level and senior management (Mun, 2011; see also Brinton, 1989, 1993, 2001, 2007).

IV. A Market Test of Gender Disparity in Japan

V.1 Data

We combine data from three data sets gathered repeatedly over time by the Government of Japan. The Establishment and Enterprise Census (EEC) is conducted twice every five years targeting all private and public establishments (about six million) and covers every industry in Japan. EEC includes data on the number of male and female executives per establishment. We then aggregated that information on the number of both female executives and all executives up to the company level. We then imported company financial variables from the Basic Survey of Japanese Business Structure and Activities (BSJBSA). EEC and BSJBSA samples were merged when they had the same company name and postal code, or the same company name and phone number.

From the underlying observation in the years of 2001, 2004, and 2006 count of 84,291 in the BSJBSA, we found that 59,041 could be successfully merged with EEC. We find that this approximates a random sample of the original BSJBSA in terms of profitability and multiple other characteristics.[4] BSJBSA is conducted by the Ministry of Economy, Trade and Industry (METI) targeting firms in the manufacturing, commerce and some service industries. The survey excludes some service industries such as finance, real estate, hospital and schools. In addition, as the survey only targets firms which have 50 or more employees and 30 million yen or more capital, small-sized firms are not included. The BSJBSA data include information on ROA (operating profit/total assets), total assets (for which we take the log when running regressions), the foreign ownership ratio, the debt/asset ratio, the export/revenue ratio, the

[4] The average ROA of sample companies in our analysis is 0.039, while that of pre-matched samples is 0.037. The average number of employees of sample companies in our analysis is 345 employees and the average revenue is 18,698 million yen, while 415 employees and 23,107 million yen for all companies in BSJBSA respectively.

R&D expenditure/revenue ratio, the advertising expenditure/revenue ratio. We utilize data from the available survey years from the 2000s, representing specifically the years 2001, 2004, and 2006.

Then in order to study the effect of upper-middle-level female managers on corporate managers, we utilized data from the Basic Survey on Wage Structure (BSWS). The BSWS utilizes the following stratified sampling to sample the broad population of Japanese establishments. In getting a sample that reflects the broader Japanese economy by both industry and establishment size distribution, the BSWS involves taking 70,000 establishments randomly (except for fulfilling quotas on industry and size) from the total of six million establishments in the EEC data. It then takes a random sample of employees at those 70,000 establishments. We aggregate the number of female managers and all managers of establishments affiliated to the same company and then calculate the female manager percentage of each firm, by assuming based on our knowledge of the data collection that female managers are randomly reflective of the actual number of female managers over total managers at these firms.[5] Because the random sampling must lead to some random imprecision in measurement, this should bias the female manager percentage variable against our finding any result.

The data aggregated to the firm level was merged with the BSJBSA data to assess the effect of female upper-middle-level managers on corporate performance. (The current Tables 6-8 report results using firms where EEC data are also available.) Managers here included section heads (ka-cho) and division heads (bu-cho). As BSWS is a survey that relies on sampling the broader population of firms, the resulting sample with available financial variables consists of 4,800 observations. We utilize data from the available survey years from the 2000s, representing specifically the years 2001, 2004, and 2006.

V.2 Models

We first model the following fixed-effects panel OLS equation:

[5] To be more precise, this is how we calculate the female manager ratio: We first calculate the number of female managers of each establishment through multiplying the number of female managers reported in BSWS by the inverse number of the sampling ratio. We do the same for the number of all managers. We then aggregate the number of female managers and all managers to the firm level and calculate the female manager ratio of each firm.

(1) ROA_{kt} = a + b (Female Executive Ratio [or Having At Least One Female Executive, Having At Least One Female Section Chief, etc.]$_{kt}$) + c (Total Female Employee Ratio$_{kt}$) + d (((Part-Time + Short-Term Workers)/Total Permanent Employees)$_{kt}$) + e ((Log(Assets))$_{kt}$) + f (Foreign Ownership Percentage$_{kt}$) + g (Leverage$_{kt}$) + h (Foreign Sales Ratio$_{kt}$) + i (R&D Intensity$_{kt}$) + j (Advertising Intensity$_{kt}$) + $Firm_k$ + $Year_t$,

where the dependent variable represents firm *k*'s ROA winsorized at the .01/99.9 level at time *t*,[6] and the independent variables include the firm's female executive ratio (or alternatively, another variable or set of variables for female representation in management) at time *t*, the firm's total female employee ratio at time *t*, the firm's ratio of (part-time + short-term workers)/total permanent employees at time *t*, the firm's natural log of assets at time *t*, the firm's foreign ownership percentage at time *t*, the firm's leverage at time *t*, the firm's foreign sales ratio at time *t*, the firm's R&D intensity at time *t*, the firm's advertising intensity at time *t*, firm fixed effects, and year dummies. Also, in this model and in later models, we conduct robustness checks in which we further control for the level of concentration within a firm's industry over time (using HHI). We also run a variation on this model with an interaction term between having at least one female executive and being a North American multinational with a subsidiary in Japan.

We then model the following dprobit equation showing marginal effects of the independent variables on the dependent variable:

(2) Having At Least One Female Section $Chief_{kt}$ [or, alternatively, Having At Least One Female Division $Chief_{kt]}$ = a + b (Majority Foreign Ownership$_{kt}$) + c ((Log(Assets))$_{kt}$) + d (Leverage$_{kt}$) + e (R&D Intensity$_{kt}$) + f (Advertising Intensity$_{kt}$) + $Industry_y$ + $Year_t$,

where the dependent variable represents firm *k*'s having at least one female section chief (or, alternatively, at least one female division chief) at time *t*, and the independent variables include whether the firm is majority-foreign-owned at time *t*, the firm's natural log of assets at time *t*, the firm's leverage at time *t*,

[6] The winsorization of the few extreme values was done by taking the distribution of ROA values from the combined three-year panel.

the firm's R&D intensity at time *t*, the firm's advertising intensity at time *t*, industry fixed effects, and year dummies.

We then utilize the individual-level panel data on wages to model each individual's wage:

(3) $\text{Wage per Hour}_{pijct} = a + b\,(\text{Is Female}_{pijct}) + c\,(\text{Tenure}_{pijct}) + d\,(\text{Tenure Squared}_{pijct}) + e\,(\text{Years Since College or Less-Than-College Graduation}_{pijct}) + f\,(\text{Years Since College or Less-Than-College Graduation Squared}_{pijct}) + g\,(\text{Part-Time Job Dummy}_{pijct}) + h\,(\text{Education Dummies}_{pijct}) + k\,(\text{Region Dummies}_{pijct}) + \text{Firm}_{c} + \text{Job-Year}_{jt} + \text{Industry-Year}_{it},$

where the dependent variable is wage per hour for person *p* in industry *i* in job *j* in company *c* at time *t*, and the independent variables include an indicator variable for being female, job tenure, job tenure squared, years since college graduation, years since college graduation squared, an indicator variable for the job being a part-time job, an indicator variable for junior high school-only education, an indicator variable for two-year college/special training school-only education, an indicator variable for four-year college education, an indicator variable for the person's prefecture being Tokyo, an indicator variable for the person's prefecture being Kanagawa, an indicator variable for the person's prefecture being Osaka, firm fixed effects, job title-year fixed effects, and industry-year fixed effects.

We then model the following fixed-effects panel OLS equation explaining productivity:

(4) $\text{Log(Gross Profit)}_{kt} = a + b\,(\text{At Least One Female Executive}_{kt}) + c\,(\text{Natural Log of Total Employees}_{kt}) + c\,(\text{Natural Log of Fixed Assets}_{kt}) + d\,(\text{Natural Log of Cost of Goods Sold/COGS}) + e\,(\text{Total Female Employee Ratio}_{kt}) + f\,(((\text{Part-Time + Short-Term Workers})/\text{Total Permanent Employees})_{kt}) + g\,(\text{Foreign Ownership Percentage}_{kt}) + h\,(\text{Leverage}_{kt}) + i\,(\text{Foreign Sales Ratio}_{kt}) + j\,(\text{R\&D Intensity}_{kt}) + k\,(\text{Advertising Intensity}_{kt}) + \text{Firm}_{k} + \text{Year}_{t},$

where the dependent variable represents firm *k*'s natural log of gross profit at time *t*, and the independent variables include the firm's having at least one female executive at time *t*, the firm's natural log of total employees at time *t*, the firm's natural log of fixed assets at time *t*, the firm's natural log of cost of goods sold (COGS) at time *t*, the firm's total female employee ratio at time *t*, the firm's ratio of (part-time +

short-term workers)/total permanent employees at time *t*, the firm's foreign ownership percentage at time *t*, the firm's leverage at time *t*, the firm's foreign sales ratio at time *t*, the firm's R&D intensity at time *t*, the firm's advertising intensity at time *t*, firm fixed effects, and year dummies. We also then take equation (4) and add in a factor for the company's deviation from wage inequality between its own female managers and male managers in the proximate labor market controlling for all observable characteristics such as education, experience, and location. The company's deviation from wage inequality in each year is attained by running equation (3) and then exporting each company-year observation's amount of wage inequality.

Next, we conclude by showing that the results from Equation (1) above are robust to controlling for different definitions of a Japanese firm's general deviation from post-World War II human resource management norms. As an initial proxy, we take Equation (1) and control further for the estimate ratio of mid-career employees (estimated as 1 – (those whose work experience at the company is more than three years different from their total working years/total company employees). This proxy focuses on the firm's time-varying deviation from standard labor-market-entry-point hiring and accompanying lifetime employment practices in Japan. Then we use eight alternative proxies for the firm's deviation from seniority-based pay. In each of those eight proxies, we run regressions on the individual-level wages to see how much residual there is for each individual. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. The eight alternative definitions come from looking at the combined sample of females and males and the male-only sample, and then looking at the four variables including annual salary, natural log of annual salary, estimated hourly wage and log of estimated hourly wage in different combinations as listed in detail at the bottom of Table 10.

V.3 Results

As seen in Panel A of Table 1, Japan has a highly competitive economy in which the average ROA in our sample increases but only slightly from 2.8% in 2001 to 4.1% in 2004 and 4.4% in 2006.

These numbers show that Japan has a far more competitive industrial structure than the United States, where the comparable numbers are known to be in the high single digits, and slightly more competitive than South Korea, which the comparable numbers are in the range of 5% (Siegel, Pyun, and Chun 2013). In a market with such high levels of industrial competition, hiring talent from Japan's excluded social group in labor market—women—might be a positive differentiating factor for firms, as our later results show. As also reported in Panel A of Table 1, the average female executive ratio in Japan is quite small, increasing but only slightly from 6.8% in 2001 to 7.4% in 2004 only to move down to 7.2% in 2006.

Table 2 shows that having a higher female executive ratio is associated with increases in profitability in the manufacturing sector. In contrast, it has no significant effect in the services sector. Similarly, in Table 3 we find that having at least one female executive has a significantly positive effect on ROA in the manufacturing sector, whereas the effect is actually negative and marginally statistically significant in the services sector. All of these results are with the key control for use of temporary and part-time employees included.

It is an established fact that the Japanese services sector has far more female-owned businesses than the manufacturing sector and that female-owned business are more likely to struggle financially in Japan because of structural disadvantages they face in the industries they tend to enter. Many of these female-owned service sector firms are small (Ministry of Health, Labor and Welfare, 2007; Ministry of Economy, Trade and Industry, 2011) and lacking in any competitive differentiation. As shown by METI (2004), women tend to start businesses in industries where the firm-size distribution is already skewed towards small firms, and women tend to be likelier than men to exit self-employment. Past Japanese government white papers and reports have reported data indicating that female entrepreneurs are more likely than male entrepreneurs to have started their business without prior work experience (Ministry of Health, Labor and Welfare, 2007; Kodama and Odaki, 2011) and to have goals that are less solely focused on profit (Ministry of Economy, Trade and Industry, 2011). While there is a surprisingly large number of female-owned businesses in Japan, the value-added ratio of these businesses is small (Ministry of

Economy, Trade and Industry, 2004). We will be doing more work in the future to test our working hypothesis that it is female ownership of marginally competitive service sector businesses that is driving the interesting, albeit only marginally statistically significant, negative result for having at least one female executive in the service sector.

We next find in Panel A of Table 4 that North American-owned affiliates in Japan have benefited particularly from having at least one female executive. We view this as at least suggestive evidence of foreign multinationals benefiting from hiring the excluded group into positions of corporate leadership and being among the actors starting to move the Japanese labor market towards a new equilibrium.

Returning to the differences between the Japanese manufacturing and services sector, we show in Table 5 that service sector companies of 150 employees and greater are far more often employing at least one female executive. We will be examining in our future work whether this is primarily a function of higher female ownership levels in the services sector.

We next examine the possible effect of upper-middle-level female managers on corporate performance in Japan. In Table 6 we find that the medium- to large-size Japanese companies that have upper-middle-level managers only very rarely have female managers. Interestingly, the mean ratio of female section chiefs goes from 0.019 in 2001 to 0.032 in 2004 and to 0.037 in 2006. So the mean ratio is increasing in a measured way from a low base. That low base is at under 2% in 2001. And that low base is much lower than the female executive ratio we saw in the 7% range in Table 1. This remaining difference between the female section chief ratio in Table 6 and the female executive ratio in Table 1 is due to the fact that there are a large number of female-owned small businesses in the service sector, with most of these female businesses never rising to the size level where they would need middle management.

We then show in Table 7 that having at least female section chief is uniformly useful to corporate performance. This is true for a sample that comprises the entire Japanese economy—both manufacturing and services. However, in looking closely at the data, we find that the result is particularly driven by the manufacturing sector.

Next, we find in Table 8 that foreign-owned firms hire female section chiefs and female division chiefs at far higher rates than the general population of Japanese firms. Furthermore, majority-owned foreign firms typically have higher female managerial representation than even minority-owned foreign firms, which in turn typically have higher female managerial representation than domestic firms. As seen in Panel A of Table 8, majority-owned foreign firms employ at least one female section chief at a rate that is more than two and a half times higher than for the sample of all firms. Majority-owned foreign firms have a female section chief ratio that is 50 percent higher than for the sample of all firms. Majority-owned foreign firms employ at least one female division chief at a rate that is more than five times higher than for the sample of all firms. Majority-owned foreign firms have a female division chief ratio that is more than five times higher than for the sample of all firms. We then also show in Panel B of Table 8 that majority-owned foreign firms are significantly more likely to have at least one female section chief and at least one female division chief, even after controlling for firm size, leverage, R&D intensity, advertising intensity, industry, and year dummies.

Next, we show in Panel A of Table 9 that a statistically significant but modestly sized mechanism behind the profit differences is that companies simply pay their female managers significantly less, even controlling for tenure, job experience, education, part-time status, geographic location, company fixed effects, job title*year fixed effects, and industry*year fixed effects. We find that this is evidence of Becker's wage-based explanation being able to explain part of the profit opportunity for companies in employing female managers in Japan.[7]

Still, differences in pay are just part of the story in Japan. We show in Panel B of Table 9 that adding at least one female executive leads to a large boost in productivity in the firm level. This is true even when controlling for the standard input-based determinant of productivity as well as a range of other controls, including firm fixed effects and year dummies. Strikingly, the Becker explanation is highly

[7] We also separately confirmed that the wage difference is not driven by differences in family benefits received between male and female managers.

incomplete for explaining the Japanese data. Moreover, it appears that the productivity mechanism is greater in economic importance. While the cost savings in Table 9 Panel A only equates to 2.4% in salary cost per average female manager, the firm-wide productivity boost in Table 9 Panel B is far larger, equating to over a 2.3 percent firm-wide productivity boost (for the typical firm starting at the mean on the dependent variable) from having at least some representation of female leadership at the top of the company. Clearly, there is something about adding female leadership which leads to higher productivity in Japanese manufacturing companies.

For both manufacturing and service companies, there are productivity benefits that come when a company hires female managers and pays them better than observably comparable males in the external labor market. Next, we show in Panel C of Table 9 that only those companies that pay their female managers favorably compared to a comparable external benchmark see productivity increases. (This is particularly true for service sector companies.) When the female managers are paid low relative to observably comparable males in the external labor market, the firm actually sees reduced productivity, all else equal. But for those firms that pay their female managers well or even better than comparable males in the external labor market, the company's productivity is significantly increased.[8] Presumably the female managers being paid better than comparable males in the external labor market are treated that way because they directly contribute toward positive productivity spillovers for the organization as a whole. Also, in a robustness check, we have confirmed that it is not the case that those firms failing to attain the productivity boost are simply paying all male and female employees an uncompetitive wage. Rather, is is specifically the decision to pay female managers a depressed market wage which leads to the so-called unfairness trap. The only limitation of this panel is that in order to calculate the female pay equity variable, the available sample for Table 9 Panel C is effectively limited to the relatively largest companies in Japan with at least one or more female managers necessary to estimate the pay comparison

[8] We have found that the result in Table 9 Panel C is also robust to temporarily excluding the log(Imputed Purchased Inputs) variable.

regression. Still, since these large firms are responsible for a considerable share of Japan's total economic output, the results are economically meaningful in and of themselves. We also confirm in Table 9 Panel D that the overall effect of pay disparity occurs over both subregions of the pay disparity variable. Specifically, not only do the companies that pay the female manager less than comparable men in the proximate market see lower productivity as a result, but also the companies that pay female managers better than comparable men—presumably because these female managers are creating positive spillovers for the firm as a whole—see higher productivity as a result.

What we found statistically echoes what we found in interviews with female managers on the ground in Japan. As one senior female executive put it, "In a society like Japan's with weak meritocracy, the minority is disadvantaged if men hold senior positions, higher than their capability, in a hierarchical organization. There is thus a tendency that competent people are bullied" (Interview, December 20, 2012). As this senior female executive went on say,

> I think, at the root of gender discrimination, there is people's primitive fear towards something which threatens their identity and existence. Unless people become more competent and organizations become a place where let these people display their competence, gender discrimination does not get extinguished. In Japan there are many who lack competence and little education is done and the result is the current status of gender discrimination. I think overall Japan has lower moral awareness or sense of taboo on discrimination. What is needed is training, every day practice, and understanding on the fact that an organization will be far benefited without discrimination towards the minority. (Interview, December 20, 2012)

Lastly, we conclude our empirical analysis by showing in Table 10 that our results from Tables 2-3 are robust to further controlling for nine alternative definitions of Japanese firms' deviation from standard Japanese human resource management practices. Specifically, our results are not driven by some Japanese firms' deviation from seniority-based promotion or seniority-based pay. This strongly suggests that female managerial representation is acting independently in its influence on company profitability.

VI. Conclusion

In conclusion, this paper has shown that manufacturing firms in Japan have benefited from hiring female executives and female managers. The findings in this paper are consistent with the notion that some owners of Japanese firms indulged in what Becker described as a "taste for discrimination" while others exploited the sexism of their peers and hired members of the excluded group to senior management positions. Those that went against this social norm of discriminating against women in the managerial labor market appear to have attained higher profitability. Part of the higher profitability came from lower compensation costs, but a much greater part of it clearly comes from a productivity boost that follows the addition of female managerial leadership. The latter results shows that the Becker pay-based explanation needs to be reformulated to take on a major productivity effect of female leadership in the world's third-largest economy. Interestingly, the same is not often true for service sector firms. Past studies along with contemporary demographic data shed light on why this would be the case. We know from past studies that women are more likely to start their own firms in the service sector, that they are more likely to start firms in the least profitable and structurally attractive parts of the service sector, and that they exit self-employment more often than men. We know from contemporary demographic data that female ownership is far higher in the service sector. Also, at the same time we know that women have a higher representation in management in the Japanese service sector. Thus, Japanese service sector firms may have less opportunity for competitive differentiation in hiring female managers than do Japanese manufacturing firms. Thus, it is logical that female pay equity is what even more powerfully differentiates firms in the service sector.

In closing, whereas past studies found mixed results on Becker's profit hypothesis due to data and methodological limitation, we have found striking contemporary evidence from Japan that manufacturing companies systematically benefit from starting to employ female executives and female upper-middle managers. We also find strong evidence that part of this benefit comes from cost savings due to lower compensation costs given in Japan to female executives and female managers, while another large part

comes from a productivity boost that follows the addition of female managerial leadership. Thus, this study is one of the first to provide strong empirical support for Becker's profit hypothesis and proposed cost savings mechanisms, in the world's third largest economy no less. But yet it shows that Becker's proposed causal mechanism, relying solely on pay differences, is quite incomplete. What is also interesting is that the profit benefit does not appear to have been quickly erased in the 2000s, but appears to be at least a medium-term opportunity for Japanese firms before the market moves on to a new equilibrium "freer" of discrimination.

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Table 1. Summary Statistics and Correlation Matrix

Panel A. Summary Statistics for All Firms

Variable	Year	Mean	Median	Std. Dev.	Min	Max	Obs
ROA Winsorized at the .01/99.9 Percent Levels	2001	0.028	0.022	0.057	-0.437	0.369	16098
	2004	0.041	0.031	0.059	-0.437	0.369	15181
	2006	0.044	0.034	0.066	-0.437	0.369	19734
Female Executive Ratio	2001	0.068	0.000	0.141	0.000	1.000	16098
	2004	0.074	0.000	0.154	0.000	1.000	15181
	2006	0.072	0.000	0.150	0.000	1.000	19734
At Least One Female Executive	2001	0.252	0.000	0.434	0.000	1.000	16098
	2004	0.249	0.000	0.432	0.000	1.000	15181
	2006	0.256	0.000	0.436	0.000	1.000	19734
Female Total Employee Ratio	2001	0.313	0.262	0.194	0.000	1.000	16098
	2004	0.310	0.264	0.190	0.000	1.000	15181
	2006	0.387	0.327	0.249	0.000	1.000	19734
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	2001	0.313	0.037	1.063	0.000	35.176	16098
	2004	0.368	0.045	1.261	0.000	46.545	15181
	2006	0.632	0.085	3.414	0.000	255.500	19734
Log(Assets)	2001	8.240	8.078	1.302	4.111	16.467	16098
	2004	8.138	7.988	1.268	3.689	15.326	15181
	2006	8.298	8.135	1.386	3.850	16.375	19734
Foreign Ownership Percentage	2001	1.182	0.000	8.891	0.000	100.000	16098
	2004	1.430	0.000	9.766	0.000	100.000	15181
	2006	1.898	0.000	10.906	0.000	100.000	19734
Leverage	2001	0.703	0.735	0.279	0.000	9.251	16098
	2004	0.683	0.711	0.304	-1.175	11.593	15181
	2006	0.664	0.687	0.294	0.010	13.577	19734
Foreign Sales Ratio	2001	0.022	0.000	0.085	0.000	1.000	16098
	2004	0.023	0.000	0.087	0.000	1.000	15181
	2006	0.027	0.000	0.096	0.000	1.000	19734
R&D Intensity	2001	0.006	0.000	0.019	0.000	0.468	16098
	2004	0.005	0.000	0.016	0.000	0.294	15181
	2006	0.006	0.000	0.039	0.000	3.527	19734
Advertising Intensity	2001	0.005	0.001	0.016	0.000	0.502	16098
	2004	0.006	0.001	0.018	0.000	0.625	15181
	2006	0.006	0.001	0.019	0.000	0.504	19734
Industry Herfindahl Index	2001	541.289	281.693	674.149	68.283	10000	16098
	2004	522.773	270.091	613.935	78.700	10000	15181
	2006	519.260	257.101	650.708	84.448	10000	19734

Note: The min and max for winsorized ROA is the same across the three years because the winsorization was done on the panel.

Panel B. Correlation Matrix

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1] ROA Winsorized at the .01/99.9 Percent Levels	1										
[2] Female Executive Ratio	-0.011**	1									
[3] At Least One Female Executive	-0.023***	0.829***	1								
[4] Female Total Employee Ratio	0.013***	0.161***	0.128***	1							
[5] (Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	0.012***	0.057***	0.045***	0.144***	1						
[6] Log(Assets)	0.035***	-0.159***	-0.109***	-0.041***	-0.039***	1					
[7] Foreign Ownership Percentage	0.094***	-0.047***	-0.055***	0.004	-0.011**	0.151***	1				
[8] Leverage	-0.217***	-0.013***	-0.015***	0.013***	0.013***	-0.117***	-0.046***	1			
[9] Foreign Sales Ratio	0.043***	-0.054***	-0.046***	-0.019***	-0.037***	0.207***	0.137***	-0.080***	1		
[10] R&D Intensity	-0.002	-0.046***	-0.042***	-0.023***	-0.028***	0.139***	0.067***	-0.107***	0.162***	1	
[11] Advertising Intensity	0.012***	0.060***	0.061***	0.120***	0.046***	0.079***	0.066***	-0.043***	-0.018***	0.061***	1
[12] Industry Herfindahl Index	0.029***	-0.016***	-0.024***	-0.046***	-0.019***	0.058***	0.005	-0.021***	0.008*	0.017***	0.028***

Note: *** denotes significance at the .01 level, ** at the .05 level, and * at the .10 level.

Table 1 continued. Summary Statistics

Panel C. Summary Statistics for Manufacturing Firms Only

Variable	Year	Mean	Median	Std. Dev.	Min	Max	Obs
ROA Winsorized at the .01/99.9 Percent Levels	2001	0.024	0.021	0.057	-0.437	0.369	8803
	2004	0.043	0.033	0.058	-0.437	0.369	7704
	2006	0.045	0.036	0.064	-0.437	0.369	9723
Female Executive Ratio	2001	0.067	0.000	0.139	0.000	1.000	8803
	2004	0.077	0.000	0.153	0.000	1.000	7704
	2006	0.070	0.000	0.144	0.000	1.000	9723
At Least One Female Executive	2001	0.247	0.000	0.431	0.000	1.000	8803
	2004	0.254	0.000	0.435	0.000	1.000	7704
	2006	0.245	0.000	0.430	0.000	1.000	9723
Female Total Employee Ratio	2001	0.291	0.247	0.186	0.000	0.962	8803
	2004	0.285	0.247	0.177	0.000	1.000	7704
	2006	0.394	0.333	0.265	0.000	1.000	9723
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	2001	0.186	0.035	0.599	0.000	12.750	8803
	2004	0.199	0.044	0.592	0.000	11.523	7704
	2006	0.305	0.074	1.870	0.000	111.000	9723
Log(Assets)	2001	8.210	8.014	1.285	4.111	15.097	8803
	2004	8.066	7.878	1.229	4.143	15.006	7704
	2006	8.338	8.126	1.350	3.871	15.179	9723
Foreign Ownership Percentage	2001	1.193	0.000	8.371	0.000	100.000	8803
	2004	1.398	0.000	9.009	0.000	100.000	7704
	2006	1.978	0.000	10.463	0.000	100.000	9723
Leverage	2001	0.676	0.706	0.268	0.020	3.849	8803
	2004	0.653	0.684	0.271	-0.213	5.736	7704
	2006	0.640	0.662	0.271	0.010	6.308	9723
Foreign Sales Ratio	2001	0.033	0.000	0.102	0.000	1.000	8803
	2004	0.035	0.000	0.107	0.000	0.993	7704
	2006	0.044	0.000	0.121	0.000	1.000	9723
R&D Intensity	2001	0.010	0.000	0.023	0.000	0.468	8803
	2004	0.009	0.000	0.020	0.000	0.294	7704
	2006	0.010	0.000	0.050	0.000	3.527	9723
Advertising Intensity	2001	0.004	0.001	0.014	0.000	0.502	8803
	2004	0.004	0.001	0.014	0.000	0.353	7704
	2006	0.004	4.64e-04	0.016	0.000	0.504	9723
Herfindahl Industry Index	2001	566.016	328.316	555.326	102.449	4461.819	8803
	2004	565.142	408.720	501.106	82.560	4679.908	7704
	2006	565.932	374.1213	535.436	126.325	8156.504	9723

Panel D. Summary Statistics for Service Firms Only

Variable	Year	Mean	Median	Std. Dev.	Min	Max	Obs
ROA winsorized at the .01/99.9 percent levels	2001	0.032	0.022	0.058	-0.437	0.369	7295
	2004	0.038	0.029	0.061	-0.437	0.369	7477
	2006	0.042	0.032	0.069	-0.437	0.369	10011
Female Executive Ratio	2001	0.069	0.000	0.144	0.000	1.000	7295
	2004	0.072	0.000	0.155	0.000	1.000	7477
	2006	0.075	0.000	0.155	0.000	1.000	10011
At Least One Female Executive	2001	0.257	0.000	0.437	0.000	1.000	7295
	2004	0.243	0.000	0.429	0.000	1.000	7477
	2006	0.266	0.000	0.442	0.000	1.000	10011
Female Total Employee Ratio	2001	0.338	0.279	0.199	0.000	1.000	7295
	2004	0.336	0.280	0.200	0.000	1.000	7477
	2006	0.380	0.322	0.233	0.000	1.000	10011
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	2001	0.467	0.042	1.420	0.000	35.176	7295
	2004	0.542	0.047	1.675	0.000	46.545	7477
	2006	0.949	0.102	4.403	0.000	255.500	10011
Log(Assets)	2001	8.276	8.161	1.322	4.407	16.467	7295
	2004	8.212	8.118	1.303	3.689	15.326	7477
	2006	8.259	8.144	1.420	3.850	16.375	10011
Foreign Ownership Percentage	2001	1.168	0.000	9.482	0.000	100.000	7295
	2004	1.463	0.000	10.490	0.000	100.000	7477
	2006	1.820	0.000	11.321	0.000	100.000	10011
Leverage	2001	0.735	0.765	0.288	0.000	9.251	7295
	2004	0.713	0.740	0.333	-1.175	11.593	7477
	2006	0.687	0.712	0.313	0.023	13.577	10011
Foreign Sales Ratio	2001	0.009	0.000	0.055	0.000	1.000	7295
	2004	0.010	0.000	0.056	0.000	1.000	7477
	2006	0.011	0.000	0.059	0.000	0.977	10011
R&D intensity	2001	0.002	0.000	0.013	0.000	0.417	7295
	2004	0.002	0.000	0.010	0.000	0.280	7477
	2006	0.002	0.000	0.023	0.000	0.996	10011
Advertising intensity	2001	0.007	0.001	0.017	0.000	0.390	7295
	2004	0.008	0.001	0.021	0.000	0.625	7477
	2006	0.008	0.001	0.021	0.000	0.472	10011
Herfindahl Industry Index	2001	511.450	227.346	793.224	68.283	10000	7295
	2004	479.119	232.202	709.112	78.700	10000	7477
	2006	473.930	222.029	743.026	84.448	10000	10011

Note: The ROA winsorization was done on the three-year combined panel of observations, and that is why the min and max are the same across those three years.

Table 2. A Tale of Two Sectors: The Effect of Female Executive Ratio on ROA

	[1] DV: ROA, for Manufacturing Sector	[2] DV: ROA, for Manufacturing Sector, with HHI added	[3] DV: ROA, for Services Sector	[4] DV: ROA, for Services Sector, with HHI added
Independent Variable:				
Female Executive Ratio	0.011**	0.011**	-0.008	-0.008
	[0.004]	[0.004]	[0.005]	[0.005]
Total Female Employee Ratio	0.014***	0.014***	0.003	0.003
	[0.003]	[0.003]	[0.004]	[0.004]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	-1.4e-04	-1.4e-04	3.091e-04	3.099e-04
	[2.789e-04]	[2.777e-04]	[3.014e-04]	[3.012e-04]
Log (Assets)	0.023***	0.023***	-0.006**	-0.006**
	[0.004]	[0.004]	[0.003]	[0.003]
Foreign Ownership Percentage	7.31E-05	7.32E-05	-5.6e-05	-5.6e-05
	[1.441e-04]	[1.441e-04]	[1.478e-04]	[1.477e-04]
Leverage	-0.088***	-0.088***	-0.025**	-0.025**
	[0.013]	[0.013]	[0.010]	[0.010]
Foreign Sales Ratio	0.025**	0.025**	0.018	0.018
	[0.010]	[0.011]	[0.017]	[0.017]
R&D Intensity	-0.119	-0.120	-0.149***	-0.149***
	[0.082]	[0.082]	[0.046]	[0.046]
Advertising Intensity	-0.128*	-0.129*	-0.474***	-0.474***
	[0.069]	[0.069]	[0.151]	[0.151]
HHI		1.19e-06		2.92e-07
		[1.35e-06]		[9.32e-07]
Year Dummies Included	Yes	Yes	Yes	Yes
Company Fixed Effects Included	Yes	Yes	Yes	Yes
p value	0.000	0.000	0.000	0.000
Obs	26230	26230	24783	24783
R-square	0.094	0.094	0.023	0.023

Note: *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Table 3. A Tale of Two Sectors: The Effect of Having At Least One Female Executive on ROA

	[1] DV: ROA, for Manufacturing Sector	[2] DV: ROA, for Manufacturing Sector, with HHI added	[3] DV: ROA, for Services Sector	[4] DV: ROA, for Services Sector, with HHI added
Independent Variable:				
At Least One Female Executive	0.003**	0.003**	-0.002*	-0.002*
	[0.001]	[0.001]	[0.001]	[0.001]
Total Female Employee Ratio	0.014***	0.014***	0.003	0.003
	[0.003]	[0.003]	[0.004]	[0.004]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	-1.352e-04	-1.368e-04	3.007e-04	3.015e-04
	[2.777e-04]	[2.765e-04]	[3.003e-04]	[3.002e-04]
Log (Assets)	0.023***	0.023***	-0.006**	-0.006**
	[0.004]	[0.004]	[0.003]	[0.003]
Foreign Ownership Percentage	7.2e-05	7.2e-05	-5.4e-05	-5.4e-05
	[1.441e-04]	[1.441e-04]	[1.479e-04]	[1.479e-04]
Leverage	-0.088***	-0.088***	-0.025**	-0.025**
	[0.013]	[0.013]	[0.010]	[0.010]
Foreign Sales Ratio	0.025**	0.025**	0.018	0.018
	[0.011]	[0.011]	[0.017]	[0.017]
R&D Intensity	-0.119	-0.120	-0.148***	-0.148***
	[0.082]	[0.082]	[0.046]	[0.047]
Advertising Intensity	-0.129*	-0.129*	-0.474***	-0.474***
	[0.069]	[0.069]	[0.151]	[0.151]
Herfindahl Industry Index		1.2e-06		-2.88e-07
		[1.35e-06]		[9.32e-07]
Year Dummies Included	Yes	Yes	Yes	Yes
Company Fixed Effects Included	Yes	Yes	Yes	Yes
p value	0.000	0.000	0.000	0.000
Obs	26230	26230	24783	24783
R-square	0.094	0.094	0.023	0.023

Note: *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Table 4. North American Multinationals and Female Executives

Panel A. The Largest Gain is For North American Manufacturing Companies That Hire or Promote A Female Executive

	[1] DV: ROA, for Manufacturing Sector	[2] DV: ROA, for Manufacturing Sector, with Herfindahl Industry Index added
Independent Variable:		
At Least One Female Executive	0.003**	0.003**
	[0.001]	[0.001]
At Least Two Female Executives	0.001	0.001
	[0.002]	[0.002]
North American ownership	0.009	0.009
	[0.042]	[0.041]
North American ownership * At Least One Female Executive	0.059***	0.061***
	[0.002]	[0.003]
Total Female Employee Ratio	0.018***	0.018***
	[0.003]	[0.003]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	-1.235e-04	-0.004
	[2.306e-04]	[0.006]
Log (Assets)	0.025***	0.025***
	[0.004]	[0.004]
Foreign Ownership Percentage	6.53e-05	6.52e-05
	[1.621e-04]	[1.621e-04]
Leverage	-0.087***	-0.089***
	[0.012]	[0.012]
Foreign Sales Ratio	0.028***	0.028**
	[0.011]	[0.011]
R&D Intensity	-0.111	-0.112
	[0.079]	[0.079]
Advertising Intensity	-0.129*	-0.129*
	[0.073]	[0.074]
Herfindahl Industry Index		1.33e-06
		[1.38e-06]
Year Dummies Included	Yes	Yes
Company Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	23812	23812
R-square	0.098	0.098

Note: *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Table 5. In Firms With More Than 150 Employees, Female Managerial Representation Is More of a Differentiation Source in Manufacturing

Size of Firms	ROA for Manufacturing	ROA for Services	Female Executive Ratio for Manufacturing	Female Executive Ratio for Services	Proportion with At Least One Female Executive in Manufacturing	Proportion with At Least One Female Executive in Services
50-99	0.033	0.031	0.098	0.080	0.314	0.264
100-149	0.038	0.037	0.081	0.071	0.280	0.250
150-199	0.041	0.037	0.060	0.069	0.234	0.249
200-299	0.040	0.039	0.047	0.070	0.187	0.246
300-999	0.042	0.046	0.029	0.060	0.135	0.236
More than 1,000	0.045	0.056	0.016	0.074	0.109	0.316

Table 6. Summary Statistics on Firms with Female Managers and Correlation Matrix

Panel A. Summary Statistics for All Firms

Variable	Year	Mean	Median	Std. Dev.	Min	Max	Obs
ROA	2001	0.027	0.023	0.048	-0.354	0.348	1427
	2004	0.043	0.035	0.048	-0.185	0.423	1686
	2006	0.044	0.035	0.051	-0.354	0.368	1686
At Least One Female Section Chief	2001	0.071	0.000	0.257	0.000	1.000	1427
	2004	0.101	0.000	0.302	0.000	1.000	1686
	2006	0.120	0.000	0.326	0.000	1.000	1686
Female Section Chief Ratio	2001	0.019	0.000	0.101	0.000	1.000	1427
	2004	0.032	0.000	0.126	0.000	1.000	1686
	2006	0.037	0.000	0.136	0.000	1.000	1686
At Least One Female Division Chief	2001	0.015	0.000	0.120	0.000	1.000	1427
	2004	0.021	0.000	0.143	0.000	1.000	1686
	2006	0.027	0.000	0.161	0.000	1.000	1686
Female Division Chief Ratio	2001	0.006	0.000	0.064	0.000	1.000	1427
	2004	0.009	0.000	0.077	0.000	1.000	1686
	2006	0.012	0.000	0.092	0.000	1.000	1686
Female Employee Ratio	2001	0.256	0.207	0.172	0.000	0.931	1427
	2004	0.272	0.233	0.171	0.000	1.000	1686
	2006	0.437	0.392	0.250	0.000	1.000	1686
(Part-Time + Short-Term Workers)/ Total Full-Time Permanent Employees	2001	0.179	0.023	0.581	0.000	10.518	1427
	2004	0.234	0.030	0.893	0.000	17.225	1686
	2006	0.441	0.061	1.575	0.000	29.252	1686
Log(Assets)	2001	9.698	9.484	1.611	4.727	16.467	1427
	2004	9.638	9.388	1.662	5.886	16.388	1686
	2006	9.716	9.421	1.784	5.342	16.375	1686
Foreign Ownership Percentage	2001	2.640	0.000	10.517	0.000	100.000	1427
	2004	3.272	0.000	10.564	0.000	100.000	1686
	2006	3.907	0.000	12.052	0.000	100.000	1686
Leverage	2001	0.647	0.664	0.234	0.020	1.793	1427
	2004	0.618	0.631	0.238	0.059	2.317	1686
	2006	0.633	0.658	0.238	0.049	1.818	1686
Foreign Sales Ratio	2001	0.051	0.000	0.129	0.000	0.960	1427
	2004	0.052	0.000	0.130	0.000	0.983	1686
	2006	0.049	0.000	0.130	0.000	0.996	1686
R&D Intensity	2001	0.015	0.002	0.029	0.000	0.369	1427
	2004	0.013	0.001	0.025	0.000	0.250	1686
	2006	0.012	0.000	0.030	0.000	0.412	1686
Advertising Intensity	2001	0.007	0.002	0.017	0.000	0.204	1427
	2004	0.008	0.001	0.023	0.000	0.437	1686
	2006	0.007	0.001	0.018	0.000	0.272	1686
Herfindahl Industry Index	2001	715.441	465.018	831.955	68.283	10000	1427
	2004	650.596	348.987	719.425	78.700	10000	1686
	2006	649.294	401.532	735.128	84.448	8263	1686

Panel B. Correlation Matrix

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1] ROA	1												
[2] At Least One Female Section Chief	0.034**	1											
[3] Female Section Chief Ratio	0.026*	0.734***	1										
[4] At Least One Female Division Chief	0.003	0.126***	0.080***	1									
[5] Female Division Chief Ratio	-0.005	0.064***	0.060***	0.784***	1								
[6] Female Employee Ratio	0.031**	0.120***	0.128***	0.068***	0.078***	1							
[7] (Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	0.039***	0.092***	0.129***	0.036**	0.033**	0.207***	1						
[8] Log(Assets)	0.051***	0.052***	-0.059***	0.021	-0.032**	-0.081***	-0.030**	1					
[9] Foreign Ownership Percentage	0.125***	0.066***	-0.002	0.043***	0.028**	-0.014	-0.024	0.370***	1				
[10] Leverage	-0.269***	0.022	0.036**	0.022	0.037**	0.031**	0.041***	-0.199***	-0.166***	1			
[11] Foreign Sales Ratio	0.037**	-0.019	-0.042***	-0.022	-0.025*	-0.037***	-0.070***	0.304***	0.283***	-0.165***	1		
[12] R&D Intensity	0.045***	0.001	-0.051***	-0.004	-0.021	-0.085***	-0.085***	0.339***	0.261***	-0.270***	0.366***	1	
[13] Advertising Intensity	0.023	0.138***	0.095***	0.109***	0.078***	0.070***	0.076***	0.141***	0.109***	-0.112***	-0.028**	0.058***	1
[14] Herfindahl Industry Index	0.010	0.021	-0.008	0.024	0.007	-0.045***	-0.027*	0.170***	0.076***	0.019	0.001	0.022	0.034**

Note: *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Table 7. Female Section Chief Effect

	[1] DV: ROA	[2] DV: ROA, with HHI added
Independent Variable:		
At Least One Female Section Chief	0.008**	0.008**
	[0.004]	[0.004]
Female Section Chief Ratio	-0.013	-0.012
	[0.009]	[0.009]
At Least One Female Division Chief	0.006	0.006
	[0.009]	[0.009]
Female Division Chief Ratio	-0.017	-0.016
	[0.019]	[0.019]
Total Female Employee Ratio	0.002	0.002
	[0.007]	[0.007]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	0.001	0.001
	[0.001]	[0.001]
Log (Assets)	0.008	0.007
	[0.010]	[0.010]
Foreign Ownership Percentage	4.938e-04**	4.902e-04**
	[1.972e-04]	[1.957e-04]
Leverage	-0.084***	-0.084***
	[0.021]	[0.021]
Foreign Sales Ratio	-0.005	-0.003
	[0.020]	[0.020]
R&D Intensity	-0.398***	-0.404***
	[0.100]	[0.100]
Advertising Intensity	-0.207	-0.214
	[0.161]	[0.157]
HHI		3.09e-06
		[1.93e-06]
Year Dummies Included	Yes	Yes
Company Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	4799	4799
R-square	0.123	0.125

Note: *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Note: The standard error for the At Least One Female Section Chief variable is bootstrapped since it is based on a sampling of managerial employees. The other variables have robust standard errors below the coefficients.

Table 8. Foreign Ownership and Female Representation in Management

Panel A. Summary Statistics

	Have At Least One Female Section Chief	Female Section Chief Ratio	At Least One Female Division Chief	Female Division Chief Ratio
All Firms	0.099	0.030	0.021	0.009
More Than 10% Foreign Ownership	0.153	0.026	0.029	0.009
More Than 20% Foreign Ownership	0.167	0.027	0.040	0.014
More Than 25% Foreign Ownership	0.173	0.026	0.041	0.014
More Than 30% Foreign Ownership	0.158	0.026	0.058	0.020
More Than 33% Foreign Ownership	0.167	0.030	0.061	0.025
More Than 40% Foreign Ownership	0.221	0.039	0.078	0.034
More Than 50% Foreign Ownership	0.255	0.046	0.106	0.051
More Than 60% Foreign Ownership	0.250	0.049	0.100	0.058
More Than 70% Foreign Ownership	0.278	0.054	0.111	0.065
More Than 80% Foreign Ownership	0.273	0.055	0.091	0.040
More Than 90% Foreign Ownership	0.250	0.046	0.071	0.039
100% Foreign Ownership	0.240	0.049	0.040	0.040

Panel B. Multivariate Regression Predicting Female Representation in Management

	Model 1	Model 2	Model 3	Model 4
	DV: At Least One Female Section Chief	DV: At Least One Female Section Chief, with HHI added	DV: At Least One Female Division Chief	DV: At Least One Female Division Chief, with HHI added
	Dprobit regression	Dprobit regression	Dprobit regression	Dprobit regression
	Marginal probabilities are shown with the standard errors below them	Marginal probabilities are shown with the standard errors below them	Marginal probabilities are shown with the standard errors below them	Marginal probabilities are shown with the standard errors below them
Independent Variables:				
Majority Foreign Ownership	0.111***	0.112***	0.090***	0.090***
	[0.051]	[0.051]	[0.055]	[0.055]
Log(assets)	0.008***	0.008***	0.002	0.002
	[0.003]	[0.003]	[0.002]	[0.002]
Leverage	0.037**	0.038**	0.022**	0.022**
	[0.018]	[0.018]	[0.010]	[0.010]
R&D Intensity	0.234	0.232	0.104	0.104
	[0.160]	[0.160]	[0.074]	[0.074]
Advertising Intensity	0.646***	0.647***	0.230***	0.230***
	[0.179]	[0.179]	[0.078]	[0.078]
HHI		-2.55E-06		1.63E-07
		[6.45e-06]		[3.52e-06]
Industry Dummies Included	Yes	Yes	Yes	Yes
Year Dummies Included	Yes	Yes	Yes	Yes
p-value	0.000	0.000	0.000	0.000
R-square	0.114	0.114	0.115	0.115
Obs	4717	4717	3313	3313

Note: The sample size falls to 4717 in Model 1 because of the few industries that predict the dependent variable perfectly (typically because not a single firm in that industry has a single female section chief). The sample size drops further to 3313 in Model 2, because an additional number of industries predict the dependent variable perfectly (typically because not a single firm in that industry has a single female division chief).

Table 9. Wage and Productivity Mechanisms for Female Managers

Panel A. Wage Mechanism

	Managers Only	Managers Only
	[1] DV: Wage per Hour	[2] DV: Wage per Hour, with HHI added
Independent Variable:		
Is Female	-0.025***	-0.025***
	[0.004]	[0.004]
Tenure	0.006***	0.006***
	[5.239e-04]	[0.001]
Tenure^2	-8.69e-05***	-8.69e-05***
	[1.17e-05]	[1.17e-05]
Years since college or less-than-college graduation	0.005***	0.005***
	[0.001]	[0.001]
Years since college or less-than-college graduation^2	-8.34e-06	-8.35e-06
	[1.41e-05]	[1.41e-05]
Part-time Job Dummy	0.186***	0.186***
	[0.051]	[0.051]
Junior High School Education (Education = 9 years)	-0.023***	-0.023***
	[0.004]	[0.004]
Two-Year College/Special Training School Education (Education = 14 years)	0.019***	0.019***
	[0.003]	[0.003]
Four-Year College Education (Education = 16 years)	0.044***	0.044***
	[0.002]	[0.002]
Prefecture is Tokyo	0.005	0.005
	[0.008]	[0.008]
Prefecture is Kanagawa	-0.002	-0.002
	[0.010]	[0.010]
Prefecture is Osaka	0.008	0.008
	[0.014]	[0.014]
Company Fixed Effects Included	Yes	Yes
Job Title*Year Fixed Effects Included	Yes	Yes
Industry*Year Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	116263	116263
R-square	0.221	0.221

Panel B. Productivity Mechanism

	Manufacturing Sector	Manufacturing Sector
	[1] DV: log(Gross Profit)	[2] DV: log(Gross Profit), with HHI added
Independent Variable:		
At Least One Female Executive	0.023**	0.023**
	[0.010]	[0.010]
log(Total Employees)	0.247***	0.247***
	[0.032]	[0.032]
log(Fixed Assets)	0.007	0.007
	[0.019]	[0.019]
log(Imputed Purchased Inputs)	0.581***	0.581***
	[0.027]	[0.027]
Total Female Employee Ratio	0.113***	0.113***
	[0.024]	[0.024]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	7.53e-05	6.06e-05
	[0.002]	[0.002]
Foreign Ownership Percentage	0.001	0.001
	[0.001]	[0.001]
Leverage	-0.526***	-0.527***
	[0.058]	[0.058]
Foreign Sales Ratio	0.209**	0.209**
	[0.102]	[0.102]
R&D Intensity	-0.308	-0.309
	[0.245]	[0.245]
Advertising Intensity	2.329*	2.324*
	[1.244]	[1.240]
HHI		1.14e-05
		[1.12e-05]
Year Dummies Included	Yes	Yes
Company Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	25895	25895
R-square	0.253	0.253

Note: The reference group for education is High School Graduates (Education = 12 years)

Note: For all three panels, *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

Table 9 continued.

Panel C. Effect of Female Pay Equity

	[1] DV: log(Gross Profit)	[2] DV: log(Gross Profit); Robustness Check Focused Solely on Service Sector
Independent Variable:		
Female Pay Equity	0.158***	0.210***
	[0.041]	[0.063]
At Least One Female Executive	0.078**	0.086
	[0.038]	[0.057]
log(Total Employees)	0.211**	0.153
	[0.105]	[0.116]
log(Fixed Assets)	-0.041	0.058
	[0.104]	[0.114]
log(Imputed Purchased Inputs)	0.458***	0.388**
	[0.151]	[0.168]
Total Female Employee Ratio	-0.052	-0.076
	[0.079]	[0.074]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	-0.001	-0.005
	[0.007]	[0.008]
Foreign Ownership Percentage	0.003	-0.005
	[0.003]	[0.006]
Leverage	-0.539**	-0.442
	[0.235]	[0.295]
Foreign Sales Ratio	-0.116	1.409
	[0.427]	[1.119]
R&D Intensity	-2.465*	-1.151
	[1.404]	[2.921]
Advertising Intensity	0.851	0.999
	[0.776]	[0.857]
HHI	-3.59e-05	-2.60E-05
	[2.91e-05]	[2.32e-05]
Year Dummies Included	Yes	Yes
Company Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	700	346
R-square	0.567	0.672

Panel D. The Productivity Result is from Both Subregions of the Female Pay Equity Variable

	[1] DV: log(Gross Profit)	[2] DV: log(Gross Profit); Robustness Check Focused Solely on Service Sector
Independent Variable:		
Above Zero Part of Female Pay Equity Variable	0.196**	0.277*
	[0.083]	[0.143]
Below Zero Part of Female Pay Equity Variable	0.143***	0.176**
	[0.047]	[0.078]
At Least One Female Executive	0.081**	0.095
	[0.038]	[0.059]
log(Total Employees)	0.213**	0.164
	[0.106]	[0.125]
log(Fixed Assets)	-0.043	0.053
	[0.104]	[0.114]
log(Imputed Purchased Inputs)	0.462***	0.396**
	[0.151]	[0.167]
Total Female Employee Ratio	-0.054	-0.088
	[0.079]	[0.074]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	-0.003	-0.006
	[0.007]	[0.008]
Foreign Ownership Percentage	0.004	-0.003
	[0.003]	[0.006]
Leverage	-0.545**	-0.437
	[0.236]	[0.300]
Foreign Sales Ratio	-0.111	1.403
	[0.422]	[1.120]
R&D Intensity	-2.418*	-1.437
	[1.420]	[3.069]
Advertising Intensity	0.824	1.022
	[0.767]	[0.855]
HHI	-3.60e-05	-2.67e-05
	[2.88e-05]	[2.32e-05]
Year Dummies Included	Yes	Yes
Company Fixed Effects Included	Yes	Yes
p value	0.000	0.000
Obs	700	346
R-square	0.568	0.675

Note: In Panel D, the standard error for the pay disparity variable is bootstrapped since it is an estimate of pay disparity based on a sampling of managerial employees. The other variables (including the other main variable of interest for At Least One Female Executive--which is not estimated based on sampling) have robust standard errors below the coefficients. In Panel D, the pay disparity is split into its above-zero and below-zero regions, and both of those are bootstrapped. In both panels, the full sample consists of both the manufacturing sector and the service sector.

Table 10. Main Results Are Robust to Proxies for General Deviation from Post-World War II Japanese Human Resource Management Practices

Panel A. Robustness to Proxy for Ratio of Mid-Career Hires

Panel B. Robustness to Proxies for Seniority-Based Compensation along with Proxy for Ratio of Mid-Career Hires

	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level	DV: ROA winsorized at the .01/99.9 level
Independent Variable:		Independent Variable:	Independent Variable:	Independent Variable:	Independent Variable:	Independent Variable:	Independent Variable:	Independent Variable:	Independent Variable:
At Least One Female Section Chief	0.008**	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief	At Least One Female Section Chief
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Female Section Chief Ratio	-0.012	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio	Female Section Chief Ratio
	[0.009]	-0.012	-0.016*	-0.012	-0.016*	-0.012	-0.016*	-0.012	-0.016*
		[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]
At Least One Female Division Chief	0.006	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief	At Least One Female Division Chief
	[0.009]	0.007	0.006	0.007	0.006	0.007	0.007	0.007	0.006
		[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Female Division Chief Ratio	-0.016	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio	Female Division Chief Ratio
	[0.019]	-0.016	-0.016	-0.016	-0.016	-0.016	-0.016	-0.016	-0.016
		[0.020]	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]
Total Female Employee Ratio	0.002	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio	Total Female Employee Ratio
	[0.007]	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
		[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	0.005	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees	(Part-Time + Short-Term Workers)/Total Full-Time Permanent Employees
	[0.009]	0.008	0.001	0.001	0.001	0.001	0.001	0.001	0.001
		[0.009]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Log (Assets)	0.005	Log (Assets)	Log (Assets)	Log (Assets)	Log (Assets)	Log (Assets)	Log (Assets)	Log (Assets)	Log (Assets)
	[0.010]	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
		[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Foreign Ownership Percentage	0.001	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage	Foreign Ownership Percentage
	[2.084e-04]	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
		[2.084e-04]	[2.073e-04]	[2.075e-04]	[2.079e-04]	[2.089e-04]	[2.077e-04]	[2.076e-04]	[2.075e-04]
Leverage	-0.079***	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
	[0.021]	-0.079***	-0.079***	-0.079***	-0.079***	-0.079***	-0.079***	-0.079***	-0.079***
		[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]
Foreign Sales Ratio	-0.003	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio	Foreign Sales Ratio
	[0.020]	-0.003	-0.002	-0.002	-0.002	-0.003	-0.002	-0.002	-0.002
		[0.020]	[0.020]	[0.020]	[0.020]	[0.021]	[0.020]	[0.020]	[0.020]
R&D Intensity	-0.405***	R&D Intensity	R&D Intensity	R&D Intensity	R&D Intensity	R&D Intensity	R&D Intensity	R&D Intensity	R&D Intensity
	[0.100]	-0.405***	-0.413***	-0.410***	-0.411***	-0.409***	-0.410***	-0.410***	-0.411***
		[0.101]	[0.101]	[0.101]	[0.101]	[0.101]	[0.101]	[0.100]	[0.101]
Advertising Intensity	-0.317**	Advertising Intensity	Advertising Intensity	Advertising Intensity	Advertising Intensity	Advertising Intensity	Advertising Intensity	Advertising Intensity	Advertising Intensity
	[0.158]	-0.317**	-0.327**	-0.317**	-0.331**	-0.317**	-0.331*	-0.317**	-0.330**
		[0.158]	[0.160]	[0.158]	[0.160]	[0.158]	[0.160]	[0.158]	[0.160]
		First Alternative Definition of Deviation from	Second Alternative Definition of Deviation from	Third Alternative Definition of Deviation from	Fourth Alternative Definition of Deviation from	Fifth Alternative Definition of Deviation from	Sixth Alternative Definition of Deviation from	Seventh Alternative Definition of Deviation from	Eighth Alternative Definition of Deviation from
Ratio of Mid-Career Hires	-0.005	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay	Seniority-Based Pay
	[0.009]	2.86e-04	0.001*	2.81e-05	-3.18e-04	1.57e-05	5.48e-05	-8.55e-05	4.16e-05
		[1.123e-04]	[0.001]	[2.83e-05]	[2.006e-04]	[4.18e-05]	[1.094e-04]	[1.256e-04]	[3.06e-05]
Herfindahl Industry Index	3.07e-06	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires	Ratio of Mid-Career Hires
	[1.93e-06]	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008
		[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]
		Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index	Herfindahl Industry Index
		2.91e-06	3.72e-06	2.95e-06	3.73e-06	2.95e-06	3.66e-06*	2.97e-06	3.72e-06*
		[1.90e-06]	[1.91e-06]	[1.90e-06]	[1.91e-06]	[1.90e-06]	[1.90e-06]	[1.90e-06]	[1.91e-06]
Year Dummies Included	Yes	Year Dummies Included	Year Dummies Included	Year Dummies Included	Year Dummies Included	Year Dummies Included	Year Dummies Included	Year Dummies Included	Year Dummies Included
		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Company Fixed Effects Included	Yes	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included	Company Fixed Effects Included
		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
p value	0.000	p value	p value	p value	p value	p value	p value	p value	p value
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Obs	4799	Obs	Obs	Obs	Obs	Obs	Obs	Obs	Obs
		4646	4646	4667	4646	4667	4646	4667	4646
R-square	0.131	R-square	R-square	R-square	R-square	R-square	R-square	R-square	R-square
		0.129	0.132	0.131	0.132	0.131	0.132	0.131	0.132

Note: For both panels, *** indicates significance at the .01 level, ** significance at the .05 level, and * significance at the .10 level

The following are the definitions of the alternative Deviation from Seniority-Based Pay variables: (First Alternative Definition) Annual Salary regressed on Female, years since school, years since school squared, Female*years since school, Female*years since school squared, tenure, Female*tenure, tenure squared, Female*tenure squared, education, Female*education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Second Alternative Definition) For males only: Annual Salary regressed on years since school, years since school squared, tenure, tenure squared, education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Third Alternative Definition) Log(Annual Salary) regressed on Female, years since school, years since school squared, Female*years since school, Female*years since school squared, tenure, Female*tenure, tenure squared, Female*tenure squared, education, Female*education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Fourth Alternative Definition) For males only: Log(Annual Salary) regressed on years since school, years since school squared, tenure, tenure squared, education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Fifth Alternative Definition) Hourly wage regressed on Female, years since school, years since school squared, Female*years since school, Female*years since school squared, tenure, Female*tenure, tenure squared, Female*tenure squared, education, Female*education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Sixth Alternative Definition) For males only: Hourly wage regressed on years since school, years since school squared, tenure, tenure squared, education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Seventh Alternative Definition) Log(Hourly wage) regressed on Female, years since school, years since school squared, Female*years since school, Female*years since school squared, tenure, Female*tenure, tenure squared, Female*tenure squared, education, Female*education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year. (Eighth Alternative Definition) For males only: Log(Hourly wage) regressed on years since school, years since school squared, tenure, tenure squared, education, company fixed effect, job title fixed effect and industry*year fixed effect. Then we take the results from that individual-level regression analysis and calculate the standard deviation of the error term divided by the mean of the error term by company-year for each company-year.