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# Why Does Employing More Females Increase Corporate Profits?: Evidence from Japanese Panel Data\*

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From the point of view of both the significance of women's participation in society and also corporate business strategy and social responsibility, it is important to know the effects of female employment on the corporate profits and the mechanism that links the proportion of female workers and corporate performance. The empirical results show a positive correlation between the proportion of female workers and corporate profits using firm-level cross-section data, and no correlation according to fixed-effect estimation using panel data. These findings are not consistent with the "discrimination hypothesis" that female workers are discriminated against in the labor market, the "amenity hypothesis" that firms that perform well employ more females for the amenity of male employees, and the "negative shock hypothesis" that firms that encounter a negative shock and experience a deterioration in performance limit hiring. The results suggest that firm-specific factors may increase female employment and also raise corporate performance. An investigation of these firm-specific factors indicates that human resource management (HRM) measures intended to enable equal opportunities and treatment between male and female workers raise both the proportion of female workers and corporate performance. As gender-equality HRM coincides with the profit motive, therefore, it is important to disseminate appropriate information on the HRM advantage. Family-friendly measures, by contrast, should preferably be pursued at public expense by society as a whole in order to avoid unfairness among the firms that comes from external economy effect the measures have.

## I. Introduction

From firms' point of view, are female workers a target of discrimination whose employment is something to be avoided if possible, a burden that should be employed as a social obligation to contribute to society insofar as this does not harm performance, or a resource to be actively used to contribute to performance? If employment of female workers and corporate performance are related, then this is an important question from the point of

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view of both the significance of women's participation in society and also corporate business strategy and social responsibility. The labor demand adjustment since the 1990s, a considerable number of firms have actually positively sought to recruit and promote women. Among their motivations for employing women are improving management efficiency, boosting competitiveness, and gaining access to high-caliber human resources.<sup>1</sup> It is not clear, however, whether the performance of such firms actually increases, and, if so, to what extent active use of women is responsible for this.

One traditional hypothesis concerning the relationship between corporate performance and female employment is the "employer-discrimination hypothesis" proposed by Becker (1971). This holds that if many firms discriminate against female workers and are reluctant to hire them, demand for female labor in the labor market is inhibited and the wages and other treatment that they receive is lower than their productivity and contributions. As a result, firms that do not have discriminatory tastes can turn the gap between their productivity and the market wage rate into profit by employing more women. Underlying the persuasiveness of this hypothesis applied to Japan are circumstances including the large gender wage gap compared with other developed countries, the low female participation rate, and the low participation rate of highly educated women whose retained value of human capital is particularly high.<sup>2</sup>

If it can be confirmed that profitability tends to be higher at firms that have a higher proportion of female workers, Becker's hypothesis may hold. The few studies so far conducted indicate that firms with a higher proportion of female workers tend to have higher profit on sales. Using cross-section data on approximately 3,000 firms and establishments in manufacturing industry in the United States, Hellerstein, Neumark, and Troske (2002) find that, after controlling for age of firm, composition (race and age) of workforce, and other such factors, plants with a high proportion of women are more profitable, and this tendency appears to be stronger at plants with high levels of product market power. In Japan, Sano (2005) uses panel data on listed firms to demonstrate that as the proportion of women rises, so too does profit on sales. Employing data from the Ministry of Economy, Trade and Industry's (METI) *Kigyo Katsudo Kihon Chosa* (Basic Survey of Japanese Business Structure and Activities), Kawaguchi (2007) discovers that the higher the proportion of women, the higher the profit on sales. The findings are thus consistent with Becker's hypothesis.

This paper examines several other hypotheses, in addition to Becker's, that allow for a positive correlation between the proportion of female workers and corporate performance,

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<sup>1</sup> According to the 2006 *Josei Koyo Kanri Kihon Chosa* [Basic survey on woman's employment management], the main reasons given for needing to pursue positive action, in terms of the proportion of firms citing them, are "to improve management efficiency by effectively utilizing women's abilities" (65.3%), "to translate male and female employees' abilities into improvements in productivity and greater competitiveness" (56.2%), and "to secure good human resources and be recognized as an firm that is worker friendly and has a fair reputation" (53.9%).

<sup>2</sup> According to Higuchi, Abe, and Waldfoegel (1997), the labor force participation rate increases with length of education in all developed countries except Japan.

and sheds light on the mechanism that links the proportion of female workers and corporate performance.

This paper is composed as follows. We begin in section II by presenting the hypotheses regarding the relationship between the proportion of female workers and corporate performance, before proceeding to explain the data used in this paper in section III. Section IV describes the estimation methodology and results. Section V discusses the effects of HRM on female employment and corporate profits, and section VI discusses the implication of this paper and unresolved issues for future research.

## II. Hypotheses Concerning Female Employment and Profits

A correlation of greater profitability at firms with high proportions of female workers, or employment of greater numbers of women at firms with high profitability, has been confirmed by Hellerstein, Neumark, and Troske (2002), Sano (2005), and Kawaguchi (2007). If wages in the labor market are equal to individual workers' marginal productivity, the gender wage gap is commensurate with the actual difference in productivity, and so the profitability of firms that employ more women instead of men is not necessarily higher.<sup>3</sup> If there is a positive correlation between the proportion of female workers and profitability, what is the mechanism behind it? Let us therefore examine four hypotheses concerning the relationship between the proportion of female workers and firms' profitability.

The first is the "discrimination hypothesis." According to Becker's taste model, introduced in the preceding section, the objective function of employers and executives reflects not only firm profits but also personal discriminatory tastes.

Thus, for example, given

$$(1) \quad U = \pi - aL_f$$

a disutility equal to coefficient  $a$  is incurred when female workers  $L_f$  is increased by one unit. When there are many such discriminatory firms on the labor demand side and they are the leading actors in making offers of limited labor demand, the female market wage rate will be precisely  $a$  lower than the marginal productivity.<sup>4</sup> While aware that women have higher marginal productivity than their wages, discriminatory firms will thus not seek to employ many women. In contrast, firms that are not discriminatory will be able to reap the differ-

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<sup>3</sup> Firms maximize profit  $\pi$  given production function  $F$  as a function of capital  $K$ , male workers  $L_m$ , female workers  $L_f$ , and intermediate inputs  $M$ , real capital price  $r$ , male and female real wages  $W_m$  and  $W_f$ , and real intermediate inputs price  $P_M$ .

$$\pi = F(K, L_m, L_f, M) - rK - W_m L_m - W_f L_f - P_M M$$

Male and female wages in the labor market at this time reflect the respective productivities of male and female workers; in other words, they reflect differences in the human capital of men and women.

<sup>4</sup> In the optimization of the objective function of discriminatory employers, (female marginal productivity)  $- a =$  (female labor wage rate).

ence between female worker productivity and the market wage as profit by employing large numbers of women. According to the “discriminatory hypothesis,” then, corporate performance increases as more women are employed.

The second hypothesis posits that firms that perform well employ more women for the amenity of (male) employees. Firms that perform well employ many women, and employ more as performance increases. This line of thinking we call the “amenity hypothesis.” This hypothesis envisages a reverse causal relationship to the preceding discriminatory hypothesis.

Third is the “negative shock hypothesis.” Individual firms are exposed to shocks (such as productivity shocks and demand shocks) at the macro level, industry level, and firm level. When a negative shock is encountered and performance deteriorates, firms in many cases limit hiring.<sup>5</sup> Even if the numbers of male and female hires are similarly restricted at such time, the job separation rate is constantly higher among female workers than males, leading to a decline in the proportion of female workers.<sup>6</sup> Lower proportions of women are consequently observed at firms with poorer performance. When performance recovers, on the other hand, the proportion of female workers recovers as a firm fills its vacancies. It is thus thought that as negative shocks inhibit hiring, which in turn causes the proportion of female workers to fall due to differences in the job separation rates for men and women, there consequently arises a positive correlation between corporate performance and the proportion of female workers.

The fourth hypothesis holds that the proportion of women does not raise corporate performance, nor vice versa, and that seemingly correlated due to the existence of a background “true cause” that affects both the proportion of female workers and corporate performance. There is a possibility that there exist “firm-specific factors” in firms that raise both the proportion of women and profitability, and HRM is one particularly likely candidate. Firms that are superior in terms of this firm-specific factor have both a high proportion of female workers and high profitability, but, as long as there is no change in the firm-specific factor, there is no change in profitability at a firm if it simply raises the proportion of women.

In this paper, we proceed with our analysis using the above discrimination, amenity, negative shock, and firm-specific factor hypotheses as our working hypotheses.

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<sup>5</sup> Japanese firms exhibit a strong tendency to respond to negative shocks by first limiting hiring rather than dismissing workers.

<sup>6</sup> According to the Ministry of Health, Labour and Welfare’s *Koyo Doko Chosa* (Survey on Employment Trends), the job separation rate in 2003 was 13.7% for males and 20.9% for females. Women are 16.5% points more likely than men to leave their jobs for “personal reasons (marriage, childbirth, child care, nursing of relative, etc.)” (56.7% for men compared with 73.2% for women), and so the female job separation rate is always high.

### III. Data

#### 1. Summary of *Kigyo Katsudo Kihon Chosa* (Basic Survey of Japanese Business Structure and Activities) Data

The analysis in this paper uses individual firm data for a total of eight years from the Basic Survey of Japanese Business Structure and Activities (*BSJBSA*) conducted by METI in 1992 and 1995-2001. This is a survey of all companies in the mining, manufacturing, wholesale/retail, and eating and drinking establishment divisions of the Japan Standard Industrial Classification (excluding other eating and drinking establishments) that have at least 50 workers and initial capital of at least ¥30 million. The sample size each year is around 20,000, and consisted of 25,826 firms in 2000.

The advantage of this data source is that corporate performance and numbers of employees by sex are surveyed, and it is possible to calculate estimates broken down into permanent employees (full-time workers) and part-time workers.<sup>7</sup> It is also possible to concatenate cross-section data to create panel data for up to a maximum of eight surveys (covering a time span of 10 years including the two years during which surveys were not conducted).<sup>8</sup> Descriptive statistics are shown in Table 1.

#### 2. Summary of *Shushoku Shikiho Joshi Gakusei Ban* [Quarterly Company Handbook for Female Students] Data

In order to examine the firm-specific factor hypothesis, which is one of the above hypotheses concerning the relationship between the proportion of female workers and corporate performance, we need variables for HRM, which is a likely candidate as a firm-specific factor, and especially variables concerning women's employment management. This paper examines the relationship between the proportion of female workers and corporate performance using HRM-related variables for the first time, and so incorporating these variables in the analysis is extremely significant.

In this paper, therefore, we obtain variables concerning HRM, including systems used by women such as child care leave systems and flextime systems, from Toyo Keizai Shinposha's *Quarterly Company Handbook for Female Students (QCHFS)* (1993, 1998, 2003).

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<sup>7</sup> In the *BSJBSA*, the term "full-time worker" refers to paid directors and full-time employees (workers employed under contracts for a term of more than 1 month and persons employed for 18 or more days in each of the last 2 months of the fiscal year concerned, regardless of whether they are called permanent employees, semi-permanent employees, or *arubaito* (temporary workers), etc.). "Part-time workers" are workers who work shorter scheduled working hours than the general employees among full-time workers, regardless of whether they are called permanent employees, semi-permanent employees, or *arubaito*, etc. These definitions are largely the same as the definitions of full-time workers and part-time workers used for *Maigetsu Kinro Tokei* [Monthly labour survey] produced by MHLW.

<sup>8</sup> As no breakdown of workers by sex was obtainable from the *BSJBSA*, 2001 data from this survey were used only for the analysis allowing for time lag.

Table 1. Descriptive Statistics

Variable name	Sample size	Mean	Standard deviation
Ratio of operating income to total assets	180294	0.028	0.147
Proportion of females (including part-timers)	180294	0.322	0.202
Ratio of female permanent employees	180294	0.229	0.157
Ratio of male permanent employees	180294	0.660	0.213
Ratio of female part-time workers	180294	0.093	0.153
Ratio of male part-time workers	180294	0.018	0.054
Log of regular workers	180294	5.017	0.967
Rate of foreign ownership	180294	0.013	0.097
Year of establishment	180294	1961	14.94
Listed firm (listed dummy)	180294	0.088	
Gender difference in length of service	1097	7.120	3.969
Existence of reemployment system	838	0.331	
Ratio of female managers	256	0.046	0.103
Proportion of women among main career track hires	245	0.212	0.210
Better than statutorily required child care leave system	1128	0.262	
Log total male/female overtime	182	2.660	0.628
Flexitime system	869	0.358	
Possibility of women's internal transfer	834	0.836	
Promotion equality	249	0.203	0.710
Percentage of child care leave taken	235	0.028	0.028
Ratio of married female employees	802	0.200	0.148

The numbers of firms covered by the report are 1,123 in 1993, 834 in 1998, and 863 in 2003. From this, 11 variables, including “gender difference in length of service,” “reemployment system,” and “ratio of female managers,” were created according to the purpose of the present analysis.<sup>9</sup>

In order to use these HRM variables to analyze the relationship between the proportion of female employees and corporate performance, data from the above the *BSJBSA* were matched with data at the individual firm level to obtain a data set consisting of a total sam-

<sup>9</sup> The 11 HRM variables prepared were as follows: “gender difference in length of service” (= men’s mean length of service in years – women’s mean length of service in years), “reemployment system” (= existence of reemployment scheme for workers retiring before mandatory retirement age due to marriage or childbirth, etc.), “ratio of female managers” (= proportion of all managerial positions that are filled by women), “proportion of women among main career track hires,” “better than statutorily required child care leave system” (= existence of child care system in 1991, existence of system allowing child care leave in excess of 1 year in 1996 and 2001 after entry into effect of Child Care Leave Act in April 1992), “overtime,” “flexitime system,” “possibility of women’s internal transfer,” “promotion equality” (= ratio of female managers/ratio of female employees), “percentage of child care leave taken” (number of people taking child care or nursing care leave/female employees), and “ratio of married female employees.”

ple of 1,763 for three years. The descriptive statistics are shown in Table 1.

The mean ROA (Return on Assets)<sup>10</sup> is 2.8%, and the proportion of women among the total number of workers calculated by adding together full-time workers and part-time workers is 32.2% (22.9% female permanent employees and 9.3% female part-time workers), the mean number of regular employed persons is 151 (= exp [5.017]), mean rate of foreign ownership is 1.3%, mean year of establishment is 1961, and listed firms account for 8.8% of the total. According to data from the *QCHFS*, the gender difference in length of service is 7.12 years, the proportion of firms that have reemployment systems for workers who retire before mandatory retirement age due to marriage or childbirth, etc. is 33.1%, the ratio of female managers is 4.6%, the proportion of women among main career track in dual career ladder system hires is 21.2%, the proportion of firms with better than statutorily required child care leave systems is 26.2%, mean overtime is 14.3 hours (= exp [2.660]), the proportion of firms with flextime systems is 35.8%, the proportion of firms at which internal transfers of female workers is possible is 83.6%, mean promotion equality is 0.20, the mean percentage of child care leave taken is 2.8%, and the mean ratio of married female employees is 20.0%.

## IV. Estimation Methodology and Results

### 1. Regression Analysis of Pooled Data

#### (1) Estimation Methodology

In order to confirm whether there is a correlation between the proportion of female workers and corporate performance, cross-section data for each year from 1992 to 2001 were pooled and a regression analysis performed. ROA was used for profitability as the productivity of capital K.<sup>11</sup> For the explanatory variables other than the proportion of female workers, we used firm size, listed dummy, industry dummies, rate of foreign ownership, and year of establishment.

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<sup>10</sup> Ratio of operating income to total assets

<sup>11</sup> While return on equity (ROE) is an indicator of the efficiency of capital attributable to shareholders, the ratio of operating income to total assets (ROA) shows the efficiency of total assets including that portion corresponding to borrowing (= capital + liabilities), and is widely used to examine the management efficiency of an firm. The return on sales used in past research is given as a proportion of capital cost, worker wages, and cost of intermediate goods, which are all the constituents of sales (capital cost's share of the sum of the three), and so there is a high probability of its serving as a proxy for the input ratio of production factors rather than corporate performance. Thus if the proportion of female workers is assumed to be correlated with the proportion of production activity that is performed internally, there is a possibility that firms that have a low proportion of female workers may, like electrical manufacturers that spin off their plants as subsidiaries, outsource production, as a result of which most of their sales will take the form of payments for the supply of intermediate goods and their return on sales will be low.

Table 2. Correlation between Profitability and Proportion of Female Workers

Dependent variable: Profitability

	(1)		(2)		(3)		(4)	
	OLS		OLS		Fixed effect		Fixed effect	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Proportion of females	0.015	0.003			-0.003	0.008		
Ratio of female permanent employees			0.012	0.005			-0.022	0.009
Ratio of female part-time workers			0.019	0.005			0.013	0.008
Ratio of male part-time workers			0.007	0.009			-0.012	0.012
Log of regular workers	0.003	0.000	0.004	0.000	0.005	0.002	0.009	0.002
Listed dummy	0.010	0.001	0.010	0.001				
Rate of foreign ownership	0.033	0.007	0.034	0.007	-0.006	0.007	-0.007	0.007
Year of establishment	0.298	0.033	0.299	0.033				
Constant	-0.578	0.067	-0.580	0.067	-0.002	0.010	-0.016	0.010
<i>N</i>	180294		180294		180294		180294	
Number of firms	37343		37343		37343		37343	
<i>R</i> <sup>2</sup>	0.009		0.009		0.007		0.007	

Notes: 1. (1) and (2) show the results of the OLS estimations (panel clustering robust standard error), and (3) and (4) show the results of fixed effect estimation.

2. The proportion of female workers indicates the proportion of female workers among all employees (including part-time workers).

3. The denominator for calculating the ratio of male permanent employees, ratio of female part-time workers, and ratio of male part-time workers is the total number of employees in specification (2) and (4).

4. All specifications are controlled by year dummies.

5. Specification (1) and (2) are controlled by industry dummies.

6. The coefficient for year of establishment is multiplied by 1,000.

## (2) Estimation Results

Column 1 in Table 2 shows the results of estimation by the least squares method (clustering robust standard error). The coefficient for the proportion of females including part-time workers is 0.015, which is significantly positive.<sup>12</sup> The estimate that profitability is 0.15% higher at firms where the proportion of females is 10% higher is quite considerable considering that mean profitability is 2.80% (see Table 1 Descriptive Statistics).

The number of female workers includes part-time workers. If the part-time workers' wages are lower than their productivity, there is a possibility that the lowness of personnel expenditures on them may have a positive effect on corporate performance. In addition to using the ratio of female part-time workers among all employees and ratio of male part-time workers among all employees as explanatory variables, therefore, estimates were calculated

<sup>12</sup> The trend remains unchanged even when estimates are performed using ordinary profit, business income, and operating income as the numerators for calculating ROA. Even the dependent variable is the ratio of Earnings Before Interest and Taxes (EBIT) to total assets, a similarly significant positive relationship to that with ROA is confirmed (results table omitted).



changing the proportion of female workers to the ratio of female permanent employees among all employees. It was found as a result that the coefficient for the ratio of female permanent employees is 0.012, which is significantly positive (column 2 in Table 2), indicating that the proportion of female workers raises corporate performance even allowing for the effect of part-time workers.<sup>13</sup>

Regression analysis of pooled data thus confirms that there is a positive relationship between the proportion of female workers and profitability. This result is consistent with the findings of previous studies, and appears to support the discrimination hypothesis that holds that women who are discriminated against receive wages that are below their productivity.

## 2. Fixed Effect Estimation

### (1) Estimation Methodology

Estimates calculated using pooled data do not take account of the possibility that the heterogeneities of each sample may be lumped together under the error term unobservable to the explanatory variables. As the unit of investigation employed by the *BSJBSA* is the firm, there are considerable unobservable heterogeneities specific to firms, and it is highly likely that these are correlated with the explanatory variables. In order to treat these firm characteristics as firm-specific factors and eliminate them, fixed effect estimates were determined using panel data.

### (2) Estimation Results

Columns 3 and 4 of Table 2 show profitability regressed by the proportion of female workers after adjusting for the impact of the business cycle by adding year dummies using panel data created from the *BSJBSA* in 1992 and 2001. The coefficient on proportion of female workers is not significant (column 3 of Table 2). By adding the ratio of female part-time workers to all employees, the ratio of male part-time workers to all employees, and the ratio of female permanent employees to all employees to the explanatory variables, the coefficient for the ratio of female permanent employees becomes significantly negative (column 4 of Table 2). This suggests that firms may regard female permanent employees as a future resource and so, though they may have a negative effect on earnings at present, employ them as a form of anticipatory investment.

If the firm-specific factors is eliminated by means of fixed effect estimation, the results indicate that the proportion of females does not have an impact on profitability. This is not consistent with the discrimination hypothesis, according to which there exists a gap between women's wages and their productivity.<sup>14</sup> This also does not tally with the amenity or negative

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<sup>13</sup> It was also confirmed by least squares estimation using pooled data that personnel costs per person are not correlated with profitability. There is a strong possibility that rather than profits being earning by firms by not paying the wages prevailing in a competitive labor market, profits are distributed to both labor and capital.

<sup>14</sup> Estimating profitability by the instrumental variables method using the existence of a better

shock hypotheses, which predict a positive correlation between the proportion of women and profitability (irrespective of the direction of the causal relationship).

### 3. Estimation Allowing for Time Lag

#### (1) Method of Estimation

Based on the results of the above fixed effect analysis alone, there is still scope to refute the negation of the discrimination hypothesis. There is a possibility that there exists a time lag between an increase in the proportion of female workers and their actually contributing to corporate performance due to the time required for training and so on, as a result of which no correlation between the proportion of female workers and corporate performance can be detected when estimating them at the same point in time. As the amenity hypothesis posits the employment of women as a result of good corporate performance, moreover, there may be a lag in corporate performance's raising the proportion of women under this hypothesis too. The same applies in the case of the negative shock hypothesis. We therefore reexamine the existence and direction of the causal relationship by calculating estimates allowing for the following time lag after simplifying the estimation model:

$$(2) \quad Y_{it+m} - Y_{it} = \alpha + \beta(X_{it} - X_{it-1}) + \gamma Z_{it-1} + \varepsilon_{it-1}$$

$$(3) \quad X_{it+m} - X_{it} = \mu + \phi(Y_{it} - Y_{it-1}) + \xi Z_{it-1} + \eta_{it-1}$$

where  $Y_{it}$  is profitability in period  $t$  at firm  $i$ ,  $X_{it}$  is the proportion of female workers, and  $Z_{it}$  is the firm attributes, such as industry and so on. Formula (2) looks at the impact of a change in the proportion of females from period  $t-1$  to  $t$  on the change in profitability in the period (year)  $m$  from  $t$  to  $t+m$ . The purpose of this is to confirm the relationship between the proportion of female workers and corporate performance taking into consideration the lag until the actual application of the abilities of the increased number of female workers. Formula (3) reexamines the discrimination hypothesis, amenity hypothesis, and negative hypothesis by looking at the impact of changes in profitability from  $t-1$  to  $t$  on changes in the proportion of females from  $t$  to  $t+m$ . Whereas the independent variables shows the change in one year, the dependent variable represents the change during year  $m$  ( $m = 1 - 6$ ).

#### (2) Estimation Results

Table 3 and Table 4 show the results of the time lag estimates. Neither the impact of

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than statutorily required child care leave system as the identification variable, it was found that the coefficient for the proportion of females is not significant (results table omitted). This would suggest that the correlation between the proportion of female workers and profitability is a spurious one.

Table 3. Change in Proportion of Females and Change in Profitability  
( $\Delta$  proportion of females  $\rightarrow$   $\Delta$  profitability)

	1-year lag		2-year lag		3-year lag		4-year lag		5-year lag		6-year lag	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Change in proportion of females	0.002	0.009	0.011	0.011	-0.001	0.012	0.026	0.015	-0.020	0.017	-0.098	0.066
Constant	0.004	0.001	0.013	0.001	0.004	0.001	-0.001	0.001	0.001	0.001	0.001	0.003
<i>N</i>	124457											
Prob > F	0											
$R^2$	0.002											

Notes: 1. The proportion of females is the proportion of women, including part-time workers, among all employees (including part-time workers).

2. The explanatory variable is the change in the proportion of females from ( $t-1$ ) to year  $t$ , and the dependent variable is the change in profitability from  $t$  to ( $t+m$ ).

3. Controlled by industry dummies and year dummies at time ( $t-1$ ).

Table 4. Change in Profitability and Change in Proportion of Females  
( $\Delta$ profitability  $\rightarrow$   $\Delta$  proportion of females)

	1-year lag		2-year lag		3-year lag		4-year lag		5-year lag	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Change in profitability	0.002	0.001	-0.001	0.002	0.002	0.002	-0.001	0.003	-0.006	0.007
Constant	-0.003	0.000	-0.006	0.001	-0.008	0.001	-0.008	0.001	-0.011	0.001
<i>N</i>	85064									
Prob > F	0									
$R^2$	0.0011									

Notes: 1. The proportion of females is the proportion of women, including part-time workers, among all employees (including part-time workers).

2. The explanatory variable is the change in profitability from ( $t-1$ ) to year  $t$ , and the dependent variable is the change in the proportion of females from  $t$  to ( $t+m$ ).

3. Controlled by industry dummies and year dummies at time ( $t-1$ ).

change in profitability on change in the proportion of female workers nor the impact of the change in the proportion of female workers to the change in profitability is significant. The absence of a correlation between the two according to this estimation allowing for a lag in the relationship between the proportion of female workers and ROA, as well as the panel fixed effect estimation, means that there is hardly any possibility that the discrimination, amenity, or negative shock hypotheses hold true in Japan.

#### 4. Search for Firm-Specific Factors

##### (1) Estimation Methodology

The findings that profitability and the ratio of female workers are positively correlated according to least squares estimation using pooled data and that there is no correlation according to fixed effect analysis and estimation allowing for a time lag are consistent with the firm-specific factor hypothesis. In other words, the correlation between profitability and the proportion of female workers indicated by the results of estimates by the least squares method using pooled data is a spurious one, and there may in fact be firm-specific factors that raise both corporate performance and the proportion of female workers. Below, therefore, we search for these firm-specific factors, or “true causes.”

In this paper, we assume that firms’ HRM measures are potential firm-specific factors, and we look for those correlated with both profitability and the proportion of female workers.

We begin with an overview of the literature analyzing the relationship between HRM measures and the proportion of female workers and corporate performance. Regarding HRM measures and the proportion of female workers, Kawaguchi (2002) demonstrates using data from a questionnaire survey conducted in the Kansai region in 2000 that HRM measures do not affect women’s employment. Wakisaka (2001) examines child care leave systems and the proportion of females using data from *Joshi (Josei) Koyo Kanri Kihon Chosa* [Basic survey on woman’s employment management] for 1995, 1996, and 1997. At small establishments (with 30 or fewer workers), the cost of child care leave systems is excessive and hiring of women is limited, and so the effect on the proportion of female workers is negative. At large firms, conversely, the proportion of female workers is significantly increased and the effect on length of women’s service is positive. Regarding child care leave systems, Morita and Kaneko (1998) also verify, using data from *Josei no Shugyo Ishiki to Shugyo Kodo ni Kansuru Chosa* [Survey of women’s attitudes to work and work behavior] conducted by the Japan Institute of Labour in 1996, that child care leave systems increase women’s length of service. Employing individual data from *Shohi Seikatsu ni Kansuru Paneru Chosa* [Japanese Panel survey of Consumers] (the Institute for Research on Household Economics) Shigeno and Okusa (1998) similarly suggest that child care leave systems have the effect of encouraging continuation in employment.

Regarding the relationship between HRM measures and corporate performance, Perry-Smith and Blum (2000) demonstrate that firms that implement multiple, rather than individual, family-friendly measures in combination exhibit both higher proportions of female

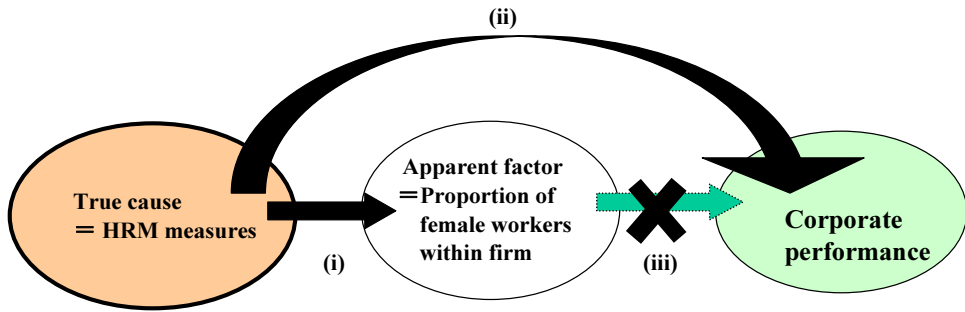


Figure 1. Relationship between Corporate Performance and Proportion of Females

workers and higher corporate performance (in terms of growth in sales). In addition, Konrad and Mangel (2000) show that the proportion of specialist personnel, proportion of female workers, and cross term of the composite work-life index (WLI) have a positive effect on corporate performance (sales per person). In Japan, Sakazume (2002) estimated the relationship between family-friendly measures and the rate of change in ordinary profit using data from a survey of firms conducted by the Japan Productivity Center for Socio-Economic Development in 2001 and data on employees from respondent firms, confirming that there is no significant relationship.<sup>15</sup> Abe and Kurosawa (2006) have also demonstrated, using data from *Shigoto to Seikatsu no Ryoritsu Shien Saku to Kigyo Gyoseki ni Kansuru Chosa* [Survey of measures to assist the balancing of work and family and corporate performance] conducted in 2005 by the NLI Research Institute, that firms with better child care leave systems that exceed statutory requirements and arrangements for working shorter hours to care for a relative exhibit higher performance (in terms of the rate of change in value of sales and ordinary profit).

The specific approach by which we search for the “true factors” affecting both the proportion of female workers and corporate performance is shown in Figure 1. The first step is to select those HRM measures that raise both the proportion of females (i) and profitability (ii). Next, each of the HRM measures survived as the result of (i) (ii) estimation and the proportion of females are added to the explanatory variables in the estimate equation for profitability again. (the same number of regressions as there are measures is per-

<sup>15</sup> Clifton and Shepard (2004) have demonstrated that work-family support programs raise productivity. Arthur (2003) and Arthur and Cook (2004) examine the impact on share prices of family-friendly initiatives reported in *The Wall Street Journal* using the event study approach, and find that there is a positive correlation between family friendly measures and share price. Kawaguchi and Nagae (2005) likewise use the event study approach to examine the impact of the Company Award for the Promotion of Gender Equality and Family-Friendly Company Award on award winners’ share prices. Their findings show that while the Family-Friendly company Award boost the share price of award winners in the short term, the effect is the reverse in the case of firms whose profits are falling, and the Company Award for the Promotion of Gender Equality depresses the share price of award winners in the short term. Roehling, Roehling, and Moen (2001), meanwhile, explain how worker loyalty is positively correlated with flextime and the informal support of superiors and coworkers.

formed.) If, in the course of regressing profitability, one of the subsequently added HRM variables is found to be significant while the coefficient for the proportion of females ceases to be significant, or the absolute value of the coefficient shrinks, then it may be surmised that that HRM variable is the true cause raising both the proportion of female workers and corporate performance, and the apparent explanatory force of the proportion of female workers in relation to profitability is removed (iii).

As these calculations depend on a sample of data created by matching data from the *BSJBSA* with data from the *QCHFS*, which covers firms that are popular as sources of employment among female students, there is a possibility of the estimates being affected by selection bias due to the correlation of the error term and explanatory variables such as the proportion of female workers and HRM variables. We therefore checked and controlled for this bias by following Heckman's (1979) two-stage estimation procedure.

## (2) Estimation Results

Table 5 shows the results of estimation of whether HRM-related variables affect the proportion of female workers.<sup>16</sup> Eight of the 11 HRM variables have a significant effect on the proportion of females. It was also estimated whether personnel and labor-related variables affect profitability. Three measures—"small gender difference in length of service," "high proportion of female managers," and "existence of reemployment systems"—were found to have a significant effect on profitability (results table omitted). From these two results, it can be seen that the above three measures have a significant effect on both the proportion of female workers and profitability.

In order to confirm whether these three HRM-related variables are firm-specific factors that raise the proportion of female workers and also raise profitability, we next examine whether the proportion of female workers loses its explanatory power in the estimation equation adopting profitability as the dependent variable by controlling for these HRM variables.

Columns 1 and 2 of Table 6 show the results of estimates regarding the relationship between profitability and the proportion of female workers, corrected for the sample selection bias and calculated using matchable data from the *QCHFS* and the *BSJBSA*. Column 1 shows the results of estimates calculated without employing an identification variable removed at the second stage of the two-stage Heckman procedure, and identification relies on the nonlinearity of the inverse Mill's ratio. Here, the coefficient for the log number of regular employees is not significant, and so in column 2 the accuracy of identification is ensured

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<sup>16</sup> In this search, too, we correct for sample selection bias having controlled for industry and ratio of foreign ownership, etc. As most HRM measures mainly apply only to permanent employees, the proportion of female workers used here is the ratio of female permanent employees excluding part-time workers. Even if we use the proportion of females including part-time workers, however, the results are the same except for the effect of overtime and possibility of internal transfers by women, which cease to be significant.

Table 5. Relationship between Proportion of Female Workers and HRM Measures

Dependent variable: Ratio of female permanent employees	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Gender difference in length of service	-0.003	0.001	0.018	0.010	0.588	0.080	0.359	0.054	0.026	0.010	-0.042	0.015	-0.034	0.010		
Reemployment system																
Ratio of female managers																
Proportion of women among main career track hires																
Better than statutorily required child care leave system																
Log of overtime																
Existence of flextime system																
Possibility of women's internal transfer																
Ratio of foreign ownership	-0.049	0.047	-0.204	0.062	-0.180	0.098	-0.271	0.105	-0.126	0.046	-0.130	0.126	-0.166	0.059	-0.205	0.012
Year of establishment	-0.136	0.278	1.062	0.323	0.034	0.425	0.378	0.473	0.766	0.262	0.402	0.555	1.096	0.310	1.144	0.325
Constant	0.458	0.541	0.256	0.014	0.245	0.810	-0.437	0.898	-1.253	0.307	-0.324	1.049	-1.860	0.600	-1.940	0.631
Inverse Mill's ratio	0.028	0.009	-0.022	0.010	-0.070	0.029	-0.091	0.033	-0.024	0.009	-0.074	0.047	-0.028	0.009	-0.029	0.010
N	66634		66634		66634		66634		66634		66634		66634		66634	
Select number	1097		838		256		245		1128		182		869		834	
$\rho$	0.225		-0.173		-0.535		-0.624		-0.188		-0.523		-0.228		-0.231	

Notes: 1. Heckman two-stage estimation. A first-stage probit analysis was performed using the ratio of foreign ownership, log of regular employment, listed status, and year of establishment.  
 2. Year dummies and 3-digit industry dummies are included (not reported).  
 3. The coefficient for year of establishment is multiplied by 1,000.

Table 6. Relationship between Profitability and HRM Measures

Dependent variable: Profitability	(1)		(2)		(3)		(4)		(5)		(6)	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Gender difference in length of service												
Reemployment system												
Ratio of female managers												
Ratio of female permanent employees	0.016	0.009	0.020	0.008	0.005	0.005	0.005	0.003	0.057	0.032	0.005	0.003
Ratio of foreign ownership	0.055	0.012	0.057	0.012	0.049	0.014	0.035	0.019	0.164	0.040	-0.006	0.010
Year of establishment	0.484	0.067	0.483	0.067	0.350	0.084	0.493	0.099	0.539	0.158	0.042	0.018
Log of regular employment	-0.003	0.003									0.257	0.101
Constant	-0.885	0.132	-0.908	0.129	-0.626	0.164	0.031	0.005	-1.103	0.301	-0.449	0.197
Inverse Mill's ratio	0.005	0.007	0.011	0.002	0.010	0.003	0.005	0.003	0.052	0.012	0.005	0.003
N	66634		66634		66634		66634		66634		66634	
Select number	1763		1763		1097		838		256		826	
$\rho$	0.125		0.269		0.253		0.146		0.828		0.135	

Notes: 1. Heckmann two-stage estimation. A first-stage probit analysis was performed using the proportion of female workers, ratio of foreign ownership, year of establishment, log of regular employment, and listed status.  
 2. Year dummies and 3-digit industry dummies are included (not reported).  
 3. The coefficient for year of establishment is multiplied by 1,000.

by removing this log number of regular employees as an identification variable. The coefficients between the proportion of females and profitability are consistent with the results of the cross-section analysis described previously, and are positively significant (coefficient = 0.016, 0.020).

Columns 3-5 of Table 6 show the results for profitability using the HRM variables and proportion of female workers as the explanatory variables. “Gender difference in length of service” and “reemployment system” have a significant impact on profitability, and the proportion of female workers is not significant. On the other hand, although the coefficient between “ratio of female managers” and profitability is positive at the 10% significance level (coefficient = 0.057), the coefficient for the proportion of female workers is also positive at the 10% level, as well as being larger (coefficient = 0.050), and so the condition for being a “true cause” is not satisfied. From this, it would appear that the two variables “gender difference in length of service” and “reemployment system” raise both profitability and the proportion of female workers, and are the “true causes” in the background that create the spurious correlation between profitability and the proportion of female workers. Column 6 of Table 6 shows the results of estimates using “gender difference in length of service,” “reemployment system,” and the proportion of female workers simultaneously as explanatory variables. The coefficients for the two variables are significant, and the coefficient for proportion of females is not significant, which confirms that “gender difference in length of service” and “reemployment system” are highly likely to be “true causes.”

## **V. Types of HRM Measure and Impact on Female Employment and Corporate Profits**

### **1. Gender-Equality Measures and Family-Friendly Measures**

The estimates in the preceding section employed numerous HRM variables, and examining their effect in view of their individual purposes and characters should be highly significant from the point of view of research on HRM.

Regarding internal HRM initiatives affecting female employment, Wakisaka (2001) divides them into two types: gender-equality measures and family-friendly measures. Gender-equality measures consist of measures designed to eliminate as far as possible the gap between men and women in hiring, job content, training, pay and other treatment. Family-friendly measures, on the other hand, are regarded as having the effect of promoting the hiring and retention of high-caliber employees (especially women) through the provision of corporate support to enable employees to fulfill their family responsibilities.<sup>17</sup>

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<sup>17</sup> This may involve, for example, allowing longer child care leave than required by law, reducing overtime, not relocating women to other operations, and creating an environment that makes it easier to take child care leave and raising the proportion of workers that take child care leave.



Table 7. Relationship between Proportion of Female Workers and Profitability

		Proportion of females	
		Positive correlation with proportion of females	No correlation with proportion of females
Profitability	Positive correlation with profitability	Small gender difference in length of service Existence of reemployment system High ratio of female managers	
	No correlation with profitability	High proportion of women among main career track hires Better than statutorily required child care leave system Short overtime No flextime system No possibility of women’s internal transfer	High equality of promotion High percentage of child care leave taken High ratio of married employees

2. Relationship between Type of Measure and Female Employment/Corporate Profits

The results of our estimates of the impact on the proportion of female workers and profitability of the 11 HRM-related variables analyzed here are summarized in Table 7. Three are correlated with both the proportion of female workers and profitability, and these are strongly bound up with equality in that they are designed to enable equal use of human resources regardless of sex. For example, the existence of a small “gender difference in length of service” is suggestive of an environment in which women can remain at a firm for a long time and the importance of mechanisms for rewarding employees according to ability and performance irrespective of sex. While having a “reemployment system” tends at first sight to be classified as family friendly, the possibility of reemployment is determined by a firm on the basis of individual workers’ performance before retirement. Consequently, reemployment systems have a powerful management effect on women who have marriage and childbirth in mind, and so may also be interpreted as equality measures that raise female workers’ motivation.<sup>18</sup>

Next, four of the five HRM variables that raise the proportion of female workers but do not affect corporate performance appear to be family-friendly measures (the exception being “proportion of women among main career track hires,” which is an equality measure). These are: “(short) overtime,” “better than statutorily required child care leave system,” “flextime system,” and “no possibility of women’s internal transfer.”<sup>19</sup> Dividing HRM-related

<sup>18</sup> It is possible that “reemployment systems” may have lost most of their actual significance since 1992, when legislation on child care leave was enacted. Possible reasons for this variable nevertheless being an important explanatory variable are that women leave their jobs due to circumstances not covered by child care leave systems and the proxy variable that women were employed from before the entry into effect of the Child Care Leave Act.

<sup>19</sup> The correlation coefficient between flextime systems and proportion of female workers is negative. This is thought to be due to the fact that, as Wakisaka (2002) observes, flextime is not in practice

variables into gender-equality measures and family-friendly measures according to how they function, then, we find in general that whereas equality measures raise the proportion of female workers and also raise corporate performance, family-friendly measures raise the proportion of female workers but do not affect corporate performance.

## **VI. Discussion**

Regression analysis of cross-section data shows there to be a significant and quite large positive correlation between the proportion of female workers and profitability. This appears to support the discrimination hypothesis that holds that women are underpaid for their contributions due to discrimination, and that firms that employ more women consequently have higher profitability. When firm-specific factors are eliminated by fixed effect estimation using panel data, however, no correlation is found between the proportion of female workers and profitability, and it is not possible to discern a correlation even when allowing for a time lag. The findings consequently contradict not only the discrimination hypothesis, but also the amenity hypothesis and the negative shock hypothesis. The results of our estimates are consistent with the firm-specific factor hypothesis that holds that an apparent correlation arises as a result of the existence of firm-specific factors that raise both profits and the proportion of female workers.

When HRM-related variables are added and correction is made for selection bias, it is confirmed that two variables—“small gender difference in length of service” and “existence of reemployment system”—are “true causes” that raise the proportion of female workers and profitability. It was also discovered that whereas these are proxy variables for gender-equality HRM measures intended to enable active and equal use to be made of men and women, family-friendly HRM measures mostly increase the proportion of female workers but do not affect profitability.

Equality measures increase the proportion of female workers and also improve business performance. Interviews with firms conducted by the METI Gender Equality Panel (2003) also suggest that firms that treat their employees as individuals, regardless of sex, also make more use of women and exhibit better performance. If the correct recognition that equality measures have a positive effect on corporate performance grows more widespread, therefore, firms whose aim is to increase profits will naturally adopt and expand their use of equality measures and use of women will develop further. Firms that do not take such action will, in the long term, be weeded out, provided that the markets in which they do business are competitive. As for policy implications, the coincidence of equality HRM measures with the profit motive means that the appropriate role of government may be to provide information by developing statistics and undertaking research studies, rather

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always family friendly because flextime workers have to work considerably longer overtime than workers that work regular hours.

than by regulation and coercion through, for example, the establishment of numerical targets for hiring of women.

Family-friendly measures, on the other hand, do not increase a corporation's profits even when enhanced. What is more, there arises the problem of externalities in that the merits of introducing such measures are enjoyed by its employees' spouses and the firms that employ these spouses and are not family friendly. For example, if the employer of a woman caring for a child were to reduce overtime as a part of its family-friendly measures, the woman's husband working at another company would then be free to work more overtime. If family-friendly measures are to be enhanced through policy means, therefore, this should be pursued by society as a whole at public expense. Policies that are likely to be effective include the various costs of child care being borne by society as a whole rather than the firm, and accelerated development of public infrastructure such as day nursery. It is also important that society as a whole rethink how men as well as women work by, for example, reducing overtime.

Certain limitations of this paper should be kept in mind when discussing the implication of these results. Firstly, as the discrimination hypothesis rejected here concerns only discrimination by management, no examination has been made of the effects of other mechanisms of discrimination, such as statistical discrimination and discrimination by customers. It should also be borne in mind that the search for possible firm-specific factors raising both the proportion of female workers and profitability was restricted to HRM-related variables. Although there are other variables that should be investigated as firm-specific factors affecting both the proportion of females and profitability, such as production technology, regulations, corporate attributes and policies, and regional structure of labor supply and demand, these were not analyzed in this paper due mainly to data constraints. Furthermore, while we also attempted an analysis of the impact on profitability and the proportion of female workers of multiple HRM-related variables in combination, the lack of a sufficient theoretical framework meant that conclusions could not be drawn in this paper. These remain as areas for further research.

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