Plant size, tenure, and discrimination in internal labor markets

Evidence on sex differentials *

Michael D. Robinson

Mount Holyoke College, South Hadley, MA 01075, USA

Phanindra V. Wunnava

Middlebury College, Middlebury, VT 05753, USA
State University of New York, Binghamton, NY 13902, USA

This paper examines the link between the operation of internal labor markets and sex differentials. Using 1983 May CPS data, we test whether male/female differences in returns to tenure increase with plant size. Our results indicate that sex differentials in returns to tenure are only significant in plants employing more than 500 employees. These results suggest that the discrimination that may exist within the framework of internal labor markets is most likely to be found in large plants.

1. Introduction

Internal labor markets, exempt from many of the competitive economic forces that serve to make discrimination difficult to maintain, may play an important role in generating wage differentials between males and females. The possibilities for discrimination in internal markets were discussed extensively by Doeringer and Piore (1971). They described a number of discriminatory mechanisms that could operate in internal markets. Recent research has expanded and refined the theory of internal markets [Osterman (1987, 1984) and Berg (1983)]. Research by Figart (1987), Gerhart (1990), Hartmann (1987), and Kelley (1982) has provided evidence on the extent of discrimination in internal markets. This paper extends this work by examining the effect of plant size on gender differences in returns to tenure using aggregate data. In the first section of this paper the implications of discrimination in internal markets on the relationship between wage differentials, plant size, and employee tenure are explored. It is argued that internal labor market discrimination will manifest itself most strongly in large plants and among workers with more tenure.

In the second section a test is employed to determine whether the suspected relationship between wage differentials, tenure, and plant size exists. Earnings equations controlling for human capital, labor market, and firm characteristics are estimated for males and females that work in establishments of varying size. The results of these regressions are used to generate tenure earnings profiles for males and females. Examination of these results indicates that the difference between male and female returns to tenure is only significant in establishments with more than 500 workers and the difference between male and female returns to tenure for workers in these large plants increases with tenure. These results support the main hypothesis of this paper and provide information on the nature of discrimination in internal labor markets.

2. Internal markets, tenure, plant size and discrimination

This section considers the relationship between discrimination in internal markets and plant size and tenure. [1] Doeringer and Piore (1971) in their seminal work on internal labor markets discuss three types of discrimination: entry, internal allocation, and wage. Entry discrimination exists if the means by which males and female enter the internal market differ in a way that disadvantages female employees. Females may enter the internal market in jobs with short or no promotion ladders or in jobs with promotion ladder that lead to inferior management positions. Internal allocation discrimination consists of differential treatment of male and female employees in the same job ladder with respect to promotion. Women may be disproportionately passed over for promotion. Finally, wage discrimination exists if workers in the same occupation/job ladder receive different wages. We focus our attention on the internal allocation and entry discrimination.

There is ample case study evidence of these types of discrimination. Kelley (1982) using union data for manufacturing firms concludes that white male workers have access to job ladders offering high wages and more chances for promotion. Hartmann (1987) using firm specific data shows that all workers, but especially females, in female dominated occupations are promoted less frequently. Gerhart (1990) shows that most of the salary differentials in a large, private firm are due to differences in starting salaries.

We believe that entry and internal allocation discrimination in internal markets will be manifested by gender differences in returns to tenure that will increase with plant size. There are two reasons that discrimination from internal markets may be more prevalent in large rather than small firms. Promotion ladders will be longest in large firms. As firm size increases the number of bureaucratic levels will increase as well. This implies that job ladders will be longer and the returns to tenure greater. With longer job ladders more opportunity exists for differential treatment of male and female employees. Secondly, in large firms the number of entry ports into the internal market will be more numerous and more varied than in small firms. This would create the possibility of more entry discrimination in large firms. Firms with 20–40 employees may have only a single entry port for all workers, while firms with thousands of employees might have hundreds of entry-level positions. The more entry ports, the more possible it would be to direct males and females to different ports.

If entry and internal allocation discrimination exist, males will move more quickly up the job ladders they share with females and males will be concentrated in job ladders with greater possibilities for promotion. Therefore, the resulting wage differentials will appear and grow over

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[1] It is not the intent of this paper to review the internal markets literature in its entirety. See Osterman (1987) and Hartmann (1987) for a review of this literature.

time, as the paths of the differentially treated workers have time to diverge. This implies that unexplained differentials for male and females should grow as tenure increases.

3. Methodology and data and results

In order to test our hypothesis that gender earnings differentials will increase with tenure and plant size, earnings regressions were estimated separately for males and females in four plant size categories: 0–24, 25–99, 100–499, and 500 + employees. The data used for these regressions consists of white, full-time, non-agricultural, private workers from the May 1983 CPS. The supplement to the May 1983 CPS includes questions on tenure and plant size. A complete list of the human capital, industrial, occupational, and regional variables that were included in the earnings equations is given in table 1. To test the hypothesis that sex differentials associated with tenure increase as plant size increases tenure-earnings profiles for males and females can be compared by plant size.

Table 2 presents the results of the estimated earnings equations. The coefficients on the included human capital variables are significant and of the correct sign. Education increases earnings, as does experience (in most cases), tenure, and union status [2] (in small firms). Workers in larger plants

Table 1
Model variables.

Variable	Description
Experience	Worker's age less education and tenure
Experience2	Experience squared
Sex	=1 if male, =0 otherwise
Race	=1 if white, =0 otherwise
Education	Year's of education
Tenure	Year's of tenure
Tenure2	Tenure squared
Union	=1 if in Union, =0 otherwise
Married	=1 if married, =0 otherwise
Central City	=1 if living in central city, =0 otherwise
Balance of SMSA	=1 if living in SMSA outside the central city, =0 otherwise
Other control variables	
Region	Dummies for the nine census bureau regions
Occupation	Eight occupation dummies
Industry	Nine one-digit SIC Code Industries
Regression categories	
Plant size 1	=1 if less than 25 employees, =0 otherwise
Plant size 2	=1 if 25–99 employees, =0 otherwise
Plant size 3	=1 if 100–499 employees, =0 otherwise
Plant size 4	=1 if 500+ employees, =0 otherwise

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[2] Our finding of an inverse relationship between union premium and the size of the establishment is consistent with the union 'threat effects' argument (i.e., large non unionized firms pay workers higher wages to ward off the thereat of potential unionization and hence the union wage premium decreases with the increases in the plant size). See Podgursky (1986), and Okunade et al. (1991) for the empirical support of this phenomenon observed for wages, and total compensation, respectively.

Table 2

OLS regression results for various plant sizes (dependent variable log of hourly earnings) [a].

Variable	0–24 Employees		25–99 Employees		100–499 Employees		500+ Employees	
	Male	Female	Male	Female	Male	Female	Male	Female
Tenure	0.026	0.027	0.027	0.032	0.029	0.026	0.029	0.025
	(2.62) **	(7.56) **	(8.32) **	(7.14) **	(9.43) **	(7.68) **	(9.92) **	(5.93) **
Tenure2/100	−0.064	−0.058	−0.055	−0.067	−0.057	−0.044	−0.051	−0.056
	(−6.04) **	(−4.65) **	(−5.51) **	(−3.84) **	(−6.03) **	(−3.77) **	(−6.29) **	(−3.92) **
Intercept	0.804	0.779	1.03	0.877	1.01	0.100	1.023	1.141
	(11.99) **	(7.12) **	(12.26) **	(7.50) **	(7.19) **	(8.88) **	(9.85) **	(8.54) **
Education	0.046	0.051	0.044	0.040	0.051	0.054	0.050	0.042
	(11.32) **	(9.39) **	(8.80) **	(6.49) **	(10.91) **	(9.48) **	(11.05) **	(6.52) **
Experience	0.018	0.010	0.014	0.009	0.014	0.000	0.007	0.008
	(8.13) **	(4.35) **	(5.82) **	(3.14) **	(5.71) **	(0.12)	(2.84) **	(2.63) **
Experience2/100	−0.044	−0.024	−0.027	−0.023	−0.026	0.003	−0.004	−0.024
	(−7.58) **	(−4.10) **	(−4.00) **	(−3.00) **	(−3.57) **	(0.49)	(−0.64)	(−2.65) **
Union	0.214	0.197	0.158	0.064	0.069	0.052	−0.007	0.030
	(7.84) **	(3.90) **	(6.28) **	(1.91) *	(3.02) **	(2.02) **	(−0.32)	(1.05)
Married	0.170	−0.000	0.138	0.033	0.087	0.000	0.107	−0.019
	(7.86) **	(−0.01)	(5.49) **	(1.41)	(3.53) **	(0.00)	(4.40) **	(−0.81)
Central City	0.077	0.073	0.004	0.112	0.026	0.038	0.001	0.058
	(3.24) **	(2.68) **	(0.14)	(3.77) **	(0.94)	(1.41)	(0.06)	(1.82) *
Balance SMSA	0.108	0.072	0.095	0.127	0.106	0.079	0.037	0.108
	(5.17) **	(3.01) **	(3.85) **	(4.70) **	(4.54) **	(3.29) **	(1.61)	(3.61) **
Sample size	2265	1381	1457	903	1339	948	1250	746
F-value	38.99	25.82	27.66	19.92	29.25	25.27	30.48	11.83
Adj. R-squared	0.37	0.39	0.39	0.43	0.43	0.47	0.45	0.33
Mean of dependent variable	1.99	1.67	2.15	1.75	2.24	1.86	2.45	2.06
SSE	376.97	176.70	202.99	92.41	154.94	75.89	117.51	64.56

[a] T-Statistics in parentheses. ** Significant at the 5% level. * Significant at the 10% level. Industry, occupation, and regional dummy coefficient estimates available on request.

clearly have higher returns to tenure. [3] This is consistent with our belief that large firms have longer job ladders. Table 3 and shows the tenure-earnings profiles for males based on the tenure coefficient estimates. After 10 years, males working in plants with fewer than 25 male workers can expect to be

[3] In the literature there is debate about the possible upward (downward) bias of tenure coefficients in a wage regression due to self-selection (mobility) of workers. The proponents of 'self-selectivity' argue that workers with higher (lower) wages tend to remain in (frequently depart from) their jobs, which may result in positive correlation between tenure and unobserved heterogeneity of the quality of workers (papers by Abraham and Farber (1987), Altonji and Shakotko (1987), and Marshall and Zarkin (1987) belong to this category). On the other hand Topel (1986,1987) argues that there may be a bias in the opposite direction i.e., tenure coefficients may be underestimated because of possible negative correlation between wages and tenure. His argument is that workers who frequently change jobs tend to gain from their mobility (i.e., workers may fare well in their new jobs with shorter tenure relative to their old jobs with longer tenure). Indeed, Topel presents evidence indicating that when both these biases are corrected, they offset each other, and the resulting tenure coefficients are very similar to the OLS estimates without these corrections. Accordingly, we do not make any corrections to neutralize these biases.

Table 3
Returns to tenure by sex and plant size percent difference from no-tenure wage.

Years tenure	Male	Female	Difference	Male	Female	Difference
	(0 – 24)			*(25 – 99)*		
1	2.53	2.64	− 0.11	2.64	3.13	− 0.49
5	11.40	12.05	− 0.65	12.13	14.33	− 2.20
10	19.60	21.20	− 1.60	21.50	25.30	− 3.80
15	24.60	27.45	− 2.85	28.13	32.93	− 4.80
20	26.40	30.80	− 4.40	32.00	37.20	− 5.20
25	25.00	31.25	− 6.25	33.13	38.13	− 5.00
	(100 – 499)			*(500 +)*		
1	2.84	2.55	0.28	2.84	2.44	0.40
5	13.08	11.90	1.17	13.23	11.10	2.23
10	23.30	21.60	1.70	23.90	19.40	4.50
15	30.68	29.10	1.57	32.03	24.90	7.13
20	35.20	34.40	0.08	37.60	27.60	10.00
25	36.88	37.50	− 0.63	40.63	27.50	13.13

Source: Computed from table 2 estimates.

making 15% more than their starting salary. This increases to 20% for plants with 25–50 employees, and to 25% for over 50 and 26% over 500 employees respectively.

Our main hypothesis was that the returns to female tenure would be less than the returns to male tenure and that this difference would increase with plant size. Table 3 reports the difference between returns to tenure for males and females by plant size. In plants with less than 100 employees this difference is surprisingly negative. [4] In plants with 100 to 499 employees their is very little difference in returns to tenure, while in plants with 500 and more employees the returns to tenure for males exceeds that for females by a considerable amount. To test the null hypothesis that male and females returns to tenure were equal, F-tests on restricted regressions were conducted. Table 4 reports these results and indicates the difference in male and female returns to tenure is only significant in the largest plant size. On the basis of these results it appears as though there may be some relationship between internal markets and sex differentials.

4. Conclusions

This paper has presented a contribution towards understanding and measuring discrimination in internal labor markets. After a brief review of recent internal labor market analysis and the role

Table 4
F-statistics for testing the differences in male and female tenure coefficients.

Plant size	*F*-Ratio	Degree of freedom
0–24	0.967	2 3570
25–99	0.270	2 2284
100–499	0.670	2 2211
500 +	4.050 *	2 1920

* Significant at the 5% level.

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[4] The results for smaller plants are consistent with the those reported by Gerhart (1990) who shows that male/female salary differentials narrowed over time.

discrimination may play in internal labor markets, a hypothesis was developed that the males would have greater returns to tenure than females and that this differential would increase with plant size. Our empirical results support this hypothesis. They indicate that only in plants with 500 or more employees do males receive significantly higher returns to tenure than females.

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