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Abstract
The authors analyze eleven years of employment data for a regional grocery store chain in the United States that faced a class-action lawsuit over gender discrimination. The data include all employees' job titles, wage rates, and earnings, allowing an examination of initial job assignments, mobility between departments, and mobility into supervisory and management positions. An analysis that models the flows of individuals between different departments and jobs within the firm as a Markov process shows a pattern of intrafirm mobility and initial job assignment that generally penalized women, even when the analysis accounts for individuals' characteristics. Although the court-mandated affirmative action remedies were not formally implemented until after the period of the study, there were clear signs of relative improvement in the economic status of the firm's female employees as a result of the filing of the lawsuit and subsequent trial.

Keywords
intrafirm mobility, sex differences in pay, gender wage differential, gender discrimination, job assignment, inter-departmental mobility, promotions, , intrafirm mobility, affirmative action

Cover Page Footnote
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INTRAFIRM MOBILITY AND SEX DIFFERENCES IN PAY

MICHAEL RANSOM and RONALD L. OAXACA*

The authors analyze eleven years of employment data for a regional grocery store chain in the United States that faced a class-action lawsuit over gender discrimination. The data include all employees' job titles, wage rates, and earnings, allowing an examination of initial job assignments, mobility between departments, and mobility into supervisory and management positions. An analysis that models the flows of individuals between different departments and jobs within the firm as a Markov process shows a pattern of intrafirm mobility and initial job assignment that generally penalized women, even when the analysis accounts for individuals' characteristics. Although the court-mandated affirmative action remedies were not formally implemented until after the period of the study, there were clear signs of relative improvement in the economic status of the firm's female employees as a result of the filing of the lawsuit and subsequent trial.

A ubiquitous feature of the U.S. labor market is the segregation of men and women into different occupations. Segregation has often been implicated as a source of differences in pay between the sexes. The study of occupational segregation deserves more attention, as it may provide insights into how and why women are paid less than men. In this paper, we use administrative employment records from a regional chain of retail grocery stores to examine job segregation, differences in promotion, and differences in pay between male and female employees. We are able to trace the job assignments and pay of male and female employees over a period of several years, and can identify how segregation influenced workers' pay. Also, during the period of our study, the firm faced a class-action lawsuit over issues of promotion and pay differences between men and women. Our data permit us to observe how gender differences in job distributions and promotion opportunities may have been affected by the class action lawsuit, which provides important insights into the effectiveness of anti-discrimination laws.

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Data used to generate the results in the paper are available upon request to Michael Ransom, Department of Economics, 143 FOB, Brigham Young University, Provo, UT 84602.

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There are advantages and disadvantages of focusing on a single employer, as we do in this study. We cannot be certain that the firm we have studied is "typical" of all firms in the grocery retail industry, and we cannot know if the experiences of women in this firm are representative of all female workers in the economy. However, the data we analyze provide a very detailed look at the internal labor market of this particular employer. The issues we examine could not have been studied using a random sample of U.S. workers, since aggregating across employers would obscure the details that are most interesting. Furthermore, we believe that this firm is typical of the industry. For example, we know that the firm was party to a collective bargaining agreement with several other employers. Thus, the job titles and work assigned to those job titles were shared by at least some other employers. The circumstances faced by the particular employer are certainly important to a broad class of firms. For example, the large retailer Wal-Mart has been sued by some of its female employees, who charge that its employment policies favor men over women in promotion and pay. A federal judge has ruled that the sex discrimination lawsuit against Wal-Mart may proceed to trial as a class-action suit that may include as many as 1.6 million current and former female employees (Joyce 2004). Hence, our understanding of the gender differences in job categories and promotion in one firm and how these processes changed after the lawsuit may be of interest beyond the particular case that we examine.

Beyond the current Wal-Mart case, occupational segregation by sex persists in the contemporary labor market. The Bayard et al. (2003) study of occupational segregation by gender implies a Duncan dissimilarity index value of 0.33 based on thirteen broad occupational categories from a special employee-employer matched sample in 1990. Our own analysis of the May 2003 CPS reveals a dissimilarity index value of 0.32 for six broad occupational categories and 0.41 for the more detailed twenty-two occupational categories (see U.S. Department of Labor 2004). Thus, anywhere from a third to 40% of female workers would have to change occupational categories in order to exactly match men's broad occupational distribution.

Background

An early paper by Oaxaca (1973) found that women tend to be in lower-paying occupations. Some economists have argued that segregation of jobs into "men's work" and "women's work" is an essential element of labor market discrimination. The crowding hypothesis asserts that barriers that keep women from entering some jobs help to maintain high wages for men, while forcing women to work for lower wages. Bergmann (1986, Chapter 5), for example, stressed the role that segregation plays in reducing pay and advancement of female employees, especially within "internal" labor markets. Bielby and Baron (1984) examined how organizational structures and bureaucratic processes generate and sustain discrimination. Data for the Bielby and Baron study covered 393 California establishments over the period 1959–79. Their analysis indicated that segregation increased with establishment size and that establishment size accounted for most of the association between establishment characteristics and job segregation. Furthermore, the study observed that the scope for job segregation lessened with the female share of employment.

Neuman and Oaxaca (2003) examined the selection effects of occupational segregation on gender wage differentials among professional workers. Depending on how gender differences in the components of the selectivity terms are interpreted, estimates of gender discrimination can vary widely (Neuman and Oaxaca 2004). Baldwin et al. (2001) identified the effects of occupational segregation on gender wage gaps using a model of hierarchical discrimination in which men have a distaste for supervision by female managers. The model predicts an exponential decline in the relative proportion of female workers as one moves up the job ladder. Their analysis of a 1988 CPS

sample of workers in the insurance industry supported this prediction.

A few other studies based on firm-level data have addressed some of the issues that we are concerned with in this paper. Authors of case studies investigating the relative employment status of women and minorities usually acknowledge that their samples may not be representative of the larger population, but also point to the advantages of examining the micro processes at work in determining relative salary and promotion for women and minorities. An early example is Malkiel and Malkiel (1973). Using administrative data on professional workers in a large firm, the authors found that within job levels, men and women were paid the same, but that the lower job level assignment of women could not be completely explained by characteristics of the individuals.

Killingsworth and Reimers (1983) examined the relationships among rank, promotions, and compensation for a sample of civilian employees at a U.S. Army base during the second half of the 1970s. The study found that although job position and pay were closely related, rankings and promotions were not always closely aligned with pay and changes in pay. For example, racial wage differentials narrowed over the period of the study to the benefit of nonwhites while nonwhites failed to realize any promotional advances relative to whites.

Cannings and Montmarquette (1991) looked at the determinants of promotional mobility among mid-level managers in a Canadian services firm. The promotion rate for women was lower than for men, and there were statistically significant gender differences in the promotional structure. Women were found to rely more than men on formal applications for promotion, whereas men relied more on informal networks within the firm. There was statistical evidence to suggest the existence of an "invisible" ceiling to the career progress of women.

Solon et al. (1997) examined data similar to those used in our study. They followed the job assignments of employees at Ford Motor and the Byers Company during the 1920s and 1930s. Of particular interest to their study was how the position held by an employee changed with the business cycle.

Data

The data we analyze come from a large grocery retailer in the United States. In the early 1980s several women initiated a class-action lawsuit, alleging discrimination. As with most suits based on Title VII, this case was bifurcated—that is, the issue was first tried for whether the employer was guilty, then separately for the amount of damages and the type of affirmative relief required. The court found the defendant guilty of discrimination in 1984, and the two parties negotiated a settlement in mid-1986. The settlement required the firm to pay several million dollars in "back pay" and also to initiate affirmative action policies for promotion and job assignment. However, the affirmative relief outlined in the settlement was not formally implemented before the end of 1986 (which is the last year of our data).

Table 1 briefly summarizes some of the characteristics of the firm during the period of our analysis. The firm operated between 55 and 60 retail stores, employing 2,200 to 2,500 workers in its retail operation. (We do not have data for non-retail employees, such as truck drivers, accountants, and janitors.) About 60% of these stores were located within a single large metropolitan area. The company closed several stores and opened several new ones during this period.

The firm's employees and the pattern of work scheduling changed over the period we analyze. The proportion of employees who were women grew from about 36% to about 41%. Seniority, as defined with respect to the company rather than the job (and, to a lesser extent, age) of the typical employee, also increased over this period. Most employees worked part-time, but the proportion changed rather dramatically over this period—growing from half to three-fourths of all employees. This is further evident from the fact that the number

Table 1. Company Characteristics in Retail Operations.
(Selected Years, as of December 31)

Characteristic	*1976*	*1982*	*1986*
Number of Stores	60	58	55
Number of Stores in Largest Metropolitan Area	35	36	32
Number of Retail Employees	2,182	2,480	2,489
Percent of Employees Who Are Female	36.2%	38.8%	41.2%
Percent of Employees Who Work Part-Time	50.8%	65.4%	75.6%
Percent of Female Employees Who Work Part-Time	57.4%	75.7%	85.5%
Percent of Male Employees Who Work Part-Time	47.1%	58.9%	68.6%
Average Age	29.6	31.0	31.7
Average Seniority	4.5	5.9	6.3

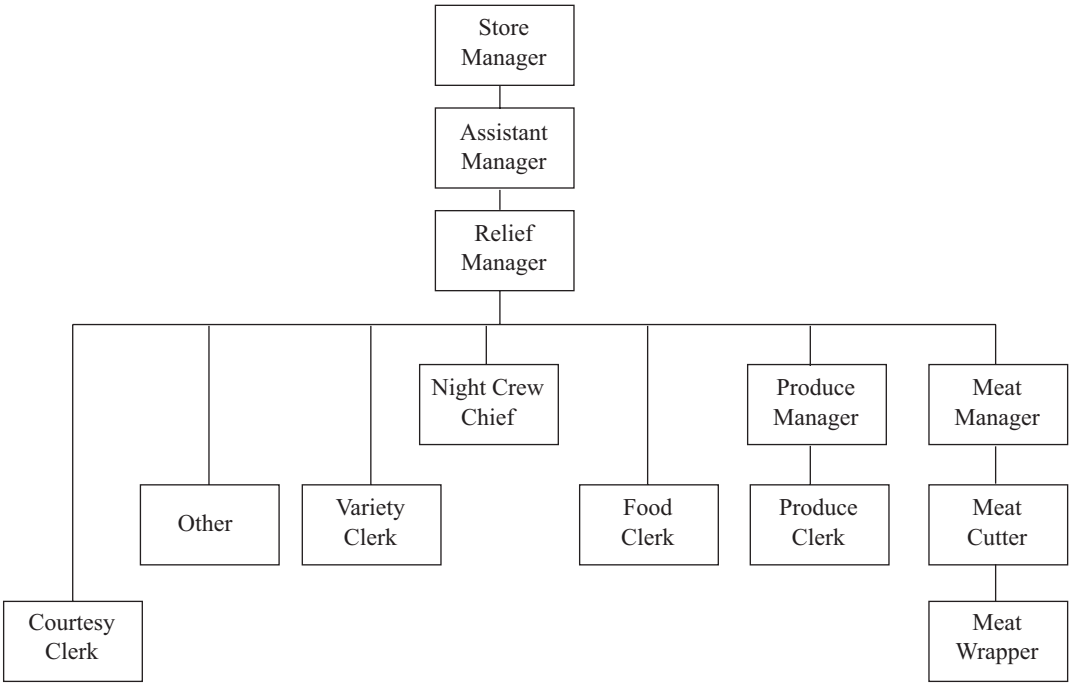
of stores decreased while the number of employees increased. Women were more likely to have part-time schedules, and by the end of the period we look at, about 86% of women were part-timers. However, the trend affected men as well. Although men were still less likely than women to work part-time (69% were doing so), the relative growth of the part-time fraction was very nearly the same for men and women between 1976 and 1986 (46–49%).

Figure 1 presents a simple organization chart for the company. Each store had three salaried positions—the store manager, the assistant manager, and the relief manager. All non-managerial employees were covered by collective bargaining agreements. Most employees were represented by local affiliates of the United Food & Commercial Workers Union, International, but meat department employees were represented by a different union. (Employees in different cities may have been represented by different local unions; however, there was little geographical variation in bargaining agreements.) We have examined one of the agreements, a multi-employer agreement that also covered several other large chains of retail groceries. This agreement excluded workers in the meat department, as well as the three salaried management positions.

The union agreement addressed the usual topics, including pay levels, premia for night or Sunday work, work scheduling, holidays, vacations, and other benefits. A few additional elements of the agreement are pertinent to the issues we analyze here. First, the employer had full control over whom to hire. Moreover, although the union was contractually entitled to timely notification of who was hired, when, and for which store, it was given surprisingly little control over job allocation; where the contract addressed that issue, it typically made clear that the employer had discretion.

It does not appear that the union contract imposed any restriction on whom the employer could place in a particular job, at least at the time of hire. Even for employees in the current work force, it appears that the employer had considerable discretion. For example, if the employer chose to promote a courtesy clerk to a food clerk position, the contract required only that the most senior courtesy clerk be considered for the job. Furthermore, the employer was free to fill the position with a newly hired employee. Movements between departments in a store were at the discretion of the employer (and were uncommon in any case, as our analysis shows). Managerial positions were outside unions' purview, and therefore neither interest nor obligation would have moved the unions to intervene on behalf of workers desiring promotion to such positions. Thus, the unions did not play a significant role in the job assignment and promotional issues raised in the lawsuit.

Figure 1. Store-Level Organization.



The most significant role of seniority appeared to be in the setting of work schedules. Part-time employees could claim the schedule of a less-senior part-time employee who was assigned to work more hours in a given week, provided that both employees worked in the same department. However, the contract made clear that the company could decide who was to fill any full-time position, although it required that the most senior part-time employee be considered.

There was some significance attached to working full-time, but this did not have a large impact on fringe benefits. Employees working at least 80 hours per month received the full employer contribution to the union's health and dental plan. Vacation and sick leave accrued roughly in proportion to the number of actual hours worked. (Thus, someone working 20 hours per week accrued vacation days at about half the rate of someone working 40 hours per week.) Courtesy Clerks did not qualify for benefits, regardless of number of hours worked.

There were basically four "departments" in each store: meat, produce, grocery, and variety (non-foods). The produce and meat departments each had a manager. These managers were part of the collective bargaining unit, and they received a higher wage than other employees. The night crew chief supervised stocking of the store during the night, and also received a wage premium. The variety department did not have a manager. A few stores had specialized departments, such as a bakery; for our analysis, these employees are lumped together in the "other" category. Courtesy clerks bagged and carried groceries for customers.

Table 2 provides summary statistics for the job categories shown in Figure 1. The average wage (or salary), as of December

Table 2. Characteristics of Job Holders.
(Year End, 1982)

Job Title	*Variable*	*Mean*	*Std. Dev.*	*Minimum*	*Maximum*
Store Manager (N = 58)					
	Weekly Salary	609.00	0	609.00	609.00
	Annual Earnings	34,099.05	3,859.89	31,543.00	44,204.10
	Seniority	15.61	8.23	0.38	34.12
	Age	39.44	9.92	25.19	63.14
	Female	0.00	0.00	0.00	0.00
Assistant Manager (N = 58)					
	Weekly Salary	541.00	0.00	541.00	541.00
	Annual Earnings	28,308.88	386.64	27,536.00	29,199.00
	Seniority	10.85	6.42	0.41	34.21
	Age	33.34	8.68	21.97	54.97
	Female	0.05	0.22	0.00	1.00
Relief Manager (N = 57)					
	Weekly Salary	513.00	0.00	513.00	513.00
	Annual Earnings	26,561.52	146.16	26,147.00	27,047.00
	Seniority	7.04	5.06	0.55	31.13
	Age	30.16	9.44	20.30	58.44
	Female	0.05	0.23	0.00	1.00
Food Clerk (N = 1,114)					
	Hourly Wage	9.06	0.99	5.58	9.55
	Annual Earnings	17,222.82	3,199.21	3,283.58	23,297.20
	Seniority	6.39	5.08	0.03	32.83
	Age	33.36	11.76	17.72	65.02
	Female	0.54	0.50	0.00	1.00
Night Crew Chief (N = 56)					
	Hourly Wage	9.65	0.12	9.50	9.75
	Annual Earnings	20,984.38	1,391.08	17,841.61	24,153.07
	Seniority	6.32	3.98	0.50	22.34
	Age	29.68	8.97	20.54	56.83
	Female	0.05	0.23	0.00	1.00
Courtesy Clerk (N = 568)					
	Hourly Wage	3.19	0.29	2.85	3.60
	Annual Earnings	4,859.61	1,408.86	1,760.35	9,761.70
	Seniority	0.90	0.83	0.02	4.40
	Age	19.16	4.62	16.09	72.63
	Female	0.29	0.46	0.00	1.00
Produce Manager (N = 58)					
	Hourly Wage	9.85	0.10	9.65	10.01
	Annual Earnings	23,454.38	1,108.86	18,900.44	25,165.37
	Seniority	14.64	8.61	2.17	31.90
	Age	36.29	9.86	20.04	56.61
	Female	0.00	0.00	0.00	0.00

Continued

31, 1982, is reported for each category, along with the average age, average seniority, and proportion female. The average annual earnings are reported for employees who held the same job title on December 31, 1981. These annual earnings include bonuses paid to management employees. Most job titles encompassed several different pay rates. Pay scales for clerks were based on seniority level. Scales may have varied slightly by location because the union contracts varied slightly from city to city.

Store-level managers typically earned substantially more than other employees. However, the average earnings of the meat

Table 2. Continued.

Job Title	*Variable*	*Mean*	*Std. Dev.*	*Minimum*	*Maximum*
Produce Clerk (N = 109)					
	Hourly Wage	8.95	1.13	5.58	9.55
	Annual Earnings	17,899.87	3,478.52	7,811.48	22,281.83
	Seniority	6.61	6.62	0.22	32.78
	Age	30.21	10.39	16.73	61.89
	Female	0.12	0.33	0.00	0.00
Meat Manager (N = 57)					
	Hourly Wage	11.64	0.09	11.29	11.67
	Annual Earnings	29,147.17	1,572.17	25,116.82	32,309.71
	Seniority	11.43	7.43	1.42	29.08
	Age	40.65	9.05	27.21	64.48
	Female	0.00	0.00	0.00	0.00
Meat Cutter (N = 168)					
	Hourly Wage	11.28	0.33	7.20	11.33
	Annual Earnings	24,523.44	2,652.64	3,212.41	28,909.21
	Seniority	7.19	5.87	0.41	28.64
	Age	41.36	11.01	23.11	65.98
	Female	0.01	0.08	0.00	1.00
Meat Wrapper (N = 89)					
	Hourly Wage	10.28	0.27	9.07	10.40
	Annual Earnings	18,758.66	4,164.13	2,156.20	24,197.57
	Seniority	8.33	6.88	0.23	26.00
	Age	41.90	11.42	20.47	64.84
	Female	0.97	0.18	0.00	1.00
Variety Clerk (N = 78)					
	Hourly Wage	7.26	0.96	5.39	8.64
	Annual Earnings	13,132.72	2,410.48	7,736.17	17,021.99
	Seniority	6.42	4.67	0.16	16.31
	Age	32.69	12.63	16.71	63.34
	Female	0.95	0.22	0.00	1.00
Other (N = 13)					
	Hourly Wage	6.55	0.95	5.58	8.47
	Annual Earnings	11,659.68	3,074.14	7,674.86	18,272.61
	Seniority	5.86	5.59	0.24	18.96
	Age	36.28	15.57	18.05	62.08
	Female	0.77	0.44	0.00	1.00

*The Annual Earnings variable is measured only for those who held the same job title on December 31, 1981, and December 31, 1982.

department manager were greater than those of the assistant or relief managers. Other meat department employees also received relatively high wages compared with workers in other departments.

Most employees in the store worked as food clerks. This job included those who stocked shelves and those who operated cash registers. The average wage for food clerks was about $9 per hour at the end of 1982, excluding night shift or overtime premia. This was probably a fairly attractive wage for a job with no special education requirements. By comparison, the average wage of production workers in manufacturing in the United States for June 1982 was $8.50.[1]

Produce clerks and variety clerks also stocked. Produce clerks had the same union

[1]U.S. Bureau of the Census, *Statistical Abstract of the United States, 1982–83* (103rd edition), Table 665.

Table 3. Distribution of Men and Women across Jobs in 1982.

Job	*Women Holding Title*	*Fraction of All Women*	*Men Holding Title*	*Fraction of All Men*
Store Manager	0	0.000	58	0.038
Assistant Manager	3	0.003	55	0.036
Relief Manager	3	0.003	55	0.036
Food Clerk	599	0.623	507	0.334
Night Crew Chief	3	0.003	53	0.035
Courtesy Clerk	170	0.177	403	0.265
Produce Manager	0	0.000	58	0.038
Produce Clerk	13	0.014	96	0.063
Meat Manager	0	0.000	57	0.038
Meat Cutter	1	0.001	167	0.110
Meat Wrapper	86	0.089	3	0.002
Variety Clerk	74	0.077	4	0.003
Other	10	0.010	3	0.002
Total	962	1.000	1,518	1.000

wage scale as food clerks, but the variety clerks' scale was much lower. The average wage of variety clerks was $1.75 per hour less than that of produce clerks and food clerks. Courtesy clerks worked for near the minimum wage. There was heavy turnover among courtesy clerks, with average seniority of only about one year. Courtesy clerks were about 10 years younger, on average, than food clerks and produce clerks.

Segregation and Wage Differentials

The distribution of men and women across job titles is reported in Table 3. Job titles within this company were highly segregated. For example, the store-level management and department management positions were occupied almost completely by male employees. (No woman had ever been a store manager for the firm as of December 31, 1982.) While 39% of the work force was composed of women, 95% of variety clerks and meat wrappers were women, compared to only 12% of produce clerks and less than 1% of meat cutters. Courtesy clerk jobs were disproportionately filled by men.

A convenient way to summarize the level of segregation is to use the dissimilarity index, D. This index is widely attributed to Duncan and Duncan (1955), who described some of its properties. The Duncan index is defined as

$$D = \tfrac{1}{2} \sum_{i=1}^{K} \left| p_i^m - p_i^f \right|,$$

where p_i^f is the proportion of all women in job i and p_i^m is the proportion of all men in job i. The dissimilarity index is bounded between 0 and 1. Proportional representation of men and women in all job categories would yield a value of 0; completely segregated categories would yield a value of 1. D has a convenient interpretation—it is equal to the fraction of women (or men) who would have to change jobs in order for the proportions of men and women in each job to be equal. In this case, about 46% of women would have to change jobs to achieve proportional representation in all jobs. For other applications of the dissimilarity index to labor market segregation, see Albelda (1986) or Ransom (1990). Because the number and types of job titles can be quite different across studies, it is not really possible to compare our estimated measure of occupational segregation with those from other studies. Nevertheless, as we discussed

in the introduction, occupational segregation is a well-documented feature of the contemporary work force.

Table 4 reports the average characteristics of men and women in the various hourly paid jobs. In most jobs, the average woman was paid more than the average man, reflecting the typically higher seniority and age of female employees. This is also demonstrated in Table 5.

Table 5 presents results of regression analysis of the natural logarithm of the hourly wage for employees present at the end of 1982. (Salaried employees are excluded.) The first column shows that women's wages were about 8.5% higher than men's, on average. However, this difference was due to the higher seniority and age of women. Column II shows that after we allow for these differences, women's wages were actually about 8.3% *less* than the wages of similarly qualified men.[2]

The third column of Table 5 includes indicators for the job title of the employee. Once these are included, the estimated male/female wage difference falls to only about 1.5%. Thus, virtually all sex differences in pay can be associated with the job assignment of the employee. In fact, column IV would suggest that job title variables explain about 95% of all of the variation in wages. However, the endogeneity between job title and wage rate is strongly manifest in these data. Of course, this result cannot be a surprise, since job titles were associated contractually with wage levels. But this makes the male/female wage difference that we observe all the more startling: among these workers, although wages were set by a collective bargaining agreement that was, ostensibly, gender-neutral, a large wage differential arose because women were placed in jobs different from those assigned to similar men. (It is also worth noting that most of the management positions, which had the highest pay, are excluded from this analysis since they were salaried. Those positions were exclusively male in 1982.)

Table 4. Average Characteristics of Employees in Hourly Paid Jobs, by Sex. (December 31, 1982)

Job Title	*Variable*	*Average Male*	*Average Female*
Food Clerk	Wage	9.03	9.09
	Seniority	5.84	6.88
	Age	27.9	37.99
Night Crew Chief	Wage	9.66	9.58
	Seniority	6.10	10.35
	Age	29.03	41.17
Courtesy Clerk	Wage	3.17	3.23
	Seniority	0.90	0.99
	Age	18.95	19.41
Produce Manager	Wage	9.85	—
	Seniority	14.64	—
	Age	36.29	—
Produce Clerk	Wage	9.02	8.48
	Seniority	7.10	2.95
	Age	30.56	27.65
Meat Manager	Wage	11.64	—
	Seniority	11.43	—
	Age	40.65	—
Meat Cutter	Wage	11.28	11.33
	Seniority	7.22	1.47
	Age	41.44	28.7
Meat Wrapper	Wage	9.76	10.3
	Seniority	2.15	8.55
	Age	21.25	42.63
Variety Clerk	Wage	5.71	7.35
	Seniority	2.15	8.55
	Age	18.31	33.47
Other	Wage	5.81	6.77
	Seniority	2.43	6.88
	Age	29.33	38.37

Intrafirm Mobility

The relatively disadvantageous job assignments for women could have arisen from two sources: (1) initial assignment at time of hire, and (2) promotions or other job changes during the employee's tenure

[2]Separate log hourly wage regressions were run for men and women that controlled only for age, age squared, seniority, and seniority squared. When evaluated at the combined sample mean, the cross-section rates of return to age and seniority were higher for men. This is consistent with the lower promotion rates and less desirable job assignments for the firm's female employees.

Table 5. Regression Results, Hourly Workers, 1982.
(Dependent Variable Is Logarithm of Hourly Wage; Standard Errors in Parentheses)

Variable	*I*	*II*	*III*	*IV*
Intercept	1.927 (0.013)	–0.292 (0.048)	0.856 (0.019)	1.152 (0.005)
Female	0.085 (0.021)	–0.083 (0.012)	–0.015 (0.005)	0.011 (0.005)
Seniority	—	0.063 (0.003)	0.019 (0.001)	—
$(\text{Seniority})^2$	—	–2.19e–03 (1.25e–04)	–6.22e–04 (4.60e–05)	—
Age	—	0.116 (0.003)	0.020 (0.001)	—
$(\text{Age})^2$	—	–1.35e–03 (4.02e–05)	–2.31e–04 (1.67e–05)	—
Food Clerk	—	—	0.900 (0.007)	1.038 (0.006)
Night Crew Chief	—	—	0.963 (0.015)	1.114 (0.015)
Produce Manager	—	—	0.942 (0.015)	1.135 (0.015)
Produce Clerk	—	—	0.900 (0.011)	1.029 (0.011)
Meat Manager	—	—	1.095 (0.016)	1.302 (0.015)
Meat Cutter	—	—	1.091 (0.011)	1.270 (0.010)
Meat Wrapper	—	—	1.012 (0.013)	1.167 (0.013)
Variety Clerk	—	—	0.687 (0.013)	0.811 (0.014)
Other	—	—	0.594 (0.027)	0.710 (0.031)
Courtesy Clerk	—	—	—	—
R^2	0.008	0.680	0.961	0.949

at the firm. We will examine both of these issues.

A Markov Model of Mobility

One way to capture intrafirm job movements is with a simple Markov model. Assume that there are K job categories. At any time t, the proportion of employees in each category can be represented by a $1 \times K$ vector, P_t, where the ith element is P_{it}. We are interested in examining the relationship between P_t and P_{t-1}, as well as the long-run value of P_t as t becomes very large.

Central to this model is a matrix of transition probabilities. We define a $K \times K$ matrix, A, whose ij^{th} element a_{ij} represents the probability of moving from category i in period t–1 to category j in period t. The ith row contains the probabilities of moving from category i in t–1 to each of the K categories in period t. Thus, the elements of each row sum to 1. If the job mobility process is stationary, then the following relationship must hold:

(1) $$P_t = P_{t-1}A.$$

In general, one can express P_t in terms of an initial period job distribution and the transition matrix by backward recursion:

(2) $$P_t = P_0 A^t.$$

The long-run distribution of employees across the K categories, P^*, is independent of the initial distribution, and is defined by

(3) $$\lim_{t\to\infty} (P_0 A^t) = P^*.$$

Without loss of generality, we designate the first row of the transition probability matrix A as the transition probabilities corresponding to a new hire being assigned job titles 1 through K. We designate the first column of A as the transition probabilities corresponding to an employment separation (quit, discharge, retirement) from job titles 1 through K. The steady-state solution P_1^* (the first element of P^*) may be interpreted as the probability that an employee would leave the company in any given period. Therefore, an employee's expected tenure equals $1/P_1^*$.

Assuming that the long-run distribution is stationary, the solution for the elements of P^* is obtained from

(4) $$P_1^* = 1 - \sum_{i=2}^{K} P_i^*$$

and

(5) $$P_j^* = \sum_{i=1}^{K} a_{ij} P_i^* \text{ for } j = 2,\ldots, K.$$

In matrix notation the steady state solution to the process may be expressed as

(6) $$P^* = P^* \tilde{A}^{TR} + b$$

(7) $$\Rightarrow P^* = b(I_K - \tilde{A}^{TR})^{-1},$$

where $P^* = (P_1^*, P_2^*, \ldots, P_K^*)$, $\tilde{A} =$

$$\begin{pmatrix} 0 & -1 & . & . & . & -1 \\ a_{12} & a_{22} & . & . & . & a_{K2} \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ a_{1K} & a_{2K} & . & . & . & a_{KK} \end{pmatrix}$$

$b = (1,0,\ldots,0)$, and I_K is an identity matrix of dimension K.

In our case, the elements of A are estimated from observed transitions. We use the estimator

$$\hat{a}_{ij} = \frac{\sum_{t=2}^{T} E_{ijt}}{\sum_{t=2}^{T} N_{i,t-1}},$$

where E_{ijt} is the number of employees in category j in year t who were in category i in year t–1, and $N_{i,t-1}$ is the number of employees in category i in year t–1. We have estimated these separately for male and female employees.

Tables 6a and 6b present our estimates of the transition matrices based on job titles held by employees as of year-end 1976, 1977, 1978, and 1979. The entries in the rows of the table show the disposition of the individuals who held the job title the previous year. For example, the second entry in the first column of Table 6a shows that 8.5% of male store managers had separated from the company by the end of the next year. This matrix clearly shows the path to management—3.9% of food clerks were promoted to night crew chief each year, while 18.5% of crew chiefs were promoted to relief manager, 19.5% of relief managers were promoted to assistant manager, and 9.7% of assistant managers were promoted to store manager.

This table also shows why men were absent from some job titles. For example, the first row of the table shows that no men were hired as meat wrappers or variety clerks during the period. Those who held meat wrapper or variety clerk jobs at the beginning of the period left the company at a high rate.

Table 6b offers a graphic explanation of the source of segregation and glass ceilings for women. Many more entries in this matrix contain zeroes than in the corresponding male matrix. The largest fraction of women who were hired became food clerks, but about 7% of all hires became meat wrappers and about 6% became variety clerks. Of the food clerks, about 80% remained in the category each year, and

Table 6a. Transition Probabilities: Male Employees.
(December 31, 1976–December 31, 1979)

	Destination Category													
Source Category	*Terminated*	*Store Manager*	*Assistant Manager*	*Relief Manager*	*Food Clerk*	*Crew Chief*	*Courtesy Clerk*	*Produce Manager*	*Produce Clerk*	*Meat Manager*	*Meat Cutter*	*Meat Wrapper*	*Variety Clerk*	*Other*
New Hires	0	0.0026	0.0013	0.0086	0.205	0.0086	0.6839	0.002	0.0271	0.0007	0.0602	0	0	0
Store Manager	0.0847	0.8701	0.0282	0	0.0113	0	0	0.0056	0	0	0	0	0	0
Assistant Manager	0.1257	0.0971	0.7371	0.0229	0.0171	0	0	0	0	0	0	0	0	0
Relief Manager	0.1379	0	0.1954	0.6207	0.0402	0	0	0.0057	0	0	0	0	0	0
Food Clerk	0.2277	0.0008	0.0024	0.0295	0.6561	0.039	0.0247	0.0024	0.0175	0	0	0	0	0
Crew Chief	0.1481	0	0	0.1852	0.1852	0.463	0	0	0.0185	0	0	0	0	0
Courtesy Clerk	0.6487	0	0	0	0.1377	0.0024	0.1733	0	0.0364	0	0.0016	0	0	0
Produce Manager	0.0457	0	0.0057	0.0057	0	0	0	0.88	0.0629	0	0	0	0	0
Produce Clerk	0.1709	0	0	0.0028	0.1289	0	0.0112	0.0364	0.6471	0	0.0028	0	0	0
Meat Manager	0.0629	0	0	0	0	0	0	0	0	0.8914	0.0457	0	0	0
Meat Cutter	0.1111	0	0	0	0	0	0	0	0.0025	0.042	0.8444	0	0	0
Meat Wrapper	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Variety Clerk	0.4	0	0	0	0	0	0	0	0	0	0	0	0.6	0
Other	0.3333	0	0	0	0	0	0.333	0	0	0	0	0	0	0.333

Table 6b. Transition Probabilities: Female Employees.
(December 31, 1976–December 31, 1979)

	Destination Category													
Source Category	*Terminated*	*Store Manager*	*Assistant Manager*	*Relief Manager*	*Food Clerk*	*Crew Chief*	*Courtesy Clerk*	*Produce Manager*	*Produce Clerk*	*Meat Manager*	*Meat Cutter*	*Meat Wrapper*	*Variety Clerk*	*Other*
New Hires	0	0	0	0	0.4627	0	0.4004	0	0.0044	0	0	0.069	0.0567	0.0067
Store Manager	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0
Assistant Manager	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0
Relief Manager	1	0	**0**	0	0	0	0	0	0	0	0	0	0	0
Food Clerk	0.1895	0	0	**0.0006**	0.804	**0.0026**	0.0019	0	0.0006	0	0	0	0.0006	0
Crew Chief	0	0	0	**0**	0	1	0	0	0	0	0	0	0	0
Courtesy Clerk	0.6122	0	0	0	0.1749	0	0.1574	0	0.0117	0	0	0.0058	0.0379	0
Produce Manager	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Produce Clerk	0.2500	0	0	0	0.2500	0	0.125	0	0.375	0	0	0	0	0
Meat Manager	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meat Cutter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meat Wrapper	0.1853	0	0	0	0	0	0.0035	0	0	0	0	0.8112	0	0
Variety Clerk	0.2222	0	0	0	0.0206	0	0.0041	0	0	0	0	0	0.7531	0
Other	0.3235	0	0	0	0	0	0	0	0	0	0	0.0294	0	0.6471

almost all of the remaining 20% left the firm. To draw the reader's attention to the stark contrast with male food clerks, in Table 6b we have used bold for the values representing the transition probabilities on the promotion path from food clerk to managerial positions. Less than 3/10 of 1% moved to the crew chief position.[3] Female variety clerks had about a 2% chance of becoming food clerks; 98% either remained variety clerks or left the firm. Less than 1/2 of 1% of meat wrappers moved to a different position within the company each year. (Male meat department employees did not move to other parts of the store, either.) Our results on glass ceilings are consistent with what Canning and Montmarquette (1991) found.

A potentially important factor in job assignment and promotion is the propensity for quits to occur. Viscusi (1980) found that among workers with less than one year of seniority, women were about twice as likely as men to quit their jobs. In contrast, among workers with one or more years of seniority, women were less likely than men to quit. Differences in job characteristics primarily accounted for gender differences in quit rates as opposed to differences in quit behavior or personal characteristics. These findings were supported by the Blau and Kahn (1981) study of young workers. It was found that the higher unadjusted quit rates among women vanished after controlling for personal and job characteristics. In fact, gender differences in job characteristics accounted for a significant portion of the gender difference in quit rates.

In the present study the implications of the observed transition rates for job quit behavior are revealed by looking at the long-run job separation probabilities for men and women. For the 1976–79 period the probabilities of a job separation were 0.218 and 0.197 for men and women, respectively. These probabilities imply an expected tenure of 4.6 years for men and 5.1 years for women. The second period we look at is 1983–86, which corresponds to the period following the filing of the lawsuit. The transition probabilities we estimate for this period are based on job titles held by employees as of year-end 1983, 1984, 1985, and 1986. To conserve space we do not report these transition probability matrices. During this period of the lawsuit the probabilities of a job separation increased to 0.270 and 0.231 for men and women, respectively. Correspondingly, the expected tenure fell to 3.7 years for men and to 4.3 years for women. Therefore, the company could expect that women would stay with the firm on average a half-year longer than the men. Conditional upon remaining with the company, the steady-state job title distribution is calculated according to $P_j^*/(1 - P_1^*)$, $j = 2,\ldots,K$. Table 7 presents the long-run job title distribution for the 1976–79 data that are presented in Tables 6a and 6b, and also the long-run distribution implied by transitions observed between 1983 and 1986. The level of segregation implied, as measured by the dissimilarity index, falls dramatically from 0.562 to 0.325. The lawsuit filed against the company in the early 1980s appears to have changed some of the firm's employment practices.

Regression Analysis of Mobility

One weakness of the preceding Markov model is that it fails to take account of differences in characteristics of men and women in the various job groups. Given the higher average qualifications of women in our sample, it seems unlikely that gender differences in characteristics can explain much of the difference in mobility, but it is interesting to observe the patterns of mobility related to characteristics of individuals. The best group to examine is the food clerks, since that category contains large numbers of both men and women. The food clerk position is also a step in the track from hire to store-level management posi-

[3]Note that the fact that female crew chiefs present in one year always show up in the same job the next year poses a problem for our long-run analysis. We have assumed that no women will have the job title.

Table 7. Long-Run Job Distributions from the Markov Model.

	Based on 1976–79 Transitions		*Based on 1983–86 Transitions*	
Job Title	*Men*	*Women*	*Men*	*Women*
Store Manager	0.041	0.000	0.025	0.007
Assistant Manager	0.045	0.000	0.020	0.012
Relief Manager	0.045	0.000	0.022	0.016
Food Clerk	0.313	0.700	0.323	0.583
Night Crew Chief	0.028	0.000	0.035	0.003
Courtesy Clerk	0.240	0.120	0.371	0.267
Produce Manager	0.037	0.000	0.032	0.000
Produce Clerk	0.071	0.005	0.063	0.020
Meat Manager	0.051	0.000	0.019	0.000
Meat Cutter	0.126	0.000	0.056	0.003
Meat Wrapper	0.000	0.094	0.003	0.011
Variety Clerk	0.000	0.076	0.005	0.051
Other	0.000	0.005	0.016	0.027
Retail Operations	0.000	0.000	0.010	0.000
Expected Tenure	4.6 yrs.	5.1 yrs.	3.7 yrs.	4.3 yrs.
Dissimilarity Index	0.562		0.325	

tions.[4] We concentrate on two aspects of mobility: (1) separations, and (2) promotions into management positions.

Table 8 examines separation probabilities, using a probit regression model. We study the group of individuals present as food clerks as of December 31, 1978. We assume that these employees have separated if they do not appear as employees in 1982. The estimated coefficients are the parameters of the index function, not the marginal effects. The first column shows that women are much less likely than men to leave the firm, which is consistent with the overall results of our Markov analysis. In fact, the estimated probabilities of a separation over this period are 0.362 for women versus 0.457 for men, a difference of –0.095. However, after we control for age and seniority, the difference among food clerks is not statistically significant.

We estimate the probabilities of separation for a woman and man with the sample mean age and tenure. The estimated probabilities of a separation are 0.403 for women and 0.444 for men, which are very nearly the same. This result contradicts the conventional wisdom that women have higher quit propensities than men, but is consistent with Viscusi (1980) and Blau and Kahn (1981). Weiss's (1984) analysis found lower quit rates for women. He argued that women should have lower quit rates if their opportunities outside the firm are generally inferior to men's. For our sample of food clerks there is a strong correlation between age, seniority, and the separation rate, though the coefficients on age and age squared are not independently statistically significant. Our specification shows that the separation rate fell with seniority for the first 10 years.[5]

In Table 9 we analyze the probability of a food clerk being promoted to a store-level

[4]Positions such as variety clerk and meat wrapper show almost no mobility, so they do not present an interesting case for regression analysis.

[5]Using a different functional form, we found that separation rates were about the same for those above about 25 years of age. Of course, separation rates for the youngest workers were extremely high.

Table 8. Probit Regression Results—Food Clerks: Determinants of Separation, 1978–1982. (Standard Errors in Parentheses)

Variable	*I*	*II*
Intercept	–0.109	1.651
	(0.059)	(0.410)
Female	–.245	–0.108
	(0.080)	(0.100)
Age	—	0.001
		(0.025)
Age^2	—	0.001
		(0.0003)
Seniority	—	–0.129
		(0.023)
$Seniority^2$	—	0.006
		(0.001)
Φ_f	0.362	0.403
Φ_m	0.457	0.444
$\Phi_f - \Phi_m$	–0.095	–0.041
Sample Size	1,001	1,001
Log Likelihood	–670.87	–638.79

Note: Φ_f and Φ_m are the estimated separation probabilities for women and men, respectively. The estimated probabilities in column II are calculated using the overall sample mean age and seniority as of December 31, 1978.

management position (store manager, assistant manager, or relief manager). Because there is mainly a single feeder job (food clerks) and there are only three hierarchical storewide managerial positions, it is not possible to test the Baldwin et al. (2001) model with our data. Again, we analyze employees who held the food clerk job as of December 31, 1978. The dependent variable in the analysis indicates whether the employee held a store-level management job in 1982. (This will obviously understate the total number of promotions, since some managers may leave the company and others may be demoted in the intervening period.) As in Table 8, the estimated coefficients are the parameters of the index function, not the marginal effects. Female food clerks were much less likely to be promoted than were male food clerks, and the difference is statistically significant.

The unadjusted probabilities of promotion to a store-level management position are a near zero 0.009 for women and 0.086 for men, a difference of –0.077. Age and seniority do a poor job of identifying those who will be promoted. We estimate the probabilities of promotion for a woman and man with the sample mean age and tenure. The estimated probabilities of a promotion are still nearly zero at 0.006 for women and 0.038 for men, a difference of –0.032. These estimates imply that after we control for age and seniority, a man is over six times as likely to be promoted as is a woman.

It is possible that the likelihood of promotion is higher for full-time workers because full-time status signals more commitment to the firm. To the extent that women are more likely than men to work part-time schedules, their probabilities of promotion could be lower as a result. The last column of Table 9 reports the results of controlling for part-time status as a determinant of promotion. It turns out that the coefficient on part-time status is not statistically significant and does not alter the conclusion that, *ceteris paribus,* female food clerks were less likely to be promoted than were male food clerks. We recognize, however, that an endogeneity problem could arise if the employer was solely responsible for assigning workers to full-time and part-time schedules.

It is very likely that some women who were initially discouraged from applying for managerial positions were encouraged to do so by the filing of the lawsuit. While our database does not indicate which women (or men) applied for managerial positions, the basis for the lawsuit presumes that some women did apply and were not offered these positions. No women had ever been managers prior to the lawsuit, and the court found in favor of the allegation that the company systematically denied women promotion to managerial positions. These facts notwithstanding, there is ample scope for discrimination and the effects of the legal remedy to operate via women's willingness to apply for managerial positions.

Conclusions

In our analysis of the employment records of a single firm, we have found a high level of segregation of jobs along gender lines. This segregation arose because some entry-level jobs were assigned almost exclusively to women (and others to men), and because movements between jobs were much less likely to occur for women than for men. In particular, women were almost totally excluded from department-level and store-level management positions during the early years of our study. These rates were more favorable for women in the later years of our data, perhaps due to the "shock effect" of a class-action lawsuit.

Our findings regarding turnover/quit rate behavior among food clerks are consistent with the findings in Blau and Kahn (1981), Viscusi (1980), and Weiss (1984) that women innately are no more likely and may even be less likely than men to quit. This is clearly relevant to the question of promotion to managerial positions within the firm. With regard to promotion rates and the existence of a glass ceiling, our results accord with those of Cannings and Montmarquette (1991), who found lower promotion rates among women and the presence of an invisible ceiling beyond which women cannot advance.

This segregation resulted in lower pay for women. Our analysis of hourly workers finds that in 1982, women's wage rates were about 8% lower than men's, after controlling for age and seniority and despite the fact that the hourly wage workers were unionized.[6] This difference can be associated almost completely with the different job assignments for men and women. Furthermore, the analysis understates the pay gap due to segregation, since the predominantly male, high-paying, store management positions were salaried, and thus were not included in our analysis.

An obvious question one might raise is why the firm's female employees did not seek alternative employment. The tautological answer is that this employment was their best alternative. There is no reason to believe that job prospects elsewhere in the local labor market were any different. This is consistent with the occupational crowding hypothesis, though we lack the data on the rest of the market that would enable us to test this hypothesis. Such data would have also permitted us to determine the impact of the class-action suit on other local employers similarly situated. We do

Table 9. Probit Regression Results—Food Clerks: Promotions to Store Level Management Positions, 1978–82. (Standard Errors in Parentheses)

Variable	*I*	*II*	*III*
Intercept	–1.363	–0.952	–1.299
	(0.084)	(1.063)	(1.185)
Female	–0.999	–0.755	–0.791
	(0.185)	(0.217)	(0.225)
Age	—	–0.018	–0.007
		(0.072)	(0.075)
Age^2	—	–0.0001	–0.0002
		(0.0011)	(0.001)
Seniority	—	0.096	0.110
		(0.092)	(0.093)
Seniority^2	—	–0.013	–0.013
		(0.011)	(0.0107)
Part-Time			0.156
			(0.222)
Φ_f	0.009	0.006	0.006
Φ_m	0.086	0.038	0.044
$\Phi_f - \Phi_m$	–0.077	–0.032	–0.038
Sample Size	1,001	1,001	1,001
Log Likelihood	–161.21	–155.46	–155.21

Note: Φ_f and Φ_m are the estimated promotion probabilities for women and men, respectively. The estimated probabilities in column II are calculated using the overall sample mean age and seniority as of December 31, 1978.

[6]Oaxaca and Ransom (1994) reported wage decompositions based on a 1986 sample from the same firm. Separate (log) earnings equations were estimated for men and women. Depending on the type of decomposition used, the unexplained earnings gap ranged from 28.8% to 33.1% in favor of men after accounting for age and seniority. Some of the unexplained gap may have resulted from different labor supply choices, but much had to do with job assignment.

observe that employment in retail sales in the state and the two large cities in which the supermarket was located grew at average annual rates that ranged from 2.2% to 4.1% before the lawsuit (1976–79) and from 3.1% to 3.3% afterward (1983–86).

Though our data for the most part do not identify the reason for employment terminations, it is very likely that most of the job separations among women (and men) were voluntary, since the firm's employment grew over the period of our study, as did retail sales employment in general. Even so, it is important to note that from the standpoints of gender equity within the firm and EEO law, the lack of better alternatives for female employees is irrelevant.

Women received back-pay awards as a part of the settlement of the lawsuit, and affirmative action policies were put in place. It appears that the lawsuit did have a dramatic effect on the relative status of female employees, even though the court-ordered changes were not formally implemented until after 1986, the last year of our data. Occupational segregation narrowed dramatically. Women suddenly appeared in managerial positions. It is difficult to imagine that the large changes observed in occupational assignment and mobility would have happened in the absence of the lawsuit.

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