

PAY EQUITY

EMPIRICAL INQUIRIES

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Effects of Excess Supply on the Wage Rates of Young Women

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In this paper we begin with the premise that wages are determined over time by the interaction of supply and demand forces within labor markets. It is assumed that excess labor supply conditions will tend to lower wage rates. Thus, we would expect wages to be lower in a relative sense in labor markets in which the supply of labor is more abundant than the demand. Bergmann (1974, 1986) argues that excess supply pressures of this sort have been particularly severe in female labor markets and that this crowding is one important reason why women's wages are as low as they are. In this paper we address the related question of whether the severity of crowding pressures on wage rates differs among various groups of working women. Reasons for expecting this to be the case are advanced, and supporting empirical evidence is presented and discussed.

Pay equity programs can be thought of as one type of measure for making female wage rates in jobs covered by these programs less vulnerable to crowding effects originating in female labor markets. We end the paper with a discussion of pay equity programs viewed from this perspective.

INVESTIGATING CROWDING EFFECTS

In the language of economists, what is being set by the interaction of supply and demand forces in labor markets are rates of remuneration for the years of schooling and work experience of individuals with different occupational specializations and other productivity-related characteristics (Polachek, 1976, 1981). The expectation is that the rates of return on human capital resources will be lower, and hence wage rates will be lower after controlling for years of schooling and work experience, in occupational labor markets in which the supply of labor is more abundant relative to the demand. This will be the case because market forces permit, or even compel, employers to pay relatively less for labor in slack occupational employment markets. It will also be the case because would-be employees in these slack markets must often settle for jobs that do not fully utilize their accumulated human capital.

Everyone understands these relative supply concepts of wage determination on an intuitive level. When recruiting for aca-

ademic staff, for instance, business schools usually find larger numbers of well-qualified applicants for the business economics and quantitative methods positions than for the accounting positions, and it is understood by all concerned that that is why the accountants receive higher salary offers. Moreover, some of those who have trained for academic jobs in business economics or quantitative methods end up having to take other sorts of jobs in business or government that do not fully utilize their research training and teaching skills. Excess supply pressures on the wages of aspiring artists (musicians, dancers, painters, and so forth) are even more severe. When artistic work can be found, the wages typically provide a paltry return on the investment in artistic training and experience. When artistic work cannot be found, aspiring artists end up supporting themselves waiting on tables or doing other jobs that make little or no use of, and hence provide little or no return on, their accumulated artistic human capital.

Nevertheless, crowding effects on wage rates cannot be easily observed or measured in a direct sense. For most occupations there are no direct measures of labor supply or demand; only those who were or are actually working in an occupation can be identified. Thus, researchers investigating possible excess supply effects on wage rates have typically proceeded by attempting to demonstrate that conditions that might be expected to cause labor market crowding accompany observed wage rates that are lower than would otherwise be expected. Several researchers, for example, have presented evidence that men born in large cohorts generally have lower earnings profiles than men born in relatively small cohorts (see, for instance, Easterlin, 1980; Freeman, 1979; Welch, 1979).

Differences in Female Labor Markets

Bergmann's assertions about the relative severity of crowding effects in female labor

markets hinge on the following empirical observations. First, female labor force participation rates have risen dramatically since World War II. Largely as a consequence of this, the growth rate for the female labor force has been much higher than for the male labor force. Second, female employment is concentrated in a narrower array of occupations than is male employment (Blau, 1977; Blau and Hendricks, 1979; Treiman and Hartmann, 1981). Moreover, there is little overlap between female and male labor markets. Even within narrow occupational classifications that appear from the numbers of female and male workers to be sex integrated, women and men often have different job titles or work in separate establishments. Based on their study of 400 California business establishments employing nearly 47,000 men and over 14,000 women, Bielby and Baron (1984:50-51) conclude that

in most establishments, few job classifications are staffed by both men and women. Indeed, complete segregation was the norm in establishments studied . . . and segregation levels were virtually constant in these organizations during the late 1960s and 1970s.

This occupational segregation by sex presumably limits the potential for a more general diffusion of crowding effects originating from excess supply in female labor markets. Corresponding to these conditions that presumably have resulted in crowding in female labor markets is the empirical evidence that women have been and continue to be paid less for their market work than men are (see, for instance, Nakamura and Nakamura, 1985; Oi, 1982; and O'Neill, 1985).

In the empirical portion of this study, we attempt to examine crowding effects in female labor markets by relating conditions deemed likely to result in excess labor supply to observed female wage rates. A study of this sort cannot yield precise estimates of the downward impact on wages resulting

from various degrees of excess labor supply. Nor is it easy to see how circumstantial evidence of this nature can illuminate the question of *how much* more severe the crowding effects are in female compared with male labor markets. For one thing, some of the conditions that can readily be identified as likely causes of labor market crowding probably affect female labor markets differently from the way they affect male labor markets. For instance, prime-aged men who are laid off due to a downturn in some sector of the economy are likely to remain in the labor force as unemployed workers until they locate new jobs. On the other hand, a substantial proportion of prime-aged women who lose their jobs are likely to simply drop out of the labor force. Also young men are more likely than their female counterparts to migrate for job-related reasons. In this study we address the more limited question of whether there is any evidence that some segments of the female work force are more vulnerable than others to crowding-related wage erosion. To our knowledge, there have been no previous empirical investigations of this question.

Differences by Occupation

Our reasons for expecting wages to be more vulnerable to crowding effects in some occupations, and in some positions within occupations, than in others include the following. First, barriers to entry, such as training requirements, appear to stem the flow of job seekers into some occupational labor markets, making it less likely that excess supply pressures will develop. The potential magnitude of these effects can be seen from the numbers presented in Table 3-1. The numbers in the first two columns indicate a dramatic surge in medical school applications following the end of World War II and the return to civilian life of large numbers of young men whose educations had been interrupted by the war and who were now eligible for GI education benefits.

Because of constraints on medical school capacity, acceptance rates dipped for both men and women as the numbers of applicants rose (see columns 3 and 4). Thus, as can be seen from the last column of Table 3-1, the numbers actually admitted to U.S. medical schools (and hence the numbers graduating from those schools) rose only modestly over the 16-year period from 1939 through 1956. In general, higher educational requirements probably act as a barrier to entry into an occupation even in the absence of binding limitations on the capacities of the relevant training programs. This is a consequence of the time and monetary costs required to obtain this training.

Second, more educated and also relatively more scarce types of workers may be more successful in securing concessions from employers that protect their wages against excess supply pressures when they do develop. These concessions may include long-term contractual agreements, job ladders requiring employers to promote from within to fill most positions, wage scales virtually guaranteeing rising levels of pay with increases in seniority, and the institutionalization of powerful collective bargaining units that can push the workers' point of view in disagreements with employers. Thus, in general, we expect to find that the returns to education and work experience (that is, the expected wage increases associated with each additional year of education and each additional year of work experience) are lower and crowding effects on wage rates are more severe for women working in occupations with lower educational requirements.

Within occupations, we would also expect wage rates to be more vulnerable to crowding effects for some jobs than for others. Moreover, even after controlling for general measures of human capital, such as years of schooling, women with certain characteristics might be more likely than other women to end up in those jobs within an occupation for which wage rates are more

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TABLE 3-1 Applicants and Admissions to U.S. Medical Schools, 1939-1956

Year	Number of Applicants		Percentage of Applicants Admitted		Total Number Admitted
	Women	Men	Women	Men	
1939-1940	632	11,168	50	51	6,012
1940-1941	585	11,269	53	52	6,170
1941-1942	636	11,304	57	51	6,128
1942-1943	810	13,233	49	46	6,484
1949-1950	1,390	23,044	29	29	7,086
1950-1951	1,231	21,049	33	31	6,931
1951-1952	1,109	18,811	38	38	7,570
1952-1953	1,021	15,742	47	43	7,249
1953-1954	972	13,706	53	49	7,231
1955-1956	1,002	13,935	54	50	7,508

SOURCE: Cole (1986:Table 1).

adversely affected by excess labor supply pressures. This might be the case, for instance, for women belonging to racial, ethnic, or religious groups that are discriminated against in the labor market; for women having relatively little work experience due to child-related withdrawals from the work force; and for recent entrants or reentrants to the work force.

METHODS

We estimate log wage equations using microdata from the 1980 census (5 percent A public-use sample) for individual working women 20 to 24 years of age. Separate results are presented for eight broad occupational groups: personal service, other clerical, secretarial, sales, managerial, health professional/technical, and teaching (defined in Appendix A). Results are also presented for women (working in all occupations) in various demographic groups. We do not show equations for women sorted by both occupation and demographic characteristics because the sample sizes are too small for many occupational-demographic categories.

We focus on the wage rates of women ages 20 to 24 for two reasons. First, the

younger cohorts of working women are larger in number, which leads to larger sample sizes for empirical analysis. Second, the careers of these younger women have been less affected by any discriminatory training or labor market practices that were, in fact, reduced as a result of the equal opportunity rulings that came into effect in the 1960s and early 1970s.

General Labor Market Variables

Our choice of explanatory variables was motivated not only by the objectives of this study, but also by the limitations of our data source.

Unemployment rates are sometimes used as indices of general excess labor supply conditions in macroeconomic models. We include state-specific unemployment rate variables for women and men ages 20 to 29 in our log wage equations. We have included those ages 25 to 29 along with those ages 20 to 24 in the computation of these state-specific unemployment rates because that leads to more reliable estimates of the unemployment rates due to the larger sample sizes and also because employers may regard those ages 25 to 29 as potential substitutes for workers who are 20 to 24 years old.

The unemployment rate for women and for men in each state was computed as the number who were unemployed in the census reference week divided by the number who participated in the civilian labor force in that week. Unfortunately, the interpretation of the coefficients of these variables is not straightforward. High male unemployment rates, for instance, may be indicative of more male competition for jobs usually held by women, which results in downward supply pressure on female wages. But high male unemployment rates may also cause some married women to be more serious about finding and holding on to jobs that pay relatively well because of the higher degree of uncertainty associated with their husbands' earnings. High male unemployment rates could even be indicative of a substitution of cheaper female labor for higher priced male labor.

The state-specific effects on labor markets of general changes in the demand for goods and services, as well as differences among states in other relevant factors, such as the cost of living, should be reflected in the average earnings of prime-aged men (who still make up the largest share of the work force). In our log wage equations, we include a state-specific variable for the log of the average earnings of men ages 25 to 45, working in all occupations. The coefficient of this variable is expected to be positive. That is, it is expected that the effects of general labor market conditions on the wage rates of young women will be in the same direction as the effects on the earnings of prime-aged men.

After controlling for more general labor market conditions, we wish to determine whether there are any *additional* effects on female wage rates due to crowding in female labor markets. In an attempt to identify additional effects, we include in our log wage equations the logarithm of the number of women ages 20 to 24 in each state divided by the corresponding number of women 25

to 29 years of age. We refer to this state-specific variable as the *log population ratio*. When the female population is growing, the number of women ages 20 to 24 will exceed the number who are ages 25 to 29. In this case, the ratio of these two numbers will be greater than unity and the log of the ratio will be positive. Our expectation is that positive values of the log population ratio will be associated with increases in labor supply in those occupations in which women seek employment.

In some occupations, of course, increases in the log population ratio may also be specifically associated with increases in the demand for female labor. Increases in the number of women ages 20 to 24, for instance, may lead to increases in the demand for primary schoolteachers as well as day-care and other service workers to care for the children of these young women. In general, however, there are no obvious reasons why the number of jobs for young women will expand as quickly as the number of potential jobholders with increases in the population of young women. Excess supply conditions in female labor markets will result when the number of women seeking jobs rises more rapidly than does the number of jobs. If there are crowding effects on the wage rates of young women after more general, state-specific labor market conditions have been controlled for by the unemployment and male earnings variables, we expect the coefficient of the log population ratio in our log wage equations to be negative.

For similar reasons, increases over time in female employment rates might be expected to lead to excess supply conditions in female labor markets. Thus, we include the logarithm of the state employment rate for women ages 20 to 24 divided by the state employment rate for women ages 25 to 29 as an explanatory variable. We refer to this variable as the *log employment ratio*. Our presumption is that the more positive

the value that the labor market variable shown

Key

The variables are the log of the state population ages 25 to 45, minus the log of the state population ages 20 to 24, divided by the log of the state population ages 25 to 45. This variable is expected to be positive. The state-specific effects on labor markets of general changes in the demand for goods and services, as well as differences among states in other relevant factors, such as the cost of living, should be reflected in the average earnings of prime-aged men (who still make up the largest share of the work force). In our log wage equations, we include a state-specific variable for the log of the average earnings of men ages 25 to 45, working in all occupations. The coefficient of this variable is expected to be positive. That is, it is expected that the effects of general labor market conditions on the wage rates of young women will be in the same direction as the effects on the earnings of prime-aged men.

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the value of this variable is, the more likely that there is crowding pressure in female labor markets. Values of the state-specific variables (before taking the logarithms) are shown in Appendix B.

Key Explanatory Variables

The explanatory variables of key interest are the state-specific log population ratio and log employment ratio variables, the log of the state average for the earnings of men ages 25 to 45, and individual-specific variables for the number of years of schooling and potential labor market experience (age minus years of schooling minus six). Our expectation is that groups of women with more negative values for the coefficients of the log population ratio and log employment ratio variables will also have smaller coefficients for the years of schooling and potential work experience variables and for the state-specific average male earnings variable.

Unfortunately, the relationship between the potential work experience variable in this study and work experience of the sort that might be reflected in higher wages is tenuous. For any given woman, suppose we denote the value of the potential experience variable by *PEXP* and the actual number of previous years in which the woman worked by *EXP*. Then,

$$EXP = PEXP - L$$

where, *L* denotes the number of years in which the woman was not employed or in school (plus any discrepancy between completed years of schooling and the number of years required to reach that level of educational attainment). Our data source contains no information concerning the values of *EXP* or *L*. That is why we use the potential experience variable.

To the extent that the average values of *L* differ across the different occupational and demographic groups of working women,

there will be systematic differences in the estimated constant terms for the log wage equations for the different groups of women. Because the estimated constant terms play no role in our subsequent analysis, this is not a serious problem. Within the groups of women, however, there may also be correlations between the individual values of the omitted variable *L* and the values of the potential experience variable. Correlations of this sort could contribute to estimates of the effects of an additional year of work experience on a woman's wage rate that are systematically too high or too low. Moreover, these biases could differ systematically among the various groups of women. As a consequence, results obtained in this study concerning the return to years of work experience await confirmation from further research based on a data source containing information about actual past work experience.

In addition to the variables discussed, we include several other explanatory variables in our log wage equations. To capture industry-specific demand effects on each working woman's wages, we include an industry-specific demand index defined as the log of the earnings of female workers ages 20 to 24 in the woman's industrial group divided by the average earnings of all women ages 20 to 24. (Values for this variable are shown in Appendix C.) We include an individual-specific variable for the number of children ever born (except in the equation for women with no children), as well as dummy variables for race (black or nonblack, except in the equations for black women and for nonblack women), for whether a woman has ever been married, and for whether a woman was working 5 years ago (except in the equations for women who were working 5 years earlier and for those who were not). Finally, in the log wage equations for the separate demographic groups, we also include a set of dummy variables for the eight occupational cate-

gories developed from the census codes (see Appendix A for the definitions of these occupations).

EMPIRICAL RESULTS

The main estimation results of this study are displayed in Tables 3-2 through 3-4. We present descriptive statistics and regression results for log wage equations for working women ages 20 to 24 classified by occupation and personal characteristics.

Occupation

The mean years of education and of potential labor market experience for women ages 20 to 24 in each of the eight occupational categories are shown in the first two rows in Table 3-2, with the occupations ordered from lowest to highest in terms of mean years of schooling. From the mean wage figures shown in the third row, women in the top four occupations in terms of educational qualifications (managerial; health, excluding doctors and dentists; professional/technical, including doctors, dentists, and university teachers; and teaching, excluding university teachers) are better paid, on average, than women working in the personal service, other clerical, secretarial, and sales occupations.

From the next two rows of the top panel, women working in the four occupations with the highest educational requirements are less likely to have wage rates below \$2.50 (approximately the mean wage rate for a secretary) than women working in the four other occupations, and they are less likely to have wage rates below \$4.50 than women working in the personal service, other clerical, and sales occupations. On human capital grounds, one would expect the wage rates to be higher for the occupations with higher educational qualifications even if workers in all occupations received the *same* returns, on average, to *additional* education. As expected, however, the top two

rows of coefficient estimates in the middle panel of Table 3-2 show that returns to both additional years of schooling and additional years of labor market exposure are also generally higher for the four occupations in which the average educational levels of the work forces are higher.

Ignoring the teaching occupation, the coefficient estimates for the log population ratio and the log employment ratio are not significantly different from zero for the occupations with higher educational requirements, but one or the other of these two coefficient estimates is statistically significant and negative for each of the four occupations with lower educational requirements. These findings are in line with a priori expectations that crowding effects on wage rates will tend to be more severe in occupations in which the educational level of the workers is lower. The results for the teaching occupation seem to confirm that our method for identifying crowding effects will not work for those few occupations for which changes in the size of the specified demographic group, or in the labor force participation rate of that group, are directly linked to changes in the numbers of jobs available in those occupations.

The coefficient estimates for the female and male unemployment rate variables are shown in the fifth and sixth rows of the middle panel of Table 3-2. With none of the coefficients of the male unemployment rate variable being significantly different from zero, there is no evidence of adverse effects on female wage rates in any of the eight designated occupations as a result of men in slack male labor markets competing for jobs usually or sometimes filled by women. The coefficient estimates for the female unemployment rate variable are only significantly negative for the high-education professional/technical and teaching occupations.

Looking at the last row of coefficient estimates in the middle panel, female wage rates do move together with male earnings,

over states, for all of the designated occupations except personal service, sales, and health. The health occupation has relatively high average educational requirements, and it is not one of the occupations for which we have found significant crowding effects on wage rates. The other clerical and secretarial occupations are ones with relatively low educational requirements, and they are also occupations for which we have found evidence of crowding effects on wage rates.

In the bottom panel of Table 3-2 we show the predicted wage impacts of changes in the log population ratio, the log employment ratio, and the male average earnings variable associated with "moving" a woman who was earning the average wage for her occupation from South Dakota to Oregon. According to our measures of excess supply conditions in female labor markets, there is less crowding in Oregon than in South Dakota. Also, average earnings for men ages 25 to 45 are almost \$5,000 higher in Oregon. We chose these two states to demonstrate the magnitude of the estimated wage gains associated with a move from a poorer into a more favorable labor market for female workers. Due to the crude nature of our proxies for excess supply conditions, our rudimentary understanding of how wages are determined, and a variety of possible statistical problems with our estimation results, however, these predictions may be very imprecise.

Personal Characteristics

One problem with looking for crowding and other related wage effects on an occupation-by-occupation basis is that each one of our broad occupational groups actually contains a range of jobs with differing educational requirements and other barriers to entry; differing pay scales, including differing institutionalized practices governing wage growth with increased seniority; and differing balances of bargaining power between employers and employees. More-

over, different sorts of jobs within the same broad occupational group tend to be filled by different sorts of workers.

To examine the possibility that, regardless of occupation, certain types of women are more likely to end up in those jobs in which accumulated human capital is less rewarded and in which wages are more subject to crowding effects, we estimated log wage equations separately for women with less than 12 years of schooling and for those with at least 12 years, for women with children and for those with no children ever born, for black women and for nonblack women, and for women who were working 5 years earlier and for those who were not (Table 3-3). From the first row of Table 3-3, women with children, black women, and (obviously) women with less than 12 years of schooling have lower mean educational levels than the other groups of women. From the wage statistics presented in the top panel, it is clear that the women in these three groups, as well as those women who were not working 5 years earlier, are more poorly paid in general than the women in the other groups.

Looking now at the first two rows of coefficient estimates in the middle panel of Table 3-3, women with less than 12 years of schooling, women with children, black women, and women who were not working 5 years earlier also earn lower rates of return on additional years of schooling or for additional years of potential labor market experience, or both. These are the groups of women, too, for whom the estimated coefficients of the log population ratio are significantly negative. Moreover, the estimated coefficients for the female unemployment rate variable are consistently negative for these four groups, and they are statistically significant for both women with less than 12 years of education and women with children.

Again, there is no evidence of adverse effects on female wage rates from men in states with higher unemployment rates com-

TABLE 3-2 Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24, Classified by Occupation

Descriptive Statistics and Variables	Personal Service	Other Clerical	Secretarial	Sales	Managerial	Health	Professional/ Technical	Teaching
Descriptive Statistics								
Mean years of schooling	12.0	12.7	12.8	13.1	13.4	13.5	14.4	15.0
Mean years of potential labor market experience ^a	3.8	3.1	3.2	2.8	3.0	2.7	2.0	1.7
Mean wage in \$s (standard deviation)	4.66 (9.83)	4.71 (7.61)	4.53 (3.54)	4.60 (4.31)	5.09 (3.25)	5.04 (4.48)	5.97 (7.51)	5.19 (4.50)
Percent with wage lower than \$2.50	30.3	18.4	11.3	19.2	11.5	14.9	12.3	15.6
Percent with wage lower than \$4.50	74.2	69.2	61.7	67.2	47.7	54.9	41.9	55.6
Regression Coefficient Estimates for Log Wage Equations (standard errors) ^b								
Years of schooling	.03 (.03)	.04* (.01)	.07* (.02)	.07* (.02)	.09* (.02)	.11* (.02)	.06* (.01)	.17* (.02)
Years of potential labor market experience ^b	.02 (.02)	.04* (.01)	.05* (0.1)	.05* (.02)	.07* (.02)	.04* (0.2)	.10* (.01)	.12* (.03)
Log population ratio ^c	-.50* (.36)	.00 (.15)	-.06 (.18)	-.37* (.29)	.09 (.17)	.00 (.23)	-.03 (.22)	.75* (.30)
Log employment ratio ^d	-1.43 (1.24)	-1.08* (.58)	-.61* (.47)	-.52 (.80)	.34 (.68)	-.12 (.68)	.59 (.65)	-2.05* (1.01)
Unemployment rate for women 20-29	.41 (1.62)	.56 (.71)	.45 (.65)	-.64 (1.10)	1.28* (.94)	1.17 (.96)	-1.85* (.97)	-4.30* (2.45)
Unemployment rate for men 20-29	1.09 (1.11)	-.35 (.55)	.09 (.49)	1.10 (.88)	-.52 (.72)	-.25 (.80)	.39 (.63)	.72 (.72)
Log of mean annual earnings for men 25-45	.17 (.41)	.89* (.24)	.59* (.21)	-.34 (.35)	.76* (.25)	.35 (.36)	.53* (.31)	1.57* (.49)

Log employment ratio ^d	-1.43	-1.08	.01
	(1.24)	(.58)	(.47)	(.80)	(.68)	(.68)	.68	1.01	
Unemployment rate for women 20-29	.41	.56	.45	-.64	1.28*	1.17	-1.85*	-4.30*	
	(1.62)	(.71)	(.65)	(1.10)	(.94)	(.96)	(.97)	(2.45)	

Unemployment rate for men 20-29	1.09	-.35	.09	1.10	-.52	-.28	.39	.72
	(1.11)	(.55)	(.49)	(.88)	(.72)	(.80)	(.63)	(.72)
Log of mean annual earnings for men 25-45	.17	.89*	.59*	-.34	.76*	.38	.53*	1.57*
	(.41)	(.24)	(.21)	(.35)	(.25)	(.36)	(.31)	(.49)
R ²	.049	.041	.076	.072	.080	.108	.069	.155
N	651	1,459	1,061	754	715	851	1,259	390

Predicted Impacts (in \$s) of Selected Variables Associated with a Move from South Dakota to Oregon^e

Log population ratio	1.48	.00	.15	1.04	-.26	.00	.10	-2.64
Log employment ratio	.56	.42	.23	.20	-.14	.05	-.25	.94
Log of mean annual earnings for men 25-45	.24	1.41	.86	-.44	1.27	.60	1.01	3.04

NOTES: The descriptive statistics as well as the dependent and explanatory variables for the estimated log wage equations were calculated using microdata from the 1980 U.S. Census (5 percent A public-use sample). The dependent variable for the regressions is the logarithm of the hourly wage, defined as the annual earnings for calendar year 1979 divided by weeks of work times usual hours of work for those weeks worked in 1979. A constant term and other control variables listed in the text were also included in these regressions. A woman was classified as working if she had positive employment income, weeks of work, and usual hours of work for 1979. An asterisk indicates that a coefficient is significantly different from zero using a two-tailed critical region of .20 and *t*-statistics calculated using heteroscedasticity-corrected standard errors.

^aPotential labor market experience is defined as age minus years of schooling minus six.

^bHeteroscedasticity-corrected standard errors (White, 1980).

^cDefined as the logarithm of the state-specific number of women ages 20 to 24 divided by the number of women ages 25 to 29.

^dDefined as the logarithm of the state-specific employment rate of women ages 20 to 24 divided by the employment rate of women ages 25 to 29.

^eCalculated as deviations from the mean wage shown above in the top panel. The population ratio, employment ratio, and mean annual earnings for men ages 25 to 45 are, respectively, 1.29, 1.05, and \$13,565 for South Dakota and .74, .97, and \$18,204 for Oregon. Both states had unemployment rates of .10 for women ages 20 to 29 and .11 for men ages 20 to 29.

TABLE 3-3 Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24. Classified by Personal Characteristics

Descriptive Statistics and Variables	Less Than 12 Years Schooling	With Children	Black	Not Working 5 Years Earlier	At Least 12 Years Schooling	No Children	Nonblack	Working 5 Years Earlier
Descriptive Statistics								
Mean years of schooling	9.4	11.7	12.2	12.7	13.2	12.7	12.7	12.6
Mean years of potential labor market experience	6.6	4.7	3.8	2.3	1.8	3.2	3.3	4.0
Mean wage in \$s (standard deviation)	4.96 (9.32)	4.47 (6.10)	4.91 (6.01)	4.88 (5.75)	5.23 (8.09)	5.29 (5.52)	5.22 (8.49)	5.56 (10.49)
Percent with wage lower than \$2.50	23.9	23.9	23.4	18.7	15.2	15.4	15.7	13.8
Percent with wage lower than \$4.50	65.1	72.2	64.3	62.0	55.9	55.1	56.4	51.5
Regression Coefficient Estimates for Log Wage Equations (standard errors)								
Years of schooling	.02* (.02)	.05* (.02)	.06* (.02)	.06* (.006)	.06* (.005)	.07* (.005)	.07* (.005)	.08* (.007)
Years of potential labor market experience	.00 (.01)	.01 (.01)	.03* (.01)	.03* (.006)	.05* (.004)	.04* (.004)	.04* (.004)	.05* (.006)
Log population ratio	-.34* (.17)	-.28* (.15)	-.58* (.23)	-.19* (.07)	-.07 (.06)	-.09* (.06)	-.06 (.06)	-.02 (.05)
Log employment ratio	.21 (.59)	-.73* (.56)	-.47 (.65)	-.03 (.23)	-.09 (.18)	.04 (.15)	.00 (.15)	-.05 (.26)
Unemployment rate for	-.67* (.02)	-1.31* (.09)	-.62 (.06)	-.28 (.06)	.02 (.09)	.09 (.06)	.06 (.06)	.16 (.16)

Years of potential labor market experience	(.02)	(.02)	(.02)	(.006)	(.005)	(.005)	(.005)	(.005)
	.00	.01	.03*	.03*	.05*	.04*	.04*	.05*
	(.01)	(.01)	(.01)	(.006)	(.004)	(.004)	(.004)	(.006)

Log population ratio	-.34*	-.28*	-.58*	-.19*	-.07	-.09*	-.06	-.02
	(.17)	(.15)	(.23)	(.07)	(.06)	(.06)	(.06)	(.08)
Log employment ratio	.21	-.73*	-.47	-.03	-.09	.04	.00	-.05
	(.59)	(.56)	(.65)	(.23)	(.18)	(.18)	(.18)	(.26)
Unemployment rate for women 20-29	-.67*	-1.31*	-.62	-.28	.02	.09	-.06	.16
	(.85)	(.78)	(.99)	(.33)	(.25)	(.26)	(.25)	(.37)
Unemployment rate for men 20-29	.85*	1.03*	1.44*	.57*	.44*	.44*	.42*	.42*
	(.60)	(.54)	(.67)	(.24)	(.18)	(.18)	(.18)	(.24)
Log of mean annual earnings for men 25-45	.25	.03	-.04*	.40*	.53*	.55*	.55*	.60*
	(.24)	(.22)	(.25)	(.10)	(.08)	(.08)	(.08)	(.11)
R ²	.046	.046	.051	.058	.068	.062	.067	.065
N	2,514	2,142	1,821	9,498	15,012	15,384	15,705	8,028

Predicted Impacts (in \$s) of Selected Variables Associated with a Move from South Dakota to Oregon

Log population ratio	1.02	.74	1.84	.54	.20	.27	.18	.06
Log employment ratio	-.08	.27	.19	.01	.04	-.02	.00	.02
Log of mean annual earnings for men 25-45	.38	.04	-.06	.61	.88	.93	.92	1.07

NOTES: See notes to Table 3-2. These results are based on data for women in the eight occupational groups considered in Table 3-2 as well as women working in all other occupations.

TABLE 3-4 Further Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24. Classified by Personal Characteristics

Descriptive Statistics and Variables	At Least 12 Years Schooling							
	Less Than 12 Years Schooling		At Least 12 Years Schooling				Nonblack with No Children	
	Black	Nonblack	Black	Nonblack	Nonblack With Children	No Children	Not Working 5 Years Earlier	Working 5 Years Earlier
	Descriptive Statistics							
Mean years of schooling	9.8	9.3	12.9	13.2	12.5	13.3	13.4	13.2
Mean years of potential labor market experience	6.2	6.6	3.1	2.8	4.0	2.7	2.2	3.3
Mean wage in \$s (standard deviation)	4.54 (5.94)	5.04 (9.80)	5.00 (6.03)	5.25 (8.27)	4.46 (5.84)	5.34 (8.48)	5.00 (5.73)	5.74 (10.57)
Percent with wage lower than \$2.50	31.1	22.7	21.4	14.5	19.8	14.0	16.5	11.6
Percent with wage lower than \$4.50	70.3	64.2	62.7	55.2	69.9	53.6	55.5	47.5
	Regression Coefficient Estimates for Log Wage Equations (standard errors)							
Years of schooling	.02 (.06)	.03* (.02)	.07* (.02)	.06* (.005)	.07* (.02)	.06* (.006)	.05* (.007)	.07* (.009)
Years of potential labor market experience	-.04 (.04)	.01 (.01)	.07* (.02)	.05 (.004)	.02* (.01)	.05* (.005)	.06* (.007)	.06* (.007)
Log population ratio	-.48	-.20*	-.57*	.02	.02	.02	.18*	.11

Years of schooling	.02 (.06)	.03* (.02)	.07* (.02)	.06* (.005)	.07* (.02)	.06* (.006)	.05* (.007)	.07* (.009)
Years of potential labor market experience	-.04 (.04)	.01 (.01)	.07* (.02)	.05 (.004)	.02* (.01)	.05* (.005)	.06* (.007)	.06* (.007)
Log population ratio	-.48 (.54)	-.30* (.18)	-.57* (.24)	-.02 (.06)	-.06 (.18)	-.02 (.06)	-.13* (.08)	.12* (.09)
Log employment ratio	-.59 (1.41)	.39 (.66)	-.47 (.73)	-.05 (.18)	-1.00* (.62)	.04 (.19)	.10 (.26)	-.02 (.25)
Unemployment rate for women 20-29	-1.36 (2.30)	-.70 (.89)	-.58 (1.07)	.06 (.25)	-.87 (.80)	.17 (.26)	.15 (.36)	.20 (.39)
Unemployment rate for men 20-29	1.65 (1.72)	.77 (.63)	1.55* (.73)	.35* (.18)	.55 (.62)	.35* (.19)	.24 (.26)	.46* (.26)
Log of mean annual earnings for men 25-45	-.18 (.57)	.31 (.27)	-.05 (.27)	.59* (.08)	.27 (.22)	.62* (.09)	.50* (.12)	.77* (.12)
R ²	.082	.046	.053	.070	.049	.069	.060	.067
N	380	2,134	1,441	13,571	1,304	12,267	6,650	5,617

Predicted Impacts (in \$s) of Selected Variables Associated with a Move from South Dakota to Oregon

Log population ratio	1.37	.90	1.84	.06	.15	.06	.37	-.37
Log employment ratio	.22	-.15	.19	.02	.37	-.02	-.04	.01
Log of mean annual earnings for men 25-45	-.23	.48	-.07	.99	.37	1.07	.79	1.46

NOTES: See notes to Table 3-2. These results are based on data for women in the eight occupational groups considered in Table 3-2 as well as women working in all other occupations.

peting with women for jobs. (The coefficient estimates for the male unemployment rate are positive, not negative.) Also, as expected, the coefficients for the male earnings variable are insignificantly different from zero for those groups of women found to be most subject to adverse crowding effects. In the bottom panel of Table 3-3 we show predicted impacts for selected variables.

The results presented in Table 3-3 raise a number of questions. For instance, would the wages of women with less than 12 years of schooling still be relatively unresponsive to human capital differences and the level of male earnings, but vulnerable to crowding effects, if we limited this low-education sample to nonblack women? From the results presented in the second column of Table 3-4, the answer to this question is probably yes. Based on the results in Table 3-3 we might also wonder if the wage rates of women with children would be found to be more responsive to human capital variables and the state level of male earnings, and less responsive to crowding effects, if we limited the sample of women with children to nonblacks. Comparing the coefficient estimates in the fifth column of Table 3-4 with those in the second column of Table 3-3, the answer to this question is probably yes with respect to the human capital effects and probably no with respect to the other effects.

In Table 3-3, the wages of black women are adversely affected by crowding and unrelated over states to the average level of male earnings. From column 3 of Table 3-4, these conclusions still hold even if we limit the sample of black women to those with at least 12 years of schooling. Finally, we might wonder whether we would still find evidence of crowding effects on the wage rates of young women who were not working 5 years earlier if we limited this sample to those who are nonblack and childless. From the coefficient estimates in column 7 of Table 3-4, the answer to this question is yes. In general, the conclusions

reached on the basis of Table 3-3 seem to be borne out by the findings for more detailed groupings of women presented in Table 3-4.

ALTERNATIVE CAUSAL EXPLANATIONS

In the empirical literature on female work behavior, log wage equations similar to those estimated in this study are viewed as reflecting the wage offers made to women with specified productive attributes in competitive labor markets in which the wage distributions are determined by marketwide supply and demand conditions not subject to the control of individual employers or labor force participants. Thus, these equations usually include both individual-specific explanatory variables, such as years of schooling, and certain marketwide variables, such as the state or county unemployment rate (see, for instance, Heckman, 1981; Nakamura and Nakamura, 1981). The estimated coefficients of the marketwide variables are presumed to represent the responsiveness of the female wage distribution, and hence the responsiveness of the wage offers received by individual women, to marketwide supply and demand conditions reflected in the values of the marketwide variables. The log wage equations estimated in this study contain a number of marketwide variables. It has been argued that negative coefficient estimates for two of these variables, the state-specific log population and log employment ratios, are indicative of negative crowding effects on the wage rates of working women.

Could it be, however, that the log employment ratio variable is serving as a proxy for other sorts of impacts on the wage distributions of women ages 20 to 24? It is often argued that the probability that a woman will work is positively related to the wage offers she receives. If marketwide supply-side effects of this sort were strong enough, there would be a tendency for the

values of higher in high for ages 25 estimate to be insignificant also negative wage rate on wage backs of an error crowding

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values of the log employment ratio to be higher in states where wages are relatively high for women ages 20 to 24 versus women ages 25 to 29. As a result, the coefficient estimates for this variable might turn out to be insignificantly different from zero or significantly positive, even though there are also negative crowding effects on female wage rates. Because of their positive effects on wage rates, however, supply-side feedbacks of this sort could not contribute to an erroneous conclusion that there are crowding effects.

On the other hand, it has also been argued in the literature that employers make minimal specific training investments in women and, therefore, are generally willing to substitute younger for older female workers (or vice versa) in order to minimize labor costs. If marketwide demand-side effects of this sort were sufficiently strong, there would be a tendency for the values of the log employment ratio to be lower in states where wages are relatively high for women 20 to 24 versus 25 to 29 years old. As a result, the coefficient estimates for the log employment rate variable might be found to be significantly negative even in the absence of crowding effects on the wage rates of female workers. However, when women lose or cannot find jobs due to the substitution of lower priced female labor from another age bracket, those women are being "crowded out" in terms of employment opportunities. Thus, negative coefficient estimates for the log employment ratio variable can still be considered to be indicative of crowding effects in female labor markets, although these crowding effects may be employment rather than wage related.

CONCLUSIONS

The evidence presented in this study suggests that increases in the female work force, brought about by population increases and increases in female employment rates,

have resulted in wage erosion that has been more serious for working women in some demographic and occupational groups than in others. In particular, we find there have been adverse crowding effects on the wage rates of women employed in the personal service, other clerical, secretarial, and sales occupations, and on the wage rates of women with less than 12 years of education, those with children, black women, and women who are relatively recent labor market entrants or reentrants (that is, those who were not working 5 years earlier). On the other hand, we find no evidence of crowding effects for working women who have at least 12 years of education, or who have no children, or who are not black, or who were already working 5 years earlier. Nor do we find any evidence of crowding effects for women working in managerial, health, and professional/technical occupations. We conclude that either there is less crowding in the segments of the female labor market in which these women are employed or the wage rates for the sorts of jobs these women have are better protected by institutional and other factors from erosion due to excess supply pressures. To the extent that these results reflect reality, it is appropriate to ask what the policy implications of these findings might be.

Bergmann (1986:128) made the following observation:

Every woman now on the women's labor market who would be allowed into a job in the men's market would reduce the pay gap between the sexes. Her move would push the wage scale in the two markets toward equality by increasing the supply of labor to the men's market and decreasing the supply to the women's.

Our empirical results indirectly support this position. They also lend added credence to Bergmann's assertion that "continued [occupational] segregation would make the efforts to close the pay gap between women and men a continual uphill struggle." If this is the case, the continued importance of

vigorous affirmative action and other programs promoting employment opportunities should not be lost sight of in the political rush to institute pay equity programs.

The results of this study also suggest a general need to examine practices and institutions that prevent the development of excess supply conditions in some labor markets or prevent wage declines in the face of excess supply conditions. Women could seek an expansion of such practices and institutions in female labor markets. The push to increase the representation and power of women in labor unions falls under this rubric. Pay equity programs can also be viewed as an institutionalized concession from employers that may serve to insulate the wages of jobholders in some sectors of the female labor market from excess supply pressures.

Affirmative action and equal opportunity programs act to break down barriers regulating female entry into occupations and cushioning the wage rates of those holding jobs in these occupations against excess supply pressures that might otherwise develop. Thus, affirmative action and equal opportunity programs contribute to the development of a labor market in which excess supply pressures on wage rates spread more evenly and more quickly through all sectors of the labor market and, hence, are borne more equally by all groups of workers. On the other hand, we have characterized pay equity programs as yet another measure for protecting the wages of those who have jobs against potential excess supply pressures. We do not see any incongruity in the fact that groups pushing for improved labor market conditions for women are supporting both of these types of measures. The goal is clearly to reduce the sensitivity of wages to excess supply pressures in the secretarial and certain other female labor markets, and at the same time open up to women a wider range of what have traditionally been male occupations.

Finally, we believe that the results of this

study convey a cautionary message. We have found that some groups of women are more likely than others to have their wage rates adversely affected by excess labor supply conditions. These results suggest that those implementing pay equity programs for the other clerical and secretarial occupations, for instance, must be careful to design those programs so that the employment opportunities of groups of women, such as blacks, those with children, and those with low educational levels, are not improperly infringed upon. The other clerical and secretarial occupations have offered black women and women with low levels of education some of the most attractive jobs, in wage terms, available to them. If wages rise in these occupations due to pay equity adjustments, competition for these jobs will presumably intensify. What needs to be guarded against is the formal or informal institutionalization of educational and other requirements for these jobs that are not dictated by productivity considerations and that would exclude from consideration for these jobs some of the sorts of women who currently rely on them for employment.

Policy conclusions are the result of judgment as well as logic. As such, they inspire disagreement. In this particular case, moreover, there is bound to be disagreement not only about the particular policy conclusions stated, but also about whether any policy conclusions at all can be drawn from a study such as ours.

Some will argue, for instance, that no policy implications can be drawn from our study because we have not established the extent to which excess supply pressures in female labor markets are the result of voluntary career decisions rather than a reflection of sex-related employment discrimination. A woman might have become a secretary because of a preference for this sort of work, because she thought this job would blend more easily with homemaking responsibilities than other possible jobs, because this was the best job she could find

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when forced to look for work by economic necessity with little or no career preparation, or because she was rejected for training programs or jobs in her chosen career area (perhaps because of discrimination). Our data source only provides information on a woman's occupation, not on her reasons for being in that occupation.

Some economists would argue that the erosion of female wage rates due to crowding pressures is an appropriate public policy concern only if the crowding can be shown to be largely due to employment discrimination against women. Demonstrating this point would probably require a fully articulated model of occupational choice. Thus, the acceptance of this position would certainly forestall any timely debate of policy measures intended to reduce or counterbalance crowding pressures on female wage rates because occupational choice is one of the most poorly developed topic areas in labor economics. A number of other economists are also pushing forward with the analysis of implications of pay equity programs, despite the paucity of empirical evidence on key behavioral responses (see, for instance, Beider et al., 1986).

Others would argue that no policy implications can be drawn from our empirical results because we have not demonstrated that crowding effects on wage rates are more severe in female than in male labor markets. It is true that our results do not shed light on the question of whether differences in the severity of crowding pressures in female versus male labor markets are an important cause of the female-male wage gap. But we do not agree that consideration of policies to deal with crowding effects in female labor markets must await evidence that this crowding is due to discrimination or that the wage effects of crowding are more severe for female than for male workers. Perhaps our position on this question can be clarified by pausing for a moment to consider some of the issues in the health care area that have come to be viewed as appropriate

topics for public policy debate and potential government action. Virtually everyone agrees that providing some minimal level of health care for the nation's elderly is an appropriate public concern. This is despite the fact that many elderly individuals are suffering from ailments that are the result of their own voluntary life-style choices (both present and past).

There is also special public concern about factors that appear to affect adversely the health status of those in subgroups of the elderly population that have particularly severe overall health problems. There is special concern, for instance, about the effects of high blood pressure and poor nutrition on the health status of elderly blacks. This is the case even though these same factors may have just as severe adverse effects on the health of those belonging to groups for whom the overall health picture is more satisfactory. Demonstrated need provides both the justification for public expenditures on health care for the elderly and the rationale for making extra funding available for programs designed to provide special assistance to certain subgroups of the elderly population.

The case for public policies to improve female labor market conditions rests on a similar foundation. There is clear evidence that the earnings situation for female workers is poor in an overall sense, even though employment and wage conditions for women have improved in recent years. Moreover, the poor earnings situation of large numbers of working women causes suffering. There is widespread and growing poverty, for instance, among widowed, divorced, and separated women and the dependent children of those women. To us the question is not whether, but how, public policy should be harnessed to improve the economic status of women. We undertook this study in the hopes of improving the understanding of how wages are determined in female labor markets, for it is this understanding that must form the basis for

policy discussions on how the wages of working women can be enhanced.

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APPENDIX A Definitions of Occupational Groups

Group Name	1980 Census Codes
Personal service	403-407, 449, 453, 457, 467, 468
Other clerical	275, 276, 319, 323, 325-329, 335-339, 343-349, 353, 354, 364, 365, 368, 374, 377-379, 383-387, 389
Secretarial	313-315
Sales	256, 259, 263-269, 274, 283
Managerial	004-009, 013-019, 024-029, 033-037
Health	095, 097-099, 103-105, 203-208, 445-447
Professional/technical	023, 043-049, 053-059, 064-069, 073-079, 083-089, 113-119, 123-129, 133-139, 143-149, 153, 154, 164-169, 173-179, 183-189, 193-199, 213-218, 223-229, 233-235
Teaching	155-159, 163

APPENDIX B State-Specific Variables Calculated Using Public-Use Sample (5 percent)
Data from the 1980 Census

State	Ratio for Women 20-24 Versus Women 25-29		Unemployment Rate		Mean Annual Earnings for Men 25-25 (\$s)
	Population	Employment Rate	Women 20-29	Men 20-29	
Alabama	1.13	.94	.15	.08	15,684
Alaska	1.00	.96	.06	.06	26,031
Arizona	1.22	1.00	.11	.05	15,992
Arkansas	1.21	.98	.10	.06	14,482
California	1.05	.97	.07	.09	18,192
Colorado	1.10	1.01	.08	.06	18,481
Connecticut	1.03	.96	.03	.06	19,442
Delaware	1.16	1.05	.11	.02	17,140
District of Columbia	.92	1.02	.10	.10	14,726
Florida	1.17	.97	.07	.06	16,345
Georgia	1.11	.93	.11	.09	15,731
Hawaii	1.05	1.04	.10	.04	17,284
Idaho	1.64	.89	.07	.08	16,589
Illinois	.98	.96	.08	.12	19,227
Indiana	1.03	.98	.10	.12	18,033
Iowa	1.19	.95	.05	.09	17,332
Kansas	1.22	1.00	.10	.09	17,511
Kentucky	1.18	.97	.08	.11	16,934
Louisiana	1.11	.90	.09	.07	17,726
Maine	1.17	.99	.09	.16	12,764
Maryland	1.14	.96	.09	.07	18,963
Massachusetts	1.10	.96	.04	.07	17,576
Michigan	1.01	.98	.12	.19	20,020
Minnesota	.98	1.03	.04	.10	18,313
Mississippi	1.48	.92	.16	.12	14,101
Missouri	.96	.99	.10	.11	17,080
Montana	1.06	1.00	.08	.16	17,355
Nebraska	.81	.96	.02	.01	17,596
Nevada	.89	1.03	.04	.04	19,081
New Hampshire	1.57	.97	.02	.08	18,610
New Jersey	1.09	.95	.09	.08	18,815
New Mexico	1.14	.99	.10	.09	16,153
New York	1.06	.91	.08	.12	17,428
North Carolina	1.18	.98	.10	.07	14,314

Continued

APPENDIX B *Continued*

State	Ratio for Women 20-24 Versus Women 25-29		Unemployment Rate		Mean Annual Earnings for Men 25-25 (\$s)
	Population	Employment Rate	Women 20-29	Men 20-29	
North Dakota	.87	1.00	.08	.06	18,091
Ohio	1.06	.99	.11	.14	18,004
Oklahoma	1.01	.95	.05	.06	16,487
Oregon	.74	.97	.10	.11	18,204
Pennsylvania	1.26	.94	.07	.11	17,506
Rhode Island	1.12	.98	.02	.07	15,328
South Carolina	1.20	.99	.08	.06	14,243
South Dakota	1.29	1.05	.10	.11	13,565
Tennessee	1.53	.99	.08	.12	16,166
Texas	1.07	.96	.07	.04	17,960
Utah	1.16	.94	.07	.04	17,314
Vermont	1.05	1.06	.12	.15	14,394
Virginia	1.13	.95	.07	.06	16,953
Washington	1.13	.95	.10	.12	18,439
West Virginia	1.09	.99	.04	.11	15,172
Wisconsin	1.07	.99	.09	.08	17,171
Wyoming	.84	1.07	.03	.02	19,137

NOTE: Natural logarithms of these variables were used in the regressions for which results are reported in Tables 3-2, 3-3, and 3-4.

APPENDIX C Definitions of Industrial Groups and Values for an Industry-Specific Relative Earnings Variable

Industrial Group	1980 Census Codes	Industry-Specific Demand Index ^a
Durable goods	230-391	1.29
Food and kindred products	100-122	1.02
Textile products	132-152	.92
Other nondurable goods	130, 160-222	1.11
Transportation	400-411, 420-432	1.37
Communications	440-442	1.47
Utilities and sanitary services	460-472	1.28
Wholesale trade	500-571	1.19
Retail trade	580-691	.76
Finance, insurance, and real estate	700-712	1.21
Business and repair services	732-760	1.12
Personal services	761-791	.77
Entertainment and recreation services	800-802	.70
Health services	812-840	1.12
Legal services	841	1.31
Educational services	842-851, 860-861	.83
Other services	852, 862-892	.86
Other	All remaining codes	1.01

^aDefined as the average earnings of women 20-24 in the given industry divided by the average earnings of all women 20-24. The natural logarithm of this variable was included in the log wage equations to account for demand effects.

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