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The Wage Rate Effects of Occupational Labor Market Tightness

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INTRODUCTION

Empirical wage equations have long been used to analyze the labor market effects of investments in human capital and to estimate wage rate differentials by gender and race. That methodology, owing primarily to Becker [1974] and Mincer [1974], has evolved over time as authors have added numerous explanatory variables aimed at better understanding labor market outcomes. The present study continues in that vein by including variables to control for occupational labor market tightness.

In an attempt to measure the independent effects of market conditions on wage rates and wage rate differentials by gender, the current analysis utilizes the May 1981 Current Population Survey (CPS) tape and occupational labor market tightness data from the Bureau of Labor Statistics to estimate wage equations which both exclude and include the measures of market tightness. The equations are designed to test two hypotheses:

Hypothesis 1. Excess demand for labor is directly related to hourly earnings, holding all else constant.
Hypothesis 2. If a relationship exists between gender and excess demand, then inclusion of an excess demand variable in a standard wage equation will tend to affect the estimated male premium.

The theory behind Hypothesis 1 is basic to the study of economics. Other things being equal, excess demand leads to higher prices, in this case the price of labor. The effects of supply and demand conditions are, however, more involved than such a simple statement suggests, as will be discussed in the following section. The theory behind Hypothesis 2 requires a bit more elaboration on the use of wage equations to estimate the extent of gender discrimination in wage rates.

MODEL

Labor Market Conditions

One can think about the wage effects of labor market conditions in a number of ways, and it is important to distinguish among them so that it is clear what is being analyzed here and what is not. In particular, two distinct effects of supply and demand conditions will be described, one of which is the topic of this paper. The two concepts will be referred to as "oversupply" and "excess supply." The first effect can be thought of as bringing about *equilibrium* wage differentials on the basis of such factors as the existence of positive nonpecuniary job characteristics of one job relative to another. The second effect has to do with

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disequilibrium conditions which bring about wage changes and subsequent changes in occupational labor supply.

A study of compensating wage differentials helps to explain why equilibrium wage differentials can exist among occupations requiring equal skill. To the extent that workers value positive nonpecuniary job characteristics, such as pleasantness of the work environment, job safety, time flexibility, prestige, or usefulness to society, workers may be willing to accept lower wages to obtain those jobs. Alternatively, workers accepting jobs with disadvantageous characteristics will want to be compensated for their willingness to accept those characteristics (e.g., hazard or unpleasant working conditions).

The labor market performs the function of establishing compensating wage differentials. Suppose for example, that the labor demand curves for two occupations were identical, but that the second occupation had more positive nonpecuniary job characteristics than the first. Then, at every wage rate, there would be more labor supply for the second occupation relative to the first. This is what we are referring to as "oversupply": more labor supply relative to labor demand at any given wage rate. It has to do with the positioning of the curves (i.e., a labor supply curve further to the right relative to a given demand curve) and leads to an *equilibrium* wage differential that will persist unless tastes or other relevant factors change.

The second effect is a disequilibrium concept for which we use the terms "excess supply" and "excess demand." If demand or supply conditions change (i.e., a shift of one of the schedules), then at the prevailing wage rate, either excess supply or excess demand will exist. Should there be, for example, a rise in the demand for professors of management information systems (brought about by altered university accreditation requirements) or a fall in the supply of nurses (as women's preferences for entering "female occupations" change), then there will be excess demand for those occupations. Economic theory suggests that the wage rates would rise in order to clear those respective markets.

The operating assumption in the present analysis is that when shortages and surpluses occur, wages will adjust, thus giving the appropriate market signal and bringing about a subsequent supply adjustment, with a lag. While the study of economics commonly assumes frictionless and immediate adjustments to market disturbances, that may be an unreasonable assumption for labor markets (if not for most markets). Delays in labor supply response could result from a lack of market information on the part of workers or students, limitations to geographical mobility, and the time involved in acquiring the necessary training to enter an occupation in which there is a shortage.

The importance of this assumption is that it allows the existence of disequilibrium to be analyzed in terms of *level differences* (holding all else constant) rather than wage rate *changes*, and therefore allows cross section estimation which accounts for market conditions. The analysis is necessarily weakened to the extent that this assumption is not valid.[1]

It is the disequilibrium aspect of labor market conditions on which this analysis focuses. Occupation and industry dummy variables may be thought to pick up some of the effect of market conditions. But within a major occupation category, such as professional-technical or managerial-administrative, labor market conditions may vary substantially. To the extent that this is true, major occupation dummy variables do not capture market conditions well. Furthermore, those dummy variables may pick up a host of other effects such as specific skill differences not captured in education and experience.

Gender Effects

Some of the earliest rhetoric on wage discrimination or pay equity claimed that women earned only 60 cents for each dollar that a man earned, indicating a 40 percent male premium. That differential, however, allowed no adjustment for differences by gender in education, experience, or type of job held. That is, men have, *on average,* more education and work experience than women and therefore should, according to human capital theory, earn, *on average,* a higher wage than women. The question is not whether men have on average higher wages than women, but whether male wages exceed female wages by an amount *more* than warranted by differences in human capital and market conditions. It is precisely for that reason that wage equations are employed. If after controlling for all factors that legitimately should cause wage differentials among individuals there is still a significant difference between males and females, then it is thought that wage discrimination exists. However, while human capital variables have been included in wage equations, there has been little explicit treatment of labor market conditions.

The inclusion of market conditions variables may have implications for the estimation of gender differences in wages. Most studies using CPS data find significant wage differences by gender (see, for example, Asher and Popkin [1984] and Mellow [1982]. Estimates of the gender differential are commonly in the 20 to 30 percent range.[2] To conclude that the gender differential is due entirely to discrimination, one must assume that the list of explanatory variables is exhaustive (and properly measured). To the extent that explanatory variables which should affect wages are omitted, the gender differential may not appropriately identify discrimination alone. If an omitted variable is, for example, correlated with gender, then bias in the gender coefficient will result making the interpretation of discrimination incorrect.

The estimation of wage equations which include human capital variables have reduced the size of the measured male premium from (the uncorrected) 40 percent to the 20–30 percent range. Because education and experience are directly correlated with gender, excluding them from a wage equation would bias upwards the gender coefficient (i.e., the male premium). Similarly, if labor market tightness is correlated with gender, then its omission would also lead to a bias in the estimated male premium. If women are in occupations characterized, disproportionately, by excess supply (or less excess demand relative to males) then the male premium estimated by excluding labor market conditions is likely to be upward biased, implying that discrimination is not so severe as previous studies have found. That is, some of the difference between male and female wages is thought to be attributable to market conditions, leaving less of a difference attributable to discrimination. If, on the other hand, women are in occupations characterized, disproportionately, by *more* excess demand than for males, estimates of the male premium obtained by excluding market conditions will be understated, implying that discrimination is more severe than previous studies have found.

While the relationship between gender and overcrowding is commonly thought to exist (i.e., equilibrium oversupply due to gender differences in preferences for nonpecuniary job characteristics, socialization, lack of information, and/or choice due to real or perceived employment discrimination), a gender-EXDEM relationship is less compelling. EXDEM measures what we are calling disequilibrium excess demand brought about by shifts of labor demand or supply prior to adjustments being made. A priori, it is not clear why EXDEM values might be correlated with gender. However, recent changes in women's preferences away from so-called "pink collar" jobs, as well as increased demand for workers in health-related fields (many of which are female-dominated) may suggest more excess demand among women. This is ultimately an empirical issue that will be addressed in the following sections.

DATA AND EMPIRICAL METHODOLOGY

While the specification of wage equations differs across studies, our strategy is to adopt a common set of explanatory variables, estimate the wage equation, then add an excess demand variable and observe what effect it has on wages (i.e., the sign and magnitude of its coefficient) and, secondarily, what effect it may have on the magnitude of the gender coefficient (i.e., how the gender coefficient changes when excess demand is included in the equation). As is customary, the equation is estimated in semi-logaritmic form, with the dependent variable being the natural logarithm of usual hourly earnings. The explanatory variables used in the estimation include region, education, experience, union status, a part-time dummy, race, gender, marital status, major occupation dummies, and major industry dummies.[3] Squared terms for both education and experience are included to allow for nonlinearities of those relationships, as is conventionally done.

To test the two hypotheses concerning the effects of labor market tightness on wages and the male premium, data were acquired from the Bureau of Labor Statistics [1982]. BLS projects growth and employment prospects for a large number of detailed occupations. The procedures for estimating employment growth are described both in the *Occupational Outlook Quarterly* and in the *Occupational Outlook Handbook.* BLS relies on independently run macroeconomic forecasts, utilizing scenarios with differing degrees of optimism. It then translates macroeconomic projections, for each scenario, into occupation-specific employment projections using its own Industry-Occupation Employment Matrix. That translation is not generated by estimated relationships with macroeconomic performance for every occupation, however. Projections for some occupations are based on expected demographic changes (e.g., for elementary and secondary school teachers), and the projections for some occupations are judgemental.

In addition to providing numerical employment projections (percentage growth rates for the 1980–90 period), the *Occupational Outlook Quarterly* gives an indication of relative supply and demand, or what it calls employment prospects. Those prospects are almost entirely judgemental, relying on experts in each field to provide an accurate assessment of the match between supply and demand, and are not available for all of the occupations for which growth is available. Employment prospects are given verbally rather than numerically and are described in a small table which is reproduced in part in Table 1. When prospects are being described for a particular occupation, BLS uses one of the statements in the first column, which it translates as meaning relative supply and demand as indicated in the second column.

For purposes of quantitative estimation, we have assigned values ranging from 1 to 5 to each of the possible classifications, with 5 indicating the highest degree of excess demand (i.e., excellent opportunities, from the workers' standpoint) and 1 indicating the lowest degree of excess demand (i.e., keen competition). There were many occupations for which numerical assignments could not be made because the statements were not specific enough. For example, the citation for hotel managers and assistants reads, "Best opportunities for persons with degree in hotel administration." Such a statement does not say whether opportunities are excellent, or very good, or good, or not very good (may face competition or keen competition), just that opportunities are *relatively* better for those individuals with particular training. No excess demand value could be assigned to individuals in this occupation or in other occupations possessing the same type of description. As a result, many occupations were necessarily dropped from the analysis for lack of numerical information.[4]

Based on an individual's 3-digit occupation (available starting on the May 1981 CPS tape), each individual is assigned two values: one for the projected growth rate (GROWTH) and the other for the degree of excess demand (EXDEM), based on the BLS projections for that occupation. For some occupations, BLS reports the projected growth rates as ranges, while for other occupations they are reported as point estimates. When a range is given, we use the mean value of that range. Values of EXDEM were matched with one hundred sixty 3-digit occupations on the CPS tape, allowing the analysis to be conducted on over six thousand observations. Values of GROWTH were matched with two hundred thirty-four 3-digit occupations, representing over nine thousand observations.

In principle, EXDEM is the better measure for investigating the effect of market conditions on wages because it takes demand relative to supply, not just employment growth. It is possible, for example, that a rapidly growing occupation also has a rapidly growing labor supply. Therefore, despite rapid employment growth, it is possible to have excess supply. Being aware of the theoretical shortcomings of GROWTH, but noting both the correlation between the two variables and the fact that the sample size could be increased by approximately 50 percent by using GROWTH instead of EXDEM, we decided to estimate equations in both ways. Those results are presented in the next section along with a discussion of the empirical relationship between GROWTH and EXDEM.

TABLE 1.
Opportunities and Competition for Jobs

If the statement reads . . .	The demand for workers may be . . .
Excellent opportunities	Much greater than the supply
Very good opportunities	Greater than the supply
Good or favorable opportunities	About the same as the supply
May face competition	Less than the supply
Keen competition	Much less than the supply

Reverse causation poses a potential estimation problem in assessing the effect of excess demand on wage rates.[5] It is possible that higher-than-equilibrium wages may attract workers, therefore causing wage rates to be inversely correlated with excess demand, having the opposite sign than that of the expected relationship, with causation running in the reverse direction. In the present analysis, wages are assumed to adjust more rapidly than supply decisions for reasons stated earlier. Therefore, in the face of excess supply, the wage would fall (relatively if not absolutely), and, generally, we should not observe excess supply and high wages. The problem is more serious if employers choose to pay a wage higher than the market equilibrium wage in order to retain workers and reduce turnover costs. Among low values of excess demand (i.e., excess supply), this would lead to an inverse relationship between EXDEM and wage rates. The problem is not likely to be symmetric. Employers are not likely to pay low wages in order to increase turnover costs. And while lower-than-equilibrium wages would lead to higher excess demand, we are, again, assuming that wage adjustment is rapid where supply adjustment is not, so that apart from a conscious choice by employers to pay wages different from equilibrium values, we should not observe an inverse relationship.

If our assumptions are false, then the coefficient on excess demand will be biased downward. That is, if there is reverse causation, then EXDEM will pick up two competing influences: the positive association as hypothesized, and the inverse association resulting from reverse causation. In principle, the two effects could empirically cancel each other out, leading us to the incorrect conclusion that excess demand does not affect wage rates. In this case, an estimated coefficient on EXDEM which is not significantly different from zero does not necessarily imply the lack of effect of EXDEM on wages. It could be consistent with very large effects of both types which happen to be of equal magnitudes but of opposite signs. We may simply be unable to identify the separate effects.

If, on the other hand, we obtain a positive coefficient on EXDEM which is significantly different from zero, then we may be confident that the hypothesized relationship holds. We may, however, underestimate the strength of that relationship if the problem with reverse causation reduces the magnitude of the coefficient from what it otherwise should be. Pragmatically, we expect this to be a problem primarily for some occupations for which the EXDEM value is very low (i.e., the most excess supply). We will estimate the wage equation using EXDEM in two ways: as a continuous variable (running from 1 to 5) and as dummy variables to allow for nonlinearities in the relationship. If our priors are correct, then, using the latter approach, reverse causation might be expected to make the relationship nonmonotonic at low values of EXDEM.

EMPIRICAL RESULTS

While the data support the fact that certain female occupations have excess supply, one striking result of this analysis is that females are disproportionately in occupations characterized by more excess demand (relative to males). This result is not in conflict with the "overcrowding hypothesis" which suggests that women crowd themselves into particular occupations, either by choice or because of discriminatory hiring practices. It is here that one must be careful about the nature of market conditions. The overcrowding hypothesis is consistent with what we are referring to as equilibrium oversupply, that is, the positioning of the supply and demand curves. It is possible that an occupation is characterized by *both* oversupply and excess demand. The first would indicate, for example, that the supply curve is positioned relatively far to the right (yielding a relatively low equilibrium wage). The second would indicate, for example, a recent rightward shift of demand or a leftward shift of supply that could still leave the wage low, relative to another occupation, but not as low as without the shift. Other things being equal, the existence of excess demand leads to a higher wage rate. Of course, not all other things are equal, such as nonpecuniary job characteristics, therefore the actual effect of excess demand in this example is to narrow the measured wage differential.

Table 2A presents figures for stereotypical female-dominated occupations which are thought to be overcrowded, as well as some male-dominated occupations for which there is a high degree of excess

TABLE 2A.
Gender Composition of Selected Occupations with Associated EXDEM Values.
(Row percents in parentheses)

	Female	Male	EXDEM Value
Female-dominated Occupations:			
Librarians	25 (78.1)	7 (21.9)	1
Social Workers	45 (66.2)	23 (33.8)	2
Decorators	19 (79.2)	5 (20.8)	2
Male-dominated Occupations:			
Programmers	8 (24.2)	25 (75.8)	5
Construction machinery operators (bulldozer, crane, trading & road machinery)	0 (0.0)	110 (100.0)	4
Automobile mechanics	1 (0.9)	114 (99.1)	4
Diesel repairmen	2 (1.2)	170 (98.8)	4
Welders	4 (3.9)	100 (96.1)	4
Construction laborers	2 (1.5)	130 (98.5)	4

demand. The gender composition of each occupation, for usable observations on the CPS tape, are given in the first two columns. The third column gives the associated values of EXDEM.

Librarians and social workers are commonly pointed out by advocates of pay equity schemes to be examples of well-educated but under-paid female workers. Critics counter that claim by citing slack market conditions, such as those presented in the table, as the primary contributor to their low wages. Similarly, critics cite excess demand among male-dominated occupations, such as those listed at the bottom of Table 2A, as contributing to higher male wages, thus lessening the remaining difference presumably due to discrimination.

As discussed above, however, female-domination of an occupation does not necessarily imply excess supply in that occupation. Table 2B presents information on both female- and male-dominated occupations having high and low degrees of excess demand, respectively, contrary to the stereotypical examples given in the previous table.

The fact that women in this sample are disproportionately (i.e., relative to men) in occupations with greater excess demand is illustrated in Table 3 which presents a two-way crosstabulation of EXDEM (with values from 1 to 5) by gender (with female = 0 and male = 1). A significant and negative relationship exists, with *high* values of EXDEM being associated with the lower (female) value of gender. In this sample, 62.2 percent of females have EXDEM values of 4 or 5, while only 34.8 percent of males are in occupations with the same high degree of excess demand. Likewise, only 15.3 percent of females have EXDEM values of 1 or 2 while 36.1 percent of males have the same low degree of excess demand (i.e., excess supply). This relationship may have implications for the estimation of the wage equation, to which we now turn.

Table 4 presents the coefficient estimates for the wage equations described in the previous section. Because the equations are specified as semi-logarithmic relationships, the coefficients on continuous variables are approximations to the percent difference in wages (in decimal form) attributable to a one

TABLE 2B
Gender Composition of Selected Occupations with Associated EXDEM Values.
(Row percents in parentheses)

	Female	Male	EXDEM Value
Female-dominated occupations:			
Therapists	31 (70.5)	13 (29.5)	5
Bookkeepers, billing clerks, timekeeping clerks (combined)	341 (86.8)	52 (13.2)	4
Cashiers	199 (84.3)	37 (15.7)	4
Secretaries	623 (99.4)	4 (0.6)	5
Waiters	235 (90.4)	25 (9.6)	4
Dental assistants	35 (100.0)	0 (0.0)	5
Health aides	52 (89.7)	6 (10.3)	5
Nursing aides	167 (87.0)	25 (13.0)	5
LPN's	63 (94.0)	4 (6.0)	4
Hairdressers/cosmotologists	62 (93.9)	4 (5.9)	4
Male-dominated occupations:			
Lawyers	11 (23.9)	35 (76.1)	2
Economists	4 (16.7)	20 (83.3)	2
Bank officers	31 (29.5)	74 (70.5)	2
School Administrators (college, elementary)	20 (29.4)	48 (70.6)	1
Ticket Agents	6 (26.1)	17 (73.9)	1
Truck drivers	4 (1.4)	273 (98.6)	1
Firemen	0 (0.0)	42 (100.0)	1
Guards & watchmen	15 (15.8)	80 (84.2)	1
Police & detectives	6 (5.3)	108 (94.7)	1

unit difference in the independent variables.[6] For dummy variables, the interpretation of a particular coefficient is the approximate percentage difference in wages between being in that category and being in the omitted category.

The basic wage equation without EXDEM is given in the first column of Table 4. The second column contains the wage equation with EXDEM. In accord with Hypothesis 1, the coefficient on EXDEM is positive and significantly different from zero at the 5 percent level. That is, greater excess demand is

TABLE 3
EXDEM by Gender. (Column percents in parentheses)

EXDEM Value	Female (0)	MALE (1)
1	196	678
	(5.98)	(22.63)
2	304	403
	(9.28)	(13.45)
3	739	874
	(22.56)	(29.17)
4	1115	946
	(34.04)	(31.58)
5	922	95
	(28.14)	(3.17)

Note: The value of Chi square is 966.76 and the Spearman correlation coefficient is −.357.

associated with higher wages, holding all else constant. For each one unit rise in EXDEM, wages are just over 1.5 percentage points higher. According to this equation, two individuals who are identical in all respects except for the degree of excess demand in their respective occupations would have wage rates that differ by 6.4 percent if one's EXDEM value was 1 and the other's was 5.

The effect of the EXDEM-gender relationship can be seen by comparing the gender coefficients in the two equations. In the basic wage equation (Equation 1), the gender coefficient is 0.2169, indicating a 24.2 percent male premium. Econometric theory tells us that if an omitted explanatory variable (EXDEM in this instance) is correlated with an included explanatory variable (e.g., gender), then the coefficient on the included variable will be biased. As presented earlier in this section, there is in this sample an *inverse* relationship between EXDEM and gender, meaning that the gender coefficient in Equation 1 is downward biased, and that after controlling for market conditions, the male premium is likely to be somewhat larger. Equation 2 is consistent with that result: When EXDEM is included, the gender coefficient rises to 0.2210, indicating a 24.7 percent male premium. The difference between the two values of the male premium is, however, not statistically significant at the 5 percent level.

The estimated equation including EXDEM demonstrates the direct relationship between tight labor market conditions and wage rates, holding other factors constant. Because, according to sample data, there is also a relationship between gender and excess demand, the impact on the gender coefficient has also been assessed. As it turns out, there is no appreciable difference in the measured male premium after controlling for EXDEM.

The foregoing analysis was also carried out using BLS values for projected growth rates in each occupation. The variable GROWTH, which ranges from −29.0 percent to +102.5 percent for the 1980–90 period, has considerably more variation than EXDEM, which takes on integer values from 1 to 5. The two variables are, however, positively correlated. A regression of GROWTH on EXDEM yields an R^2 of .197 (a correlation coefficient of .444), a coefficient of 4.83, and a t-statistic in excess of 38. Thus, while leaving much of the variation of GROWTH unexplained, EXDEM is directly and significantly associated with it.

The GROWTH-gender relationship and the estimated wage equations are presented in an appendix which is available upon request from the authors. The GROWTH-gender relationship is less pronounced than the EXDEM-gender relationship. While a regression yields an inverse and significant relationship (with a coefficient of −2.4 and t-statistic of 7.5), the correlation coefficient is only .08.

The findings from the wage equations corroborate those obtained by using EXDEM. The coefficient on GROWTH is positive and significantly different from zero at the 5 percent level. The gender coefficient rises slightly from 0.2158 to 0.2214 when GROWTH is included in the equation, indicating a rise in the

TABLE 4
Estimated Wage Equations With and Withoout EXDEM
(Dependent variable: LOG (HOURLY EARNINGS))

Independent Variable	Eq. 1 Basic Equation	Eq. 2 With EXDEM
Intercept	0.9652	0.9061
	(9.93)	(9.075)
Region		
Northeast	−0.0101	−0.0097
	(0.743)	(0.714)
South	−0.0410	−0.0400
	(3.161)	(3.078)
West	0.0692	0.0700
	(5.168)	(5.234)
Education	−0.0012	−0.0025
	(0.123)	(0.252)
Education Squared/100	0.1511	0.1588
	(3.866)	(4.054)
Experience	0.0190	0.0190
	(13.743)	(13.755)
Experience Squared/100	−0.0323	−0.0323
	(11.042)	(11.048)
Union Member	0.1118	0.1146
	(9.324)	(9.521)
Part-time Worker	−0.1309	−0.1295
	(9.709)	(9.600)
Race	0.0033	0.0048
	(0.210)	(0.307)
Gender	0.2169	0.2210
	(17.137)	(17.331)
Marital Status		
Married, Spouse Present	0.0604	0.0599
	(4.352)	(4.323)
Married, Spouse Absent	0.0103	0.0100
	(0.348)	(0.339)
Widowed or Divorced	0.0564	0.0566
	(2.885)	(2.900)
EXDEM	—	0.0155
		(2.569)
Occupation		
Professional, Technical	0.3323	0.3527
	(17.873)	(17.456)
Managerial, Administrative	0.4626	0.4849
	(16.813)	(16.814)
Sales	0.2571	0.2970
	(3.960)	(4.451)
Clerical	0.1525	0.1473
	(9.143)	(8.769)
Crafts	0.1911	0.1961
	(8.620)	(8.818)
Operatives except Transport	0.1158	0.1277
	(4.447)	(4.831)

TABLE 4
(Continued)

Independent Variable	Eq. 1 Basic Equation	Eq. 2 With EXDEM
Transport Operatives	0.1279	0.1692
	(4.712)	(5.365)
Nonfarm Laborers	0.0080	0.0103
	(0.183)	(0.235)
Industry		
Mining	0.3015	0.2916
	(3.590)	(3.471)
Construction	0.2456	0.2374
	(3.242)	(3.131)
Manufacturing, Durables	0.2342	0.2275
	(3.265)	(3.172)
Manufacturing, Nondurables	0.1791	0.1765
	(2.466)	(2.431)
Transportation, Utilities	0.2365	0.2340
	(3.242)	(3.209)
Trade	−0.0373	−0.0381
	(0.523)	(0.535)
Finance, Insurance, Real Estate	0.1125	0.1141
	(1.538)	(1.561)
Service	0.0535	0.0475
	(0.755)	(0.671)
Federal Government	0.3328	0.3305
	(4.312)	(4.284)
State Government	0.1232	0.1276
	(1.504)	(1.559)
Local Government	0.1494	0.1750
	(1.964)	(2.282)
R^2	0.4822	0.4827
F-Ratio	176.005	171.176
No. Observations	6271	6271

estimated male premium from 24.1 percent to 24.8 percent. The difference is, again, not statistically significant.

Breaking EXDEM into dummy variables, and arbitrarily dropping one category, allows the relationship between EXDEM and wages to be nonlinear. The interpretation of the coefficients is, of course, different from that in the previous equations. The coefficient for one dummy variable will be the approximate percentage difference (in decimal form) in wages due to the difference between that particular EXDEM value and the value of the omitted EXDEM category. We have arbitrarily chosen the middle category (EXDEM = 3) as the omitted category. The other dummy variables are labeled EXDEM1, EXDEM2, EXDEM4, and EXDEM5. In this specification, a direct relationship between the EXDEM and wages would be demonstrated by a negative coefficient on EXDEM1, a negative coefficient on EXDEM2 which is smaller in absolute value, a positive coefficient on EXDEM4, and a larger positive coefficient on EXDEM5.

The results of the wage equation using EXDEM dummy variables are given in Table 5. The coefficients all have the correct signs except that of EXDEM4 which is not significantly different from zero (meaning there is no statistical difference between the effects of EXDEM3 and EXDEM4 on wage rates).

TABLE 5.
Wage Equation Coefficients on EXDEM Dummy Variables

Variable	Coefficient	t-statistic	Significance Level
EXDEM1	−0.022	1.1	.286
EXDEM2	−0.047	2.6	.009
EXDEM4	−0.023	1.2	.226
EXDEM5	0.038	1.8	.073

The coefficient on EXDEM2 is −.047 and significantly different from zero (at the 1 percent level), indicating that, holding all else constant, an individual with an EXDEM value of 2 will have a wage rate approximately 4.7 percent lower than an individual with an EXDEM value of 3 (the omitted category). The coefficient on EXDEM5 is 0.038 (and significantly different from zero at the 7.2 percent level), signifying a wage rate difference of approximately 3.8 percent between individuals having EXDEM values of 3 and 5, holding all else equal.

Though the coefficient on EXDEM1 has the expected negative sign, the point estimate is smaller in absolute value than the coefficient on EXDEM2, and it is not significantly different from zero. As discussed in the previous section, reverse causation could bring about this result. The existence of occupations for which a high wage brings about excess supply can have the effect of countering the hypothesized effect of excess supply causing a lower wage rate. As such, we are unable to identify the separate effects.

CONCLUSIONS

Though wage equations are frequently used to measure the effect on wage rates of differences in human capital and market conditions, the treatment of market conditions has been inadequate. Given that occupational labor markets experience varying degrees of excess demand or supply at any given moment, wages should reflect the shortages or surpluses of workers, thereby providing the market signal for subsequent supply and demand responses. In most empirical analyses, major occupation dummy variables are included to explain wage differences attributable to skill differences not captured in education and experience as well as wage differences attributable to the variation in market conditions. However, market conditions may vary substantially across the detailed occupations within a given major occupation category, making the use of major occupation dummy variables less adequate for capturing the effects of market conditions.

In this analysis, information on occupational labor market conditions provided by the Bureau of Labor Statistics have been assigned to individuals on the May 1981 Current Population Survey tape based on their 3-digit occupation. While major occupation dummy variables are retained for explaining otherwise unmeasured skill differences, a measure of excess demand is also included to isolate that effect.

As hypothesized, excess demand is directly related to wages, holding all else constant. The inclusion of a market conditions variable did not appreciably affect the estimated male premium, though it raised the point estimate because, in this sample, females were found disproportionately to be in occupations characterized by excess demand.

Future research concerning the effects of labor market conditions on wages should concentrate on a number of problems encountered in this study. First, many occupations were not represented in the analysis for lack of information on excess demand. While there is no *a priori* reason to believe that there is sample selection bias, given data with a broader coverage of occupations we could find, *ex post*, that there was. Second, reverse causation and problems associated with identification of a supply-demand relationship warrant additional work in light of the quasi-fixed nature of labor and its effect on paying higher than equilibrium wages to retain employees, reduce labor turnover, and insure a ready supply of potential workers.

NOTES

1. Casual evidence tends to support this claim, though it may be less true, or the supply lag less pronounced, among occupations for which skill requirements are low and occupational mobility is less hindered.
2. Standard semi-logarithmic wage equations estimated from the 1979, 1981, and 1983 CPS tapes yielded gender coefficients (male premium estimates) of .250, .230, and .220, respectively.
3. The omitted categories for the dummy variables having more than two categories are as follows: region—North Central; marital status—never married; major occupation—service workers; and major industry—agriculture. The values for the other dummy variables are as follows: union status—1 if a member, 0 if a nonmember; part-time dummy—1 if part-time, 0 if full-time; race—1 if white, 0 if nonwhite; and gender—1 if male, 0 if female.
4. The inclusion or exclusion of particular occupations does not derive from any conscious selection bias on the part of BLS, as was the fear of an anonymous referee. BLS does not restrict its attention to occupations having extreme values of excess demand, as demonstrated in a subsequent table (only 13.9 percent of the observations had an EXDEM value of 1, and only 16.2 percent had an EXDEM value of 5, leaving 70 percent of the sample with values 2, 3, and 4). On the other hand, the resulting subsample could, *ex post,* be less representative than the full CPS sample from which it is drawn. So that the reader may be aware of the differences in sample and subsample characteristics, they have been presented in Appendix Table 3 along with an indication of which values differ from one another. At the one percent level, significant differences exist for the proportion of males (undersampled in the data set used in this analysis) as well as the mean values of education and experience (less schooling but more experience). Though the sample is not perfectly representative of the CPS sample (due to the inability to assign EXDEM values to all occupations), the data are probably the best that exist on such a broad basis. It is hoped that the present analysis will demonstrate the need for more comprehensive and carefully measured data on labor market conditions that will be suitable for analysis, not simply tabular presentation by BLS.
5. We are thankful to Lisa Ehrlich Daniel for helpful discussions on this point.
6. The approximation is worse the further the coefficient value is from zero. To obtain the actual rather than approximated estimate, exponentiate the coefficient and subtract one.

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