cise in paper-pushing has actually been of material importance in prompting companies to increase their employment of minorities and females. The combined impact of being a contractor, and of undergoing a review as in the case 17.4 percent of all contractor employment, is presented in row 3. Row 5 displays the relative extent of these contract compliance induced demand shifts by expressing them as a proportion of initial 1974 employment shares in the contractor sector. The shift is largest for blacks: fourteen percent for black males, and eleven percent for black females. The proportionate shifts for white females and for non-black minority males are not as large: two and five percent respectively.

To derive an estimate of the effect of affirmative action on market demands, I assume that affirmative action has not directly altered labor demand schedules in the non-contractor sector. I also maintain the assumptions that the demand elasticities are equal in both sectors, and the supply curve identical, so that the differential between employment shifts in the contractor and non-contractor sectors can be identified as a demand shift. Since 68.6 percent of employment in the sample is in contractor establishments, the market demand shift in row 6 is taken to be .686 times the shift in the contractor sector. In other words, the market shift is simply the weighted average of sectoral shifts. Because many small employers who are not contractors are not included in the sample, this may overestimate the shift in the economy as a whole.

The impact of establishments which change contractor status is explored in Table 4.11, which replicates Table 4.7 in a log-odds specification. In the case of black males, the coefficients line up in the expected order of magnitude. Black males experienced the greatest employment gains at establishments that remained contractors, followed in order by establishments that left contractor status, those that became contractors, and finally, those that never were contractors. For all protected groups, employment gains, if any, were smaller at establishments that were not contractors in 1974 and 1980 than in establishments that were contractors in either or both years. Except for white females, establishments which left contractor status demonstrate better employment records for members of protected groups than do establish-

ments that just became contractors. This is consistent with state dependence, the inertia of employment stocks. Except for black males, the impact of affirmative action actually appears to have been greater at establishments that ceased being contractors than at those that remained contractors. If some establishments found the cost of complying with affirmative action exorbitant, one might well expect them to give up being contractors before incurring the cost. In this sense, the pattern observed in these cases is anomolous. Similarly, it is not obvious why new entrants should have better records of employing white females and of not employing white males than contractors of long-standing. If these establishments are becoming contractors because they find it easy to comply with affirmative action, as one self-selection argument goes, why didn't they choose to reap the benefits of being a federal contractor six years sooner? Before leaving Table 4.11, note that while the status change variables are usually individually significant, they do not generally contribute to a significant reduction in the standard error of the estimate.

Weighted Log-odds Equations

There are econometric arguments that while the unweighted log-odds result presented so far are unbiased, they are not fully efficient, if the data is thought of as coming from grouped observations. If each establishment is considered a random sample, then the information on sample proportions in the larger establishments is more precise, and a regression that utilizes this information on heteroskedasticity is more efficient. Since our estimates should be unbiased in either case, weighting should not greatly change them. That it does in some cases, as can be seen by comparing the weighted log-odds equations in Tables 4.12 with the unweighted Table 4.9, suggests that the impact of affirmative action depends in a non-linear fashion on establishment size, or less likely, initial demographics. The weighted regressions weight by the square root of npq, contain no intercept, and enter the square root of npq as an independent variable. Since the contract compliance program appears to be less effective in the weighted regressions, it is likely that contractor and review effects are relatively smaller in large establishments with high minority and female representation.

The weighted log-odds equations in Table 4.12 are summarized in Table 4.13, which is consistent with other specifications in showing that the demand for black males has increased in the contractor sector. There is also evidence here that compliance reviews have significantly increased the employment of female and male blacks, and of non-black minority males. However, contractor status appears to have had a perverse effect on other groups, helping white males and hindering non-black minority males and white and black females, although black females' share of female employment has increased. These particular estimates point to a contract compliance program that appears to have enjoyed greater success in promoting the employment of black males than that of members of other protected groups, and may even have hindered the employment of other such groups. While in some cases protected group employment may not have increased as fast in the contractor sector as outside, it is worth keeping in mind that the employment of minorities and females has been increasing in both sectors. Indeed, if the OFCCP pressured establishments to hire more females and minorities compared to their own past record rather than compared to industry and region averages, the observed pattern is just what we would expect to see during a period when female labor supply had been growing. Females' share would increase at all establishments due to the supply shift, and contractor establishments would be under little pressure to employ more females than non-contractors. The relatively shorter history of affirmative action for females, as well as the demographic composition of the bureacracies that enforce affirmative action, may also help explain the differential impact of affirmative action across protected groups.

Are things any different in the South? Table 4.14 presents a set of weighted log-odds equations estimated separately on the sample of establishments located in the Southern states. For black males, F-tests accept the identity of contractor effects, but reject the identity of Southern and national review effects. Compliance reviews have an insignificant impact on black males in the South, in contrast to what is observed nationwide. For black females, contractor status has a significantly more negative impact in the South than nationwide, while reviews have a greater positive impact. Finally, for non-black minority males, contractor status is

significantly more positive and review status significantly more negative in the South than in the nation.

The linear probability and log-odds equations presented in this section control for establishment size, growth rate, industry, and region and other variables. The results from these stricter controls show the robustness of the previous cross-tabulation results for black males. While the impact on other protected groups is less clear, and in some cases negative, Executive Order 11246 has led to significant employment gains for black males.

Section 4: Illusions and Qualifications

This chapter and the last fundamentally concern questions of measurement. More than once we have seen that whether one ends up holding a diamond or dust depends upon how one slices the rock. This section will first focus on an example of the difference made by an innocuous looking change in approach. The moral of this analysis is that the weighting of observations implicit in the specification of the regression equation plays a crucial role in our tests. The second part of this section will present evidence on the question of simultaneity bias in our results.

First, ask whether our results so far imply that the contractor sector's share of all employed black males has increased. In other words, since our previous results tell us that, ceterus paribus, contractors increase black male representation faster, can we infer that a growing proportion of black males are employed in the contractor sector?

Consider the elemental Table 4.15, which shows absolute employment levels. In contrast to previous cross-tabulations that showed the mean of ratios, Table 4.15 shows the ratio of means. These absolute employment levels shows that .74 of all black males were employed in the contractor sector in 1974, but that this fell slightly to .72 in 1980. This can be easily reconciled with our previous result by noting that the non-contractor establishments grew much more than the contractors. They absorbed more black males as they grew, and from our previous results we know that growing establishments increase their employment of minorities and females more quickly. The ratio of black males to total males grows at only a slightly greater rate in the contractor sector because the rate in the non-contractor sector is bolstered by growth in total employment, which is not controlled for in these simple cross-tabulations. While the ratio of black males to total males is lower in the contractor sector, the ratio of black males to total employees is higher. This is because the ratio of all males to total employment is much higher in the contractor sector than among non-contractors. This fact will play a crucial role in a moment.

Recall from Table 4.6 that contractor status increased black males' share of total employ-

ment by .20 percentage points and decreased white males' by .02 percentage points. Can we infer from this that black males share of male employment increased? The answer will depend on how we weight. To clarify the issues here, some simple mathematics will help.

Let

W_i = absolute number of white males

B_i = absolute number of black males

M_i = absolute number of males = $W_i + B_i$

N_i = absolute number of employees

A = absolute number of establishments

$P_i^B = B_i / N_i$

$P_i^W = W_i / N_i$

$Q_i^B = B_i / M_i$

$Q_i^W = W_i / M_i$

$R_i = M_i / N_i$

Now

$$A \cdot \bar{P} = \sum^{A} P_i \tag{1}$$

or equivalently:

$$A \cdot \bar{P} = \sum^{A} Q_i R_i \tag{2}$$

In my analysis, the number of establishments is fixed, so totally differentiating yields:

$$d\bar{P} = [1/A][\sum^{A} (Q_i dR_i + R_i dQ_i)] \tag{3}$$

So $d\bar{P} = \overline{RdQ}$ if $dR_i = 0$ for all i, and if $R_i = \bar{R}$ for all i. $d\bar{P}$ will be greater than $\overline{RdQ}$ if:

(1) R_i and dQ_i are positively correlated or,

(2) $\sum (Q_i dR_i) > 0$.

This second condition states that $d\bar{P} > \overline{RdQ}$ if the proportion male is growing, and will move both black and white ratios in the same direction and so is uninteresting. The key is the

first condition. If the male proportion of total employment is positively correlated with increases in black males' share of male employment, then $\overline{dP^B} > \overline{RdQ^B}$ and $\overline{dP^W} < \overline{RdQ^W}$.

The empirical results in Table 4.6 showed that $dP^B/dC = .2$ and $dP^W/dC = -.02$, where dC refers to the partial derivative with respect to contractor status. But we know from Table 4.15 that the males' share of employment, R, is much greater among contractors than non-contractors. So we expect that the difference between contractors and non-contractors will be more striking in comparisons of shares of total employment than in shares of male employment.

In fact, this is just what we observe in Table 4.16, where employment shares within sex are estimated. Briefly put, the evidence in Table 4.16 suggests that at the average contractor establishment, black females' share of female employment has significantly increased, but black males' share of male employment has insignificantly changed. But we know from Table 4.6 that black males', as well as black females', share of total employment has increased more in the contractor sector. In effect, there is an important interaction term missing from Table 4.16. For tables 4.6 and 4.16 to be consistent it must be the case that the contract compliance program is particularly effective at establishments that are male intensive. In effect, Table 4.6 weights Table 4.16 by R, the proportion male. Since Table 4.16 does not account for this important interaction, it understates the impact of the contract compliance program on black males, and overstates its impact on black females.

The missing interaction term comes into play just as predicted in Table 4.17. The contract compliance program is far more effective at establishments that are male intensive. The interaction of 1974 contractor status with 1974 percent male is strong and significant in Table 4.17. The impact of the contract compliance program is summarized in Table 4.18, which evaluates the effect at the mean percent male, or female, as appropriate. The total impact of the contract compliance program is to increase black males' share of male employment by .17 percentage points, at the expense of other non-black minority males. A similar pattern occurs among females. While white females' share remains largely unchanged, black females' share

increases by .49 percentage points, again at the expense of non-black minority females. Similar results are obtained in regressions using absolute levels of employment rather than proportions. Taken together with the results of the previous section, these results consistently point toward an affirmative action policy that has been effective in increasing the employment of blacks, though not other minorities, among federal contractors.

Simultaneity

It is not implausible to suppose that those establishments that found it most costly to increase black employment would avoid being federal contractors. Some of the findings in this chapter might be qualified if there were evidence of such simultaneity: if establishments with more blacks, or a higher growth of black employment, were more likely to be contractors. I test this proposition in Table 4.19 in logit estimates of the probability of being a contractor in 1980 as a function of 1974 demographics, the change in demographics between 1974 and 1980, and establishment size, growth rate, corporate status, industry and region. There is little evidence here to support the proposition that establishments with a high or growing level of minority or female employment are more likely to be contractors. This leads one to speculate that perhaps the costs of affirmative action are not great on average, or that they are balanced by lump-sum transfers from the government in a contracting process that does not turn on price alone.

The evidence in Table 4.19 suggests that the establishments that were more likely to be contractors in 1980 were actually those with the greatest proportion of white males and the least proportion of minorities and females in 1974, just the opposite of what one simultaneity argument would suggest. Similar results are found when contractor status in 1974 is controlled for in linear probability equations. These effects are significant, with the exception of black males, who have no significant impact one way or the other on contractor status at the .05 confidence level. Since the share variables must sum to one, the smallest group, non-black minority females, is omitted. Controlling for initial period demographics, Table 4.19 also suggests that establishments with the greatest increases in minority or female employment share were not

significantly more likely to be contractors in 1980. However, one would have expected some of these coefficients to be positive, and the coefficient on white males is also negative. While it is possible to interpret these estimates to say that conditional on 1974 demographics, establishments in which white male employment share increased at the expense of black males were slightly more likely to be contractors, this small effect is statistically insignificant. In general, there is no significant evidence here that establishments with a large or growing proportion of minority or female employees are more likely to be contractors.

Section 5: Occupational Detail

So far we have concentrated on measuring the gains in minority and female shares of total employment due to the contract compliance program. One's judgement of the program might well depend on the distribution of these gains across occupations. The challenge of affirmative action has been not only to increase minority and female representation, but to increase that representation in the more highly skilled and remunerative occupations. Have minorities and women moved up as well as moved in?

Tables 4.20 to 4.30 present detailed linear regression equations of the impact of contractor and review status on minority and female shares of employment in each of nine occupations and two training programs, controlling for establishment size, growth, corporate structure, industry, region, and lagged employment share. In Table 4.31 the distribution of minorities and females across occupations is summarized with an index of occupational status. This index weights the proportion of members of a given demographic group in an occupation by the 1969 mean earnings by occupation of full-year employed males from the 1970 Census of Population. If the within occupation variance of wages is small then changes in the occupational index should explain a good deal of overall wage changes. In the equations for occupational index, employment growth by demographic group is also controlled for. As expected, the higher the employment growth, the lower the rate of occupational advance since many new entrants are at the bottom of occupational ladders.

The key results from this mass of information are condensed in a set of summary tables by demographic group, Tables 4.32 to 4.35. In these tables the coefficients on contractor and review status are expressed as a percent of initial 1974 employment share. The evidence is most striking in the case of black males in Table 4.32. In every occupation except laborers, black males' share of employment has increased significantly faster in contractor than in non-contractor establishments. This is true whether we consider the proportionate change in black males' share of total employment, or the proprtionate change in the ratio of black male to white male share. The proportionate change in black male employment share due to contractor status

is greatest among professionals, technicians, and blue-collar trainees: .38, .22, and .24 respectively.

The marginal impact of a compliance review, conditional on contractor status is also shown. The relative importance of being a contractor and of being a reviewed contractor is mixed across occupations, but in every case, except blue-collar trainees, reviewed establishments have increased black males' employment share more than non-reviewed contractors. This effect is largest and most significant in the technical and clerical occupations: .31 and .44 respectively.

The total impact of the contract compliance program, the weighted sum of contractor and review effects, shows some evidence of a twist in demand toward more highly skilled black males. The contract compliance program has not reduced the demand for black males in low skilled occupations. It has raised the demand for black males more in the highly skilled professional and technical occupations and in white-collar clerical jobs than in the blue-collar operative and laborer occupations. While this may help explain why highly skilled black males have been better off than their less skilled brethren, it does not help explain why low skilled black males should be having greater difficulty over the years in finding and holding jobs.

The advance of black males under affirmative action also shows up in net occupational upgrading in Table 4.31. The coefficents of interest here, on contractor and review status, do not change significantly when the equations for black and white males are reestimated on a larger sample of 41660 establishments with just the restrictions that black male and white male employment be positive. In Table 4.31, black males' occupational index increases 2 percent more in contractor establishments and an additional 1 percent in reviewed establishments. Relative to white males, black males' occupational index has increased 1 percent during six years of affirmative action. Remember that this does not include within occupation promotions, which the next section shall show are substantial within such broadly defined occupations. It also refers to the changing net position of black males at the average establishment, not to the average career transition of the average black male. In particular, since our unit of observation

is the establishment, no individual black male need move to a higher occupation for the index at the average contractor establishment to increase, if many highly skilled blacks migrate into the contractor sector. Of course, it is very unlikely that all of the increase in the occupational index is due to such cross-sector migration.

Between 1974 and 1980, the ratio of black male to white male mean employment income for full-time, full-year workers increased by 2.3 percent, from .684 to .700.[3] Since roughly 69 percent of all employment is in contractor establishments, our results imply that about thirty percent of the increase in the relative economic position of black males may be due to occupational advance induced by affirmative action. While this does not include the effect of promotion within the broad occupational categories used here, it is still likely to be an overestimate because part of the increase in the relative occupational index is probably due to the movement of skilled blacks into the contractor sector, rather than to the advance of blacks within the sector.

Affirmative action has also helped non-black minority males, although to a lesser extent. Table 4.33 shows evidence of a twist in demand toward Hispanic, Asian, and American Indian males in white-collar occupations, particularly in sales and clerical positions, and significantly away from this group in operative and laborer positions. Compliance reviews have had a strong and significant additional impact in the professional and clerical occupations. The total impact of the contract compliance program on non-black minority males is positive in the white-collar occupations and in training programs. This impact is strongest in the sales and clerical occupations. It is negative in blue-collar occupations, with the exception of service workers. Relative to white males, affirmative action has increased the occupational status of non-black minority males by 2 percent.

The evidence in Table 4.34 suggests that the contract compliance program has had a mixed, but generally negative impact on white females. With the exceptions of officials and managers, operatives, laborers, and white-collar trainees, contractor status is associated with a significant decline in white females employment share. Where compliance reviews have a

significant impact, this too is negative. While both contracts and reviews produce a significant one percent increase in white females' occupational status, this positive impact disappears when changes in white females' occupational status are compared to the relatively greater gains of white males.

Black females in contractor establishments have increased their employment share in all occupations except the crafts, as seen in Table 4.35. This increase has been strongest among officials and managers, sales workers, clericals, laborers, and white-collar trainees. Where compliance reviews have had a significant impact, they have increased black female employment share. The positive impact of the contract compliance program is even more marked when the position of black females is compared with that of white females. Overall, black females' index of occupational status has increased 1 percent relative to that of white females under affirmative action. With the same qualifications as in the male case, this net movement across broad occupations may account for twenty percent of the 3.2 percent increase from .917 in 1974 to .946 in 1980 in the ratio of black female to white female earnings observed in Bureau of the Census data.[4]

The conclusion drawn from this detailed analysis of employment by occupation is that with the puzzling exception of white females, affirmative action appears to have contributed to the occupational advance of members of protected groups. In particular, for non-white males affirmative action has increased demand relatively more in the more highly skilled occupations. The finding here that affirmative action has helped move minorities up as well as in stands in contrast to some past studies of the early years of affirmative action which found no significant evidence of occupational upgrading.

Section 6: Turnover: Churning or Stable Employment

We have seen that affirmative action has been successful in increasing the employment share of some protected groups, and that compliance reviews have played a significant role in this process. Our evaluation of this impact depends on its permanence. To take an extreme example, if there were one black economics professor earning handsome rents by riding circuit with the reviewers across universities, we might question whether any lasting reduction in discrimination or improvement in the employment of black professors had been achieved. This speculative example may not be so far-fetched, given past testimony about black construction workers "bicycling" from one construction project to another ahead of the reviewers. To what extent has the observed improvement in the employment of minorities and females been accompanied by a game of musical chairs, albeit with added chairs? The interpretation of protected groups' separation rates relative to white males' will depend on whether the separations are quits or fires. If members of protected groups have disproportionately high voluntary turnover then we might infer that affirmative action has induced high sorting costs by creating a situation of excess demand, in which there are not enough workers of sufficient quality to meet the imposed goals. An alternative explanation in the case of disproportionate fire rates is that employers run a revolving door policy. Hiring minorities and females for the duration of a review, then firing them.

Turnover may also be viewed in a more positive framework. Given the higher net growth rates of females and minorities in the contractor sector, through what channels has this increase been achieved? Have establishments found it most effective to increase protected groups share of hires and promotions or to decrease their share of terminations.

In Table 4.36, for a sample of 2240 establishments that were reviewed in 1978, I present data on turnover by occupation. Those who are unfamiliar with turnover data may be surprised at the high turnover rates: 1/3 of the stock is hired, 1/4 terminated, and 1/5 promoted annually. The rates in this sample are actually very close to Bureau of Labor Statistics rates for manufacturing. In 1978, in durable goods manufacturing the annual new hire rate was .336,

while the rate of separations less quits was .192. In non-durables these rates were .408 and .240 respectively.[5] In such a fluid employment situation, there should be many opportunities to increase the employment of members of protected groups without displacing sitting white males, although this will depend on the turnover of positions, not people.

Are black males overrepresented in turnover? In Table 4.37 we see that in no occupation do black males account for a significantly larger proportion of terminations than of hires. This is consistent with the observed net growth of black male employment share in the EEO panel data. At the same time though, black males are overrepresented in terminations. Their proportion of terminations is greater than their proportion of stock in all white-collar occupations, except officials and managers. This may be evidence of churning in the white-collar occupations. In the blue-collar occupations, black males' share of terminations is lower than their share of hires and their share of stock, indicating a more stable work force relative to non-black males. Of course, since turnover is endogeous, this may well reflect employers' policies as well as employees' behavior. In all occupations except service workers we find evidence of upgrading: black males are overrepresented in promotions.

Females exhibit more stable employment patterns than males. Table 4.38 shows that in every occupation females share of terminations is lower than their share of stock, suggesting that their termination rate is lower than that of males.

This interpretation of the evidence suggests that establishments have had more long-lasting success in meeting affirmative action goals for females than for black males. They have been more successful in finding and keeping qualified females. On the other hand, for black males in white-collar occupations, there is some evidence of churning. In these occupations, black males are overrepresented in terminations, suggesting that establishments have trouble finding and keeping qualified black males. In light of black males' high share of hires, the affirmative action goals for black males may be inducing high search costs. However, this interpretation is problematical since it does not control for job tenure, which we know is an important determinant of terminations.

Terminations usually are concentrated among the newly hired. It is more appropriate then to compare share of terminations with hires rather than with stocks, which leads to a different interpretation of the results in Tables 4.37 and 4.38. Think of the new hires as the stock from which the terminations come. Now in every occupation black males' share of terminations is less than or about equal to their share of hires. In this light, black males experience relatively stable employent, and there is no significant evidence of churning. The same finding of stability holds true of females, except in the craft occupations, where critics have claimed the goals set by affirmative action are too high. Under this plausible interpretation, the evidence in Tables 4.37 and 4.38 that both females and black males at reviewed contractor establishments have low termination rates relative to other workers implies that their employment gains won under affirmative action are not short-lived.

Having previously found that the demand for black males increased in the contractor sector it is natural to infer that this would tend to drive their relative wage up, absent an excess or an infinitely elastic supply of black males. While black unemployment rates are very high, this is much less the case among the skilled, where affirmative action has increased demand the most. Even here, some might argue that the increased demand for black males could be met out of natural turnover, so wages need not rise to attract new workers. But this line of reasoning ignores the endogeneity of turnover, and has the same economic content as the statement that since the number of oranges bought is identical to the number sold, there is no reason for the price of oranges to change. To fully explain turnover by framing it as an endogeous variable within a full model is well beyond the scope of the present work, and has not been our purpose here. This work has shown in a sample of reviewed contractor establishments that females and black males share of new hires is typically greater than their share of terminations. The evidence here is that establishments do not run a revolving door policy when it comes to compliance reviews.

Comparison of Flows and Stocks

In this section I develop a formal model making clear the relationship between the flows and stocks already discussed. I shall develop conditions that must hold for consistent behavior among stocks and flows, and point out a paradoxical theoretical condition under which an affirmative action program that is effective in increasing protected groups' share of hires appears to be ineffective because it does not increase the growth rate of their share of employment.

The change in stocks is equal to hires less terminations, assuming no promotions across occupations, and assuming that terminations are all severances of the employment relationship. In share form this identity is:

$$P_t = \lambda P_{t-1} + \alpha H - bT \qquad (4)$$

where

P_t = Blacks' share of stock in year t.

H = Blacks' share of hires.

T = Blacks' share of terminations.

α = The ratio of total hires to total end of year stock.

b = The ratio of total terminations to total end of year stock.

λ = $1-\alpha+b$

First I shall show that the observed turnover data from establishments reviewed in 1978 is consistent with the observed change in stocks in reviewed establishments between 1974 and 1980. For example, consider black male craftsmen. In 1978 their share of hires was .067, of terminations .052, and of stock .067 (see Table 4.37). From Table 4.36 we know that in 1978 craft workers had some of the lowest turnover rates of any occupation, a hire rate of .18 and a termination rate of .17. Are these flows consistent with the observed changes in stocks? The share of craft jobs held by black males rose by .020 from .056 to.075 in non-reviewed firms. but by .013 from .048 to .061 in reviewed establishments between 1974 and 1980 in a sub-sample of a few thousand establishments. On this basis, and judging from the more stringent tests in

Table 4.25, compliance reviews have caused neither higher levels nor growth rates of black males' share of craft jobs. Yet from Table 4.37 we know blacks share of hires is greater than their share of terminations in this occupation, while the hire rate is approximately equal to the termination rate. In Chapter 3 we solved the share equation recursively to find:

$$P_t = \lambda^n P_{t-n} + \frac{\lambda^n - 1}{\lambda - 1}(aH - bT) \qquad (5)$$

Substituting into this equation taking 1978 as the starting date we find after six years that $\Delta P = .016$ and $\%\Delta P = 33$. These are close to the observed changes in reviewed firms between 1974 and 1980; $\Delta P = .013$ and $\%\Delta P = 27$.

This example demonstrates that the flow statistics from compliance review reports are roughly consistent with the stock statistics from EEO-1 forms.

Now consider whether the apparent ineffectiveness of compliance reviews on black males' share of craft jobs might be due to relatively low turnover in the reviewed sector. Recall from our discussion of the stock/flow model in Chapter 3 that the impact of affirmative action might be masked if turnover rates were exogenously higher in the non-contractor or non-reviewed sector. For purposes of illustration assume that in the crafts black males' share of hires increases by one percent and their share of terminations decreases by one percent at establishments that undergo review. The change in black male employment share in reviewed establishments would now be identical to that in non-reviewed establishments if turnover were fifteen percent higher among the non-reviewed. This illustrates, but only illustrates, that with higher turnover rates among the non-reviewed, or among the non-contractors, the true impact of affirmative action may be understated by looking only at protected groups' share of employment or even change in share of employment.

Section 7: Conclusion

Those who have argued about the propriety of affirmative action have not been quibbling over a fine point. The federal contract compliance program has substantially improved employment opportunities for black males. The growth rates of blacks share of employment and index of occupational status are greater in contractor establishments obligated to undertake affirmative action than in non-contractor establishments with no such obligation. Compliance reviews, the major enforcement tool of the affirmative action program, while poorly targetted, have contributed significantly to improving the employment of members of protected groups. This evidence from employment stocks in 1974 and 1980 is corroborated with independent data on flows in 1978 from a different source which shows that in general members of protected groups experience more stable employment than white males and accounted for a greater proportion of new hires than of current employment in reviewed establishments. This flow data also suggests the possibility that since turnover rates may be higher in non-reviewed or non-contractor establishments, I may understate the impact of affirmative action.

The scale of the demand shifts due to affirmative action found in this chapter is not small, but this can best be appreciated by comparing them to relative wage changes during the same period. Between 1974 and 1980, the black male to white male ratio of the mean earnings of full-time, full-year workers increased by 2.3 percent from .684 to .700.[6] Can affirmative action account for part of this improvement in relative black male earnings?

To frame the implicatons of the demand shifts found here for the change in black male relative earnings, consider the following simple model of the labor market, where all variables are in logarithmic form:

$$N^D = \lambda - \eta W \tag{6}$$

$$N^S = b + \epsilon W \tag{7}$$

where

N^D is the logarithm of the demand for black male labor relative to white male labor.

N^S is the logarithm of relative labor supply.

W is the logarithm of the ratio of black to white male wages.

In equilibrium:

$$W = \frac{\lambda - b}{e + \eta} \tag{8}$$

The logarithmic derivative of relative wages with respect to a demand shift is then:

$$\frac{dW}{d\lambda} = \frac{1}{e + \eta} \tag{9}$$

One of our smallest estimated relative demand shifts comes from the weighted log-odds specification summarized in Table 4.13. Here the percentage change in the relative demand for black male to white male workers increased by 3.6 percent in the contractor sector between 1974 and 1980. Maintaining the assumption that affirmative action has not directly shifted demand curves outside the contractor sector, and assuming that as in my sample 68.6 percent of all employment is in the contractor sector, the implied relative demand shift overall is 2.5 percent. If we assume that the demand and supply elasticities are both equal to one, then $\%\Delta W = .5\ \%\Delta\lambda$. This implies a 1.25 percent increase in the ratio of black to white male earnings under affirmative action. Since the actual increase was 2.3 percent, this suggests that nearly half of the improvement in black relative earnings among men may be explained by affirmative action. Since the actual percentage increases in the ratio of median earnings, or in the mean or median earnings of all workers were all less than 2.3 percent, affirmative action may well have played an even greater role. The same would be true to the extent that the elasticity of relative labor supply were less than one. While it is not implausible to think of the elasticity of relative labor demand being greater than one, in the next chapter I estimate this elasticity of substitution of non-white for white male labor to be on the order of of .7 to 1.1. While other factors on both the demand and the supply side of these markets have likely also played a role, the increase in the demand for black male labor relative to white induced by affirmative action can help account for a significant part of of the increase in the relative earnings of black males.[7] In sum, this chapter has presented evidence that affirmative action has played a major role in improving the economic position of black males.

Table 4.1: Composition of the Labor Force, Employment, and Out of the Labor Force by Race and Sex, 1960-1979

	Year	Civilian Labor Force	Employed	Unemployed	O.L.F.
Total	1960	69628	65778	3852	47617
	1970	82715	78627	4088	54280
	1974	91011	85935	5076	57587
Percent White	1960	.600	.604	.516	.174
Male	1970	.566	.562	.454	.216
	1974	.544	.551	.423	.223
	1979	.516	.523	.395	.246
Percent	1960	.067	.063	.129	.020
Non-White	1970	.063	.061	.093	.029
Male	1974	.063	.060	.103	.036
	1979	.063	.060	.111	.043
Percent Female	1960	.334	.333	.355	.805
	1970	.381	.377	.453	.759
	1974	.394	.389	.474	.741
	1979	.422	.417	.494	.711

Note: derived from Handbook of Labor Statistics, 1980.

Table 4.2: Proportion of all Employees

Line	Demographic Group	Contractor Status	Number	1974 Mean	1974 σ	1980 Mean	1980 σ	MeanΔ	Mean%Δ
1	Black	N	27432	.053	.10	.059	.10	.006	28
2	Males	Y	41258	.058	.10	.067	.10	.008	33
3				(6.0)		(9.4)		(6.5)	(3.6)
4	Other	N		.034	.10	.046	.10	.012	52
5	Minority	Y		.035	.08	.048	.09	.013	58
6	Males			(1.6)		(2.1)		(1.2)	(2.1)
7	White	N		.448	.27	.413	.26	−.034	−2
8	Males	Y		.584	.26	.533	.25	−.047	−4
9				(66.7)		(66.5)		(16.4)	(2.0)
10	Black	N		.047	.10	.059	.11	.012	47
11	Females	Y		.030	.07	.045	.08	.015	77
12				(24.0)		(19.2)		(5.7)	(10.8)
13	Other	N		.024	.08	.036	.08	.012	65
14	Minority	Y		.016	.05	.028	.06	.012	77
15	Females			(14.8)		(13.0)		(1.1)	(3.2)
16	White	N		.394	.27	.400	.26	.006	17
17	Females	Y		.276	.23	.288	.23	.012	30
18				(59.7)		(57.8)		(7.8)	(11.9)
19	Total	N		186	286	209	341	23	17
20		Y		271	728	276	720	5	21
21				(21.2)		(16.2)		(10.7)	(3.3)

Note: T-Tests across means in parentheses, on every third line. In every case, F-tests reject equality of variances across contractors and non-contractors, with more than 99% confidence. The last column is the mean of percentage changes, not the percentage of change in means. The next to last column is the mean of changes, not the change in means.
N = non-contractor in 1974.
Y = contractor in 1974.

Table 4.3: Proportion of all Employees Weighted by Establishment Size

Line	Demographic Group	Contractor Status	Number	1974 Mean	1980 Mean	MeanΔ	Mean%Δ
1	Black Males	N	27432	.056	.056	.003	36
2		Y	41258	.073	.074	.004	37
3	Hispanic,	N		.033	.042	.009	90
4	Asian & Indian Males	Y		.032	.043	.009	115
5	White Males	N		.395	.362	−.025	.7
6		Y		.598	.554	−.036	−.8
7	Black Females	N		.063	.071	.009	74
8		Y		.038	.049	.011	173
9	Hispanic,	N		.027	.037	.009	122
10	Asian & Indian Females	Y		.015	.024	.008	222
11	White Females	N		.425	.436	.000	16
12		Y		.244	.258	.007	33

Note: The last column is the mean of percentage changes, not the percentage of change in means. The next to last column is the mean of changes, not the change in means.
N = non-contractor in 1974.
Y = contractor in 1974.

Table 4.4: Proportion of all Employees by Review Status

Line	Demographic Group	Review Status	Number	1974 Mean	1974 σ	1980 Mean	1980 σ	ΔMean	%ΔMean
1	Black	N	38650	.057	.10	.066	.10	.009	.16
2	Males	Y	2608	.071	.09	.078	.09	.007	.10
3				(7.2)		(6.3)			
4	Other	N		.035	.08	.048	.09	.013	.37
5	Minority	Y		.039	.08	.052	.09	.013	.33
6	Males			(2.5)		(2.2)			
7	White	N		.584	.26	.537	.25	−.047	−.08
8	Males	Y		.587	.24	.540	.23	−.047	−.08
9				(0.7)		(0.7)			
10	Black	N		.030	.07	.044	.08	.014	.47
11	Females	Y		.042	.08	.057	.09	.015	.36
12				(8.2)		(7.0)			
13	Other	N		.016	.05	.028	.06	.012	.75
14	Minority	Y		.021	.07	.030	.08	.009	.43
15	Females			(3.7)		(1.3)			
16	White	N		.276	.23	.290	.23	.012	.04
17	Females	Y		.239	.20	.245	.18	.006	.03
18				(9.8)		(12.1)			
19	Total	N		238.8	659.7	242.7	646.1	3.9	.02
20		Y		744.6	1302.3	765.1	1327.1	20.5	.03
21				(1.7)		(19.9)			

N = Not reviewed between 1975 and 1979 inclusive.
Y = Reviewed between 1975 and 1979 inclusive.

Table 4.5: Variable Definitions, Means, and Standard Deviations
N = 68690

Variable Name	Mean	Standard Deviation	Definition
C74	.601	.49	= 1 if establishment was part of a contractor company in 1974
STAYC	.533	.50	= 1 if establishment was part of a contractor company in 1974 and in 1980
LEAVEC	.068	.25	= 1 if establishment was part of a contractor company in 1974 but not in 1980.
ENTERC	.109	.31	= 1 if establishment was part of a contractor company in 1980 but not in 1974.
R	.041	.20	= 1 if establishment completed a compliance review between 1974 and 1980 exclusive.
SIZE	237	594	Total number of employees in 1974.
GROWTH	.197	1.67	Rate of growth of total employment from 1974 to 1980.
SINGLE	.183	.39	= 1 if establishment was not part of a multi-establishment company.
PWC	.381	.31	Proportion of all employees who are officials, managers, professionals, technicians and sales people.
CX...	—	—	Interactions of C74 multiplied by other variables.
RX...	—	—	Interactions of R multiplied by other variables.

Table 4.6: Linear Probability Equations of the Effect of Contractor and Review Status on Percent Employed by Demographic Group.
N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	−.024	.198	−.101	−.464	.154
	(.081)	(.040)	(.042)	(.079)	(.040)
R	−.432	.071	.047	−.388	.261
	.194	(.095)	(.100)	(.188)	(.095)
P74*	.868	.840	.901	.870	.921
	(.0016)	(.0019)	(.0023)	(.0017)	(.0023)
SIZE	.0012	−.000068	−.00025	−.00011	−.000046
	(.000062)	(.000031)	(.000033)	(.000061)	(.000031)
GROWTH	−.382	.097	.083	.104	.065
	(.021)	(.010)	(.011)	(.021)	(.010)
SINGLE	.073	−.342	.150	−.505	−.450
	(.109)	(.053)	(.056)	(.105)	(.053)
PWC	−1.637	−.381	−.299	3.49	−5.02
	(.146)	(.072)	(.075)	(.141)	.072)
R^2	.876	.784	.743	.868	.751
MSE	86.14	20.87	34.20	81.45	20.87

Note: All equations include 27 Industry and 4 Region Dummies.

Table 4.7: Linear Probability Equations of the Effect of Contractor and Review Status on Percent Employed by Demographic Group, Status Changers. N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
STAYC	−.166	.156	−.101	−.305	.081
	(.093)	.045)	(.048)	(.090)	(.045)
LEAVEC	−.761	.159	−.147	.014	.537
	(.154)	(.076)	(.080)	(.150)	(.076)
ENTERC	−.731	−.135	−.021	.658	−.028
	(.129)	(.063)	(.067)	(.125)	(.063)
R	−.463	.073	.044	−.376	.295
	(.194)	(.095)	(.101)	(.188)	(.095)
P74*	.876	.839	.901	.870	.920
	(.0016)	(.0019)	(.0023)	(.0017)	(.0023)
SIZE	.00012	−.000068	−.0025	−.00011	−.000048
	(.000063)	(.000031)	(.000033)	(.000061)	(.000031)
GROWTH	−.381	.097	.083	.103	.065
	(.021)	(.010)	(.011)	(.021)	(.010)
SINGLE	.0008	−.360	.149	−.433	−.472
	(.110)	(.054)	(.057)	(.106)	(.053)
PWC	−1.628	−.374	−.301	3.48	−.472
	(.147)	(.072)	(.076)	(.141)	(.072)
R^2	.876	.784	.743	.869	.751
MSE	86.35	20.87	23.20	81.41	20.86

Note: All equations include 27 Industry and 4 Region Dummies.

Table 4.8: Linear Probability of the Effect of Contractor and Review Status on Percent Employment by Demographic Group, with Interactions. N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
STAYC	−.37	.11	−.16	.073	.098
	(.18)	(.053)	(.054)	(.14)	(.05)
LEAVEC	−.96	.12	−.21	.43	.57
	(.21)	(.080)	(.084)	(.19)	(.08)
ENTERC	−.73	−.13	−.022	.67	−.03
	(.13)	(.063)	(.067)	(.13)	(.06)
R	−.47	−.14	−.24	−.12	−.20
	(.48)	(.13)	(.12)	(.31)	(.12)
C × SIZE	.00034	3.27×10^{-5}	.00040	-6.64×10^{-5}	.00012
	(.00022)	(.00011)	(.00011)	(.00021)	(.0011)
C × GROWTH	.137	−.155	.118	−.127	−.039
	(.064)	(.031)	(.033)	(.062)	(.031)
C × P74	.0026	.012	−.0072	−.010	−.010
	(.0028)	(.0036)	(.0044)	(.0029)	(.0043)
R × SIZE	.00027	6.37×10^{-5}	.00014	−.00011	-2.2×10^{-5}
	(.00016)	(7.70×10^{-5})	(.00081)	(.00015)	(7.7×10^{-5})
R × GROWTH	.0054	−.080	−.033	.0017	.091
	(.11)	(.052)	(.055)	(.10)	(.05)
R × P74	−.0029	.027	.048	−.0079	.115
	(.0076)	(.0094)	(.011)	(.0088)	(.011)
SIZE	−.00024	−.00011	−.00064	-3.76×10^{-5}	−.00015
	(.00021)	(.00010)	(.00011)	(.00020)	(.00010)
GROWTH	−.50	.24	−.019	.22	.10
	(.059)	(.029)	(.031)	(.057)	(.029)
P74	.866	.832	.903	.875	.921
	(.0023)	(.003)	(.0033)	(.002)	(.003)

Table 4.8: Linear Probability of the Effect of Contractor and Review Status on Percent Employment by Demographic Group, with Interactions. N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
SINGLE	.049	−.35	.196	−.43	−.45
	(.11)	(.055)	(.058)	(.11)	(.05)
PWC	−1.63	−.37	−.29	3.45	−.48
	(.15)	(.072)	(.076)	(.14)	(.07)
R^2	.876	.784	.243	.868	.751
MSE	86.34	20.85	23.18	81.40	20.83

Table 4.9: Log-Odds Equations of the Effect of Contractor and Review Status on Employment by Demographic Group.
N = 68690

Demographic Group	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	−.300	.816	.207	.242	.310
	−.012	.136	.046	.011	.062
	(.005)	(.009)	(.009)	(.006)	(.009)
R	−1.43	1.03	−.234	1.34	.660
	−.057	.171	−.052	.061	.132
	(.012)	(.021)	(.022)	(.015)	(.021)
P74*	115	56.5	46.0	110.0	53.8
	4.60	9.41	10.21	4.92	10.76
	(.010)	(.042)	(.050)	(.013)	(.050)
SIZE	.0002	.0002	−.00063	−.0026	−.00027
	.000008	.000033	−.00014	−.00012	.00043
	(.000004)	(.000007)	(.000007)	(.000005)	(.000007)
GROWTH	−.475	.138	.117	.163	.130
	−.019	.023	.026	.007	.026
	(.001)	(.002)	(.002)	(.001)	(.0023)
SINGLE	.050	−1.27	−.851	−.792	−1.53
	.002	−.212	−.189	−.036	−.305
	(.007)	(.012)	(.012)	(.008)	(.012)
PWC	4.43	−.324	.887	10.41	.66
	−.177	−.054	.197	.471	.131
	(.009)	(.016)	(.0017)	(.011)	(.016)
R^2	.837	.545	.519	.796	.536
MSE	.343	.992	1.116	.485	1.017

Note: The first line is 100(dP/dX) evaluated at mean P. The second is the coefficient from the log-odds equation. The third is the standard error. All equations include 27 industry and 4 region dummies.

Table 4.10: Demand Shifts Induced by the Contract Compliance Program: A Summary of Table 4.9.

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
1. Contractor Effect	−.30*	.82**	.21**	.24	.31**
2. Review Effect	−1.43**	1.03**	−.23*	1.34**	.66**
3. Total Effect	−.55	1.00	.17	.47	.42
4. Initial Share in Contractor Sector	59.8	7.3	3.2	24.4	3.8
5. Proportionate Shift in Contractor Sector	−.01	.14	.05	.02	.11
6. Proportionate Market Demand Shift	−.01	.10	.03	.01	.08

Note: The contractor and reviewer effects are the change in proportion as estimated in Table 4.9 evaluated at the sample mean. The initial shares are means across establishments weighted by establishment size, or, in other words, the ratio of means in the contractor sector. Significance levels are indicated in rows 1 and 2 only.

* = Significant at the .05 level.

** = Significant at the .01 level.

Table 4.11: Log-Odds Equations of the Effect of Contractor and Review Status on Employment by Demographic Group, Status Changers. N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
STAYC	−.375	.876	.230	.506	.240
	−.015	.146	.051	.023	.048
	(.006)	(.010)	(.011)	(.007)	(.010)
LEAVEC	−1.025	.786	.333	.748	.825
	−.041	.131	.074	.034	.165
	(.010)	(.017)	(.018)	(.012)	(.017)
ENTERC	−.575	.150	.113	.968	.050
	−.023	.025	.025	.044	.010
	(.008)	(.014)	(.015)	(.010)	(.014)
R	−1.45	1.02	−.230	1.34	.700
	−.058	.169	−.051	.061	.140
	(.012)	(.021)	(.022)	(.015)	(.021)
P74	115	56.5	46.0	110.0	53.8
	4.60	9.41	10.21	4.92	10.74
	(.010)	(.042)	(.050)	(.013)	(.050)
SIZE	.0002	.0002	−.00063	−.00026	.00027
	.000008	.000032	−.00014	−.000012	.000042
	(.000004)	(.000007)	(.000007)	(.000005)	(.0000007)
GROWTH	−.475	.138	.117	.163	.130
	−.019	.023	.026	.0074	.026
	(.001)	(.002)	(.002)	(.00016)	(.0023)
SINGLE	.002	−1.25	−.837	−.682	−1.55
	.0001	−.208	−.186	−.031	−.309
	(.007)	(.012)	(.012)	(.008)	(.012)
PWC	4.43	−.336	.887	10.36	.69
	−.177	−.056	.197	.471	.137
	(.009)	(.016)	(.0017)	(.011)	(.016)
R^2	.837	.545	.519	.796	.536
MSE	.343	.992	1.116	.485	1.016

Note: The first line is 100(dP/dX) evaluated at mean P. The second is the coefficient from the log-odds equation. The third is the standard error. All equations include 27 industry and 4 region dummies.

Table 4.12: Weighted Log-Odds Equations of the Effect of Contractor and Review Status on Employment by Demographic Group.
N = 68690

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	.274	.266	−.169	−.525	−.082
	.011	.050	−.050	−.024	−.023
	(.004)	(.007)	(.009)	(.004)	(.007)
R	.017	.170	.233	−.459	.200
	.0007	.032	.069	−.021	.056
	(.005)	(.008)	(.011)	(.006)	(.010)
P74	98.98	30.97	22.06	92.50	23.59
	3.98	5.83	6.53	4.23	6.62
	(.008)	(.018)	(.025)	(.009)	(.023)
SIZE	−.00002	.00002	−.00034	−.00011	.00018
	−.000001	.000004	−.000010	−.000005	.000005
	(.0000005)	(.0000007)	(.000001)	(.0000006)	(.000001)
GROWTH	−.796	.016	.057	.241	.068
	−.032	.003	.017	.011	.019
	(.002)	(.003)	(.004)	(.002)	(.003)
SINGLE	−.423	−.213	.358	−.809	−.281
	−.017	−.040	.106	−.037	−.079
	(.0048)	(.010)	(.005)	(.008)	
PWC	−5.12	−2.47	−.952	5.97	−.331
	−.206	−.465	−.282	.273	−.093
	(.008)	(.014)	(.016)	(.008)	(.015)
R^2	.859	.704	.624	.846	.665
MSE	6.99	5.16	5.81	7.15	5.44

Note: The first line is 100 (dP/dX) evaluated at $\bar{P}$. The second is the coefficient from the log-odds equation. The third is the standard error. All equations include 22 industry and 4 region dummies.

Table 4.13: Demand Shifts Induced by the Contract Compliance Program. A Summary of Table 4.12

Demographic Group	White Males	Black Males	Other Males	White Females	Black Females
1. Contractor Effect	.27	.27	−.17	−.53	−.08
2. Review Effect	.02	.17	.23	−.46	.20
3. Total Effect	.27	.30	−.13	−.61	−.05
4. Initial Share in Contractor Sector	59.8	7.3	3.2	24.4	3.8
5. Proportionate Shift in Contractor Sector	.005	.04	−.04	−.03	−.01
6. Proportionate Market Demand Shift	.003	.03	−.03	−.02	−.01

Table 4.14: Weighted Log-Odds Equations of the Effect of Contractor and Review Status on Employment by Demographic Group in the Southern States.
N = 22908

Demographic Group	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	−.025	.409	.028	−.443	−.400
	−.001	.043	.007	−.021	−.054
	(.007)	(.010)	(.017)	(.007)	(.011)
R	−1.98	−.038	−.159	−.169	.562
	−.008	−.004	−.040	−.008	.076
	(.009)	(.012)	(.026)	(.010)	(.015)
P74	94.71	48.39	2.13	87.67	43.37
	3.82	5.09	6.32	4.16	5.86
	(.015)	(.028)	(.043)	(.017)	(.034)
SIZE	−.00002	−.000008	−.00023	−.000011	.000007
	−.0000006	−.0000008	−.000057	−.0000005	.000001
	(.000001)	(.000002)	(.000005)	(.000002)	(.000003)
GROWTH	−.818	.010	.084	.211	.192
	−.033	.001	.021	.010	.026
	(.003)	(.005)	(.009)	(.004)	(.006)
SINGLE	−.694	−.685	.322	.063	−.622
	−.028	−.072	.081	.003	−.084
	(.008)	(.011)	(.019)	(.009)	(.013)
PWC	−4.59	−4.73	−8.19	6.13	−1.03
	−.185	−.498	−.206	.291	−.139
	(.015)	(.023)	(.031)	(.015)	(.025)
R^2	.832	.686	.582	.823	.664
MSE	6.97	5.81	5.55	6.55	6.17

Note: The first line is 100(dP/dX) evaluated at mean P. The second is the coefficient from the log-odds equation. The third is the standard error. All equations include 27 industry dummies.

Table 4.15: The Absolute Employment of Black Males.
N = 68690.
27432 non-contractors and 41258 contractors.

Demographic Group	Contractor Status, 1974	1974	1980
White Males	N	73.8	75.7
	Y	161.9	152.8
Black Males	N	10.5	11.7
	Y	19.9	20.4
Other Males	N	6.2	8.9
	Y	8.6	11.9
Total Males	N	90.5	96.3
	Y	190.4	185.1
Total Females	N	96.0	112.5
	Y	80.4	90.6
Total Employees	N	186.5	209.1
	Y	270.8	275.7
Males/Females	N	.485	.461
	Y	.703	.671
Black Males/ Total Males	N	.116	.121
	Y	.105	.110
Black Males/ Total	N	.056	.056
	Y	.073	.074

Table 4.16: Employment within Sex, Linear Probability Equations.
N = 67383

Dependent Variable:	White Male	Black Male	White Female	Black Female
Equation:	1	2	3	4
C74	.608	−.081	−.730	.712
	(.10)	(.07)	(.12)	(.09)
R	−.011	.153	.520	.252
	(.23)	(.17)	(.28)	(.21)
P74*	.826	.808	.720	.748
	(.002)	(.002)	(.003)	(.003)
SIZE	.00048	−.000065	.0012	−.00025
	(.00007)	(.00005)	(.00009)	(.00007)
GROWTH	−.253	.153	−.292	.194
	(.03)	(.02)	(.04)	(.03)
SINGLE	.980	−.941	2.07	−1.49
	(.13)	(.09)	(.16)	(.12)
PWC	2.92	−1.81	4.33	−2.92
	(.18)	(.13)	(.22)	(.16)
Industry and Region Dummies	Yes	Yes	Yes	Yes
R^2	.699	.706	.540	.594
MSE	121.5	64.6	185.5	96.9

Table 4.17: Employment Within Sex, Linear Probability Equations, with Interactions.
N = 67383

Dependent Variable Equation	White Male 1	Black Male 2	White Female 3	Black Female 4
C74	.719	−.397	−.281	.910
	(.22)	(.16)	(.20)	(.15)
C × P	−.798	.857	.644	−1.28
	(.33)	(.24)	(.40)	(.29)
P*	5.99	−3.42	10.57	−4.23
	(.27)	(.19)	(.33)	(.24)
R	−.124	.214	.767	.143
	(.23)	(.17)	(.28)	(.20)
P74	.826	.807	.732	.735
	(.002)	(.002)	(.003)	(.003)
SIZE	.00057	−.00011	.0010	−.00020
	(.00007)	(.00005)	(.00009)	(.00007)
GROWTH	−.258	.156	−.287	.193
	(.03)	(.02)	(.04)	(.03)
SINGLE	1.20	−1.05	1.61	−1.26
	(.13)	(.09)	(.16)	(.11)
PWC	2.54	−1.63	5.02	−3.26
	(.18)	(.13)	(.21)	(.16)
Industry and Region Dummies	Yes	Yes	Yes	Yes
R^2	.703	.708	.554	.599
MSE	120.0	64.2	179.9	95.7

* In the first two columns P is percent male. In the last two columns P is percent female.

Table 4.18: Demand Shifts Induced by the Contract Compliance Program: A Summary of Table 4.17.

Demographic Group	White Male	Black Male	White Female	Black Female
1. Contractor Effect	.23	.13	−.03	.42
2. Review Effect	−.12	.21	.77	.14
3. Total Effect	.21	.17	.10	.49
4. Initial Share	85.15	9.24	87.15	8.29
5. Proportionate Shift	.003	.018	.001	.059

Table 4.19: Logit Estimates of Simultaneity: the Effect of Establishment Demographics on Contractor Status in 1980.
N = 68690

	$\frac{dP}{dx}(\bar{P})(1-\bar{P})$	*Beta*	Asymptotic Standard Error
Proportion White Male, 1974	.079	.344	.13
Proportion Black Male, 1974	−.032	−.138	.15
Proportion Non-Black Male, 1974	−.086	−.376	.18
Proportion White Female, 1974	−.205	−.891	.13
Proportion Black Female, 1974	−.200	−.871	.17
Δ Proportion White Male, 1980-1974	−.552	−2.40	.18
Δ Proportion Black Male, 1980-1974	−.543	−2.36	.23
Δ Proportion Non-Black Minority, 1980-1974	−.727	−3.16	.25
Δ Proportion White Female, 1980-1974	−.499	−2.17	.17
ΔProportion Black Female, 1980-1974	−.511	−2.22	.23
SIZE	.0011	.0047	.0043
GROWTH	−.453	−1.97	.021
SINGLE	.00009	.00039	.00013
27 Industry and 4 Region Dummies	Yes		
MSE	.189		
Mean of Dependent Variable	.641		

Table 4.20: Occupational Detail: Officials and Managers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Officials and Managers Who are Members of a Given Demographic Group.
N = 66860

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	−.41	.18	.15	.054	.086
	(.16)	(.06)	(.07)	(.13)	(.04)
R	.07	.33	.12	−.38	−.09
	(.37)	(.14)	(.16)	(.31)	(.04)
P74*	.65	.55	.50	.67	.67
	(.003)	(.004)	(.003)	(.003)	(.005)
SIZE	−.00047	.00020	−.00007	.00018	.00010
	(.00012)	(.000004)	(.00005)	(.00010)	(.00003)
GROWTH	−.14	.021	.056	.046	.008
	(.04)	(.01)	(.02)	(.03)	(.01)
SINGLE	−1.20	−.44	.22	1.40	−.09
	(.21)	(.08)	(.09)	(.17)	(.05)
R^2	.51	.28	.29	.51	.25
MSE	311.44	43.90	56.63	223.33	20.38
mean of the dependent variable	76.2	2.8	2.9	16.3	1.2

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.21: Occupational Detail: Professionals.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Professionals Who are Members of a Given Demographic Group.
N = 29299

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	1.47	.45	.14	−1.76	.013
	(.32)	(.08)	(.13)	(.30)	(.08)
R	−1.41	.12	.58	.60	.11
	(.53)	(.13)	(.22)	(.48)	(.19)
P74*	.60	.30	.33	.63	.62
	(.005)	(.006)	(.006)	(.005)	(.006)
SIZE	−.00051	.00012	−.00016	.00032	.00014
	(.00015)	(.00004)	(.00006)	(.00014)	(.00004)
GROWTH	−.19	.001	.086	.11	.025
	(.08)	(.02)	(.03)	(.07)	(.02)
SINGLE	−1.01	−.27	.30	.39	.046
	(.37)	(.09)	(.15)	(.33)	(.09)
R^2	.58	.09	.13	.60	.27
MSE	482.61	31.35	82.34	402.17	32.37
mean of the dependent variable	64.6	1.6	3.1	27.6	1.6

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.22: Occupational Detail: Technicians.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Technicians Who are Members of a Given Demographic Group.
N = 25205

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	1.94	.56	.087	−2.56	.14
	(.39)	(.13)	(.16)	(.37)	(.14)
R	−1.30	.81	.42	.15	.085
	(.60)	(.20)	(.24)	(.56)	(.21)
P74*	.59	.39	.42	.61	.60
	(.005)	(.006)	(.006)	(.005)	(.006)
SIZE	−.00003	.00015	−.00013	−.00018	.00015
	(.00017)	(.00006)	(.00007)	(.00016)	(.00006)
GROWTH	.082	.039	.042	−.003	−.003
	(.10)	(.04)	(.041)	(.10)	(.04)
SINGLE	.67	−.15	.24	−.88	−.19
	(.43)	(.15)	(.17)	(.41)	(.15)
R^2	.56	.16	.22	.54	.33
MSE	579.82	67.43	92.88	523.83	75.62
mean of the dependent variable	57.9	3.3	3.6	30.0	3.4

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.23: Occupational Detail: Sales Workers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Sales Workers Who are Members of a Given Demographic Group.
N = 35062

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	1.38	.28	.39	−2.39	.20
	(.22)	(.06)	(.07)	(.21)	(.06)
R	.36	.056	.010	.12	−.21
	(.64)	(.18)	(.21)	(.61)	(.19)
P74*	.77	.71	.59	.75	.95
	(.003)	(.005)	(.005)	(.003)	(.005)
SIZE	−.0018	.00022	.00006	.00084	.00095
	(.0002)	(.00006)	(.00007)	(.00021)	(.00007)
GROWTH	−.17	−.0006	−.027	.081	.15
	(.09)	(.02)	(.029)	(.083)	(.03)
SINGLE	2.92	−..083	.47	−3.10	−.065
	(.32)	(.09)	(.11)	(.31)	(.09)
R^2	.72	.41	.37	.68	.50
MSE	332.21	25.87	36.13	304.34	29.94
mean of the dependent variable	59.4	2.4	2.4	31.2	2.6

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.24: Occupational Detail: Clerical Workers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Clerical Workers Who are Members of a Given Demographic Group.
N = 58568

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	−.43	.19	.078	−.70	.65
	(.16)	(.04)	(.05)	(.20)	(.09)
R	.39	.40	.42	−2.09	.68
	(.34)	(.09)	(.10)	(.43)	(.19)
P74*	.48	.35	.41	.55	.71
	(.003)	(.004)	(.005)	(.004)	(.005)
SIZE	.00097	.00026	.00006	−.0017	−.00043
	(.00011)	(.00003)	(.00003)	(.00014)	(.00006)
GROWTH	.13	.039	.019	−.29	.070
	(.05)	(.01)	(.01)	(.06)	(.03)
SINGLE	.26	−.092	.24	−.51	−.28
	(.19)	(.05)	(.06)	(.24)	(.11)
R^2	.37	.13	.13	.35	.34
MSE	264.36	17.84	24.52	419.60	83.79
mean of the dependent variable	14.5	1.3	1.1	73.9	5.4

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.25: Occupational Detail: Craft Workers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Craft Workers Who are Members of a Given Demographic Group.
N = 39862

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	.45	1.07	−.25	−1.14	−.24
	(.25)	(.13)	(.13)	(.17)	(.06)
R	.46	.22	.39	−1.03	.034
	(.47)	(.25)	(.25)	(.32)	(.12)
P74*	.61	.60	.67	.51	.48
	(.004)	(.004)	(.005)	(.005)	(.006)
SIZE	.00016	.00003	−.00022	−.00006	.00005
	(.00015)	(.00008)	(.00008)	(.00010)	(.00004)
GROWTH	−0.26	−.093	.046	.035	.013
	(.09)	(.05)	(.005)	(.06)	(.02)
SINGLE	−2.07	.60	.84	.36	.061
	(.31)	(.17)	(.17)	(.21)	(.08)
R^2	.43	.39	.44	.33	.19
MSE	426.80	124.06	123.45	202.13	28.47
mean of the dependent variable	77.5	7.1	6.1	7.3	1.1

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.26: Occupational Detail: Operatives.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Operatives Who are Members of a Given Demographic Group.
N = 39572

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	−.63	1.08	−.30	.025	.021
	(.26)	(.16)	(.13)	(.22)	(.10)
R	−1.81	.52	−.017	−.57	1.38
	(.50)	(.30)	(.24)	(.40)	(.19)
P74*	.69	.67	.71	.73	.67
	(.003)	(.004)	(.004)	(.003)	(.004)
SIZE	.00010	.00022	.00019	−.00025	.00017
	(.00015)	(.00009)	(.00007)	(.00001)	(.00006)
GROWTH	−0.29	−.16	.047	.31	.052
	(.10)	(.06)	(.05)	(.08)	(.04)
SINGLE	.34	.60	.72	−1.63	−.25
	(.32)	(.19)	(.16)	(.26)	(.12)
R^2	.61	.54	.52	.64	.46
MSE	469.77	166.67	111.76	312.10	68.00
mean of the dependent variable	59.1	11.4	6.5	20.3	4.0

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.27: Occupational Detail: Laborers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Laborers Who are Members of a Given Demographic Group.
N = 25015

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	−.67	.33	−.73	.56	.69
	(.38)	(.27)	(.21)	(.27)	(.12)
R	−1.43	1.13	.15	−.60	.70
	(.71)	(.50)	(.40)	(.51)	(.23)
P74*	.62	.58	.68	.64	.61
	(.005)	(.005)	(.005)	(.005)	(.006)
SIZE	.00012	.00010	−.00019	−.00014	.00021
	(.00019)	(.00013)	(.00011)	(.00014)	(.00006)
GROWTH	−.29	−.57	.20	.41	.10
	(.17)	(.12)	(.10)	(.12)	(.06)
SINGLE	−.30	.93	1.18	−2.17	−.094
	(.43)	(.31)	(.24)	(.31)	(.14)
R^2	.49	.49	.50	.46	.38
MSE	599.14	299.70	187.20	309.36	64.69
mean of the dependent variable	54.1	16.0	8.6	15.4	3.7

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.28: Occupational Detail: Service Workers.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Service Workers Who are Members of a Given Demographic Group.
N = 31798

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	.014	.75	.42	−.97	.53
	(.35)	(.26)	(.18)	(.28)	(.17)
R	−.50	.76	.68	−.74	.11
	(.73)	(.55)	(.38)	(.58)	(.35)
P74*	.53	.55	.59	.63	.67
	(.005)	(.004)	(.005)	(.004)	(.004)
SIZE	.00016	−.00008	−.00030	−.00011	.00016
	(.00020)	(.00015)	(.00010)	(.00016)	(.00009)
GROWTH	.14	−.14	−.061	.33	−.021
	(.13)	(.10)	(.07)	(.10)	(.06)
SINGLE	−.96	.36	1.12	−.74	−.17
	(.43)	(.32)	(.23)	(.34)	(.20)
R^2	.43	.41	.35	.51	.49
MSE	710.46	404.98	197.54	450.47	162.07
mean of the dependent variable	41.5	15.5	6.2	25.9	8.4

Note: All equations include 27 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.29: Occupational Detail: White Collar Trainees.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all White Collar Trainees Who are Members of a Given Demographic Group.
N = 2297

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	−7.16	1.07	.64	3.70	1.58
	(1.62)	(.92)	(.64)	(1.42)	(.64)
R	−1.06	1.75	−1.54	1.82	−.18
	(3.58)	(2.01)	(1.41)	(3.11)	(1.41)
P74*	.28	.18	.28	.30	.18
	(.02)	(.03)	(.02)	(.02)	(.03)
SIZE	−.00013	−.00031	−.00006	.00013	.00024
	(.00054)	(.00031)	(.00020)	(.00050)	(.00021)
GROWTH	1.19	.37	−.25	−.81	−.17
	(1.29)	(.73)	(.51)	(1.12)	(.51)
SINGLE	−10.97	−2.66	.94	.10	.84
	(2.99)	(1.67)	(1.17)	(.03)	(1.17)
R^2	.14	.07	.10	.15	.04
MSE	1185.97	377.92	185.65	901.80	185.21
mean of the dependent variable	55.2	8.1	3.9	26.8	4.4

Note: All equations include 23 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.30: Occupational Detail: Production Trainees.
Linear Probability Equations of the Effect of Contractor and Review Status on Proportion of all Production Trainees Who are Members of a Given Demographic Group.
N = 1482

Demographic Group:	White Males	Black Males	Other Males	White Females	Black Females
Equation:	1	2	3	4	5
C74	−2.26	3.01	1.22	−1.37	.21
	(1.93)	(1.26)	(1.07)	(1.30)	(.58)
R	.046	−.41	−.020	.058	−.34
	(2.69)	(1.74)	(1.49)	(1.79)	(.81)
P74*	.41	.29	.55	.50	−.35
	(.02)	(.02)	(.03)	(.03)	(.03)
SIZE	−.00024	.00034	−.00013	.00009	.00002
	(.00044)	(.00030)	(.00024)	(.0003)	(.0001)
GROWTH	−2.01	−1.18	.87	1.26	.53
	(1.45)	(.94)	(.80)	(.96)	(.44)
SINGLE	−2.64	3.10	1.29	−1.26	−.59
	(1.93)	(1.25)	(1.07)	(1.27)	(.58)
R^2	.35	.19	.33	.39	.27
MSE	670.58	284.12	207.41	296.89	61.30
mean of the dependent variable	65.3	11.1	7.5	12.5	2.6

Note: All equations include 23 Industry and 4 Regional Dummies. Standard Errors in Parentheses.

* P74 is the lagged dependent variable: the proportion of all workers in the given occupation who are members of the given demographic group in 1974.

Table 4.31: Index of Occupational Status.
Linear Probability Equations of the Effect of Contractor and Review Status on Occupational Index by Demographic Group.
N = 13936

Demographic Group: Equation:	White Males 1	Black Males 2	Other Males 3	White Females 4	Black Females 5
C74	50.9	120.6	204.4	41.3	84.3
	(12.8)	(18.6)	(24.1)	(11.5)	(15.7)
R	60.4	98.9	102.1	54.6	26.5
	(19.0)	(27.6)	(35.9)	(17.1)	(23.3)
O74*	.82	.62	.60	.83	.63
	(.005)	(.006)	(.006)	(.006)	(.007)
SIZE	.0011	−.010	.022	.006	.005
	(.005)	(.007)	(.009)	(.004)	(.006)
G**	−8.50	−16.9	−21.3	−26.5	−6.90
	(1.40)	(2.0)	(2.5)	(2.5)	(1.3)
SINGLE	30.88	−150.7	−42.9	12.8	−53.4
	(14.40)	(21.0)	(27.2)	(13.0)	(17.7)
R^2	.71	.50	.47	.69	.49
MSE	338,731	713,418	1,203,759	273,348	509,357
mean of the dependent variable	9258	8152	8663	8510	7977

Note: All equations include 27 Industry and 4 Regional Dummies. Sample limited to establishments with at least one employee in each Demographic Group. Standard Errors in Parentheses.

* O74 is the lagged dependent variable: the index of occupational status for the given demographic group in 1974.

** G is the rate of growth of total employment of the given Demographic Group between 1974 and 1980.

Table 4.32: Summary of the Impact of Contractor and Review Status on Black Male Employment by Occupation.

Occupation	% of all Black Males in Occupation in 1974	Elasticity of Black Males' Share With Respect to: Contractor Status	Review Status	Total	Elasticity of Ratio of Black Male to White Male Share with Respect to: Contractor Status	Review Status	Total
1. Officials and Managers	.030	.09**	.17*	.12	.10	.16	.13
2. Professionals	.015	.38**	.10	.40	.35	.12	.37
3. Technicians	.020	.22**	.31**	.27	.18	.34	.24
4. Sales	.032	.16**	.03	.17	.13	.03	.14
5. Clerical	.032	.17**	.44**	.25	.20	.33	.26
6. Craft	.119	.18**	.04	.19	.17	.03	.18
7. Operatives	.418	.10**	.05	.11	.11	.08	.12
8. Laborers	.198	.02	.07*	.03	.09	.05	.10
9. Service	.137	.05**	.05	.06	.05	.06	.06
10. Trainees—White Collar	.003	.17	.28	.22	.31	.30	.36
11. Trainees—Blue Collar	.106	.24*	−.03	.23	.28	−.03	.27
12. Occupational Index	—	.02**	.01**	.02	.01	.006	.01

* = significant at the .05 level.
** = significant at the .01 level.
Significance levels indicated only for elasticity of black male's share.

Table 4.33: Summary of the Impact of Contractor and Review Status on Non-Black Minority Male Employment by Occupation.

Occupation	% of all Other Males in Occupation in 1974	Elasticity of Other Males' Share With Respect to: Contractor Status	Review Status	Total	Elasticity of Ratio of Other Male to White Male Share with Respect to: Contractor Status	Review Status	Total
1. Officials and Managers	.048	.07*	.06	.08	.08	.06	.09
2. Professionals	.057	.06	.25**	.10	.04	.28	.09
3. Technicians	.035	.03	.16	.06	.00	.18	.03
4. Sales	.052	.21**	.01	.21	.18	.00	.18
5. Clerical	.044	.09	.47**	.17	.11	.44	.19
6. Craft	.159	−.05	.08	−.04	−.06	.08	−.05
7. Operatives	.300	−.06**	−.00	−.06	−.05	.03	−.04
8. Laborers	.193	−.10**	.02	−.10	−.09	.05	−.08
9. Service	.110	.09**	.14	.11	.09	.16	.12
10. Trainees—White Collar	.002	.25	.59	.35	.39	−.59	.29
11. Trainees—Blue Collar	.006	.22	−.00	.22	.26	−.00	.26
12. Occupational Index	—	.02**	.01**	.02	.02	.01	.02

* = significant at the .05 level.
** = significant at the .01 level.
Significance levels indicated only for elasticity of other male's share.

Table 4.34: Summary of the Impact of Contractor and Review Status on White Female Employment by Occupation.

Occupation	% of all White Females in Occupation in 1974	Elasticity of White Females' Share With Respect to: Contractor Status	Review Status	Total	Elasticity of Ratio of White Female to White Male Share with Respect to: Contractor Status	Review Status	Total
1. Officials and Managers	.037	.01	−.03	.00	.01	−.03	.00
2. Professionals	.083	−.00**	.03	−.09	−.10	.05	−.09
3. Technicians	.049	−.10**	.01	−.10	−.13	.03	−.12
4. Sales	.133	−.09**	.00	−.09	−.11	.00	−.11
5. Clerical	.299	−.01**	−.03**	−.02	.01	−.05	.00
6. Craft	.024	−.20**	−.18**	−.23	−.20	−.18	−.23
7. Operatives	.195	.00	−.03	−.01	.01	.00	.01
8. Laborers	.069	.04	−.05	.03	.05	−.02	.05
9. Service	.111	−.04**	−.03	−.05	−.04	−.02	−.04
10. Trainees— White Collar	.002	.20**	.10	.22	.34	.12	.36
11. Trainees— Blue Collar	.002	−.16	−.01	−.16	−.13	−.01	−.13
12. Occupational Index	—	.01**	.01**	.01	−.00	.00	−.00

* = significant at the .05 level.
** = significant at the .01 level.
Significance levels indicated only for elasticity of white female's share.

Table 4.35: Summary of the Impact of Contractor and Review Status on Black Female Employment by Occupation.

Occupation	% of all Black Females in Occupation in 1974	Elasticity of Black Females' Share With Respect to: Contractor Status	Review Status	Total	Elasticity of Ratio of Black Female to White Female Share with Respect to: Contractor Status	Review Status	Total
1. Officials and Managers	.015	.14**	−.10	.12	.14	−.08	.13
2. Professionals	.026	.01	.12	.03	.10	.09	.12
3. Technicians	.051	.06	.04	.07	.18	.03	.19
4. Sales	.061	.13**	−.14	.11	.24	−.14	.22
5. Clerical	.190	.19**	.19**	.22	.20	.26	.25
6. Craft	.024	−.34**	.05	−.33	−.18	.27	−.13
7. Operatives	.276	.01	.31**	.06	.01	.47	.09
8. Laborers	.112	.24**	.24**	.28	.19	.30	.24
9. Service	.245	.07**	.01	.07	.11	.05	.12
10. Trainees—White Collar	.003	.72**	−.08	.71	.43	−.17	.40
11. Trainees—Blue Collar	.004	.08	−.13	.06	.29	−.12	.27
12. Occupational Index	—	.01**	.00	.01	.01	−.00	.01

* = significant at the .05 level.
** = significant at the .01 level.
Significance levels indicated only for elasticity of black female's share.

Table 4.36: Mean Employment Stocks and Annual Flows by Occupation, 1978.

Line No.	Occupation	N	Stock	Hires	Hires Per Stock
1.	Officials & Managers	2235	94.6	7.6	.08
2.	Professionals	1975	155.3	31.3	.20
3.	Technicians	1913	70.5	20.5	.29
4.	Sales	951	36.7	12.7	.41
5.	Clerical	2214	105.5	33.5	.32
6.	Craft	1919	146.7	25.7	.18
7.	Operators	1943	264.5	109.3	.41
8.	Laborers	1218	79.8	71.6	.90
9.	Service	1521	26.1	17.5	.67
10.	Total	—	974	330	.34

Line No.	Occupation	Terminations	Terminations Per Stock	Pro-motions	Promotions Per Stock
1.	Officials & Managers	9.5	.10	19.1	.20
2.	Professionals	21.7	.14	32.2	.21
3.	Technicians	14.2	.20	17.5	.25
4.	Sales	9.7	.32	6.9	.22
5.	Clerical	25.3	.24	25.5	.24
6.	Craft	25.2	.17	30.6	.21
7.	Operators	80.6	.30	57.6	.22
8.	Laborers	46.7	.59	28.5	.36
9.	Service	13.7	.52	7.3	.28
10.	Total	247	.25	225	.23

Table 4.37: Percent Black Male by Occupation, in Stock and Flows—1978.

Line	Occupation	N	Stock	Hires	Terminations	Promotions
1.	Officials & Managers	2235	.026 (.06)	.042 (.14)	.021 (.09)	.047 (.15)
2.	Professionals	1975	.016 (.05)	.032 (.09)	.024 (.08)	.025 (.09)
3.	Technicians	1913	.039 (.08)	.053 (.13)	.055 (.14)	.050 (.14)
4.	Sales	951	.018 (.07)	.056 (.12)	.026 (.11)	.037 (.14)
5.	Clerical	2214	.019 (.05)	.022 (.07)	.023 (.08)	.028 (.09)
6.	Craft	1919	.067 (.12)	.067 (.15)	.052 (.12)	.101 (.21)
7.	Operatives	1943	.103 (.16)	.099 (.16)	.100 (.15)	.119 (.20)
8.	Laborers	1218	.162 (.22)	.173 (.23)	.155 (.23)	.170 (.27)
9.	Service	1521	.184 (.26)	.188 (.28)	.173 (.28)	.154 (.28)

Table 4.38: Percent Female by Occupation, in Stock and Flows—1978.

Line	Occupation	N	Stock	Hires	Terminations
1.	Officials & Managers	2235	.094 (.19)	.080 (.19)	.077 (.17)
2.	Professionals	1975	.153 (.19)	.175 (.25)	.151 (.24)
3.	Technicians	1913	.209 (.24)	.203 (.27)	.185 (.27)
4.	Sales	951	.136 (.23)	.162 (.28)	.123 (.25)
5.	Clerical	2214	.799 (.18)	.825 (.21)	.789 (.25)
6.	Craft	1919	.102 (.19)	.068 (.18)	.083 (.20)
7.	Operatives	1943	.372 (.34)	.361 (.33)	.347 (.33)
8.	Laborers	1218	.227 (.28)	.203 (.27)	.195 (.27)
9.	Service	1521	.334 (.33)	.178 (.28)	.145 (.26)

NOTES

1. James Heckman and Kenneth Wolpin, "Does the Contract Compliance Program Work?", Industrial and Labor Relations Review, July, 1976, Table 7, p. 562.
2. In future work I plan to model and test this growth process more explicitly.
3. Earnings of full-time workers employed 50-52 weeks from U.S. Bureau of the Census, Current Population Reports, Series P-60, "Money Income in 1974 of Families and Persons in the U.S.", no. 101, January,1976, Table 61, p.127.

   and from U.S. Bureau of the Census, Current Population Reports, Series P-60, "Money Income in 1974 of Households, Families, and Persons in the U.S.", no. 132, July, 1982, Table 59, p.213,214.
4. ibid.
5. Derived as twelve times the average monthly rate from Table 83, Handbook of Labor Statistics, 1980.
6. U.S. Current Population Reports, op. cit.
7. For a discussion of these issues, see Charles Brown, "Black/White Earnings Ratios Since the Civil Rights Act of 1964: The Importance of Labor Market Drop-Outs" National Bureau of Economic Research Working Paper #617, January, 1981, and Richard Butler and James Heckman, "The Government's Impact on the Labor Market Status of Black Americans: A Critical Review" in Leonard J. Hausman et. al., eds., Equal Rights and Industrial Relations, (Madison, Wi : Industrial Relations Research Association, 1977), pp. 235-281.

   For a detailed study of changes on the supply side of this market see Jonathan S. Leonard, "The Social Security Disability Program and Labor Force Participation", National Bureau of Economic Research, Working Paper #392, August, 1979.

Chapter 5: Anti-Discrimination or Reverse Discrimination: The Impact on Productivity

> The EEOC has sometimes been credited with opening up new pools of labor that corporations somehow contrived to ignore, and occasionally with hastening the breakdown of traditional barriers to labor mobility . . . But in the context of the market's endless search for efficiency, these anomolies would have been eliminated anyway, leaving only the question of whether they were worth the expenditure compelled by law. Affirmative action is not cost to the economy. . . . And the true dynamic effects - the opportunity cost of all this expense and effort, the diminuation of competition, innefficiencies due to the employment and promotion of marginal labor and the consequent demoralization of good workers - can only be a matter of conjecture, although they are clearly the most important of all.
>
> -- Senator Orrin Hatch, 1980

The last two decades have witnessed a massive influx of minorities and females into the labor market. Between 1966 and 1978 the number of women employed in manufacturing rose by 32 percent, and the number of blacks and Hispanics by 62 percent, while total employment increased by only 10 percent. The previous chapter demonstrated that part of the increased employment of women and minorities came in response to government pressure

under Executive Order 11246. This chapter seeks to answer three questions. First, in promoting this influx, what have been the respective roles of affirmative action and of federal anti-discrimination law under Title VII of the Civil Rights Act of 1964? Is affirmative action still effective when Title VII pressure is controlled for? Second, has employment discrimination decreased, or shifted to the extent that there is now evidence of reverse discrimination? Third, what effect has the influx had on productivity? In particular, has the manufacturing sector been able to employ more minorities and women without a decline in their productivity relative to that of white men?

Between 1965 and 1977 the Federal District Courts decided more than 1,700 class action suits brought under Title VII of the Civil Rights Act of 1964. This chapter will present the first evidence of the impact of this largely private Title VII litigation on the employment of minorities, and of the relative importance of Title VII and Executive Order 11246.

The integration of the American workforce, both racially and sexually, has been among the most far-reaching and controversial goals of domestic policy in the past two decades. Opponents of this goal have argued that integration can only be achieved at great cost in terms of reduced productivity and profits, that forced equity will entail reduced productivity. However, productivity has proved difficult to measure. Economists have developed a large and refined body of research on racial wage differentials. This approach will not easily detect discrimina-

tion on the basis of racially correlated, but facially neutral criteria, such as education. Moreover, after considerable efforts to correct for the quality or ability of a worker, these wage equation studies always conclude that the remaining racial wage differential is due either to discrimination or to unobserved quality differences. In this sense such studies have reached a dead end.

This chapter will approach the question of discrimination from a fresh angle. Productivity will be measured not through indirect indices such as earnings or education, but by measures of worker output. I will directly estimate over time the ratio of minority to white, and of female to male productivity. Both the changes in these ratios over time, and their comparison with earnings ratios, will have important implications concerning the extent of discrimination.

The following section will analyze the changing distribution of minorities and females, and present evidence of the role of Title VII and affirmative action in promoting members of protected groups. Section 2 will describe a simple model of discrimination, a technique for estimating relative marginal products, and a new state by 2-digit SIC industry data set to be used in estimation. The estimated relative marginal products will be discussed in Section 3, and compared to relative wages. This section will also consider the implications of these results for the issue of reverse discrimination and the induced productivity effects of employment regulation. Since the empirical

work in this chapter is based on more highly aggregated data with fewer control variables, the inferences drawn here are by nature more tentative than results from other chapters. This is the initial, not the final, word on this issue.

Section 1: The Impact of Anti-Discrimination Policy on Work-Place Demographics

The last two decades have witnessed an influx of minorities and women into the labor force, and the concurrent growth of government anti-discrimination policy. In this section I shall examine the changing distribution of minorities and females in manufacturing, and the extent to which government policy has directly affected this distribution. Government policy has been established through Executive Order 11246 and through the Civil Rights Act of 1964, which established the Equal Employment Opportunity Commission (EEOC) and provided the basis for private litigation under Title VII, which outlawed employment discrimination.

The results in this section are based on a sample of 555 state by 2-digit S.I.C. industry cells within manufacturing with data from the 1980 and 1978 EEOC Reports. The data is assembled from Equal Employment Opportunity forms which must be filed by all establishments with more than 24 employees affiliated with companies with more than 99 employees, or more than 50 employees and a government contract of $50,000 or more. How representative is this sample? A comparison with the B.L.S. Employment and Earning for March 1978 shows that 74.1% of all manufacturing employees are reported on EEO-1 forms. Employers with small or temporary workforces are underrepresented.[1]

Do employers fabricate minorities and women on the EEOC forms to keep the inspectors away? Apparently not with regard to totals, as the comparison in Table 5.1 with decennial Census of

Population data shows. The Census is of course based on individual, not employer, responses, and the incentive to misrepresent race or sex is correspondingly less. Both minority and female employment in manufacturing have grown steadily since 1960, and the information from the EEOC is not out of line with Census data. In 1969, only 6% of manufacturing workers were non-white males, 24% were female. By 1978 the proportion non-white male had nearly doubled to 11%, while the proportion female had grown to 31%.

The bulk of this increase occurred in the clerical and blue-collar occupations (see Table 5.2). The greatest percentage increases occurred among professionals and managers, but this accounts for relatively few people. Between 1966 and 1977 the number of non-white male blue-collar workers increased by nearly half, until they accounted for 14% of the blue-collar workers. Most of the incoming females entered traditional jobs in the clerical occupations, increasing their proportion from 46 to 56 percent.

The white-collarization of manufacturing is also apparent in Table 5.2. This increase in the white-collar proportion of the workforce has played some role the recent decline in the growth rate of productivity. While blue-collar workers have fallen from 72 to 69 percent of the workforce, professional and managerial workers have increased from 11 to 15 percent of all workers in manufacturing.

Anti-discrimination law and affirmative action regulation

are often thought of as bringing pressure to bear on firms with few minority or female employees relative to the industry and region average. If this is the case, we would expect enforcement of Title VII and of Executive Order 11246 to reduce the variance of minority and female representation. I find, however, that the standard deviation across state by industry cells of the percent of white-collar, managerial, or blue-collar workers who are minority or female did not, in general, fall from 1966 to 1977. This finding, coupled with the increase in the means, is consistent with an enforcement effort that brings direct pressure to bear on only a few firms.

The Civil Rights Act of 1964 must get some of the credit for increasing opportunities for minorities and females. Class action suits under Title VII of this Act are likely to have been among the most powerful prods to increasing minority and female employment. Others have argued that the passage of the Civil Rights Act of 1964 reflected a diminished level of discrimination on the part of the electorate that one would expect to see reflected in improved employment opportunities for minorities and women even if the Act were never enforced. Moreover, this line of argument proceeds, only a small proportion of establishments have been directly involved in Title VII litigation, so large effects are unlikely. This rosy view ignores the near defeat of the Civil Rights Act of 1964, and the continuing stream of litigation since, some of which has established broad precedents. The Kennedy administration believed the 1964 Act too strong to pass. Title VII, and in particular the clause extending

protection to females, was supported by some Congressmen because they believed it would doom the entire bill.[2] It was precisely the provisions for enforcement through the courts that distinguished Title VII from its toothless but equally noble forebears and gave it prospects for effecting change.

Before 1972, the Justice Department was empowered to bring suit for enforcement through the courts of Title VII's provisions. The EEOC's powers were limited to conciliation and persuasion. Since 1972 the power of litigation has been entrusted to the EEOC, which in turn can pass it on to individual plaintiffs. By such recourse to the courts, the EEOC can sometimes accomplish in years what takes the OFCCP weeks. What it gives up in speed though it may sometimes win back in power through the setting of sweeping legal precedents. For example, the celebrated case of Griggs v. Duke Power did not simply aid Griggs, or effect only Duke Power. By establishing the principle of disparate impact as primae facie evidence of discrimination, it placed a heavier burden on all employers to avoid the appearance of discrimination.

The EEOC's major contribution has probably been in helping to establish such far-reaching principles of Title VII law in the courts which can then be used by private litigants, rather than in directly providing relief from systematic discrimination through its own enforcement activity.

A 1976 General Accounting Office review of EEOC enforcement activity concluded that it was generally ineffective. Most

individual charges were closed administratively before a formal investigation. Charges took about two years to be resolved, and only 11 percent resulted in successful negotiated settlements. There was little EEOC followup to ensure compliance with conciliation agreements, and entering into a conciliation agreement caused no significant change in a firm's employment of blacks or females. Between 1973 and 1975, among 12,800 charges for which the EEOC found evidence of discrimination and was unable to negotiate settlements, fewer than 1 percent had been brought to litigation resulting in favorable court decisions.[3] Between fiscal years 1972 and 1976 the EEOC brought 462 cases to court.[4] The much publicized charges brought by the EEOC against AT&T, GM, Ford, Sears, GE and the IBEW in the early seventies were largely anomalous. This major legal and public relations offensive was atypical of the Commission, which has normally been a reactive body slowly working its way through a mountain of individual complaints, many of which it discards as lacking substance.

Despite its official mandate, the EEOC claims not to place great weight on such individual complaints in targetting enforcement, considering them unreliable. Rather, in interviews it claims to target by using EEO-1 forms to screen out establishments whose entry level employment of protected groups compares poorly with that prevalent in the SMSA, and whose professional employment falls short of the national norm. But according to the General Accounting Office, "... the use of such [EEO-1] information in sophisticated methodologies for selecting targets for sytemic enforcement activities has been minimal."[5] The

EEOC also claims to take into account community reputation, past charges, and the size of the company. It avoids large companies, finding them too hard to digest. Yet this targetting system has produced relatively few systemic charges. There is little evidence to suggest that the EEOC has focused its attention on large firms that systematically discriminate. I argue, however, that litigation under Title VII by private parties and by the EEOC constituted the cutting edge of government anti-discrimination policy.

The enforcement of Title VII through the courts has led to a significant improvement of the employment and occupational status of minorities. Between 1964 and 1981 more than 5000 cases of litigation under Title VII were decided in the Feceral District courts. More than 1,700 of these were class action suits. These are the tip of an iceberg consisting of cases settled out of court, or decided in state courts, but these class action decisions are likely to generate the most publicity, result in the largest awards, and affect the most people.

In regressions of the change in the percentage of workers in an occupation who are members of a protected group on number of Title VII class action suits per corporation, percentage of employment in an industry by state cell that is in federal contractor establishments under the affirmative action obligation, and a lagged dependent variable, Title VII litigation leads to a moderate yet significant improvement in the position of blacks. Table 5.3 presents the regression results, and Table 5.4 summar-

izes the impact of Title VII litigation. In every case considered in Table 5.3, Title VII litigation plays a significant role in increasing blacks' employment share.

For example, between 1966 and 1978 the proportion of all workers in manufacturing who were black increased from .06 to .12. On average, a Title VII class action suit per corporation raises this proportion by .277. Since there were an average of .011 such suits per corporation in a state by industry cell, about 7 percent of the improvement in black employment share can be attributed directly to Title VII litigation. The impact is even more pronounced for black females. This counts only the direct effects of litigation on firms in the same industry and state. In particular it does not count the spillover effects onto firms in other industries and states from establishing creoible threats and wide-ranging legal precedents. In fact, the greater such spillover, the less the differential impact of Title VII estimated here.

Th proportionate impact of Title VII litigation is summarized in Table 5.4. This litigation has had its strongest impact in the white-collar occupations. Black gains through Title VII have been most striking in professional and management positions, suggesting that Title VII litigation has created pressure for occupational advancement as well as employment.

This analysis treats litigation under Title VII as exogenous. If one believes that Title VII suits that reach a decision in the federal District Courts are more prevalent in firms

with growing black employment, then the estimate presented here will be biased upwards. More plausibly in my judgement, if discrimination leads to both stagnant levels of black employment and to litigation, then my estimate of the impact of Title VII will be biased downwards, and the positive results shown here are that much more notable.[6]

Title VII litigation plays a significant role even when concurrent affirmative action pressure under Executive Order 11246, the effect of which has already been established, is controlled for. In discussing our previous establishment level results, the possibility was raised that the observed impact of affirmative action might be exaggerated because it included part of the impact of the omitted Title VII variable. There is little evidence here to support this omitted variable bias conjecture. Across state by industry cells, the correlation between Title VII suits and contractor status weighted by employment is only .19, so while this does not speak directly to the issue of covariance at the establishment level, it is unlikely that the contractor effect found in Chapter 4 is really a Title VII effect. In those detailed establishment level tests we found that affirmative action worked in complicated ways, and that establishment growth and composition also had significant impacts on protected group employment. The results in Table 5.3 are at a much higher level of aggregation in which these important control variables are omitted. In their absence, affirmative action still increases black employment, but the effect is not as large or significant. The impact is larger for black females, and in white-collar

occupations.

Considering the level of aggregation, and the omitted complex interactions, the relatively small impact of affirmative action is not surprising. If similar omitted variable and aggregation biases are at work, the relatively large impact of Title VII is even more striking. The advantage of aggregation to the state by industry level is that it may reveal something about spillover. Suppose contactor establishments increased their employment of minorities and females by hiring them away from non-contractor establishments in the same industry and state. In this inelastic supply case, total minority and female employment within a state by industry cell need show no relation to the prevalence of contractors in a cell. Such negative spillover may help explain the relatively small impact of affirmative action in the aggregated sample. In contrast, while affirmative action regulation applies only to federal contractors, Title VII law applies to nearly all employers, so the liklihood of such negative spillover is correspondingly diminished. When the analysis is replicated with disaggregated data at the establishment level between 1974 and 1980, both Title VII and affirmative action have strong and significant effects on the employment of black males.

We have seen the absolute numbers of minorities and females increase rapidly in clerical and blue collar jobs in manufacturing. And while few women or minorities are employed as managers or professionals, their proportional representation in these occupations has more than doubled for women, and quadrupled for

minority men. Government policy, through the enforcement of anti-discrimination and affirmative action laws has played a significant role in increasing employment opportunities for minorities. In the next sections we turn to the question of whether this integration of the workforce has had significant productivity costs.

Section 2: The Framework for Measuring Employment Discrimination

Opponents of civil rights and affirmative action have argued that employers were discriminating on the basis of merit, not on the basis of race of sex. If their contention is correct, then government policies that favor the hiring and promotion of minorities and women should cause a decline in their relative productivity. Equal pay restrictions will compound the inefficiency. The hypothesis inherent in this argument and to be tested in the following sections is that the relative marginal productivities of minorities and females have declined as their employment has increased, and has not moved toward equality with relative wages.

The Model

To clarify the issues to be resolved, we use a simple model of discrimination of the type originally proposed by Becker. As is well known, such models cannot support an equilibrium with persistent discrimination, absent an ongoing flow of people with wealth to spend on discrimination. We assume competition weeds out the unprofitable discriminators slowly, so at any point in time we can observe a temporary equilibrium with discrimination in which firms are slowly running down their wealth.

Assume there are two types of firms, distinguished by whether or not they discriminate. The firms that discriminate against blacks will hire them only at a rate of pay below their marginal product. If we observe that the ratio of black to white marginal products is greater than the ratio of black to white

wages, we infer discrimination against blacks. The extent of the divergence is a measure of the prevalence and intensity of discrimination.

Let firms produce output Y from capital K and labor L of two colors: A and B.

$$Y = e^{a^1} K^{a^2} (L_A + cL_B)^{a^3} \tag{1}$$

We assume labor of type A is a perfect substitute for labor of type B except for a scaling factor C, the ratio of marginal product of B to A. We shall relax this restriction in later empirical work.

A non-discriminating firm taking the prices of labor w_A and W_B as given will hire labor to satisfy the first order conditions for profit maximization:

$$C = \frac{W_B}{W_A} \tag{2}$$

Given the assumption of perfect substitution, this may easily lead to corner solutions.

A discriminating firm is assumed to maximize a utility function separable in profits π,

$$U = \pi - dL_B \tag{3}$$

where d is an index of the taste for discrimination. Solving the first order condition for utility maximization yields

$$C = \frac{W_B + d}{W_A} \tag{4}$$

If both types of firms hire in the same labor markets, a temporary equilibrium will be at $W_B = cW_A - d$, where d now measures both the intensity and the prevalence of discrimination. Mobile labor will enforce the constancy of c across markets.

Note that we assume firms take the wage rates as given. In particular this means that non-discriminating firms will hire the discriminated against workers until their marginal product equals their market wage. The estimated marginal products, like the wages, reflect discrimination as well as inherent abilities. It is crucial to realize that what distinguishes the color and sex blind from the discriminator in this model is the divergence of relative productivity from relative wage. We shall measure both the levels and the change in that divergence.

A finding that the wage ratio is equal to the productivity ratio need not prove the absence of discrimination. Consider the extreme case in which productivity is a characteristic of the job independent of the person who holds it, and in which discrimination takes the form of segregating minorities and women in low productivity jobs. Note again, this cannot be a full equilibrium if productivity is at all an individual characteristic. But in this plausible world discrimination will not be observable as a divergence between wage ratios and productivity ratios. To the extent that this occupational segregation model accurately describes the world, our results will be biased against finding discrimination. By itself, however, the occupational segregation model has a few limitations. First, most of the variance in

wages is within, not across, occupations. At the broad 1-digit census occupation level, more than 90% of the total variance in wages is within occupations, even when race or sex is controlled for. Considerable within occupation dispersion remains even within more finely detailed occupational categories. Consider the stereotypical black male janitor and the female secretary. In 1970 the median earnings of the former were $4,220, well below the male median of $7,610. But 14% of all black male janitors earned more than $7,000. In 1970 the median earnings of female secretaries were $4,796, but 15% of the secretaries earned more than $7,000. Within detailed occupations there is considerable wage variation that simple occupational segregation models do not explain. Second, the occupational segregation model does not seem well suited to explaining the inequality of wage and productivity ratios or their movement towards equality over time.

We can also make inferences concerning discrimination by comparing the change in relative productivity over time with the change in other indicators of ability, such as relative education. If the measured relative productivity of minorities and females has increased more than their relative ability, then we are led to suspect a diminution of past discrimination.

Estimation

The effect of the changing sexual and racial composition of the work force on productivity can be estimated using production-function techniques similar to those which have been used to investigate the effect of differences in worker quality

(Griliches, 1967) and of unionization (Brown and Medoff, 1978) on output.

We begin with a modified Cobb-Douglas production function, which in logarithms can be thought of as a first-order approximation to a more general production function.

$$Y = e^{\sum \alpha_i D_i} K^{B_1} (L_{WM} + C_1 L_{RM} + C_2 L_F)^{B_2} \tag{5}$$

where Y is output, K is capital, LWM is white-male labor, LRM is non-white male labor, and LF is female labor. The Di are a vector of regional and industry dummy variables.

The parameters C1 and C2 reflect differences in the productivity of non-white male to white male and of all female to white male labor respectively; females being C2 times as productive as white males.

$$\text{Let } L \equiv L_{WM} + L_{RM} + L_F$$

$$P_1 \equiv \frac{L_{RM}}{L}$$

$$P_2 \equiv \frac{L_F}{L}$$

Factoring out L from equation (5) we find:

$$Y = e^{\sum \alpha_i D_i} K^{B_1} L^{B_2} (1 + (C_1 - 1) P_1 + (C_2 - 1) P_2)^{B_2} \tag{6}$$

Taking natural logarithms:

$$\ln Y = \sum \alpha_i D_i + B_1 \ln K + B_2 \ln L + B_2 \ln [1 + (C_1 - 1) P_1 + (C_2 - 1) P_2] \tag{7}$$

Applying the Taylor series approximation that ln(1+x) is approximately equal to x for x < 1 yields:

$$\ln Y = \sum \alpha_i D_i + B_1 \ln K + B_2 \ln L + B_2(C_1-1)P_1 + B_2(C_2-1)P_2] \qquad (6)$$

which is our basic estimating equation.

The error of approximation goes to zero as P1 and P2 go to zero, and as C1 and C2 go to 1. In other words, for work forces with small proportions of black and female workers or with small differences in productivity across groups the error will be small. Under the hypothesis that there is no productivity differential across groups, the approximation is exact.

Equation (8) is the key relationship to be estimated here. The productivity differential C1 is identified as one plus the ratio of the coefficient on P1 to the coefficient on L. This yields productivity differentials between minority and white males, and between females and white males, controlling for occupational distribution and industry and regional characteristics.

With data from two years we can pool cross-sections to get more accurate estimates of the average productivities across time, and of the change in production over time. For the first we estimate:

$$\Delta \ln Y_t = B \, \Delta \ln X_t \qquad (9)$$

where Xt is the vector of inputs into the production function. This specification assumes constant elasticities, b, over time.

For the second we estimate the equation:

$$\ln Y_t - \ln Y_{t-1} = B_t \ln X_t - B_{t-1} \ln X_{t-1} \qquad t-1 \qquad (10)$$

This specification allows us to difference out any unobserved industry by state specific constants with stable impact over time, without imposing the restriction of constant elasticities over time on the variables of interest.

Data

The model will be estimated for 1966 and 1977 at the state by 2-digit S.I.C. industry level of aggregation in manufacturing. This required the formation of a new data-set, merging data from Census of Manufactures, Annual Survey of Manufacturers, Equal Employment Opportunity Council Reports, and B.L.S. input-output studies. A description follows of the construction of the major variables. Capital, materials, and outputs are expressed as the natural logarithms of thousands of 1972 dollars per establishment. Labor is measured in the natural logarithm of thousands of hours worked per year per establishment.

Capital

For this study the first consistent measure of real capital stock by state by industry was created. Using the perpetual inventory technique, the B.L.S. developed net capital stock measures by 2-digit industry nationally in 1972 prices. I allocated this net real stock of capital by industry for 1964 across states according to each state's share of 1964 book-value of capital. For example, if Ohio accounted for 10% of the book value of capital in the food industry in 1964, it was allocated 10% of total 1954 real depreciated capital. The 1964 A.S.M. contains data on

capital rentals and book value of owned capital by industry by state. The rental payments are capitalized at 10% and added to user owned capital to arrive at total book value.

To arrive at real capital stock in other years, the 1964 starting value is depreciated by an industry and year specific depreciation rate, and real investment by state by industry is added. The depreciation rate is the weighted average of the industrial buildings rate of 3.61 and the industrial equipment rate of 12.25 given by Hulten and Wykoff (1981). The weights are the annual shares in national real net capital of plant and equipment, by industry, as measured by the B.L.S.

Investment by state by industry is from the A.S.M. or C.J.M., and is deflated by the industry and year specific price index (1972 = 1.0) for gross-investment implicit in the B.L.S. historical and constant dollar gross-investment series.

Value Added

Value added, is from the 1966 A.S.M. and the 1977 C.J.M. It is expressed in 1972 prices, using the G.N.P. implicit price deflator. I assume that discriminating and non-discriminating firms compete in the same product markets, so that the impact of demographics on value-added can be interpreted as a productivity effect rather than a price effect.

Labor

Total labor inputs by industry by state in yearly hours for

production workers and in bodies for non-production workers are available from the 1966 A.S.M. and the 1977 C.D.M. Non-production workers are assumed to work 2,080 hours yearly. The proportion blue-collar is the ratio of reported production workers hours to constructed total hours.

The 1966 and 1978 EEOC Reports on Minority and Female Employment provided data on the demographic composition of the work force by industry by state. In 1978 I grouped Asians and Native Americans with whites so as to be consistent with the EEOC's 1966 grouping. The percent non-white is the percent of male workers who are black or Hispanic. Females of all races have been grouped together because of their relatively small numbers.

Section 3: Estimated Productivity Differentials

Relative minority and female productivity increased between 1966 and 1977, a period coinciding with government anti-discrimination policy to increase employment opportunities for members of these groups. There is no significant evidence here to support the contention that this increase in employment equity has had marked efficiency costs. The relative marginal productivities of minorities and women have increased as they have progressed into the work force suggesting that discriminatory employment practices have been reduced.

In separate cross section regressions in 1966 and 1977 of value added on capital, total labor, percent non-white male and percent female, controlling for percent blue-collar, industry and region (Table 5.5) only the coefficient on percent non-white male in 1966 is significantly negative. At the 95% confidence level we cannot say non-white males were less productive than white males in 1977, or that females were less productive than non-white males in 1966 or 1977. The point estimates indicate that non-white males were .68 times as productive as their white counterparts, and that females were .75 times as productive as white males in 1966. As equation (2) of Table 5.5 shows, both these ratios had increased by 1977, to .71 and 1.01 respectively. On their face, these numbers suggest increases in the productivity of protected groups, particularly females, as the work force has been integrated. How significant is this increase in productivity? Not very. Table 5.6 shows a 95% confidence interval for

the estimated ratios of marginal products, C. Since C, in the case of females, is identified as (BF/BLH)+1, I take the covariance structure of the estimated coefficients into account in constructing the asymptotically correct confidence interval. The estimated BLH decreases by .27 standard errors when BF increases by one. Using this technique, as BF varies by 2 standard errors, the ratio of marginal products varies from .44 to .91. The width of this confidence interval makes strong policy conclusions questionable, since the ratios of marginal products are not precisely measured.

Comparing these estimated productivity ratios with wage ratios, we find stronger evidence of sexual discrimination than of racial discrimination. From the 1968 and 1978 Current Population Surveys I obtained the yearly earnings of full-time full year workers. Over this time period, the earnings ratio of black to white males increased from .69 to .73 while the ratio of female to white male earnings increased slightly from .53 to .54. Wage ratios show similar patterns. Across races, the earnings ratios do not differ significantly from the productivity differentials. Across sexes, in 1977, the earnings ratio is significantly less than the productivity ratio. The stability of the female to male wage ratio contrasts with the estimated increase in relative productivity, and suggests women have been able to increase their employment in manufacturing only by accepting wages below their marginal products. Again, I stress that these comparisons are only suggestive in light of the imprecision of the estimated relative productivities.

One criticism of the use of value-added as a measure of output is that if product markets are not competitive then changes in value-added may correspond to price, rather than ouput, effects. In this regard, it is notable that in regressions of total compensation on demographics in this same data set, the resulting estimated ratios of female to white male, and of non-white male to white male earnings both declined between 1966 and 1977. This does not support the argument that the productivity equations are really wage equations in disguise.

It is plausible that women's productivity increased faster than their earnings if occupational segregation broke down and women found themeselves reallocated to the bottom of more productive job ladders. But this raises an alternative explanation of our results that does not entail discrimination. It is possible that women have moved from dead-end occupations to occupations that require an investment in human capital, and so recuir the worker to accept a wage below marginal product at the beginning of her career. Since men are spread over the tenure distribution, their wage equals their marginal product on average. On the other hand, the recent influx of females implies relatively more will be investing in human capital on the job, and on average their marginal product may exceed their wage at this point in their working lives. On the other hand, the rough evidence on the proportion of women in highly skilled jobs does not strongly support this argument. For example, the percentage of women employed as managers and professionals increased from 3% in 1966 to 5% in 1976. While this represents a high growth rate in

these skilled occupations, it still remains true that few women are employed in such professions.

The general results found above are not dependent upon the assumption that workers of all races and both sexes are perfect substitutes, nor are they dependent upon the assumption that the elasticity of output with respect to capital is constant across industries. I dispense with both of these simplifying assumptions in Table 5.8, in which a partial trans-log production function is estimated in which capital is interacted with industry dummies. This specification places no restrictions on the elasticity of substitution between types of labor, or on capital's share of output by industry.

The estimated elasticities of substitution, σ, are closer to one than to infinity, but this matters little for the estimated marginal products, c. Between white males and non-white males σ drops from 1.11 in 1966 to .69 in 1977. Between white males and females σ declines slightly from .65 to .61. As the skills and training of females and non-whites approximated those of white males, one would have expected these elasticities of substitution to increase. These elasticities are all calculated at sample means, controlling for occupational distribution.

In the trans-log specification, between 1966 and 1977, the ratio of non-white male to white male productivity increased from .49 to .62. Over the same period, the ratio of female to white male productivity increased from .92 to 1.10. Compared to the results obtained assuming perfect substitutes, the ratio of non-

white male to white male productivity starts at a lower level but increases more, while the ratio of female to male productivity starts at a higher level but increases less. Concerning the bottom line, even when the assumptions of perfect substitutes and constant capital share are relaxed, I still find no significant evidence of a decline in the relative productivity of minorities or females. The point estimates suggest that their relative productivity has increased.

The finding that the increased employment of minorities and females has not brought about a decline in their relative marginal productivity is logically distinct from the question of the impact on the average marginal productivity of labor of this change in the composition of the workforce. The point estimates for 1977 in Table 5.8 indicate that minority males are roughly sixty percent as productive as white males at the margin, and that females are ten percent more productive than white males. Multiplying these relative marginal productivities by the change in minority and female employment share in manufacturing from Table 5.1, I find that the ratio of the marginal product of the average worker to the marginal product of a white male worker fell by only .007 due to the changing composition of the workforce. This decline is small because non-white males are still a small minority of the workforce, and because the productivity of females is estimated to be greater than that of white males.

One interpretation of the increase in the relative productivity of non-whites and females is that they have been reallo-

cated to jobs more suitable to their skills under the inducement of anti-discrimination law. An index of occupational status in manufacturing formed by weighting the occupational distribution by the median earnings in 1969 of full-year male workers increased by 7.7% for non-white males from 1966 to 1978. Over the same period the female index increased by just 2.3% . For comparison the white male index rose by 3.6%. Put another way, the ratio of non-white male to white male occupational index increased from .84 to .88, while the female to white male ratio actually declined slightly from .68 to .67. This evidence of net occupational advance across broad occupations in manufacturing may play a role in explaining part of the increase in the relative productivity of non-white males, though not that of females.

Productivity increases may accompany higher levels of education as well as employment in more skilled occupations. We would expect to observe the same increase in relative productivity, absent anti-discrimination efforts in the labor market, if minorities and females became relatively better educated. Are our observed productivity increases due then to improved education rather than integration? Taking the median number of years of school completed from March CPS samples between 1966 and 1977[7], we find in Table 5.9 that the ratio of non-white males' education to that of white males has increased from .81 to .95. Among professionals and managers, relative non-white male education has actually fallen towards equality. In 1966 a non-white male manager or professional was likely to be more highly educated than his white counterpart. By 1977 this was no longer the case.

Table 5.9 also suggests that employers did not find it necessary to lower their standards to increase their non-white employment. Among blue-collar workers, relative education increased from .83 to .97.

The level of female schooling relative to that of males has not increased, and so cannot explain the estimated productivity ratio increase. Just as in the racial comparisons, female relative schooling has fallen to equality among managers and professionals, and increased toward equality among blue-collar workers. Education levels are rising more rapidly among blue-collar workers, and especially among minorities and women. However neither increases in education nor broad occupational changes are sufficient to explain the relative productivity increase among women.

The observed increase in both non-white and female productivity persists when data from the 1966 and 1977 cross-sections are pooled to difference out unchanging unobserved variables. If

$$\ln Y_t = \bar{B}_t \ln \bar{X}_t + \bar{a} \ln \bar{Z} + e_t \qquad (11)$$

where Xt is a vector of observed production inputs and Z a vector of unobserved inputs, then taking first differences as in eq. (12) eliminates the Z, which are assumed not to change over time.

$$\ln Y_{t+1} - \ln Y_t = \bar{B}_{t+1} \ln \bar{X}_{t+1} - \bar{B}_t \ln \bar{X}_t + (e_{t+1} - e_t) \qquad (12)$$

This specification is relatively non-restrictive. It allows cell-specific constants and it allows the coefficients to vary freely over time.

This specification yields point-estimates, and confidence intervals similar to the unpooled cross-sections. In Table 5.10, for the 445 industry by state cells with observations in both 1966 and 1977, I find that the ratio of non-white male to white male productivity increased from .52 in 1966 to .60 in 1977. Over the same time, the ratio of female to white-male productivity increased from .73 to .85. Confidence intervals are presented in Table 5.10. Even when cell-specific constants are corrected for, the evidence still points toward an increase in minority and female relative productivity.

In Table 5.10 note that the imprecision of the cross-sectional relative productivities is not due to omitted unchanging cell-specific variables. The estimated productivites from pooled data are also imprecise, as are estimates of the average productivity over time in Table 5.11.[8]

The argument that the influx of minorities and women has caused a decline in productivity can also be tested in a more direct fashion. In the 1977 cross-section production function regression in Table 5.12 we include directly as independent variables the change in percent non-white male and percent female from 1966 to 1977. Increases in the proportion of the workforce that were minority or female had no significant effect on productivity.

The evidence in this and the preceeding chapter is that government anti-discrimination and affirmative action pressure has led to the increased employment of members of protected

groups, most significantly in the case of blacks. The most divisive question raised by affirmative action is whether it constitutes reverse discrimination. Opponents of this regulation argue that it causes a double misallocation of resources that reduces productivity. First, it forces firms to employ relatively less qualified minorities and females, moving away from first best efficiency. Call this the indirect productivity effect. Second, it forces the firm to reallocate resources to comply directly with regulations involving paperwork, test validations and personnel procedures. Call this the direct productivity effect.

What are the direct costs imposed on firms by compliance with equal employment opportunity regulations? According to a number of simple measures, compliance costs about as much as most firms spend on annual bonuses. A Business Roundtable study developed for the purpose of questioning the expense of government regulation, found 40 companies spending $217 million in 1977, or $78 per employee.[9] This is .1% of sales and 1.3% of profits for a group of companies accounting for 5% of U.S. non-agricultural employees, and 8% of U.S. sales. The range was from $10 to $150 per employee, with AT&T at the top. Of this total equal employment opportunity cost of $78 per employee, 76% was for affirmative action programs. The Equal Employment Advisory Council imputed a cost of $1.5 billion for the Fortune 500 based on a sample of 21 companies.[10] The Congressional Research Service guessed that $1.6 billion would pay for the cost of affirmative action for all non-construction contractors in 1976, based

on a sample of two: the Warner-Lambert Company spent $55 per employee and Atlantic-Richfield spent $46 per employee.[11] Concerning just the direct cost of an affirmative action compliance review, a 1981 National Association of Manufacturers survey of 42 companies with an average workforce of 50,000 found that 80% of the reviewed were requested to submit data in addition to the AAP, at an average cost of $3000.[12] A similar survey by Senator Hatch's Labor Committee of 245 contractors with an average workforce of 2584 in 1981 reported that 60% were asked to submit additional data beyond the AAP, at an average cost of $24,000.[13] The low incidence of financial penalties in the form of back-pay awards through conciliation agreements has already been discussed.

Concerning the indirect productivity effects, AT&T presents a remarkable case study of the impact of government regulation. On January 18, 1973, AT&T entered into a consent decree with the federal government that represents an extreme of government intervention and pressure. During the six year tenure of this initial decree female representation nearly doubled in management from 8.8 to 17.4 percent, and tripled in craft jobs, from 2.6 to 9.5 percent. At the same time minority representation in management and craft positions roughly doubled. In the face of this forced and dramatic influx, a personnel official of AT&T stated in an interview that they had found no effect of compliance on productivity or performance. A recent AT&T internal study concurred that female managers "managerial abilities are decidedly up to those of men of either yesterday or today," while noting

that non-white managers where less motivated and less able than whites.[14] At AT&T where the government has imposed some of the most stringent requirements for upgrading minorities and females, the company has complained far more of temporary morale setbacks among white males, and of increased administrative and training costs, than of a decline in productivity.

My finding is that neither affirmative action, nor Title VII litigation, have had a significant impact on productivity. Table 5.13 presents a semi-reduced form pooled cross-section production function. This equation includes two variables indicating government policy: T7, the number of Title VII class action suits decided between 1966 and 1977 in the Federal District Courts per establishment; and PC74, the percent of employment in a state by industry cell in 1974 that is in federal contractor establishments. These policy variables are used to test both for direct and indirect productivity effects. The change in minority and female employment between 1966 and 1977 can be partitioned into a voluntary change and a forced, or government induced, change. As well as capturing the direct productivity effects, the government policy variables also reflect the indirect effect on productivity of a forced change in firm demographics. There is no significant evidence of a productivity effect in Table 5.13. Title VII litigation has a negative effect, but one that is not significantly different from zero. The greater the percent of employment in a cell that is in contractor establishments, the higher the productivity, although this coefficient is also insignificant.

Lest one suppose this data-set is incapable of discerning the productivity effect of regulation, note that using data assembled by Wayne Gray on O.S.H.A. regulation, such regulation was found to have an adverse impact on productivity in this same data-set.

These results from aggregate production functions are supported by independent tests of the impact of changing demographics on corporate profitability at a sample of more than 1000 large corporations between 1974 and 1980. EEO data on corporate demographics was matched with publicly available information on corporate profits, assets, and sales. In this disaggregated analysis, there was no significant evidence that corporations that had high turnover or that increased their employment of non-whites or females had suffered lower profit rates.

While the conclusions drawn in this chapter must be tempered by the low significance levels of most tests, conclusions of a similar nature may be drawn from a very detailed study of plant level productivity by Katz, Kochan, and Gobeille.[15] This study of industrial relations performance at eighteen automotive assembly plants during the 1970's finds that the race or sex of workers generally has no significant impact on productivity, corroborating some of the findings here for manufacturing in general.

The evidence presented here is consistent with effective federal anti-discrimination and affirmative action policies that have led to increased employment opportunities for minorities and women without a significant decline in their relative

productivities. This suggests that job redistribution has not entailed a large efficiency cost, and that government policy has made progress in fighting discrimination.