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7 Employment in Construction and Distribution Industries: The Impact of the New Jobs Tax Credit

John Bishop

The New Jobs Tax Credit (NJTC) offers a tax credit of fifty percent of the first $4200 of wages per employee for increases in employment of more than two percent over the previous year. Economic theory predicts that such a tax credit should stimulate employment, decrease hours worked per week, and reduce product prices of the subsidized industries. A time series analysis of the construction, retailing, and wholesaling industries finds strong support for these hypotheses. Our results suggest that the NJTC was responsible for 150,000–670,000 of the more than 1-million increase in employment that occurred between mid-1977 and mid-1978 in the construction and retailing industries. Similar analysis indicates that by June 1978, NJTC had produced roughly a 1 percentage point reduction in the margin between retail and wholesale prices of commodities that saved consumers $1.9–$3.6 billion over the course of the previous year.

7.1 Introduction

This paper examines the effect of the NJTC provision of the 1977 Tax Reduction and Simplification Act on employment demand and pricing policies in the construction, trucking, wholesaling, and retail sectors of the economy. Employing 22.7 million workers in 1976, these industries

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provided 26 percent of the nation's jobs and 27 percent of the hours worked by all persons engaged in production.

Time series studies of employment demand have neglected these industries, despite their importance and the availability of reasonably good monthly data on input and output prices, wages, employment, hours worked, and sales or output. Wages tend to be low: average earnings in the retail sector are two-thirds the national average; construction earnings are only slightly lower than that average, but vary greatly. A large share of the nation's low-earning workers is employed in these industries—in 1970, 45 percent of teenagers, 21 percent of black males, and 23 percent of women.

Because the life of capital equipment is short and rates of labor turnover are high, the response of construction and distribution to changes in input prices induced by tax policy may be speedier than in the rest of the economy. NJTC places a $100,000 cap on the amount of subsidy each firm may receive, and one would expect the most noticeable response to it to occur in industries dominated by small and medium sized firms like construction and the distribution sector.

The data reported here are consistent with the hypothesis that firms in the construction and distribution industries have responded to NJTC by increasing employment, of part-time workers especially, and by reducing prices. The point estimates of the increase in employment that the credit had stimulated by March 1978 generally lie in the neighborhood of 400,000, with a band of uncertainty of ± 180,000. A 400,000-job stimulus is roughly one-third of the growth in employment that these industries were experiencing between April 1977 and April 1978. Point estimates of the decline in the margin between the retail price of commodities and manufacturers' wholesale prices suggest that by April 1978 the credit had reduced the consumer price index for commodities by slightly less than one percentage point.

Section 7.2 outlines the problem that employment subsidies are designed to address and describes the structure of the currently operating marginal employment incentive. Section 7.3 discusses how a firm should respond to such an incentive and selects three hypotheses for testing at the industry level. Section 7.4 describes the estimating equations and the methods of testing the hypotheses. Section 7.5 reviews the data and section 7.6 presents and discusses the results. In section 7.7, we review the limitations of the study and suggest some fruitful areas for research.

7.2 Background

Over the past six years, overall unemployment has averaged 6.8 percent, nonwhite unemployment 12.2 percent, and teenage unemployment

17.5 percent. This discouraging unemployment record has led both economists and politicians to search for new ways to stimulate the employment of inexperienced and disadvantaged workers. Martin Baily and James Tobin (1977) suggested that, by focusing the employment stimulus on the lower-skilled, less-experienced workers, it may be possible to lower the rate of unemployment at which inflation accelerates (NAIRU, the nonaccelerating inflation rate of unemployment).

One approach is to expand public service employment for young unskilled workers. The cost per job created, however, is high; and it is in any case doubtful that in the long run public service employment results in large net additions to total employment. An additional problem is that the public sector is highly skill-intensive. The proportion of workers with at least one year of college is twice as high in the public as in the private sector (45% vs. 22%).

These difficulties have led to programs whose objective is to create additional jobs for unskilled and inexperienced workers in the private sector. WIN and JOBS are examples of programs that have attempted to induce the private sector to hire the disadvantaged by offering employers a subsidy to hire workers in their target groups. They have not, however, proved very effective.

Most employers that hire target group workers for whom a subsidy is available neglect even to apply for the money (Hamermesh 1977), apparently because of the paperwork involved in applying for the subsidy. A further disadvantage of this approach seems to be that the subsidy adheres to specific individuals. Employers may feel that eligibility for the subsidy signals that the job applicant is likely to be a worker of low productivity—leading to the paradox that the programs may in fact lower the subsidized worker's chances of getting a good job.

A third approach is to subsidize employment generally. First proposed by Nicholas Kaldor in 1936, this approach has more recently been refined and analyzed by Fethke and Williamson (1977) and Kesselman, Williamson, and Berndt (1977). These analyses suggest that by paying the subsidy only for increases in employment over a threshold level based on a firm's past employment—that is, by designing a so-called marginal employment subsidy—it is possible to achieve rather large increases in employment at rather limited cost to the government. Independently, several influential members of Congress (Senator Lloyd Bentsen and Representatives Barber Conable and Al Ullman among them) were thinking along similar lines and introduced bills implementing this marginal employment subsidy approach.

President Carter's January 1977 tax reduction recommendations contained a nonmarginal wage bill tax credit. The House Ways and Means Committee substituted a marginal employment subsidy for the presi-

dent's proposal; this, after being somewhat modified by the Senate, was passed and signed into law as part of the Tax Reduction and Simplification Act of 1977.

This law provided businesses with a tax credit against corporate or personal income tax liability for expansions in employment in 1977 or 1978.

> The credit is 50 percent of the increase in each employer's wage base under the Federal Unemployment Tax Act (FUTA) above 102 percent of that wage base in the previous year. The FUTA base for a year consists of wages paid up to $4,200 per employee. . . .
>
> The employer's deduction for wages is reduced by the amount of the credit. Therefore, although the maximum gross credit for each new employee is $2,100, the effective credit ranges from $1,806 (for a taxpayer in the 14-percent tax bracket) to $630 (for a taxpayer in the 70-percent bracket).
>
> The total amount of the credit has four limitations: (1) the credit cannot be more than 50 percent of the increase in total wages paid by the employer for the year above 105% of the previous year, (2) the credit must be no more than 25% of the current year's FUTA wages, (3) the credit for a year cannot exceed $100,000 and (4) the credit cannot exceed the taxpayer's tax liability. Credits which exceed tax liability for a year may be carried back for 3 years and carried forward for 7 years. [Joint Committee on Taxation 1977]

The requirement that the total wages paid rise by at least five percent was designed to ensure that NJTC was based on actual increases in employment rather than artificial increases in unemployment insurance wages (for example, an employer could increase unemployment insurance wages by dividing full-time jobs into part-time or part-year jobs). The requirement that the credit not exceed twenty-five percent of the FUTA wages limited the amounts of credit that new and rapidly expanding businesses could receive. (The tax credit for each newly hired handicapped worker was 60% of the first $4,200 of wages paid, with no limit on the total amount of subsidy. This paper does not analyze the effects of the credit for the handicapped.)

In 1977, its first year of operation, $2.358 billion of NJTC credits were claimed on a total of 614,000 tax returns. In 1978, its second and final year of operation, $4.513 billion of credits were claimed on a total of 1,142,000 tax returns. Since the firm's deductions for wages must be reduced by the amount of the credit, revenue costs (assuming no direct effects on before-tax profits) were approximately $1.4 billion in 1977 and $2.7 billion in 1978. Although roughly one-third of the returns claiming a credit were corporate returns, two-thirds of the dollars claimed were on these returns. Since the credits due to a partnership or subchapter-S corporation may show up on more than one individual return, the total number of

businesses claiming the credit in 1978 is likely to have been closer to 1 million than 1.14 million. This would imply that approximately twenty-eight percent of the nation's 3.5 million employers claimed the credit in 1978. A lower-bound estimate of the number of workers whose employment received subsidy can be obtained by dividing the dollars of credit claimed by $2,100, the maximum credit an employer can receive for one worker. This calculation implies that at least 1.1 million employees were subsidized in 1977, and at least 2.15 million in 1978. By comparison, total private nonagricultural employment grew 2.8 million in 1977 and 3.6 million in 1978.

7.3 The Likely Impact of NJTC

Key features of NJTC are that it is (a) a fixed proportion of earnings up to a rather low maximum; (b) marginal; and (c) temporary. Each of these features has important consequences. The first feature focuses the employment stimulus on low-wage, part-time, part-year workers, a group that currently suffers from very high unemployment rates. The second feature, that the subsidy is based on a threshold employment level defined by last year's employment, makes possible a high rate of subsidy at low cost to the treasury; it also restructures the relationship between the marginal and average costs of existing firms and between the average costs of new and existing firms. The third feature, that the subsidy expired at the end of 1978 and has an eligibility threshold that is updated each year to reflect last year's change in employment, tends to make it an "automatic destabilizer."

7.3.1 Employment

The first crucial feature of NJTC is that it is paid on only the first $4,200 of earnings of each extra worker. Among full-time, full-year workers, therefore, NJTC works to the advantage of low-wage workers because the proportionate subsidy of their wages is greater. NJTC also tends to provide a proportionately larger subsidy of part-time and temporary employment.

Since members of minority groups, women, and teenagers predominate in all three types of employment—low-wage, part-time, and part-year—NJTC should, as a consequence, target the employment stimulus on groups that currently experience very high rates of unemployment.

7.3.2 Price Inflation

The impact of the marginal employment subsidy on the pricing policies of firms is of major importance. If the subsidy is immediately passed on to consumers, the employment stimulus will be larger because the lower price will cause an expansion in demand for real output. This once-and-

for-all reduction in the price of output will also temporarily reduce inflation. How large these effects will be depends on how firms set prices.

Tax incidence theory tells us that the size of the price reduction induced by the subsidy depends upon the nature of the market and the slopes of the demand and supply curves. If industry demand is defined as $P_d = B + bQ$ for $b < 0$, and the supply curve as $P_s = A + \alpha Q - S$ for $\alpha > 0$, then the impact of a subsidy S on price in a competitive industry is $dP/dS = b/(b - \alpha)$. An industry's long-run supply curve depends on the average costs of production of new entrants and the incremental total costs of expansion by existing firms. If there are no factors specific to the industry (i.e., the price of factors supplied to the industry does not depend on that industry's output), then the long-run supply curve should be quite flat ($\alpha \approx 0$). Thus, except for agriculture and mining, dP/dS should be closer to 1 than to zero. In the long run, shocks to demand should have only minor effects on price; and changes in costs of production will be passed on to the consumer almost completely. In the long run, prices will behave as if they were set according to a standard markup on normal average costs.

Normal average cost pricing is also a popular theory of short-run pricing behavior and currently predominates in certain lines of econometric work on inflation (Nordhaus 1974). For competitive industries like retailing and services, the basis for using this theory to predict short-term pricing behavior is that rates of entry and exit are very high and that since most firms operate with substantial excess capacity, marginal costs do not increase as sales rise. For firms in oligopolistic industries, one of the primary theoretical justifications for setting prices administratively according to a normal average cost rule is limit price theory. According to this theory, prices in an oligopolistic industry are set in order to forestall or minimize entry of new competitors into the industry. Prices are therefore set below the average costs of new entrants and adjusted up or down as these costs change. To the extent that changes in the normal average costs of existing firms approximate changes in the costs of entry, normal average costs will be good predictors of short-term pricing behavior.

A permanent marginal employment subsidy with a fixed threshold changes the relationship between the average costs of existing firms and the average costs of new entrants. The fact that new firms receive a subsidy on all their workers rather than just a few will give them a cost advantage, even though the subsidy per worker is half the standard amount. Existing firms that choose to expand by bringing out a new product line or opening an establishment to serve a new market will also have a cost advantage over firms that are already serving that market. Such marginal employment subsidy would cause the limit price that would otherwise forestall entry of a new firm to decline by substantially more than the average costs of existing firms.

New firms compete at a substantial disadvantage, because they lack an established reputation with customers, have inexperienced managers, and need to start from scratch in recruiting and training a labor force. The advantages that marginal employment subsidies would give new firms are not likely to outweigh these disadvantages completely. When the costs of energy, materials, and capital are taken into account, the advantage produced by NJTC was only four percent in manufacturing, three percent in retailing, and 4–8 percent in services. Relative to the current environment, a permanent NJTC with fixed threshold could be expected to provide an important stimulus to the formation of new firms and the expansion of small ones.

A permanent marginal employment subsidy with a fixed threshold and no upper limit on the subsidy per firm might, therefore, reduce prices by more than it reduces the average costs of existing firms. It is somewhat more difficult to predict, however, whether the temporary and constrained NJTC credit of the 1977 Tax Reduction and Simplification Act will have a substantial impact on prices.

The $100,000 maximum on the credit offered any one firm limits the size of the subsidized expansion to forty-eight workers for existing firms and ninety-six for new firms. The expiration date means that a new firm cannot plan on receiving a subsidy for more than the first two years (i.e., for a maximum of 192 workers). As a result, the credit will be of only minor help to entrants into industries with scale economies that require firms to employ many more than that. Almost fifty percent of all private wage and salary workers are in firms that employ more than five-hundred workers. In many cases, however, the large firms compete directly with small firms in certain segments of their business. NJTC should be more effective in such situations. Computer software, auto parts manufacture, and steel wholesaling and fabrication are examples of this type of industry. In these markets the invigorated competition coming from small, fast-growing firms may compress everyone's margins and reduce the share of the market served by large firms.

The fact that permanent increases in employment receive a NJTC subsidy only in the first year also lowers the impact of the subsidy on average costs of production over a ten-year horizon. This feature will limit the credit's effect in lowering the entry-forestalling price. It also means, however, that the potential entrant can be sure he will get the credit even if his attempt at entry fails. If he fails to make profits, the credit (which can be carried forward for 7 years) is still worth something to potential purchasers of business.

7.3.3 The Hypotheses

The list of ways in which we might expect NJTC to change firm behavior is quite long. Work that used to be contracted out, such as

cleaning, maintenance, accounting, etc., might be done internally. If deferred maintenance can be done by new hiring of additional workers, we would expect it to be completed before January 1979. Where manufacturing firms have low wages and high turnover, there might be a build-up of the inventory of finished goods. Large firms that are no longer subsidized on the margin by NJTC might contract work out to firms that are eligible for NJTC; the negotiated price for that work would, as a result, be lower. Groups of workers that were avoided because of their high turnover rates might now become especially desirable.

In the empirical work of this chapter, however, only three hypotheses will be examined:

1. Employment will rise
2. Hours worked per week will fall
3. Prices will fall

Behavior will change only if the firm is aware of the subsidy and can increase its tax credit by increasing employment. Small firms tend to be unaware of the credit (only 30 percent of firms with 1–10 employees had heard of it by February 1978). Firms with over 2,000 employees will generally have hit the $100,000 cap without having to change their behavior. Consequently industries dominated by medium-sized firms should respond more than industries composed wholly of either small or large firms.

7.3.4 Other Studies of the Impact of NJTC

Two other studies have found evidence that is consistent with the hypothesis that NJTC had a substantial impact on employment in 1977 and 1978, and that the tax revenue lost per job created was under $5,000.

The first study (McKevitt 1978) is based on a mail questionnaire survey of a sample of the membership of the National Federation for Independent Businesses (NFIB). The first survey to ask questions about NJTC was conducted in January 1978. Of the employers responding, 43% knew about NJTC and 1.4% reported that the credit had influenced them to hire extra workers (the number averaged 2.0 per firm). The April survey found that 51% knew of NJTC's existence and that 2.4% had increased hiring by an average of 2.3 employees as a result. In the July 1978 survey, 58% were aware of the credit and 4.1% of the firms reported that they had increased hiring as a result. An increase in employment of 2.3 employees by over 4% of all employers is not a small response. If the NFIB survey is representative, and other firms are not hurt by the expansion of subsidized firms, these responses imply that in the second quarter of 1978 there were more than 300,000 extra jobs directly created as a result of NJTC at a tax expenditures of roughly $6,500 for each job created. The NFIB firms seem to be more aware of the credit's existence, but not to be more likely to respond that they are increasing employment

because of the credit. A Bureau of the Census survey of a stratified random sample of firms found that, in February 1978, 2.4% of firms reported being aware of the credit and making a conscious effort to increase employment because of it. This contrasts with NIFB's findings of a 1.4% response the previous month and a 2.4% response two months later. Thus the census survey indicates that, if anything, the NFIB survey is a conservative indicator of employer response to NJTC.

Another study (Perloff and Wachter 1978) is based upon the survey conducted by the Bureau of the Census. Perloff and Wachter compared rates of employment growth between 1976 and 1977 for firms that knew about the credit and those that did not. Holding employment size, class, region, form of organization, type of industry, and the growth rate of sales constant, they found that the employment of firms that had heard of the credit before February 1978 had grown three percent faster. Firms that reported they made a conscious effort to expand employment because of the credit grew nine percent faster than firms that knew about the credit but did not report making any special effort. If one were to assume that NJTC caused the three percent higher growth of the small and medium-sized firms that knew about the credit (about a quarter of total employment is in these firms) and left the rest of the economy unaffected, the total number of extra jobs in 1977 would be roughly 700,000. Tax expenditure per job created would be $2,000 per job. Since NJTC had not passed Congress until almost half the year had passed, effects of this magnitude for 1977 are large indeed. Perloff and Wachter pointed out that some firms may learn about the credit because they are growing fast or because they are generally more aware of opportunities to expand their business. Consequently, they suggest that their results should be viewed "as an upper bound on the short-run impact of this program."

Studies like those just reviewed are measuring the differential impact of NJTC across firms, not the net impact of NJTC on the total economy. If NJTC is to have any impact on total employment, it must first change the employment level of individual firms. These two studies provide some support for the hypothesis that firms did change their behavior because of NJTC. However, since firms compete with each other in both labor and product markets, the increases of employment in subsidized firms may cause decreases of employment in their unsubsidized competitors. Alternatively an NJTC-induced expansion by one firm may cause that firm's suppliers to expand as well. The direction of NJTC's impact on nonsubsidized firms cannot be signed a priori, for it depends upon the relative size of offsetting effects. We suspect, however, that the first effect is larger than the second. If so, simple extrapolations from measured impact on firms to impacts on the economy will exaggerate the true impact. Most of the displacement effects that may bias estimates of net job creations when the firms are the unit of observation are netted out when the industry is

the unit of observation. A study that uses aggregate industry data to test for the impacts of NJTC would seem to have an important contribution to make.

7.4 Specifications of the Model

In a world of perfect information, no inventory, and zero adjustment costs, optimal levels of employment and hours depend solely on current prices and sales. In a world of imperfect information, inventory holding, and adjustment costs, the firm's optimal employment and hours in period t depends upon the realized level of employment in period $t-1$ and upon anticipated levels of sales and input prices in both current and future periods.

$$E_t = f(S^e, \frac{W^e}{p^e}, \frac{Q^e}{p^e}, E_{t-1}) \tag{1}$$

where S, W, P, and Q denote sales, wages, output prices, and input prices respectively, and the e superscript denotes a vector of anticipations of future values, based on all information available up to time t.

When the observable lagged values of S, W, P, and Q are used in an estimating equation, lag distributions will vary, not only because adjustments to different stimuli take different amounts of time but also because the expectation formation process for each variable will have different lag structures.

Since the information set used to predict future values of a particular variable may include other variables in the model, coefficients on lagged values of sales or wages may not follow a regular pattern. The primary objective of this study is to obtain unbiased measures of NJTC's impact on employment and prices. Imposing regularity conditions on the lag structure might bias our estimates of the NJTC's effect. Consequently, estimating techniques are employed that produce free estimates of the lag structure.

Since $E_{t-1}, E_{t-2}, \ldots$, etc., are themselves a function of lagged values of S, W, P, and Q, we may substitute the lagged dependent variable out of the equation. Since expectations about P may be formed very differently from expectations about W and Q, the most general way to write our equation in terms of observable, contemporaneous, and lagged values is

$$E_t = f(S, \boldsymbol{W}, \boldsymbol{P}, \boldsymbol{Q})e^{u}t \tag{2}$$

where S, $\boldsymbol{W}$, $\boldsymbol{P}$, $\boldsymbol{Q}$ denote vectors containing current and lagged values of the variable.

Econometric studies of labor demand often estimate their models under some rather strong maintained hypotheses, many of which have recently received severe criticism. Clark and Freeman (1977) find that for

manufacturing, the data reject the constraint that the rental cost of capital and real wage rates has equal but opposite effects on employment demand. Constraints requiring identical lag structures across variables have also been found to be inconsistent with the data (Sims 1972 1974; Clark and Freeman 1977).

Estimates of systems of demand equations that have included materials and energy inputs typically reject the weak separability of materials and energy from capital and labor (Berndt and Wood 1975; Gollop 1974). This rejection implies that the correct specification of a labor demand function contains the prices of materials and energy. Since the prices of materials may be correlated with the cost of capital or wage rates, estimates of labor demand functions derived from a value-added production specification are likely to be biased.

A number of other potentially troublesome maintained hypotheses, relating to the exogeneity of industry sales and wage rates in regressions predicting employment, will be tested. Sims (1972) has shown that, under fairly general conditions, a test of the hypothesis that coefficients on future values of the wage rate or on sales are all zero can be regarded as a test of the hypothesis that the equation is in fact structural. Rejection of this hypothesis will be taken as evidence for simultaneity, and the equation will be reestimated using two-stage least squares (2SLS). Potential exogeneity problems with the price of output are eliminated by treating P as a function of nominal input prices and solving P out of the model.

Our models were estimated under two alternative sets of maintained hypotheses. The relative wage model assumes that the information set used in generating expectations about future input price ratios is limited to current and lagged information about input price ratios. This specification implies that a simultaneous five percent increase in all input prices will leave current and all future employment levels unchanged. Although the tests for exogeneity that were applied to this model were rejected for some industries, there was no attempt to apply 2SLS using this model, because to do so would have involved simultaneously instrumenting all input prices.

The second, somewhat more general, specification is the nominal input price model. Using nominal input prices rather than price ratios as regressors means that we are dropping the assumption that the information set is limited to input price ratios. Firms are certainly aware of the history of nominal prices. Rational behavior implies that expectation formation takes into account the noise-to-signal ratio of a series, and this, in turn, implies that the time pattern of response to each nominal input price should be estimated separately. In this model we choose not to impose the constraint that the coefficients on input prices sum to zero, because errors in measurement of the rental price of capital and of price indexes for consumable materials and business services are likely to be

larger than errors in measurement of wholesale prices and wage rates (especially in the disaggregated retail industry models). Imposing this constraint would increase the likelihood of transmission of a bias arising from an error in variables to the wage coefficients. (Clark and Freeman 1977 demonstrate this for simple cases.) If we are wrong, and the constraint should have been imposed, we lose efficiency only.

All the variables in these models except for seasonal dummies, time trends, and NJTC are expressed as logarithms. The estimating form of the relative wage model is:

$$E = \beta_0 + \beta_1 T + \boldsymbol{M}\beta_2 + \boldsymbol{TM}\beta_3 + \beta_4 \text{ NJTC} + \boldsymbol{S}_1\beta_5 + \boldsymbol{S}_2\beta_6 + (\boldsymbol{Q} - \boldsymbol{W})\beta_7 + (\boldsymbol{R} - \boldsymbol{W})\beta_8 + \beta_9(\bar{P}_k - \bar{W}) + e$$

The estimating form of nominal price model is:

$$E = \alpha_0 + \alpha_1 T + \boldsymbol{M}\alpha_2 + \boldsymbol{TM}\alpha_3 + \alpha_4 \text{ NJTC} + \boldsymbol{S}_1\alpha_5 + \boldsymbol{S}_2\alpha_6 + \boldsymbol{W}\alpha_7 + \boldsymbol{Q}\alpha_8 + \boldsymbol{R}\alpha_9 + e$$

T = a time trend

$\boldsymbol{M}$ = a vector of monthly seasonal dummies

$\boldsymbol{TM}$ = time trends on the seasonal dummies

NJTC = measure of knowledge of NJTC

$\boldsymbol{S}_1$ = a row vector of current and lagged measures of output for the entire industry

$\boldsymbol{S}_2$ = a row vector of current and lagged measures of the subindustry's output

$\boldsymbol{W}$ = a row vector of current and lagged hourly rates of compensation in the industries

$\boldsymbol{Q}$ = a row vector of current and lagged prices of the industry's intermediate inputs

$\boldsymbol{R}$ = a row vector of current and lagged rental costs of capital specific to the industry

$P_k - W$ = a three-year average of the ratio of capital goods prices to wage rates

The basic model assumes that anticipations of present and future values of sales and prices are based on the previous three-year record of these variables. The sales, wage rate, and intermediate input price variables are represented by their current value, with averages for the previous four quarters and half-yearly averages going a further two years back in time.[1]

Cost of capital is represented by four variables: an average for the previous twelve months and this same variable lagged one, two, and three years.[2]

7.5 Data

For the construction industry, the output variable is construction put in place, deflated by an interpolated National Income Accounts (NIA) deflator for structures. For the retail industry, aggregate output is defined as retail sales, deflated by the consumer price index (CPI) for commodities. Industry-specific output measures for the disaggregated segments of the retail industry are retail sales for that segment of the industry deflated by the appropriate components of the CPI. For trucking, the output variable is a seasonally adjusted index of the volume of general freight hauled by class 1 and 2 common carriers of property. For wholesaling, we use the sales of merchant wholesalers deflated by the CPI for commodities. For trucking and wholesaling, only partial coverage of the industries is provided by these indexes, and the data on employment and hours and those on retail or wholesale sales are obtained from separate samples of firms. When industry subaggregates are being used, sampling error in the industry-specific sales variable can become a serious problem. Consequently, models predicting employment in trucking, wholesaling and disaggregate retail industries contain the additional scale variable of current and lagged total retail sales.

Indexes of the rental cost of capital services in the construction, trucking, and retail industries were calculated. The appendix details our data sources and assumptions. The main features of the resulting calculations are summarized in table 7.1. In the first three rows are tabulated present values (at a 10% discount rate) of the depreciation deductions allowed on equipment used by retail firms. Note that these present values have increased (from 41.7¢ to 72¢ per dollar invested) as tax lives have shortened. The liberalization of depreciation rules and the investment tax credit have lowered the rental on capital goods (rows 4–7). For retail corporations the rental cost of equipment fell from .278 in 1950 to .224 in 1978. Corporate rental costs for trucks fell from .44 in 1950 to .373 in 1978. Rentals in 1978 are almost equal to those that would prevail if there was no taxation of business income or complete expensing of all investment costs in the first year (compare the first and last columns of rows 4–7).[3]

The retail industry's compensation per hour of work has risen in current dollars to 4.7 times its level in 1950 (see bottom row). The price of other inputs has not been rising quite as rapidly so their relative cost has been declining. An index of the relative rise in labor costs (the log of the wage deflated by a price index of the competing input) is tabulated in

Table 7.1 **History of the Tax Treatment of Capital and of Relative Input Prices**

		Year: Month						
		1950:01	1955:01	1960:01	1965:01	1972:01	1975:01	1978:03
A. Present value of deprec. deduct. for:								
1. Structures		.287	.445	.508	.508	.508	.508	.508
2. Retail equipment		.417	.580	.644	.698	.720	.720	.720
3. Trucks		.799	.849	.849	.908	.951	.951	.951
B. Implicit rental cost of:	No tax							
4. Structures—corporate	.094	.161	.170	.164	.159	.158	.158	.158
5. Equipment—corporate	.207	.278	.288	.288	.245	.235	.235	.224
6. Equipment—proprietorship	.207	.237	.237	.245	.222	.224	.221	.213
7. Trucks—corporate	.37	.439	.447	.447	.398	.382	.382	.373
C. Log ratio of retail wage to:								
8. Wholesale price of cons. fin. goods		0	.157	.329	.505	.731	.612	.703
9. Price of business serv. and materials		0	.128	.261	.415	.591	.501	.533
10. Price of capital goods		0	.042	.058	.136	.211	.176	.206
11. Rental cost of capital		0	.155	.217	.497	.717	.657	.747
D. Nominal compensation in retail		1.00	1.294	1.619	1.953	2.967	3.672	4.701

Note: The assumptions and data sources used to calculate the present value of the depreciation deduction on one dollar of investment (Z) and the implicit rental cost of capital (R_i) are described in the appendix. Rows 8–11 present the log of the ratio of nominal hourly compensation in the retail sector to the price of the other factor inputs in this sector.

$$\log \frac{W_t}{W_{1950.1}} \div \frac{P_t}{P_{1950.1}}$$

In the bottom row, $W_t/W_{1950.1}$ = index of the nominal rate of hourly compensation in retailing.

rows 8–11. Relative to the wholesale price of consumer finished goods, wages had risen in 1972 to 2.1 (antilog .731) times their 1950 level. The price explosion following the Yom Kippur War, however, lowered real wages by nearly twelve percent in three years to 1.84 times their 1950 level. Since then, real wage rates have recovered somewhat to 2.02 times their 1950 level. Relative to the price of business services and consumable materials or to the price of capital equipment, wages have risen much less dramatically. Between 1950 and 1978 wage rates rose only twenty-three percent faster than an index of plant and equipment prices. The increasingly favorable tax treatment of capital investment has meant, however, that the price of efficiency units of capital services has lagged behind the prices of the equipment and buildings that provide those services. As a result, wage rates (the price of labor services) have doubled relative to the price of capital services.

Most studies of the effect of tax incentives on firm behavior assume that factor demand responds to the after-tax cost of the variable. Studies of investment incentives imbed a multiplicity of tax provisions in a single variable for the rental cost of capital. To construct this cost of capital variable, assumptions must be made about (1) the appropriate market interest rate; (2) how expectations of output and capital goods prices are formed; (3) the level and timing of knowledge of tax incentive provisions; and (4) the nature of the firm's expectations about changes in tax provisions. Inferences about the effect of specific tax provisions are based on the role the tax provision has in determining rental cost and the magnitude and significance of the rental cost variable. The inevitable errors in constructing the rental cost variable bias both the coefficient on rental cost and the policy simulations that are derived from that coefficient. Studies applying this methodology to labor demand attempt to measure the wage elasticity of employment. Hamermesh (1976) has recently reviewed these studies and predicts that a marginal wage subsidy of NJTC's generosity would have a substantial impact upon employment. The assumptions necessary to draw such an inference are considerable, however: (1) Employers must know of NJTC's existence and provisions and believe the credit will not be extended beyond 1978. (2) Employers cannot be subject to income effects, for the income effects of wage rate changes and a marginal wage subsidy are very different. (3) Elasticities based on historical responses to anticipated and permanent changes in before-tax wage rates must correctly predict the response to an unanticipated temporary change in a tax provision. Policy simulations of this kind are useful (Bishop and Lerman 1977); Hamermesh 1977), but they cannot be conclusive.

Where it is feasible, direct measurement of the effects of a tax provision is to be preferred. This is what we propose to do in this paper. Since our primary purpose here is to provide a powerful test of the effects of

NJTC, the specification of this variable is important. The effect of the tax credit is likely to be very different from the effect of an equivalent change in the wage rate. NJTC is capped, temporary, and marginal; it requires that the firm have tax liability if it is to receive benefits. In February 1978, more than half of all firms were unaware that the credit existed, and many of those that had heard of it wrongly thought themselves to be ineligible.

In February 1978, a census bureau survey asked a large sample of firms whether they had heard of the tax credit and, if so, when they had heard of it. Large firms were much more likely to have heard of the credit and to have heard of it immediately after its passage in May 1977. Using a distribution of retail employment categorized by size of firm, we estimated the proportion of retail employees that were in firms that knew about the credit for each month of 1977 and 1978. (Firms employing more than a thousand workers were excluded from this calculation.)

It was assumed that once a firm knows about the credit its response will be distributed over the following six months. The NJTC variable is, therefore, an average over the past six months of the proportion of firms (weighted by employees) that knew about the credit. The firms that reported hearing of the credit before it was passed were assumed to have waited until passage before responding. Defining the NJTC variable in this way means that, although the House passed a bill with the credit in early March, we are assuming that anticipation of that credit was not responsible for any part of the spring 1977 upswing in employment.

The NJTC variable had a value of .057 in June 1977, and rose at an average rate of .0424 per month. By March 1978 it had achieved the value of .435. In June 1978 its value was .572. Multiplying the coefficient on NJTC by .435 provides our estimate of the credit impact on the March 1978 value of a dependent variable. Note that this specification implies an assumption that almost the entire impact of the credit on the average level of employment will occur in 1978 rather than 1977, although in fact it might have had important impacts on the level of employment in November and December 1977.

7.6 Results

7.6.1 Employment Models

Relative input price model regressions using three-year-distributed lags on sales, wages, the rental rate on capital, and materials input prices are presented in table 7.2. Corresponding nominal input price model regressions are presented in table 7.4. The two-state least-squares results for construction and retail aggregates are presented in table 7.5. All the results reported are for models estimated with data transformed to correct for serial correlation of residuals. The estimate of ρ used to correct

Table 7.2 **Equations Predicting Employment: Sums of Coefficients of Relative Wage Model**

		Sum of Wage Coefficients					Capital		Sales						
	NJTC	1Q	1 Yr	2 Yr	Total	Other Inputs	Rental Rate	Price	1Q	1 Yr	Ind. Sales 3 Yr	Total Ret. Sales 3 Yr	σ_e	ρ	DW
Retail and wholesale household data	.094 (.055)	.176	.102	−.631	−.420	—	+.595	−.581	.230	.667	1.153	—	.0117	.62	2.02
	.068 (.041)	−.199	−.430	−.482	−.295	+.574	+.307	−.507	.288	.626	.897	—	.0117	.50	1.76
Retail established data	.048* (.026)	+.150	+.127	−.187	−.232	—	+.165	−.367	.273	.563	1.013	—	.0041	.78	2.08
	.045* (.028)	+.074	.097	−.229	−.488	+.313	+.157	−.371	.264	.558	.995	—	.0040	.78	2.15
Eating and drinking (64–78:03)	−.025 (.06)	−.087	−1.310	−2.63	−3.10	+3.88	+.873	−1.948	.158	.693	−1.316	2.532	.005	.15	1.809
Apparel (52–78:03)	.0125** (.064)	−0.202	.62	.182	−.162	−.0196	+.330	−.660	.329	.514	.6034	.682	.013	.27	2.03
Other retail (61–78:03)	.0727** (.0266)	.014	−.223	−.148	−.038	−1.124	+.296	0	.253	.481	.091	.815	.003	.42	1.602
Food (61–78:03)	.112** (.037)	−.134	.064	.076	−.707	−.6903	−0.177	0	.213	.659	−.035	.998	.005	.45	1.602

Table 7.2 (continued)

	NJTC	Sum of Wage Coefficients 1Q	1 Yr	2 Yr	Total	Other Inputs	Capital Rental Rate	Price	Sales 1Q	1 Yr	Ind. Sales 3 Yr	Total Ret. Sales 3 Yr	σ_e	ρ	DW
General merchandise (52–78:03)	−.054 (.0417)	−.221	−.288	−.355	−.28	−.796	+.339	0	0.403	.658	0.909	0.141	.0089	.41	1.92
Furniture (61–78:03)	.122** (.026)	.167	.084	−.412	−.488	−.315	+0.702	.568	.1624	.37	.597	−.23	.003	.28	1.89
Wholesale (52–78:03)	.007 (.021)	−.088	−.149	−.417	−.296	+.346	−.228	−.445	.126	.303	−.019	.275	.0031	.715	1.51
Construction est. (52–78:03)	.230** (.082)	−.283	−.128	−.321	+.285	+.224	−.674	—	.254	.355	.176	0	.0154	.789	1.71

Note: All input prices are entered as ratios to the wage. This imposes the constraint that an equal percentage change in all input prices leaves employment levels in all future periods unchanged. The lag structures on all variables go back 3 years.
Columns 2–5 are the negative sum of the coefficients on the wage rate variables starting with the contemporaneous coefficients and including all lags back to the indicated one.
Columns 6–8 are the sum over the full three-year period of the lag structure of the coefficients on other input prices—wholesale prices of goods sold, rental cost of capital, and the price index for plant and equipment.
Columns 9–10 sum the coefficients on both sales variables—subindustry retail sales and total retail sales—starting with the contemporaneous coefficients and including all lags back to the indicated one.
Columns 11 and 12 are the sum of the full three-year period of the coefficients on subindustry sales and total sales, respectively.
The standard error appears in parentheses under the NJTC coefficient.
Significant levels * $.05 \geq p \geq 0.1$ ** $.01 \geq p$.

Table 7.3 **The Impact of NJTC on Employment under Alternative Specifications of the Relative Wage Model**

Industry	Time Period	Employment 1977 (000)	Coefficient on NJTC 3-Yr Lag	2-Yr Lag	1.5-Yr Lag
Eating and drinking	61–78:03	3,854	−.025	−.054	−.006
t-value			−.41	−1.08	−.19
(σ_e)			(.0050)	(.0059)	(.0066)
Apparel	52–78:03	821	.0125	.028	.067
t-value			.20	.63	1.67
(σ_e)			(.013)	(.013)	(.014)
Other retail	61–78:03	4,021	.073	−.028	−.026
t-value			2.74	−1.24	−1.57
(σ_e)			(.0029)	(.0035)	(.0041)
Food	61–78:03	2,116	.112**	.113**	.184**
t-value			3.04	3.44	5.25
(σ_e)			(.0048)	(.0057)	(.0072)
General merchandise	52–78:03	2,541	−.054	−.035	.051
t-value			−1.28	−.953	1.35
(σ_e)			(.0089)	(.0094)	(.0107)
Furniture	61–78:03	551	.122**	−.024	−.018
t-value			4.73	−1.47	−1.14
(σ_e)			(.0031)	(.0045)	(.005)
Wholesaling	52–78:03	4,389	−.012	−.014	.045**
t-value			−.54	−.68	2.20
(α_e)			(.0032)	(.0033)	(.0037)
Trucking	61–78:03	1,131	+.128	−.037	−.010
t-value			1.67	.96	−.27
(σ_e)			(.0073)	(.0081)	(.0084)
Constr. (estab. data)	52–78:03	3,844	.230**		
t-value			2.81		
(σ_e)			(.0154)		
Increase in employment by March 1978 (000)		474			

Note: Derivation of these series is described in the appendix. Underneath the coefficient is first the *t*-statistic for testing the null hypothesis of no effect and then the standard error of the regression (in parenthesis).

Table 7.4 **Employment in Construction and Distribution Industries: Nominal Input Price Models with 3-Year Lags**

		Sum of Coefficients on Hourly Compensation				Mate-	Rental Cost of	Sales		Ind.	Total Ret.			
	NJTC	1Q	1 YR	2 YR	Total	rials Price	Plant & Equipment	1Q	1 Yr	Sales 3 Yr	Sales 3 Yr	σ_e	ρ	DW
Construction estab. data	.065 (.104)	−.230	.701	.237	−.638	1.162	−.235	.531	.745	.947	0	.0143	.818	1.98
Retail & wholesale household data	.041 (.071)	−.795	−.583	.700	.092	.623	−.143	.274	.741	1.017	0	.0122	.657	2.00
Retail estab. data	.067** (.034)	.187	.475	.402	−.171	.343	−.159	.286	.515	.777	0	.0043	.846	2.24
Eating & drinking	.250** (.066)	.122	−.447	−.580	.054	.526	−.218	.387	.605	−.515	1.275	.0060	.584	1.54
Food	−.044 (.031)	−.005	−.339	−.126	−.106	.497	−.116	.091	.414	.506	.206	.0046	.616	1.89
Apparel	−.119 (.052)	−.095	−.590	−.780	−.653	.728	.019	.318	.406	.007	.900	.0140	.387	2.04
Furniture & appliance	−.001 (.033)	.183	−.070	−.400	−.665	.014	.538	.212	.605	.267	.915	.0041	.663	1.73

Table 7.4 (continued)

	NJTC	Sum of Coefficients on Hourly Compensation				Materials Price	Rental Cost of Plant & Equipment	Sales		Ind. Sales 3 Yr	Total Ret. Sales 3 Yr	σ_e	ρ	DW
		1Q	1 YR	2 YR	Total			1Q	1 Yr					
General merchandise	.073 (.062)	−.163	−.337	−.296	−.151	−.344	.390	.379	.615	1.020	−.126	.0092	.575	2.09
Other retail	.053* (.027)	−.037	.078	.476	−.355	.142	.185	.173	.474	−.487	1.668	.0036	.510	1.49
Wholesaling	.007 (.028)	.165	.143	.174	.089	.135	−.200	.147	.324	.203	.273	.0032	.774	1.49
Trucking	−.013 (.061)	−.317	−.200	.097	.085	−.533	.223	.377	.523	.984	−.514	.0072	.408	1.83

Note: Columns 2–5 are the sum of coefficients on the wage rate starting with the contemporaneous coefficients and including all lags back to the indicated one, i.e., $1Q = \alpha_t + a_{-1}$

Columns 6–7 are the sum over the full three-year period of the coefficients in other input prices. Derivation of rental cost of capital is described in appendix.

Columns 8 and 9 sum the coefficients on both sales variables back to the indicated lag.

Columns 10 and 11 are the sum for the full three-year period of the coefficients on subindustry sales and total sales, respectively.

Significant levels * $.05 \geq p \geq .01$ ** $.01 \geq p$

Table 7.5 **Comparison of Ordinary Least-Squares (OLS) and Two-Stage Least-Squares (2SLS) Models of Employment, Nominal Input Price Model**

	NJTC	Wage 1Q	Wage 1 YR	Wage 2 YR	Wage Total	Material Price	Capital Rent	Sales 1Q	Sales 1 YR	Ind. Sales 3 YR	σ_e	ρ	DW
Construction													
OLS													
Employment Household data	.095 (.152)	−.744	−.114	.59	−.477	.672	−.075	.521	.767	.799	.0251	.722	1.89
Estab. data	.065 (.104)	−.230	.701	.237	−.638	1.162	−.235	.531	.745	.947	.0143	.818	1.98
Man hours	−.046 (.138)	.100	.99	.009	−.701	1.273	−.283	.598	.891	1.068	.0280	.580	2.17
2SLS													
Employment Household data	.199+ (.133)	−.371	1.089	.369	−.351	.518	−.039	.485	.677	.659	.0265	.668	1.70
Estab. data	.174* (.098)	−.944	1.133	.259	−.614	1.064	−.196	.556	.771	.959	.0148	.820	1.89
Man hours	.048 (.131)	−.330	1.283	.241	−.800	1.235	−.206	.591	.977	1.140	.0287	.601	2.14

Table 7.5 (continued)

	NJTC	Wage 1Q	Wage 1 YR	Wage 2 YR	Wage Total	Material Price	Capital Rent	Sales 1Q	Sales 1 YR	Ind. Sales 3 YR	σ_e	ρ	DW
Retail													
OLS													
Employment	.041	−.795	−.583	.118	−.490	.622	.016	.274	.743	1.019	.0122	.657	2.00
Household data	(.071)												
Estab. data	.067**	.187	.476	.407	.288	.342	−.159	.287	.516	.778	.0043	.845	2.24
	(.034)												
2SLS													
Household data	.056	−1.200	−.706	.115	−.491	.691	−1.96	.298	.751	1.050	.0123	.657	2.01
	(.067)												
Estab. data	.069**	.094	.415	.390	−.164	.364	−.170	.29	.518	.792	.0043	.846	2.26
	(.032)												

Note: Derivation of these series is described in the appendix.
Double 2SLS involves applying two-stage least squares to the data twice. In the first application we assume that w at all lags is endogenous. This produces a consistent estimator of $\hat{\rho}$ which is used to transform the data. 2SLS is then applied to the data a second time, assuming only the current w endogenous.
Significance levels ** $.01 \geq p$ * $.05 \geq p > .01$

Table 7.6 **Impact of New Jobs Tax Credit on Employment in the Nominal Input Price Model**

Industry	Time Period	Employment 1977 (000)	Coefficient on New Jobs Tax Credit		
			3-Yr Lag	2-Yr Lag	1.5-Yr Lag
Construction (household) data	51:02–78:03	3,844	.095	.124	.194†
t-value			.62	.89	1.43
(σ_e)			(.0251)	(.0261)	(.0263)
Construction (estab. data)	51:02–78:03	3,844	.065	.149†	.190**
t-value			.63	1.57	2.06
(σ_e)			(.0143)	(.0147)	(.0148)
Retail and wholesale (household data)	51:02–78:03	18,292	.041	.002	.012
t-value			.57	.03	.21
(σ_e)			(.0121)	(.0122)	(.0122)
Retail (estab. data)	51:02–78:03	13,903	.067**	.016	.044†
t-value			1.96	.55	1.56
(σ_e)			(.0043)	(.0044)	(.0046)
Eating & drinking	58:02–78:03	3,854	.250**	.161**	.127**
t-value			3.79	3.43	3.90
(σ_e)			(.0059)	(.0064)	(.0065)
Food	58:02–78:03	2,116	−.044	.036	.089†
t-value			1.40	1.24	1.51
(σ_e)			(.0046)	(.0051)	(.0053)
Apparel	52:02–78:03	821	−.119	−.125	−.122
t-value			2.27	2.59	2.56
(σ_e)			(.0140)	(.0140)	(.0140)

Furniture & appliance	58:02–78:03	551	−.001	−.035	−.049
t-value			.02	1.67	2.41
(σ_e)			(.0041)	(.0042)	(.0043)
General merchandise	52:02–78:03	2,541	.073	−.004	.050
t-value			1.18	.08	1.05
(σ_e)			(.0092)	(.0099)	(.0170)
Other retail	61:02–78:03	4,021	.053*	−.007	−.016
t-value			1.94	.52	1.22
(σ_e)			(.0026)	(.0029)	(.0031)
Wholesaling	51:02–78:03	4,389	.007	−.007	.019
t-value			.27	.36	1.00
(σ_e)			(.0032)	(.0033)	(.0035)
Trucking	58:02–78:03	1,131	−.013	−.006	.029
t-value			.21	.18	.93
(σ_e)			(.0072)	(.0076)	(.0078)
Life insurance	61:02–78:03	519	.019	−.014	−.001
t-value			.55	.66	.03
(σ_e)			(.0030)	(.0039)	(.0041)
Increase in Employment by March 1978 in Construction and Distribution (000)					
Using detailed indust. model			566	471	581
Using estab. data aggregates			441	334	580
Using household data			398	225	379

Note: Derivation of these series is described in the appendix.
All models were estimated with the same ρ correction. Underneath the coefficient on NJTC is first the *t*-statistic for testing the null hypothesis of no effect and then the standard error of the regression (in parentheses).
Significance levels ** $.01 \geq p$ * $.05 \geq p > .01$ † $.10 \geq p > .05$

the data is presented in the second to last column of the tables. The Durbin Watson statistic is for the regression using the transformed data and is therefore a test for second-order serial correlation of the residuals.

The elasticity of employment with respect to sales is indicated in columns 9–12 of table 7.2, columns 8–11 of table 7.4, and columns 8–10 of table 7.5. The elasticity of employment with respect to changes in wage rates or input prices is presented in columns 2–8 of table 7.2 and columns 2–7 of tables 7.4 and 7.5. The response of employment to a change in an input price depends on how long a time there has been to react. The elasticity of response after a change has been maintained for three months is given by the column headed 1Q. The responses after 1, 2, and 3 years are given respectively in columns 3, 4, and 5 of table 7.2. Note that with a freely estimated lag structure, the high degree of colinearity between wage rates in adjacent quarters produced rather jagged lag structures. The sum of coefficients for all lagged values of a variable is a more stable parameter than sums for only part of the estimated lag structure.

Our focus is on the NJTC variable, however. Most of the coefficients are positive. In the relative input price model, we may reject at the .05 level or better the hypothesis that NJTC has had zero or negative effects on employment for the construction industry and the industry subaggregates for apparel, food, furniture, and other retailing. In the nominal input price model, statistically significant, positive coefficients on the NJTC variables are obtained for eating and drinking places and for other retailing. Tables 7.3 and 7.6 summarize the sensitivity of the NJTC coefficient to reductions in the length of the lags on all variables. At the bottom of these tables we sum the effects implied by each industry equation across industries, to obtain for March 1978 a total effect for the industries studied. For the relative wage model, the estimates of employment stimulus are 470,000 for the preferred three-year lag. In the nominal input price model of table 7.6, estimates of employment stimulus range between 225,000 and 585,000. During this period employment rose 1,140,000 in these industries and roughly 3,800,000 in the nation as a whole. These results are consistent with the observation that between 1977:II and 1978:II rates of employment growth in both construction and retailing substantially exceeded the rates of output growth. For example, while the growth rate of construction put in place was 4.5 percent over this period, the growth rate of employment was 8.2–9.9 percent and that of man-hours was 10.4 percent. Even in retailing, where cyclical increases in sales are typically handled without hiring extra workers, employment growth—3.4 percent in household data and 4.0 percent in establishment data—outpaced the 3.0 percent growth of deflated retail sales.

Table 7.7 **Impact of NJTC on Hours Worked per Week in Construction and Distribution (Nominal Compensation Model)**

	1.5-Yr Lag	2-Yr Lag	3-Yr Lag
Construction	.034	.041	.022
t-value	.77	.90	.40
(σ_e)	(.0166)	(.0167)	(.0167)
Retail[a]	−.028*	−.021**	−.049**
t-value	3.66	2.83	2.58
(σ_e)	(.0033)	(.0031)	(.0026)
Eating & drinking[a]	−.002	−.039	−.101
t-value	.07	.94	1.49
(σ_e)	(.0059)	(.0059)	(.0055)
Food	−.027*	−.032*	−.023
t-value	1.77	1.81	1.02
(σ_e)	(.0048)	(.0048)	(.0047)
Apparel	−.005	−.006	.008
t-value	.22	.31	.32
(σ_e)	(.0067)	(.0067)	(.0066)
Furniture	−.061*	−.064*	−.088
t-value	3.95	4.26	3.76
(σ_e)	(.0056)	(.0053)	(.0034)
General merchandise	−.079*	−.030	.023
t-value	3.72	1.31	.74
(σ_e)	(.0060)	(.0057)	(.0055)
Other retail	.006	.024	−.021
t-value	.58	2.42	.89
(σ_e)	(.0036)	(.0031)	(.0028)
Wholesaling	.017	.023	.013
t-value	1.86	2.33	1.10
(σ_e)	(.0032)	(.0031)	(.0026)
Trucking	.004	.029	−.105*
t-value	.17	1.34	2.31
(σ_e)	(.0080)	(.0076)	(.0072)
Life insurance	−.013	.027	−.080
t-value	.66	1.13	1.73
(σ_e)	(.0060)	(.0052)	(.0040)

Note: Derivation of these series is described in the appendix.
Underneath the NJTC coefficient is first the *t*-statistic for testing the null hypothesis of no effect and then the standard error of the regression (in parentheses).
'64–78:03
Significance levels ** $.01 \geq p$ * $.05 \geq p > .01$

Hours

Table 7.7 presents coefficients on NJTC in regressions predicting the log of hours worked per week. Coefficients are consistently negative in retailing. Statistically significant negative coefficients are obtained for the retail aggregate and for food, furniture, and general merchandising. The coefficient in the construction hours equation may be biased by simultaneity. The man-hours 2SLS regression reported in table 7.5 has a considerably smaller coefficient than the corresponding employment equation. When one takes into account the reduction in average hours worked per week that the New Jobs Tax Credit seems to be producing in the retail sector, the percentage increase in man-hours worked is likely to be only half the percentage increase in employment.

7.6.2 Retail Price Models

In competitive industries like those studied, reduced marginal costs imply reduced prices. To test this relationship, the monthly rate of change of the retail price was regressed on current and lagged changes in a number of industry cost variables—wage rates; wholesale price of the product; the price of materials, services, and energy consumed by the distribution sector; the rental price of capital; and excise taxes—as well as on the unemployment rate, seasonal dummies, and trends on the seasonal dummies. The sums of the coefficients on the input price terms reported in columns 5–8 of table 7.8 have a pattern that is reasonable. The restaurant and tavern industry has the largest wage coefficients, and the elasticity of retail price with respect to the wage rate is approximately equal to the share of distribution sector labor compensation in the total costs of the industry. In retail sectors where payroll is a smaller (10%–20%) share of total costs, the sum of the wage coefficients is smaller. The elasticity of the retail price with respect to wholesale prices of the goods being sold is high in sectors with low retail markups (food) and lower in sectors with high markups (furniture). The impact of the rental cost of the plant and equipment used by the distribution sector is uniformly low. The coefficients on the price of energy, materials, and business services do not seem to follow any pattern.

The coefficient on CONTROLS measures the response of the yearly rate of change of prices to the eighteen-month period of controls running from August 1971 to January 1973. When price controls are phased out, retail margins should return to their former level, so the CONTROLS variable becomes midly negative during Nixon's phase 3 (1973) and more strongly negative during phase 4 (1974). Although most of the coefficients are not statistically significant, it is certainly remarkable that they are all negative. The statistically significant coefficient in the food away from home regression suggests that the controls may have succeeded in

compressing the margins of companies like MacDonald's and Denny's. A rising unemployment rate also seems to compress retail sector margins. The unemployment variable is the average monthly proportionate rate of increase or decrease in the unemployment rate of prime-age males over the previous 6–9 months. The coefficients imply that a doubling of the unemployment rate compresses the retail margins of furniture by .8 percentage points and of food away from home by 1.1 percentage points.

Estimates of the impact of NJTC on retail margins in our preferred model are given in column 1 of table 7.8. Table 7.9 reports the NJTC coefficients, the standard errors of the coefficient, and the regression standard error for alternative specifications of the model. The NJTC variable in the price change equations is the first difference of the NJTC variable used in the unemployment and hours equations. Column 2 presents the coefficients for a model which excludes the price of consumable inputs and business services. Column 3 presents the results when there are no trends on the seasonal dummies. Column 4 presents the results for a model which restricts lags to six months. Beginning in January 1978 there was a rapid escalation of food prices. Column 5 presents estimates which exclude this period and which therefore measure NJTC's impact during the first eight months. For nonfood commodities and restaurant meals, the retail trade margin is negatively and significantly related to the timing of NJTC knowledge. Between May 1977 and June 1978 nonfood commodity retail prices rose 4.73 percent while wholesale prices of nonfood, consumer finished goods were rising by 6.56 percent. This discrepancy of 1.83 percentage points is quite close to the NJTC effect of 2.2 percent ($.038 \times .572 \times 100$) estimated by the preferred model (column 1). The observed decline in the margin is particularly surprising given recent increases in the relative price of imported consumer goods. (Imported products, it should be noted, are included in retail but not wholesale price indexes.)

The payroll of the distribution sector is less than twenty percent of the retail price of the commodities sold to consumers. Only in the restaurant and tavern industry does payroll approach thirty percent. Consequently, there is only a limited amount of room for reductions in prices in response to a subsidy of payroll costs.

Among the subsectors, the pattern of coefficients is consistent with a priori expectations. For example, the large negative NJTC coefficients in the restaurant industry equation suggest that in this low skill, intensive sector the 8%–12% policy-induced reduction in marginal costs resulted in a 1.1 percent decline in output price during the twelve-month period. Estimates for moderately wage intensive retail industries (apparel, furniture) indicate that the 5%–7% reduction in marginal costs induced here is associated with a smaller .5 percent reduction in prices over the period. In contrast, the small-margin, non-wage-intensive retail food industry has a

Table 7.8 **Equations Predicting the Rate of Change of Retail Prices of Commodities**

	NJTC	Sales Tax	CONTROLS	Δ Log Unemp.	Sum of Coefficients on: Wage	Wholesale Price	Service & Mat. Price	Rental on Capital	σ_e	ρ	DW	R^2
Food away from home	−.036** (.013)	1.0	−.015* (.007)	−.016** (.003)	.332	.243	.122	.137	.0017	0	1.87	.723
Nonfood commodities	−.038** (.015)	.93* (.515)	−.001 (.009)	−.003 (.005)	.186	.539	.040	.044	.0020	0	1.88	.755
Apparel	−.017 (.022)	1.0	−.006 (.012)	−.008 (.006)	.049	.625	.075	−.005	.0029	0	1.93	.841
Furniture	−.016 (.017)	1.0	−.003 (.009)	−.011** (.005)	.087	.459	.306	.102	.0015	.41	1.79	.559
Food	.046 (.039)	1.0	−.022 (.023)	.001 (.011)	−.030	.720	.509	−.044	.0054	0	2.51	.700
All commodities	−.018 (.017)	1.32** (.574)	−.006 (.009)	−.0002 (.005)	.274	.684	−.004	−.035	.0002	0	2.23	.733

Note: Derivation of these series is described in the appendix.
The price index for commodities excluded prices of owner-occupied housing. In the disaggregated equations (1, 3, 4, and 5) the coefficient on the state and local excise tax rates was constrained to be 1. The sales tac variable in the equation for all commodities and nonfood commodities includes federal excise taxes.
All models were estimated for 53:03–78:06 except Furniture, which was estimated for 58:03–78:06. Standard errors are located in parentheses underneath variables that do not have freely estimated lag structures.
Significance levels ** $.01 \geq p$ * $.05 \geq p > .01$

Table 7.9 **Impact of NJTC on the Margin between Retail and Wholesale Prices under Alternative Models**

CPI Component	1-Yr Distributed Lag: Trends on Seasonals with Q	1-Yr Distributed Lag: Trends on Seasonals w/o Q	1-Yr Distributed Lag: No Trends with Q	6-Month Lag Trends with Q	1-Yr lag Trends with Q
Food away from home	−.036**	−.037**	−.032**	−.033**	−.051**
σ_β	.013	.012	.013	.013	.018
(σ_e)	(.0017)	(.0017)	(.0017)	(.0018)	(.0017)
Nonfood commodities	−.038**	−.038**	−.031*	−.038**	−.049**
σ_β	.015	.015	.016	.015	.020
(σ_e)	(.0020)	(.0021)	(.0022)	(.0020)	(.0020)
Food at home	.051	.041	.051	.051	.011
σ_β	.039	.038	.040	.038	.059
(σ_e)	(.0053)	(.0053)	(.0052)	(.0052)	(.0053)
All commodities	−.018	−.019	−.013	−.018	−.036
σ_β	.016	.016	.017	.016	.022
(σ_e)	(.0022)	(.0022)	(.0023)	(.0022)	(.0022)
Reduction in consumer costs between 6/77 and 6/78 (in billions)					
All commodity regressions	3.4	3.6	2.4	3.4	2.5
Disaggregated regressions	2.8	3.3	1.9	2.8	2.3

Note: Derivation of these series is described in the appendix.
The standard error of the coefficient and the regression are located beneath the coefficient. Models 1–4 estimated on monthly data 1953:03 to 1978:06. For model 5, sample period ends 1978:01. Weights for Q are based on the 1967 input-output table, which includes gasoline, electricity, telephones, containers, cellophane packaging, supplies, insurance, auto repair, and legal fees.
Significance levels ** $.01 \geq p$ * $.05 \geq p > 0.1$

nonsignificant positive coefficient, reflecting the fact that incremental employment in this sector tends to contribute more to the quality than to the volume of output.

The final rows of table 7.9 indicate the reduction of consumer costs due to NJTC-induced compression of the distribution margin implied by the equations. The estimated cost savings of $1.9–$3.6 billion in the first twelve months after passage of the credit can be compared with total NJTC claims of $2.4 billion in 1977 and $4.5 billion in 1978.

7.7 Caveats and a Research Agenda

This study finds considerable evidence for the hypothesis that in the construction and distribution industries NJTC had the effects on employment, hours worked per week, and prices that would be predicted by economic theory. The point estimates of the size of these effects—400,000 extra jobs in construction and distribution and one percentage point reduction in the margin between retail and wholesale prices of commodities—seem to imply that the program succeeded in achieving some of its goals.

Our findings must be viewed as preliminary, however, for they are based on only twelve months of experience with the program and on outcomes in industries that employ only thirty-five percent of all private nonagricultural workers. Perhaps the NJTC variable is capturing other exogenous forces that are inducing contemporaneous employment increases and price decreases in the sectors studied. And, if that is the case, perhaps improved specifications would reduce the impacts attributed here to NJTC. Longer or shorter lags, adding the price of energy, or assuming a once-and-for-all shift in the time trend during 1974, do not, however, cause major reductions in the NJTC coefficients. There may, nevertheless, be other factors at work, and the conclusion that NJTC is having major effects on employment and prices must remain tentative until better data or more periods of observation become available.

Further evidence on the impact of NJTC can be obtained by studying a greater variety of industries. The cap on the credit means that industries dominated by large firms—e.g., aluminum, metal mining, autos, insurance—do not receive significant benefits. NJTC should either leave employment in these industries undisturbed or cause them to lose workers to the more favored industries. Examining the employment and pricing behavior of these industries would thus simultaneously sharpen our tests of NJTC's impact and measure any across-industry displacements that may be occurring. Good price, wage rate, and output data are essential if the methodology used in this paper is to be applied to other industries. The necessary data are available for mining, manufacturing, transportation, and ultilities, and studies of these industries should be high on the research agenda.

This paper has not attempted to measure the effects of NJTC on output or wage rates. The efficacy of marginal wage subsidies cannot be evaluated, however, without knowing how they influence output and wage rates. One of the primary arguments for marginal wage subsidies is that they can induce an employment expansion while simultaneously putting downward pressure on prices. If, however, they induce wage increases and most of the inertia in the wage-price spiral is wages chasing wages, NJTC could cause the underlying rate of inflation to accelerate rather than decelerate. Three types of issues must be investigated: (1) What is the impact effect of NJTC on the wage rates of industries that benefit from the credit? (2) Does the impact effect observed in these industries induce catch-up wage increases in other industries? and (3) Do the wage adjustments induced by NJTC accelerate the underlying rate of wage inflation or are they once and for all shifts of relative wage rates?

Output effects are also extremely important, for if the total economy's real output has not increased, aggregate social welfare will almost certainly have declined. Empirical studies of NJTC output effects will be difficult to do, however. In most industries the output measures available do a very poor job of capturing changes in quality or service mix. Measures of the quantity of other factor inputs used are also generally unavailable. Under these circumstances it is hard to envision how it will be possible to make definitive statements about wage subsidy impacts on total factor productivity. In the retail industry, for instance, the extra workers hired because of a wage subsidy might carry packages to a customer's car, contact delinquent credit customers more quickly, take inventory or clean the store more frequently, substitute for deliverymen as arrangers of product displays, or allow the store to remain open longer hours. None of these responses will raise total sales of the retail sector. Nevertheless, the extra workers have allowed the firm either to reduce other costs or to improve the quality of the service provided. The data limitations mean that results of any studies of productivity impacts will have to be interpreted cautiously.

Making wage rates and output endogenous is desirable for still another reason. The models we have used to estimate the impact of NJTC take output and wage rates as given. If NJTC raises output, our measure of its employment effect will understate the true impact. To the extent that NJTC raises wage rates and wage rates have a negative short-run impact on employment, our measure of employment effects will overstate the true impact.

Research is also needed on (1) the sensitivity of wage subsidy impacts to the stage of the business cycle; (2) the optimal timing of the initiation and cancellation of such a subsidy; and (3) the long-term response of business to a predictable countercyclical manipulation of this policy instrument. Temporary programs have a way of becoming permanent, so it is important to understand how the response of firms and the economy

will change if the program becomes permanent. The temporary nature of NJTC certainly reduced employer awareness of and responses to it. If a marginal wage subsidy were permanent, this program would eventually disappear. On the other hand, a permanent credit would not induce firms to build up inventories, as NJTC may have done. If, in a permanent marginal NJTC, the threshold of eligibility were revised periodically to reflect more recent employment experience, raising current employment would reduce the future expected subsidy, thus inducing a smaller response (Bishop and Wilson 1980).

Appendix

Calculation of Rental Price of Capital Indexes

The rental price of capital services for the ith industry is given by:

$$R_i = P_{ki}\left[\tau_p + \frac{(1-uz-k+uzk')}{(1-u)}\ (\delta_i + r - \dot{P}^e_{ki})\right]$$

P_{ki} = price of investment goods used by the ith industry

τ_p = property tax rate on business property

u = effective tax rate on business income (depends upon form of organization)

z = present value of depreciation deductions

k = statutory rate of the investment tax credit

k' = statutory rate of the investment tax credit during the period of the Long amendment, when firms were required to subtract the investment tax credit from their depreciation base

δ = rate of replacement

r = nominal rate of return

$\dot{P}^e_{ki}$ = expected rate of price appreciation of capital goods

This formula was separately applied to the corporate and noncorporate business sector. The share of corporate business in each of our industries was estimated from the 1967 Statistics of Income by calculating the share of the total business receipts of proprietorships, partnerships, and corporations in the industry that went to corporations with more than $25,000 in profits. This share is 75 percent in wholesaling, 66 percent in

retailing, 47 percent in eating and drinking places, and 72 percent in trucking. The business receipt ratio of 68 percent for construction was adjusted to 60 percent to reflect the greater importance of subcontracted work in large, corporately held construction firms.

The rental price used in the equations is a composite of rental prices for structures and for equipment. Estimates of gross stocks of plant and equipment for each industry were taken from Fawcett's "Development of Capital Stock Services by Industry Sector." Updates of the time series of effective tax rates and present values of depreciation deductions for nonresidential structures published in Christensen and Jorgenson (1973) were graciously provided by L. Christensen.

For each period, 1947–54, 1954–62, 1962–71, 1971–78, separate present values of depreciation deductions were calculated for four types of trucks, two types of construction equipment, two types of office and business equipment, and office furniture. It was assumed that between 1954 and 1962, twenty percent of new investment continued to be depreciated by straight line methods. Since January 1, 1959, small businesses have been able to write off immediately twenty percent of the value of new investments in equipment with a tax life of six or more years. It was assumed that lack of knowledge and the $4,000 cap per joint return caused only half the proprietorships and partnerships to claim this deduction, and the present values of office furniture and business equipment depreciation deductions were adjusted accordingly. The timing of changes in depreciation policy was taken to be the date of announcement for the administrative liberalizations of 1962 and 1971 and the date of enactment for legislated changes. Effective rates of property taxation were taken from Christensen and Jorgenson (1979).

The seven percent investment tax credit was part of the revenue act which became law October 16, 1962. The date of the Long amendment's repeal was February 26, 1964. As an antiinflationary measure, the credit was suspended from October 10, 1966, to March 1967, and from April 19, 1969, to August 15, 1971. The period of the Long amendment is therefore taken to be 1962:11 through 1964:02. The periods of suspension are defined as 1966:10 through 1967:02 and 1969:05 through 1971:07. The value of the tax credit was raised to ten percent by the tax reduction act enacted on March 29, 1975. Bischoff has recommended that the effective rate of the investment tax credit be adjusted downward to reflect the lower rate available on short-lived equipment and on equipment purchased by utilities. Our assumptions are that for fixed producers' durable equipment, retail and wholesale industries were eligible for 6/7 of the statutory rate of the credit. Corporations were assumed to receive a tax credit of 3/7 of the statutory rate for trucks and 4/7 of the statutory rate for construction equipment. Because proprietorships and small corporations face lower marginal tax rates, they will prefer the higher tax credit that

they receive for reporting a five-year lifetime for trucks and equipment to the speedier depreciation deductions that a three-year lifetime provides. This option is provided by the Asset Depreciation Range System; we assume that such firms exercise it, and we adjust the value of depreciation deductions and the investment tax credit (2/3 of the statutory rate) to reflect it.

We assume that real, after-tax rates of return (nominal after-tax returns minus expected capital gains on plant and equipment) are equated across industries, and are constant over time. The average of the after-tax, real rates of return given in Christensen and Jorgenson (1979) for 1947 through 1969 is five percent for corporations and 4.8 percent for noncorporate business. We adopt five percent as our assumed real rate of return.

Price indexes for nonresidential structures were obtained from the Data Resources Data Bank. Wholesale price indexes for trucks were adjusted for the federal excise tax and used as the price index for trucking equipment. The wholesale price index for construction equipment was used in construction. The price index for nontransport producers' durable equipment in wholesale and retail industries is an average of wholesale price indexes adjusted for state and federal excise tax changes. The components of this are office and store machines equipment ($wt = .30$), office furniture ($wt = .35$), and general purpose machinery ($wt = .35$). For retailing, replacement rates of .044 for plant and .157 for nontransport equipment were provided by Gollop and Jorgenson. Replacement rates for trucks and construction equipment were .32 and .2858, respectively.

In both 1963 and 1967, forty-one percent of the retail and wholesale industry's purchases of new equipment were from the motor vehicles and equipment industry. The replacement rate for trucks is twice that of other nontransport producers' durable equipment. Using this fact we calculate motor vehicles to be 25.8 percent of the industry's stock of equipment.

Notes

1. For instance the vector $\boldsymbol{W} = (W_t, W^q, W^q_{-3}, W^q_{-6}, W^q_{-9}, W^s_{-12}, W^s_{-18}, W^s_{-24}, W^s_{-30})$ where $W^q = \sum_{i=1}^{3} \frac{W_{t-i}}{3}$ and $W^s = \sum_{i=1}^{6} \frac{W_{t-i}}{6}$

The one exception is that the sales variable specific to the industry whose employment is being predicted has the first three months of the lag structure entering individually rather than as a quarterly average.

2. $\boldsymbol{R} = (R, R_{-12}, R_{-24}, R_{-36})$ where $R = \sum_{i=1}^{12} \frac{R_{t-i}}{12}$

3. V. Smith (1963) has shown that investment incentives when there is no taxation of business income are identical to those prevailing when investment is experienced in the first year.

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