FINAL REPORT

Implications of the Declining Supply of Entry Level Workers for Small Firms

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by

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EXECUTIVE SUMMARY

Traditionally, youths (16-24 years old) have been defined as entry level workers, primarily because they hold entry level jobs. Over the past 8 years youth labor supply has declined, but prime aged (25-54 years) women have more than made up for the youth decline; thus, the number of workers in entry level ranks has actually increased.

In this paper we analyze the labor market for entry level jobs in the U.S., and specify an empirically testable model of the decrease in the youth labor force participation rate on entry level wages and thus small firms. We argue that the 'expected' significant increase of real wages in this market due to declining youth participation did not occur because prime-aged women were readily substituted for youths. The traditionally-defined stock of entry level workers--all 16-24 year old workers--was augmented by 5 million prime-aged women during the 1979-1986 period. We also found that a large class of small firms, i.e. those run by owner-operators, may not reduce their employment of entry level workers as entry level wages rise. Finally, we show that expected nominal wage increases of 5% per year through 1995 in the entry level market will only have marginal adverse effects on small firms.

We begin the paper with a discussion of trends in the labor market behavior of entry level workers. Youth participation and employment rates were increasing through 1979, and since have declined significantly. But similar rates for prime-aged and older women increased proportionately. Our conjecture that these women were substituted for youths was confirmed by the economics literature on statistical tests of the hypothesis that adult women (25 years or older) and youths are substitutes. We also found that while a reduction in demand leads to a more than proportionate response in the quantity of youth labor supplied, this is not true for adult women who have
worked in the previous year; thus, in the future we would not expect most adult women to be driven out of jobs or the labor market by reducing their wages.

We should recognize that two alternatives to the female substitution hypothesis exist for the decline in real wages for entry level workers. One alternative is that the decline in real wages represented a restructuring of the U.S. economy, with less capital-intensive industries generating a disproportionate share of entry level jobs. Another explanation is that during the 1979-86 period the economy experienced a high level of inflation; thus, the decline in real wages may reflect the inability of entry level workers to enjoy indexed wage contracts. Moreover, one could argue that women did not necessarily replace men; instead, traditionally female-held jobs grew faster than traditionally male-held jobs. But this contention is rather shallow given that female wage rates are less than male wage rates. None of these hypotheses were analyzed in the report, since econometric research overwhelmingly confirmed the female substitution hypothesis.

A model of the utility-maximizing small firm is specified to test the impact of changes in wages of entry level workers on the product supply and entry level labor demand of these firms. We derive the key parameters for estimating the effects of wage changes, which are (1) the responsiveness of labor supply to own wage changes by the owner-operator of the firm, and (2) the substitutability between the owner operator and the entry level workers. Technical methods are delineated for statistically estimating each of these parameters.

The utility-maximizing model is tested with data from the restaurant and lunchroom industry. This sector is comprised primarily of owner-operator firms, with an average of 20 employees per establishment. We find that an
increase in the nominal wage rate of entry level restaurant workers leads to an increase in product supply of the firm. The reason for this result is that as hired workers' wages rise \textit{cet. par.}, the net profit or nominal wage of the owner-operator falls, inducing him to work more. Since his productivity is significantly higher than entry level workers, the net effect is that output increases. Thus increased entry level wages need not have a serious adverse effect on the small firm in the short run; however, there is a limit to the hours the owner-operator can work. On the other hand, it is not clear that the nominal wage of entrepreneurs declined, since product prices generally increased faster than worker's wages; thus, it may be that owner-operators in the restaurant sector actually worked less.

In general, we have found that labor markets have operated very efficiently for entry level workers. Since small firms provide two-thirds of entry level jobs, these firms have reaped the benefits of a smoothly functioning labor market. As for the future, if the supply of adult women no longer continues to increase, the demand for youths will rise. The supply response of youths is more than proportionate to demand changes; thus, youths should fill any shortages. Moreover, if youths and women cannot fill future increases in demand for entry level jobs, wages would likely rise enough to induce a strong substitution of capital for entry level labor.
I. Introduction

Since 1979, the percentage of the labor force ages 16-24 years - traditionally referred to as entry level workers - has been declining. Small firms typically provide two-thirds of entry level jobs; thus, given a decrease in supply of entry level workers (ELW), it is plausible that wages could rise for small firms.

This scenario makes a key implicit assumption that turns out to be of major importance in explaining recent behavior in ELW markets. The implicit assumption is that there are no substitutes for 16-24 year olds in entry-level jobs. This assumption does not hold. We have observed that prime-aged (25-54 year olds) and older women have been substituted for youths (16-24 year olds) over the past decade, and especially since 1979. Indeed, women have not only replaced youths in entry level positions, but they have also obtained a majority of the jobs resulting from growth in the economy. So ELW should augment its traditional definition to include the 5 million women that have replaced youths in entry level positions. The result of the substitution of women for youths is that the nominal wage increase expected from the declining labor force participation rate (LFPR) of youths was cushioned. In fact, the real wage for entry level jobs declined between 1979 and 1986. To be sure, the real wage declines could have alternative explanations, i.e., new ELW jobs may have less capital per worker, or ELW wages may not have kept up with inflation. These alternatives were not explored because econometric evidence using micro data bases were consistently strong in confirming the substitution of women for youths. This evidence is strengthened by the fact that women receive lower wages than men.

The purpose of this paper is to document the substitution process
described above, and to specify a testable model which could be used to
determine the economic impacts of increases in entry-level wages on small
firms. The documentation is performed by (1) observing descriptive
statistics of the labor market behavior of ELW, and (2) reviewing the
theoretical and empirical economics literature on the determinants of the
demand for and supply of labor.

We choose to model the small firm as a utility (rather than profit)
maximizer, since a majority of small firms are owned and operated by single
entrepreneurs. Assuming that no perfect substitute exists for the
entrepreneur as an input, any exogenous price changes invoke not only labor-
leisure substitution and income effects for the entrepreneur and other
inputs. The net effect of these two factors determines the shape of the
small firm's input demand and product supply curves. We find that the key
parameters of the utility-maximizing firm needed to analyze the effect of
increased entry level wages are (1) the elasticity of substitution in
production between the owner-operator's labor and the entry level worker's
labor, and (2) the wage elasticity of labor supply for the owner-operator.
Using plausible estimates of these parameters from other studies, we deduce
the effects of expected wage changes through 1995 on the profitability, input
demand and product supply of small firms.

The paper is organized as follows. In section II we analyze employment
levels and shares, LFPR's, employment rates, wage changes, and other
characteristics of ELW. Section III looks at the substitution elasticities
among worker groups estimated in the economics literature, as well as new
information on the dynamic labor supply behavior of married women, who have
joined the ELW forces. In Section IV we specify and analyze the theory of
the utility-maximizing firm, and show how this model differs from the
traditional profit-maximizing behavior of the firm. Finally, in Section V we
take projections of ELW to 1995 and show how our model - if empirically
estimated - would predict firm reactions to changes in entry level wages.

II. Recent Trends in Entry Level Worker Markets

Over the past two decades there has been a growing revolution in the U.S. labor market. Women are no longer "back-seat" participants in the labor market. In the 1960's, less than one-half of prime-aged (25-54 years old) women were in the labor force. Today, nearly three-fourths of prime-aged women participate in the labor force. At the same time, the participation rate of prime-aged men has declined slightly. These phenomena have been major determinants of the labor market behavior of youths, who are traditionally defined as ELW.

In Table I are data on employment levels by age group and gender for the period 1975-1986. Youth employment reached a peak in 1979 of 22.4 million jobs. Since 1979, youth employment has declined in excess of 2.4 million. In comparison, total jobs in the U.S. increased by 11.4 million since 1979. Male youths have lost 1.67 million jobs since 1979, while female youths lost three-fourths of a million. Who were the job-gainers? Prime-aged women and men. Prime-aged women gained 8.87 million jobs, and prime-aged men added 6.44 million. Since the total job gain of prime-aged workers was 15.3 million, and the economy wide increase was 11.4 million, we can deduce that a substitution of prime-aged workers for youths and older (55 years and over) workers occurred.
The employment level data in Table 1 are used to calculate shares of total U.S. employment in Table 2. In Table 2 we can see that the youth share of total employment reached its peak of 22.9% in 1978, and has steadily declined since. While both women and men have shared this steady decline, job share losses of women have been relatively less than men's. Prime-aged male's employment share declined from 1975 to 1980, and has since grown rapidly enough to surpass its 1975 share in 1985. Prime-aged women clearly have the most impressive record over the 1975-1986 period. From 1975 to 1980, their share increased. Given the (effectively) constant share for youths during this period, and the declining share for older workers, prime-aged women were replacing prime-aged men and older workers. Moreover, women were replacing male youths from 1978 to 1980. Between 1980 and 1986, the growth in the prime-aged women's share increased from its 1975-80 level.

From 1979-1986, prime-aged women's jobs grew at 35.2%, while total employment grew at 11.5%.

One obvious question at this point is, what is behind the information in Tables 1 and 2? Are women participating more and youths less? Have employment rates (% of population employed) merely declined for youths and increased for prime-aged women, while LFPR has remained constant? In Tables 3 and 4 postwar trends in LFPR and employment rates (ER) are presented for detailed age and gender classes. A number of informative trends are shown by Table 3. From 1954-1979, the LFPR of teenagers steadily increased, but then declined from 1979-1986. Note that the male-female differential narrowed over time to only a 2 percentage point difference in 1986. Turning to the 20-24 year old group, the male LFPR has been close to 85% for three decades, while women have increased their rate by 26 percentage points. Since 1979,
TABLE 1

U.S. Civilian Employment Levels by Age and Gender
1975-1986 (thousands)

<table>
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<tr>
<th></th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>MALE</th>
<th>FEMALE</th>
<th>MALE</th>
<th>FEMALE</th>
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<td>10323</td>
<td>8664</td>
<td>32602</td>
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<td>9044</td>
<td>33346</td>
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<td>9478</td>
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<td>98824</td>
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<td>35923</td>
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<tr>
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<td>12196</td>
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<td>11319</td>
<td>10029</td>
<td>36578</td>
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<td>1986</td>
<td>110192</td>
<td>10418</td>
<td>9571</td>
<td>42364</td>
<td>34075</td>
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TABLE 2

Shares of Total U.S. Civilian Employment by Age and Gender, 1975-1986 (%)

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<th></th>
<th>TOTAL</th>
<th>MALE</th>
<th>FEMALE</th>
<th>MALE</th>
<th>FEMALE</th>
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</thead>
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<tr>
<td>16-24 years</td>
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<td>16-24 years</td>
<td>25-54 years</td>
<td>25-54 years</td>
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<tr>
<td>1975</td>
<td>22.1%</td>
<td>12.0%</td>
<td>10.1%</td>
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<td>22.4</td>
<td>12.2</td>
<td>10.2</td>
<td>37.6</td>
<td>24.1</td>
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<td>1977</td>
<td>22.7</td>
<td>12.4</td>
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<td>1978</td>
<td>22.9</td>
<td>12.4</td>
<td>10.5</td>
<td>36.6</td>
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<td>1979</td>
<td>22.6</td>
<td>12.2</td>
<td>10.4</td>
<td>36.4</td>
<td>25.5</td>
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<td>11.7</td>
<td>10.3</td>
<td>36.2</td>
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<td>36.4</td>
<td>27.1</td>
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<td>10.6</td>
<td>9.7</td>
<td>37.3</td>
<td>27.9</td>
</tr>
<tr>
<td>1983</td>
<td>19.9</td>
<td>10.8</td>
<td>9.5</td>
<td>37.5</td>
<td>28.5</td>
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<td>1984</td>
<td>19.7</td>
<td>10.4</td>
<td>9.3</td>
<td>37.9</td>
<td>28.9</td>
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<td>1985</td>
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<td>10.0</td>
<td>9.1</td>
<td>38.1</td>
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<td>1986</td>
<td>18.1</td>
<td>9.4</td>
<td>8.7</td>
<td>38.4</td>
<td>30.9</td>
</tr>
</tbody>
</table>

the male rate declined, while the female rate continued to grow.

If the gender categories for youths in Table 3 were further broken down by race, they would show a disturbing trend for black males. Black male teenagers had a 61.2% LFPR in 1954. This rate has steadily declined to 39.1% in 1986. Black males aged 20-24 had a 91% participation rate in 1954, which declined to 75.2 in 1986. One might conjecture from these data on black males that part of the gains made by women in the labor force since the 1960's have come at the expense of black male youths.\(^1\) Since 1979, however, the story differs. The white male teenage LFPR fell from 61.4% to 56.4%, while for 20-24 year old white males the participation rate actually increased (from 83.9 to 86.7%). Black male rates for youths declined by only 2 percentage points from 1979-96; thus, the real 'cost' of the alleged substitution of female for male entry level workers since 1979 may have been primarily borne by white male teenagers. This implication assumes employment rates for white and black male youths has remained the same over the time interval; plus, it recognizes that white males outnumber black males by nearly 9 to 1.

Regarding the participation behavior of non-youths, Table 3 shows that prime-aged males have kept a constant LFPR over the past 15 years. Older males (55 years and over) experienced a steep decline in LFPR during the same period. Prime-aged women, on the other hand, added a little over 9 percentage points from 1979-1986, after a very impressive growth in the 1960's and 1970's. The extreme increases for prime-aged women are consistent with the data in Tables 1 and 2. Older women aged 55-64 years have actually shown a slight increase in their rate of participation over the past 15

\(^1\) Black female youths have experienced a steady increase in LFPR since 1954.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16-19 years</td>
<td>Male</td>
<td>61.8%</td>
<td>55.4%</td>
<td>53.5%</td>
<td>58.3%</td>
<td>60.6%</td>
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<tr>
<td></td>
<td>Female</td>
<td>39.9</td>
<td>39.8</td>
<td>38.5</td>
<td>45.6</td>
<td>54.5</td>
</tr>
<tr>
<td>20-24 years</td>
<td>Male</td>
<td>85.1</td>
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<td>85.6</td>
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<td>46.1</td>
<td>47.6</td>
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<td>68.2</td>
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<td>25-34 years</td>
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<td>95.3</td>
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<td>32.9</td>
<td>37.3</td>
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<tr>
<td>35-44 years</td>
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<td>98.4</td>
<td>97.3</td>
<td>96.1</td>
<td>95.6</td>
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<td>41.5</td>
<td>45.1</td>
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<td>45-54 years</td>
<td>Male</td>
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<td>97.1</td>
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<td>Female</td>
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<td>41.6</td>
<td>50.8</td>
<td>53.3</td>
<td>58.9</td>
</tr>
<tr>
<td>55-64 years</td>
<td>Male</td>
<td>89.0</td>
<td>89.3</td>
<td>86.3</td>
<td>80.5</td>
<td>72.8</td>
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<td>65 or over</td>
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<td>8.2</td>
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* October

TABLE 4

Employment Rates by Age and Gender, Selected Years
(1948-1986)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1948</th>
<th>1954</th>
<th>1963</th>
<th>1972</th>
<th>1979</th>
<th>1986*</th>
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<td>16-19 years</td>
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<tr>
<td>Male</td>
<td>51.8%</td>
<td>44.0%</td>
<td>41.1%</td>
<td>47.5%</td>
<td>50.3%</td>
<td>43.7%</td>
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<td>65.0</td>
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<tr>
<td>Male</td>
<td>89.1</td>
<td>86.2</td>
<td>86.5</td>
<td>87.9</td>
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<td>88.5</td>
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<td>67.9</td>
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<td>Male</td>
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<td>92.2</td>
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<td>Female</td>
<td>8.6</td>
<td>9.7</td>
<td>9.6</td>
<td>9.2</td>
<td>8.0</td>
<td>7.4</td>
</tr>
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* October

Source: Same as Table 3.
years.

The employment rate (ER) information in Table 4 essentially corroborates the findings of Table 3, i.e. labor force participation rates are highly correlated with ER. Teenage ER declined from 1979-1986, while ER for youths aged 20-24 increased. Prime aged women enjoyed significant increases in ER, while the ER of prime-aged males remained steady during the last seven years. Older women (54-65 years) had a slight increase in ER over the same period. The declining teenage LFPR and ER are consistent with the discouraged worker phenomenon, i.e. as ER falls, workers become discouraged and drop out of the labor force.

Tables 3 and 4 can be used to derive the unemployment rate (UR), since \( UR = LFPR - ER \). Such derivations reveal that the UR for teenage males was 10.3% in 1979 and 10.4% in 1986, which is consistent with the discouraged worker hypothesis. Teenage females suffered an increase in their UR over this period from 4.0% to 8.9%; thus their behavior is inconsistent with the discouraged worker phenomenon. This is the only age group where females had a large increase in UR, although 20-24 aged women saw their UR increase from 6.1% in 1979 to 7.7% in 1986. In general, the UR of women is less than that of men, and UR declines with age.

We now have most of the pieces to determine the effects of a lower LFPR by youths on the ELW market. In Table 1 we saw that entry level jobs totaled 22.4 million in 1979, and only 19.99 million in 1986 using 16-24 year old workers as our proxy for the stock of ELW. In 1979, the ER was 59.0% for prime-aged women, which we can assume is the steady-state rate for this group. So if the ER had remained the same between 1979 and 1986, only 29.1 million prime-aged females would have been employed. Since 34.1 were
actually employed in 1986, we can deduce that at least 5 million of the jobs were at the entry level. So nearly one-half of the net increase of prime-aged female jobs over the past seven years came at the expense of youths.

Who bore the costs of this job loss among youths? White male teenagers lost 1,013 million jobs, while white female teenagers lost 694 thousand jobs. Black male teenagers lost 119 thousand jobs, and black female teenagers lost 45 thousand jobs. So teenagers accounted for 1.9 of the 2.4 million youth jobs lost. Black male teenagers suffered a more than proportionate loss than white male teenagers, since in 1979 the teenage white/black employment ratio was 10.5, whereas the job loss ratio was only 8.5. The same result holds for older black male youths. White teenage females, on the other hand, incurred disproportionate losses compared to black female teenagers. Unemployment rates for white teenagers were in the 8% range in 1986, while black teenagers had a 15% unemployment rate.

Additional Labor Market Conditions

Our analysis of ELW labor markets thus far has not distinguished among types of jobs. While we’ve observed that youths have lost jobs and prime-aged women have made tremendous job gains, it could be that these differences have been somewhat transparent, depending on whether we’re dealing with full-time or part-time jobs. The information in Tables 1-4 does not distinguish between full and part-time jobs.

To further analyze the dynamics of the ELW labor market, we have broken

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2 Full-time jobs are defined as those involving 35 or more hours per week, while part-time is less than 35 hours per week.
### TABLE 5

Full and Part-time Employment by Age and Gender  
1975, 1979, 1986 (1000)

<table>
<thead>
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<tbody>
<tr>
<td><strong>16-19 years</strong></td>
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</tr>
<tr>
<td>Male</td>
<td>1817</td>
<td>1986</td>
<td>2127</td>
<td>2109</td>
<td>1094</td>
<td>2090</td>
</tr>
<tr>
<td>Female</td>
<td>1283</td>
<td>1959</td>
<td>1534</td>
<td>2214</td>
<td>965</td>
<td>1888</td>
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<tr>
<td><strong>20-24 years</strong></td>
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<td>Male</td>
<td>5347</td>
<td>1087</td>
<td>6510</td>
<td>1024</td>
<td>5786</td>
<td>1552</td>
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<td>Female</td>
<td>4055</td>
<td>1244</td>
<td>4883</td>
<td>1474</td>
<td>4714</td>
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<td><strong>25-54 years</strong></td>
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<tr>
<td>Male</td>
<td>38150</td>
<td>3222</td>
<td>34529</td>
<td>1393</td>
<td>39900</td>
<td>2463</td>
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<tr>
<td>Female</td>
<td>14889</td>
<td>5113</td>
<td>18925</td>
<td>5874</td>
<td>26072</td>
<td>8001</td>
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<tr>
<td><strong>55 and over</strong></td>
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<tr>
<td>Male</td>
<td>7086</td>
<td>1400</td>
<td>7431</td>
<td>1376</td>
<td>7012</td>
<td>1404</td>
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<tr>
<td>Female</td>
<td>3369</td>
<td>1639</td>
<td>3687</td>
<td>1855</td>
<td>3909</td>
<td>2102</td>
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</table>

*October

down employment by age and gender classes in Table 5 for the years 1975, 1979 and 1986. Focusing on teenage and female jobs only, a general trend from 1975-1986 is that the percent of total jobs that are part-time has increased. Since 1979, all age and gender categories shown in Table 5 had an increase in their proportion of part-time jobs except for one group - prime-aged women. While prime-aged women held the largest number of part-time jobs, their proportion of total jobs that were part-time declined from 25.6% in 1975 to 23.5% in 1986. If any group can be singled out for significant increases in their proportion of part-time jobs, it is teenagers. From 1979-1986, male teenager's proportion of part-time employment rose from 49.8% to 65.6%. More striking is the full-time job loss of teenagers between 1979 and 1986. Males lost over 1 million full-time jobs, and females lost over 1/2 million. In short, when part versus full time work is considered, from 1979-1986, teenagers lost and prime-aged women gained.

Given all of the indicators that women are participating far more successfully in the labor force, plus our assertion that women have augmented the stock of ELW by at least 5 million over the past 7 years, it may be useful to learn about trends in moonlighting by women. Moonlighting is defined as holding more than one job. John Stinson (1986) has shown that moonlighting by women has increased to record highs. In 1975, there were 956 thousand female moonlighters. By 1985, this number had reached 2.2 million. There were 3.5 million male moonlighters in 1985 (versus 3.4 million in 1970). Since the second job held by a moonlighter is almost certainly a part-time job, and the vast majority of the latter are entry level positions, we can be sure that the substitution of prime-aged women for youths discussed earlier is a real phenomenon.
Table 6 shows weekly earnings by age and gender for full and part-time workers for 1979 and 1986. Unfortunately, the Bureau of Labor Statistics only publishes this information for two age groups, 16-24 and 25 years and over. Nevertheless, some interesting results are embedded in the table. First, we can see that hours worked increased between 1979 and 1986 for all categories except part-time women aged 16-24 years. All nominal wage rates increased. The percentage gains were greater for women in every category except the 25 and over part-time group. For example, full-time women aged 16-24 had an increase of 36.6%, while their male counterpart’s wage rate only increased 16.8%. Part-time female workers aged 16-24 enjoyed a 52.8% increase in their wage rate, while males in the same group experienced an increase of 41.7%.

To be sure, women receive lower wage rates than men in all categories; nevertheless, the differential is declining almost across the board. The Consumer Price Index increased by 52% between 1979 and 1986; thus, only 2 groups in Table 6 had real wage increases; full-time women workers over 25, and part-time women 16-24.

Summary

We have reviewed a large number of aggregate statistics on the labor market behavior of entry level workers. We found that since 1979, youths have lost 2.4 million jobs to prime-aged women (2 million) and older women (400 thousand). We showed that even though women were substituted for youths, the stock of ELW increased by at least 5 million since 1979. Participation rate and employment rate data demonstrated that prime-aged women have been more active and successful in labor markets than any other
### TABLE 6
Weekly Earnings, Hours of Work and Wage Rates by Age and Gender for Full and Part-time Workers, 1979 and 1986

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<tr>
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<th>Full-time</th>
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<tbody>
<tr>
<td></td>
<td>Earnings</td>
<td>Hours</td>
<td>Wage</td>
<td>Earnings</td>
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<td>Earnings</td>
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<tr>
<td>16-24 yrs.</td>
<td>$200</td>
<td>42.5</td>
<td>$4.71</td>
<td>$237</td>
<td>43.1</td>
<td>$5.50</td>
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<tr>
<td>25 and over</td>
<td>310</td>
<td>44.5</td>
<td>6.97</td>
<td>461</td>
<td>45.1</td>
<td>10.22</td>
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<td>Women</td>
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<tr>
<td>16-24 yrs.</td>
<td>152</td>
<td>39.7</td>
<td>3.83</td>
<td>212</td>
<td>40.5</td>
<td>5.23</td>
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<tr>
<td>25 and over</td>
<td>196</td>
<td>40.3</td>
<td>4.86</td>
<td>309</td>
<td>41.0</td>
<td>7.54</td>
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<tr>
<td></td>
<td>Part-time</td>
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<td>Men</td>
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<tr>
<td>16-24 yrs.</td>
<td>59</td>
<td>18.5</td>
<td>3.19</td>
<td>84</td>
<td>18.6</td>
<td>4.52</td>
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<tr>
<td>25 and over</td>
<td>83</td>
<td>20.1</td>
<td>4.13</td>
<td>126</td>
<td>20.2</td>
<td>6.24</td>
<td></td>
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<tr>
<td>Women</td>
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<tr>
<td>16-24 yrs.</td>
<td>57</td>
<td>19.8</td>
<td>2.88</td>
<td>81</td>
<td>18.4</td>
<td>4.40</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>25 and over</td>
<td>77</td>
<td>20.2</td>
<td>3.81</td>
<td>117</td>
<td>20.5</td>
<td>5.71</td>
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</table>

* Third Quarter
** October data

major age/gender group. While black male teenagers have been losing jobs for over three decades, since 1979 white teenagers have lost 1 3/4 million jobs, primarily to prime-aged and older women. As the demand for youths (especially teenagers) declined over the past seven years, white males left the labor force. White females, on the other hand kept searching; thus, their unemployment rate increased significantly. Youth job changes included a disproportionate shift to part-time jobs. Finally, nominal wages increased faster for women than for men. Except for prime-aged women working full-time and 16-24 year old women working part-time, real wages declined from 1979-1986.

III. The Determinants of the Demand for and Supply of Labor in Entry Level Job Markets

In the previous section we observed a number of trends in the labor markets for entry level workers. In this section our task is to review the economics literature which explains the behavior underlying these trends. Specifically, we ask whether prime-aged women and youths are substitutes in the eyes of the firm. If they are, then as the supply of prime-aged women increased, the demand for youths declined.

**Labor Demand**

The demand for labor by a firm relates optimal quantities of labor to wages, given other input prices and the price of the firm's output. If more than one type of labor exists in a given market for a firm, then the demand for any given type will be determined by the substitutability across types.
This substitutability is measured by the elasticity of substitution ($\sigma$).

For example, if a given level of output $Q$ can be produced by labor-type $L_1$ and $L_2$, then we have the situation referred to in Figure 1. $Q_0$ is an isoquant, which shows alternative combinations of two inputs - $L_1$ and $L_2$ - which yield the same level of total output ($Q_0$). The elasticity of substitution along $Q_0 = (\partial L_2/\partial L_1)(L_1/L_2)$. So if $\sigma$ is large, $L_1$ and $L_2$ are strong substitutes, and the isoquant approaches a straight line. If $\sigma$ were 0, the isoquant would be a right angle, and there would be no substitutability possible between $L_1$ and $L_2$.

Economists derive the elasticity of substitution by statistically estimating the parameters of a cost or production function. A cost function is derived from cost minimizing firm behavior, and relates total costs of the firm ($C$) to output ($Q$), given factor input prices ($w$). The production function, on the other hand, relates $Q$ to input levels, e.g. $Q = f(L_1, L_2)$. With the cost function, factor prices are exogenous, while with the production function input levels are exogenous.

The researcher's choice of a cost or production function to estimate the elasticity of substitution is determined by the type of data available. If the data were individual firm-specific, and the firm was a price taker in factor markets, then the cost function would
be the proper approach. That is, the supply of inputs would be perfectly elastic (see Figure 2); so wages would be the same regardless of the firm's demand for labor. If one's data set was comprised of large aggregates, then the available supply of labor would be fixed, so the production function approach would be called for in estimating the substitutability among inputs.

The most popular form of the cost and production function employed by economists for empirical testing is the translog. The translog cost function is written for an n factor input case as follows:

$$\ln C = \ln a_0 + \sum_{i} a_i \ln w_i + 0.5 \sum_{i,j} b_{ij} \ln w_i \ln w_j,$$

where $w_i$ is the price of the $i$th factor input, and the $a$'s and $b$'s are parameters. If $\sum a_i = 1$, and $\sum b_{ij} = 0$ for all $j$, then $C$ is linearly homogeneous in the $w_i$, i.e. a 10% increase in all $w_i$ leads to a 10% increase in $C$. By Shephard's Lemma,

$$\frac{\partial \ln C}{\partial \ln w_i} - x_i w_i / C = S_i, \; i = 1, 2\ldots n.$$ 

Equation (2) says the quantity of each input ($x_i$) times its price, or expenditures on $i$ as a share ($S_i$) of total costs is found by partially differentiating the cost function. The factor shares are linear in the parameters:

$$S_i = a_i + \sum_{j=1}^{n} b_{ij} \ln w_j, \; i = 1, 2\ldots n.$$

We estimate (3) statistically to obtain estimates of the elasticity of substitution ($\sigma_{ij}$) among the inputs, and the elasticity of demand for each
input \( n_{ij} \), where

\[
\sigma_{ij} = \frac{b_{ij} + S_iS_j}{S_{ij}} \quad \text{and} \quad n_{ij} = b_{ij}S_j.
\]

if \( \sigma_{ij} \) is positive (negative), inputs \( i \) and \( j \) are substitutes (complements).

If one desires to estimate the translog production function,

\[
\ln Q = \ln \alpha_0 + \sum_i \ln x_i + \frac{1}{2} \sum_{i,j} d_{ij} \ln x_i \ln x_j,
\]

the cost share equations are derived as above, but are related to the levels of each input:

\[
S_i = \sigma_i + \sum_j d_{ij} x_j, \quad i = 1, \ldots, n.
\]

With the production function approach one is measuring the exogenous changes in factor quantities on factor prices; therefore, instead of measuring the elasticity of substitution we use Hicks' measure of the elasticity of complementarity \( c_{ij} \):

\[
c_{ij} = \frac{d_{ij} + S_iS_j}{S_iS_j}
\]

The elasticity of complementarity measures the effect on relative factor prices of changes in relative factor quantities, holding output price (or marginal cost) and input levels constant. If \( c_{ij} \) is negative (positive),

\[3\] See Hicks (1970) and Sato and Kaizumi (1973).
then i and j are substitutes (complements), i.e. increases in the supply of factor j decreases i's price if i and j are substitutes. In the previous section, we saw that the supply of prime-aged women increased, and the real price of teenagers declined. According to the theory these two groups are undoubtedly substitutes.

We now want to review the recent economic literature which estimates $\sigma_{ij}$ and/or $c_{ij}$ for categories of labor that make up the entry level work force.\textsuperscript{4} Grant and Hamermesh (1981) were interested in the exact same question we are, namely: Are youth and adult women close substitutes in production? Using cross-section data from the 1970 Census of Population and Annual Survey of Manufacturers, the authors estimated a translog production function across SMSA's on grounds that (especially for older workers) factor quantities are more likely to be considered exogenous than factor prices. The inputs included in their production function were youths (aged 14-24), adult blacks, white women, white men and capital. The elasticity of complementarity between youths and white women was -2.35, which means that white women and youths are strong substitutes. Hamermesh and Grant (1979) also reviewed a number of studies using both cost and production functions. They found that the elasticity of demand for youths exceeded unity, i.e. a 10% increase in youth wages would lead to a more than 10% decline in youth employment. Highly skilled or educated workers had elasticities of demand significantly below unity. The authors also found that youths and older workers are easily

\textsuperscript{4} For a more detailed coverage of the theoretical and empirical literature, see Hamermesh (1986).
substituted for by capital, whereas skilled workers are not. This suggests that federal tax subsidies for investment may reduce the number of entry level jobs. The large elasticity of demand for youths is solid evidence that a subminimum wage policy could induce a substantial increase in youth employment.

Berger (1983, 1984) was interested in understanding why the relative wage of young males to prime-aged males had declined, and why there was a decline in the wages of college graduates relative to nongraduates. He used 1968-1975 Current Population Survey (CPS) data by state to estimate a translog production function across gender, schooling and experience classes. Berger found that women were highly substitutable for younger, less-educated males. Moreover, he demonstrated that the increase in female labor over the 1968-1975 period was the major determinant of the decline in earnings of young men who have not finished college relative to the earnings of older less educated male workers. For college graduates, Berger found that the increase in supply of college graduates overwhelmed all other effects in explaining their relative decline in wages. In his 1984 paper, Berger showed that the negative effect of cohort size on earnings not only persists with age, but actually increases with age.

Borjas (1986a) used a cross-section of 1980 Census micro data to estimate a generalized Leontief production function for white males, black males, immigrant males, capital and females. The sample was restricted to workers between 18 and 64 years of age. Borjas found that women were strong substitutes for white men and capital. White men, on the other hand, were strong complements to capital, corroborating the findings of Hamermesh and Grant (1979). One might question Borjas' results on grounds that the
assumption of the labor supply elasticity being zero does not hold; however, more sophisticated estimation techniques that correct for this problem do not change his results. The findings of substitutability between women and capital means that like youths, entry level women are vulnerable to future capital subsidies written by Congress to generate economic growth.

Borjas (1986b) employed the 1970 Census 1/100 Public Use Sample on 18-64 year olds to estimate a generalized Leontief production function for the 125 SMSA's identified in the Census data. The micro data covered black men, women, Hispanic native men, Hispanic immigrant men, white native men, and white immigrant men. Borjas found that the demand for black labor was reduced by the increased LFPR of women. He also found that women were substitutes for all men - white, black and Hispanic; but, the elasticity was higher for women and black men, regardless of the latter's age (young or old). These results were robust to alternative estimation techniques, accounting for various technological relationships, using real as opposed to nominal wages and disaggregating the female input into white and black women.

Borjas also tested labor force participation hypotheses, and found that an increase in the LFPR of women led to a decrease in the LFPR of black males. Upon further analysis, he showed that this LFPR finding held for young (18-24 yrs.) black males, but not older (24 and over) black males. Finally, using all of his models for simulations of the impact of increased female LFPR on white and black earnings during the postwar period, Borjas showed that the increased LFPR of married white women effectively prevented the equalization of black and white wage rates in U.S. labor markets. The simulations show that a 10% increase in the LFPR of women leads to a reduction in young black male wage rates of 15%. Since the expected wage level determines one's
probability of participation in the labor force, the decrease in wages will further reduce the LFPR of young black males.

In summary, economists have estimated production or cost functions using micro data bases to determine whether prime-aged women are substitutes for youths. The evidence overwhelmingly reveals a substitute relationship. Thus, as women have increased their rate of participation in the labor force, the demand for youths has declined. As a result, youth's (real) wages and employment levels have fallen off.

Labor Supply

Labor supply functions relate the hours an individual is willing to work to their wage rate, nonwage income levels, marital status, and other characteristics. We are strongly interested in the determinants of the labor supply behavior of prime-aged women. In addition, we will analyze the labor supply behavior of youths and older women.

Until 1985, labor economists' models of married women emphasized the roles of child status and husband's income as the primary determinants of labor supply. Married women would quit working to have children, and would also reduce their hours worked or outright quit if their husband's income increased. In concluding his definitive work on labor supply, Mark Killingsworth (1983) said there are two things we know: (1) wage rates and nonwage income have something to do with labor supply, and (2) female labor supply, when measured as labor force participation or hours of work, is much

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5 We will use married women as a proxy for prime-aged women since (1) most prime-aged women are married, and (2) of those that aren't, they essentially behave like prime-aged men (except for unmarried mothers with children at home).
more wage and nonwage income elastic than male labor supply. The wage elasticity of labor supply for married women was generally found to be near unity, while the same measure for men was close to zero.\textsuperscript{6} Certainly these elasticity results are consistent with the information portrayed in Tables 1-4.

In 1985, Alice and Masao Nakamura published a monumental book, \textit{The Second Paycheck}, which has called these "findings" from previous studies of women's labor supply into question.\textsuperscript{7} Nakamura and Nakamura used the 1971-1978 waves of the Michigan Panel Study of Income Dynamics to estimate dynamic models of women's labor supply behavior. The categories of labor supply behavior studied included: (1) women 14-20 years, (2) wives 21-46 years, (3) unmarried women 21-46 years, (4) wives 47-64 years, (5) unmarried women 47-64, (6) women 65 years and over, and (7) 4 age categories of men (14-20, 21-46, 47-64, and 65 and over). The authors eschew the traditional t test methodology in their work. Instead, they estimate their models for a variety of age, sex and marital status groups, and search for consistency in explaining various dimensions of labor supply. They employ simulation checks within and out of samples. The final results are those that survive all of these tests.

The basic dynamic model employed by Nakamura and Nakamura is called an \textit{Inertia Model}, where the probability of work in the current year for a person who worked in the previous year is a function of hours worked in the previous year, the hourly wage in the previous year, variables that describe changes

\textsuperscript{6} See Killingsworth (1983) for details.

\textsuperscript{7} James J. Heckman, in a foreword to the book, called it a 'goldmine of empirical evidence on the dynamic labor supply of men and women.'
in the person's circumstances (marital, household, etc.) since the previous year, and characteristics of the person. Hours of work and wage equations for those with previous work experience are modeled as a function of the previous year's hours of work and wage rates, plus any changes in circumstances. For those without previous work experience (or out of work in the past year), their wage functions are related to personal and macroeconomic characteristics, while their hours of work are related to the wage rate and personal traits.

The major findings of the Second Paycheck are: (i) properly specified dynamic labor supply equations for men and women are quite similar, i.e. the wage elasticity of labor supply for both is close to zero; (2) given previous work behavior, children have no impact on women's (or men's) current labor behavior; (3) changes in marital status strongly affects women's labor supply, e.g. divorce leads to increases in the labor force participation of women; and (4) only recent labor market history is required to predict current labor supply behavior.

The first finding, i.e. that women already working have low wage elasticities of labor supply (-.14 to +.08) just as men do is of major significance not only for this paper, but for labor market policy in general. Women not previously working were found to have very large (positive) wage elasticities of labor supply, consistent with the old stock of knowledge. What this means for our purposes is once prime-aged, married women enter the labor force and attain a job for a year, they are willing to work at almost any wage, just as prime-aged males. In other words, they are not going to leave the labor force once they get in and find a job. Thus women are not likely to reduce their LFPR, i.e. they will accept wage cuts and still remain
on the job. This result implies that youths and others who have lost their jobs to women are not likely to gain them back in the near future unless the growth in the LFPR of prime-aged women declines. Moreover, it is demand-side phenomena that will determine the future wages of small firms, since the labor supply curve they face for veteran labor is essentially perfectly inelastic.

Nakamura and Nakamura also find some labor supply results for specific age groups that are of interest for our purposes. When considering young workers (aged 14-20 years), they find that given one worked in the previous year, the wage elasticity of labor supply is 1.2 for women and -.11 for men. This implies that young females' labor supply does not react to wage changes as prime-aged females' labor supply curve does, but young men do not respond to wage changes in the same way that prime-aged men do.

On the other hand, conditioning on no previous work experience in the last period, the wage elasticity of young men is -1.44 while young women have wage elasticity of +.32. In other words, young female entry level workers are not sensitive (in terms of hours of work) to wage changes in their first year of work, but after the first year they are very sensitive to wage changes. Young men, on the other hand, are very hours-sensitive to wage changes in their first year, but after the first year the wage sensitivity declines drastically.

Note young men have negatively sloped (with respect to the wage rate) labor supply curves. If small firm demand increases for young labor, say due to a decrease in the labor supply of prime-aged women, they will get significantly more hours from experienced females while male hours would actually drop. Thus it is not surprising that young females lost a lot fewer
jobs than young males over the 1979-1986 period. The relatively low wage elasticity of supply for young women without previous work experience suggests that they have a high reservation wage, while the highly elastic young male's negative response means that young men cherish leisure relative to work. Finally, if we consider the wage elasticity of labor supply for women 65 or older, it was +2.27 for those without work experience in the previous period, and -.21 for those who worked in the previous year.

Clearly, all women who have not worked in the previous year (and therefore are highly likely to be taking entry level jobs) have strongly wage-elastic, positively sloped labor supply curves. In other words, if wages rise by 10%, this will induce more than a 10% increase in the hours offered for work by new female workers in all age groups. This is not true for young men, the major competition of women for entry level jobs. It is clear now why women have responded much more than men to job opportunities for entry level jobs, and also that women are very likely to keep their jobs once they attain them.

Black Youth Labor Supply Problems

Thus far we have reported some rather startling and bleak information regarding the labor market behavior of young black men. In Tables 3 and 4 we saw that their LFPR and ER has been declining, and in review of the demand literature we found that this was due to women being substituted for young black males. To attempt to understand the labor market behavior of young black males, the National Bureau of Economic Research conducted a survey of 2358 black men ages 16-24 in three major cities (Boston, Chicago, and Philadelphia) during the period November 1979-May 1980. The survey provided
a data set which most of the papers in Freeman and Holzer (1986) used. The research found that black male youths are quite responsive to a number of economic incentives as well as their social and family environment, i.e. the reduced LFPR and ER for this group during the 1970's was a rational response to negative labor market incentives and poor social environments. The key finding of this analysis was that young male blacks have (and maintain) very high reservation wages, especially if they are out of school.

In the aggregate, the problems facing youths may be dichotomized into trend and cyclical factors. That is, after accounting for business cycle movements, the trend component shows what happened over a given time period to a groups' ER or UR. Cycle effects measure the change in ER or UR due to movements in the business cycle, holding trend factors constant. John Pencavel (1980) performed a statistical analysis to determine the trend and cyclical movements in ER for white and nonwhite age-gender groups over the period 1954-1977. For black males 18-20, he found that after accounting for cyclical movements, each year the ER for this group accounted for a 26.8% decline in ER during the 1954-1977 period. Cyclical effects for black male youths were in excess of unity, which means that a 1% decrease in the base group ER (35-44 year old white males) led to a more than 1% decrease in ER for black male youths. The cyclical effect for black males aged 20-25 was 3.22.

We have updated (to 1962-1985) the Pencavel analysis for youths by gender and race, and also added the 35-44 year age group for women. The base group is white males aged 35-44 years. The test is made by regressing the change in ER for a given age-gender group from one time period to another on the change in ER for the base group. The constant term in the regression
equation, when multiplied by the number of observations (23) yields the trend factor. The cyclical term is the coefficient on the change in ER for the base group\(^8\). We first regress the change in ER for the base group on time to be sure there is no discernible trend in the reference group's ER:

\[
ER = 0.00297 - 0.00012 \text{ time}
\]

\[(0.46479) (0.40000)\]

where the numbers in parentheses are t-statistics. This test is passed. The results for youths and women aged 35-44 are shown in Table 7. Young black males still had a significant negative trend in employment rates. No other age-gender group experienced a significant negative trend during the 1962-1984 period. White and black male youths have cyclical effects in excess of unity, while all women have less than unity cyclical effects. Thus all women lose less than the reference group during a down turn in the business cycle. These results are not surprising given the information we've evaluated thus far. However, they add another hurdle to the young black male's labor market problems discussed earlier.

Labor Supply of Older Women

Nakamura and Nakamura found a +2.21 wage elasticity of labor supply for women 65 years and over who had not worked in the previous year. The jobs held by this age group are basically entry level, and mostly part time.

\(^8\) See Kmenta (1986) p. 321 for an explanation of why the constant or intercept term is our trend measure.
<table>
<thead>
<tr>
<th>Group</th>
<th>Intercept</th>
<th>Slope</th>
<th>$R^2$</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Male 16-24</td>
<td>.00348</td>
<td>1.61*</td>
<td>.55</td>
<td>.08</td>
</tr>
<tr>
<td>White Female 16-24</td>
<td>.00769</td>
<td>.698*</td>
<td>.27</td>
<td>.18</td>
</tr>
<tr>
<td>Black Male 16-24</td>
<td>-.00683*</td>
<td>1.72*</td>
<td>.42</td>
<td>-.16</td>
</tr>
<tr>
<td>Black Female 15-24</td>
<td>.00181</td>
<td>.98*</td>
<td>.26</td>
<td>.04</td>
</tr>
<tr>
<td>White Female 35-44</td>
<td>.0116*</td>
<td>.37*</td>
<td>.21</td>
<td>.27</td>
</tr>
</tbody>
</table>

*Denotes significance at 5% level.
While the LFPR of women 65 and over has declined significantly in the past 15 years, the total employment has increased. In 1975, 980 thousand women over 65 were employed. By 1979 this figure had increased to 1.108 million, and by October of 1986 these women had 1.208 million jobs. While these gains are more or less marginal when compared to the job losses of black or white youths over the past seven years, older 'retired' women ranks are becoming so large that they could become a significant force in the ELW market. This would come about more quickly if Congress lifted the earning restriction on Social Security beneficiaries. The private sector has begun to show an interest in using older workers on jobs formerly held by teenagers. McDonald's, the national fast food chain, has a new program called McMasters, which is aimed at attracting workers aged 40 and over. Older workers are often more reliable than youths, especially if the older worker is reasonably healthy. Research evidence shows that older women are more likely to be working if (1) they are unmarried, (2) they have no (or only a small) pension income, (3) their husband is working, and (4) they held a job previously for 10 or more years.

IV. A Theory of Small Firm Behavior

Since the major goal of this paper is to specify a testable model of how small firms will react to changes (increases) in wages for ELW, we have to specify a behavioral model that is appropriate for the vast majority of small firms. Historically, economists have utilized the profit-maximization model

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9 See Kevin Klose (1986).
10 See Iams (1986)
to explain firm behavior. This model gives an unequivocal firm response to an increase in wages: firms hire less of the more expensive labor. That is, the profit-maximizing firm's demand curve for all inputs must be negatively-sloped, due to diminishing marginal productivity. In addition, product supply declines due to the higher wage rate.

While small firms may at times operate like profit maximizers, a more general approach to small firm behavior is utility maximization. Most small firms are owned and operated by a single individual. The owner's labor input to the firm generally cannot be perfectly substituted for by other inputs; however, there are other inputs (labor, equipment) that can be substituted for the owner-operator's time. So if the owner-operator is modelled as a utility-maximizer, then any exogenous change in (output or input) price will lead to two competing sets of substitution and output (income) effects: (1) in production, where the cheaper input is substituted for the expensive one, and output changes inversely to the directional change in the input price; and (2) in consumption-leisure, where the owner-operator decides to work more or less given changes in his wage or net profit. In the profit-maximizing model only (1) exists, and the output effect is positive, i.e. there are no inferior inputs; thus, input demand curves are negatively sloped. With the utility maximizer, (2) can work against and in principle outweigh (1); thus, input demand curves may be positively sloped. If this were the case, small firms could be willing to buy more ELW as their wage rate increased, so the concern for rising wages and its effect on small firms may be somewhat muted.

11 As the reader will see below in equation (7), if other inputs are perfect substitutes (σ = ∞) for the owner-operator's input to the firm, then the predictions of the model are similar to those of a profit maximizer.
To determine the conditions in which (2) may negate (1) above, we have to write down the utility-maximizing firm model.

We assume the firm in question produces a homogeneous output \( Q \) using the owner's labor \( L \) (which cannot be purchased in a market) and also using other (purchased) inputs \( N \). \( N \) can be obtained in competitive markets at a constant price \( R \) to the firm. The production function, \( Q = F[L,N] \) is assumed to exhibit constant returns to scale. The earned income to the owner-operator is \( Y_E = PF - RN \), where \( P \) is the price of the output that is assumed given to the firm. Thus the owner is a residual claimant, whose wage \( W \) is equal to \( Y_E/L \). Clearly \( W \) is homogeneous of degree one in \( P \) and \( R \), i.e., a 10% increase (decrease) in \( P(R) \) leads to a 10% in(decrease) in \( W \). In addition to \( Y_E \), the owner may derive income \( I \) from nonlabor sources such as interest, dividends, and so forth.

The owner-operator maximizes a utility function over consumption and leisure subject to the production function and budget constraints. Optimizing over \( N \) yields the usual first order condition that we hire \( N \) up to where the value of its marginal product equals \( R \). The other first order condition is that the marginal rate of substitution between leisure and consumption be equal to the ratio of prices \( W/P \), where \( P \) = the price of the consumption good. From the first order conditions of the optimization problem, we can write down the product supply and input demand equations as functions of \( P, R, I \) and \( P \).\(^{12}\)

\(^{12}\) For a full derivation, see Lapan and Brown (1986). The independent and dependent variables in (6) and (7) are actually measured in percentage changes; accordingly, the coefficients are elasticities.
(6) \[ Q = \frac{(n_{LW} + \phi \sigma)}{1 - \phi} P - \phi \frac{n_{LW} + \sigma}{1 - \phi} R + n_{LP} P + n_{LI} I, \]

(7) \[ N = \frac{(n_{LW} + \sigma)}{1 - \phi} P - \frac{(\sigma + \phi n_{LW})}{1 - \phi} R + n_{LP} P + n_{LI} I, \]

where \( n_{LX} \) is the uncompensated elasticity of \( L \) with respect to \( X \) (where \( X \) includes \( W, P \) and \( I \)), \( \phi \) is the output-elasticity of \( N \) (\( \phi = \partial Q/\partial N \cdot N/Q \)), and \( \sigma \) is the elasticity of substitution between \( L \) and \( N \) in production.

Consider the supply equation first. Since \( \phi \) will be greater than zero but less than unity and \( \sigma \) will be positive, the slope of the product supply curve is determined by the relative sign and magnitude of the wage elasticity of labor supply (\( n_{LW} \)) for the owner operator versus that of \( \Phi \sigma \). If the substitution effect of a wage change outweighs the income effect for the owner-operator, then \( n_{LW} \) is positive, and the product supply curve is positively-sloped. If \( n_{LW} \) is negative, i.e. the owner-operator is on the backward bending portion of his labor supply curve, then the product supply curve may be positive or negative depending on whether \( \Phi \sigma \) is greater than or less than (the absolute value of) \( n_{LW} \). So a backward bending labor supply curve for the owner-operator is a necessary but not sufficient condition for a negatively-sloped product supply curve.

Next consider a change in input prices (\( R \)) on supply. Recall that for profit maximizers an increase in \( R \) must decrease supply. For the utility maximizer, this result need not hold. If \( n_{LW} \) is negative and large enough relative to \( \sigma \), then an increase in \( R \) can lead to an increase in quantity supplied by the utility-maximizing firm. What is the intuition behind this result? As \( R \) increases, \( W \) declines proportionately. This leads to the two substitution and income effects described earlier. If \( n_{LW} < 0 \), the owner
operator works more hours as his wage declines. His increased hours raises the marginal product of other inputs, who have decreased in number (L substituted for N). Since the owner’s productivity is greater than hired workers, the net effect is an increase in output.

Now consider the shape of the input demand function, equation (7). If $\sigma$ exceeds $n$, even though $n$ is negative, an increase in product price leads to an increase in the demand for N. This result is similar to profit maximization. On the other hand, if $n$ is negative and exceeds $\sigma$, then an exogenous increase in $P$ leads to a decrease in $N$. The slope of the input demand curve is given by the coefficient for $R$ in (7). If $\sigma$ is greater than $\phi n$, then we get the traditional negatively-sloped input demand curve. But if $n$ is negative and $\phi$ exceeds $\sigma$, then the firm’s purchased input demand curve is positively sloped.

Clearly there are three key parameters in learning the response of small firms to increases in the wages of hired inputs - $R$ in this model. These parameters are $\sigma$, $\phi$, and $n$. We have already shown that $\sigma$ can be estimated with either cost or production functions. $\phi$ can be determined from the same estimates. The wage elasticity of labor supply can be estimated directly, but there is no readily available data set that includes most of the required information. As an alternative, one can indirectly determine $n$ by estimating a product supply curve. Given estimates of $\sigma$ and $\phi$ from production or cost function models, and the price coefficient from a supply model, we can deduce the value and sign of $n$. Moreover, there are consistency checks on the sign combinations from the utility maximization model.\footnote{For details, see Brown and Lapan (1979).} For example, a positive coefficient for $R$ in the supply equation...
requires that the coefficient for $P$ be negative. If the fitted supply equation gave inconsistent results, then we would conclude that we have technical estimation problems or small firms don't behave as utility maximizers. So by estimating a supply model and cost or production function, we can obtain all of the parameters required to determine the slope of the small firm's purchased input demand curve.

Before concluding this section, it may be useful to consider briefly some of the policy applications of the utility maximizing model. Looking at the supply curve, it is apparent that an exogenous decrease in the owner's nonlabor income ($I$) will increase the product supply of the firm. That is, any change in $I$ only has an income effect on labor supply of the owner-operator; thus, if $I$ declines, labor supply increases, and via the production function $Q$ increases. So a lump sum tax or franchise (registration) fee will increase the supply of the small firm, other things held constant. Consider an income tax on earned income ($Y_E$). This tax will lower the effective wage rate to the entrepreneur and increase (decrease) the firm's supply if and only if $n_L$ is less (greater) than zero. If the income tax is on unearned $LW$ income as well, it is more likely to increase the firm's supply.

**Empirical Tests of the Utility Maximizing of Small Model Firms**

The author has done two previous studies which estimate the supply behavior of industries with a majority of utility maximizing firms: physicians and homebuilders. The physician model employed aggregate time series data over the 1948-81 period. The price elasticity of supply was found to be -1.49, and the input price elasticity of supply was +1.15. Note the consistency of the sign patterns with our theory in equation (6) above,
i.e. if the R coefficient is positive, then the P coefficient must be negative. By estimating a production function for physicians we found that $\sigma = .8$ and $\phi = .25$; thus, from the price elasticity of supply definition we could deduce that $n_{LW} = -1.79$ for physicians.

The second study is a supply model of residential housing construction using aggregate time series data for the period 1947-1981. The price elasticity of supply was found to be +1.55. Two purchased input prices were employed, one for hired labor and the other for materials. The former had a positive coefficient while the latter had a negative sign; thus owner-operators have found material inputs better substitutes for their time than hired laborers.

An informative application of the utility maximizing small firm for our purposes is the restaurant and lunchroom sector. In 1982, there were 122,851 restaurant and lunchroom establishments in the United States. While 90% of these establishments qualify as small businesses, 81% had 49 or fewer employees. The latter group comprised half of the more than two million employees in this industry. Most establishments are owned and operated by single individuals, which makes this industry a candidate for testing our model of the utility maximizing firm.

The U.S. Census of Retail Trade publishes restaurant and lunchroom information by state and metropolitan area, respectively, on: (1) the number

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14 As a further check on consistency, the sign of the coefficient on $P$ was positive, which means that $n_{LW}$ is negative. The latter is consistent with the coefficients on $P$ and $R$.  

15 These establishments are engaged in serving prepared food and beverages from a full menu. They provide waiter/waitress services for at least 15 patrons. While they may serve alcoholic beverages, a majority of their revenue comes from the sale of food and nonalcoholic beverages.
of meals served per establishment, (2) the price charged per meal per establishment, and (3) the annual payroll per hired employee per establishment. Clearly (1) and (2) correspond to Q and P in our model of the utility maximizing firm. On the assumption that average hours worked per employee are the same across states or metropolitan areas, (3) is a proxy for the price of hired inputs (R) in our model. The Bureau of Labor Statistics publishes a regional price index which can be scaled down to the state level to give us an estimate of \( \bar{P} \). In short, we can estimate our supply model except for the nonlabor income variable.

The results of estimating our supply model with ordinary least squares for the restaurant and the lunchroom sector across states are shown in Table 8. We have listed the parameters, their t statistics, and elasticities at the mean where appropriate. The elasticities are useful in that our theoretical discussion of the supply model [equation (6) above] was based on elasticities. Besides P, R and P, the reader will note that two additional independent variables exist in Table 8. They are dummy variables for the states of California (CA) and New York (NY). The average number of meals per establishment in these two states were significantly below the mean of our sample.

The supply model in Table 8 exhibits a negative slope, and the positive coefficients on R and P are consistent with this slope. Indeed, the results in Table 8 are exactly like those found for the physicians services sector.

Let us analyze each parameter to understand the message in Table 8. First, the positive coefficient on \( \bar{P} \) says that in states with higher overall

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16 See 1982 Census of Retail Trade, Industry Series, Miscellaneous Subjects.
TABLE 8

A Supply Model\(^1\) of Meals in Restaurants and Lunchrooms, 1982

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Parameter</th>
<th>t statistic</th>
<th>Elasticity (at mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>-2.71</td>
<td>.98</td>
<td>-.215</td>
</tr>
<tr>
<td>R</td>
<td>4.66</td>
<td>1.22</td>
<td>.354</td>
</tr>
<tr>
<td>P</td>
<td>177.2</td>
<td>2.70</td>
<td>3.79</td>
</tr>
<tr>
<td>CA</td>
<td>-52</td>
<td>-4.91</td>
<td>-</td>
</tr>
<tr>
<td>NY</td>
<td>-30.3</td>
<td>-2.77</td>
<td>-</td>
</tr>
<tr>
<td>Intercept</td>
<td>-208.3</td>
<td>2.09</td>
<td></td>
</tr>
</tbody>
</table>

R\(^2\) = .46
F = 5.82
Observations (Obs) = 40

The dependent variable is the average number of meals produced per establishment in state \(i\) \((i = 1...40)\). The omitted states (due to data inavailability) were Alabama, Alaska, Arkansas, Idaho, Mississippi, Montana, Rhode Island, South Carolina, Vermont, West Virginia and Wyoming. The District of Columbia is included in the sample.
price levels, output per establishment is greater. Why is this? As \( P \) increases, the real wage of the owner-operator declines. This leads to increased hours of work if he is on a negatively sloped labor supply curve \( (n_{LW} < 0) \); thus, output increases. Clearly then, the positive sign on \( P \) means \( n_{LW} \) is negative.

Next consider the negative sign on \( P \). By ordinary standards, this coefficient is not significant. However, referring back to equation (6) we know that the \( P \) coefficient can be negative. Plausible values of \( \Phi \) and \( \sigma \) are positive; thus, since \( n_{LW} \) is negative, we know the \( P \) coefficient can be negative. Plausible values of \( \Phi \) and \( \sigma \) for the restaurant sector would be .25 and .7, respectively. Plugging these values into the elasticity coefficient for \( P \) from equation (6), we have 

\[
-0.215 = \frac{[n_{LW} + (.7)(.25)]}{1-.25}.
\]

Solving this equation for \( n_{LW} \) gives a value of -.336.

Finally, consider the positive elasticity for \( R \), which says that a 10% increase in the wages of hired employees leads to a 3.5% increase in meals served. The intuition behind the positive sign is that an increased \( R \) reduces the owner-operator's net wage. This leads him to work more, and the firm to produce more output. Again assuming that \( \Phi = .25 \) and \( \sigma = .7 \), and using equation (6), we can solve for \( n_{LW} \) since 

\[
.25[(n_{LW} + .7)/1-.25] = .354.
\]

The significance level is .33, whereas .10 or .05 is normally acceptable. Using a data set of 26 metro areas for the restaurant and lunchroom sector in 1982, we obtained the following results:

\[
Q = 88.1 - 8.95P + 20.03R + 8.5P^2, \quad R^2 = .25.
\]

\[
(1.86) \quad (-2.48) \quad (1.97) \quad (.58)
\]

t statistics are in parentheses below the parameter estimates. The \( P \) and \( R \) coefficients are significant at the .02 and .06 level, respectively. The \( P \) elasticity is -.62, while the \( R \) elasticity is .33. The higher price elasticity in metro areas compared to states is expected since metro areas have more substitutes for restaurants and lunchrooms.
Here the value of $n_{LW} = -0.36$. It appears then that $n_{LW} = -0.35$. This result, along with the estimated positive $R$ elasticity, leads us to believe that the product supply curve is negatively sloped with respect to $P$.

In summary, the restaurant and lunchroom sector was found to exhibit characteristics that are consistent with establishments being run by owner-operators. The positive $R$ supply elasticity implies that in the short run, tight entry level labor markets need not adversely affect small firms. Indeed, the increased wage of hired inputs is felt mostly by the owner-operator, who chooses to work more hours rather than see a decline in his 'wage' or net profit\textsuperscript{19} from the restaurant.

V. Testing the Effects of Increased Wages on the Supply Behavior of Small Firms

We have shown that the required information for determining the effects of increased input prices on the supply behavior of the firm includes three parameters: (1) the wage elasticity of labor supply of the owner-operator ($n_{LW}$), (2) the elasticity of substitution in production between purchased inputs and hours of the owner-operator ($\sigma$), and (3) the output-purchased input elasticity ($\theta$). Unfortunately, no data set exists which includes the information required to estimate jointly or independently all three of these parameters.

\textsuperscript{18} Lapan and Brown (1986) show that these results hold for the industry in the long run.

\textsuperscript{19} In 1982, all eating and drinking establishments in the U.S. had a net income share of total sales of 36.8%. Thus, assuming restaurant and lunchroom establishments are the same as all eating and drinking establishments, the average restaurant and lunchroom owner-operator (who sold $383,680 in meals) earned approximately $141,578 in net profit.
parameters. By a judicious use of existing data sets, however, the requisite information is possible to attain. This would be accomplished as follows.

To obtain estimates of $\sigma$ and $\Phi$, one could employ the Bureau of the Census' CPS micro data file. CPS can now identify the self-employed who are incorporated and unincorporated. Prior to the past two years, the incorporated self-employed were lumped in with wage and salary workers. So we could estimate a cost or production function using the self-employed as proxies for the owner-operator. The other categories of labor directly available from the CPS file are the standard age-gender groups of ELW discussed earlier. Since the data are person-specific, and characteristics (hours of work, wages, gender, age, industry of job, situs of house) are available, one would choose a cost function for estimation.

Economists have employed longitudinal data sets such as the Panel Study of Income Dynamics to estimate $n$. Unfortunately, this data set does not include a large enough share of owner-operators of small businesses for our purposes. As we noted earlier, one can indirectly estimate $n_L$ by fitting a product supply (or input demand) equation for a sample of small firms. The Center for Economic Studies, Bureau of the Census has available a longitudinal establishment data file for manufacturing establishments over the 1972-1981 period. The establishments are in 4 employment size categories: 1-99, 100-249, 250-499, 500 or more. We could estimate a product supply equation similar to (6) above with this data source, since

\[\text{20 In reality, the Health Care Financing Administration has a micro file of 3500 physicians for 1976, 1977, 1978 and 1983-84 which includes all required information.}\]
output levels and input prices are available. When coupled with manufacturing-specific estimates from the CPS micro data of $\sigma$ and $\phi$, we could derive $n$ from the price coefficient of the product supply model. For nonmanufacturing, we could (in principle) obtain micro data from the 1983 Census of Business (wholesale trade, retail trade, and selected services) and Census of Construction and estimate a cross-sectional product-supply equation for small firms. Again, the CPS data would yield industry specific estimates of $\sigma$ and $\phi$ from which we could derive $n$ given the price coefficients from the product supply equations for the specific sector. In this way, we would cover a majority of small businesses.

Now that we have explained how one can determine, both conceptually and empirically, the impact of increased wages of hired inputs on small firms, we will close our paper with a hypothetical analysis. Fullerton (1986) has reported forecasts of LFPR by entry level workers to 1990 and 1995. These forecasts show that with the exception of men aged 20-24, LFPR will continue to rise. Accordingly, wages should not increase much more than inflation, which is forecasted at 5% by 1990-1995. If entry level wages rise by 5% per year, what will happen to small firms?

First, we note that the relationship between purchased input prices and the owner-operators wage - or profits - was homogeneous of degree one, i.e. ceteris paribus, a 5% increase in wage rates leads to a 5% decline in the residual wage or profits of the small firm. According to Hester (1979) the elasticity between net income and interest rates on loans is -0.208; thus, a decrease of net income by 5% would lead to an increase in the interest rate charged to small firms of 1%. So if the present rate charged small firms is 15%, the rate would rise 15 basis points.
Second, consider the impact of the increased wage rate on the level of ELW employment. Referring back to equation (7), we see that the direction and level of change is determined by \(- (\sigma + \phi n)/(1-\phi)\). Assume \(\sigma = .7, \phi = .25\), and \(n = .35\); then, the whole term = -.82; that is, a 10% increase in purchased input prices leads to a 8.2% decline in purchased labor. So a 5% increase in wages will reduce employment by 4.08%. Given the assumed values of supply parameters, we can predict what will happen to the supply (output) of the small firm using equation (6). The coefficient for the input price in (6) is \(-\phi(n + \sigma)/(1-\phi)\), which is .35. So a 5% increase in wages will lead to an increase in output by 1.75%. Of course if we found estimates of our parameters for non-restaurant and lunchroom sectors, we would expect some to respond differently. Specifically, if \(n\) were large and negative, we could find some sectors hiring more workers (and producing more output) as wages increase.

In summary, conditioned on a forecast of continual increases in labor force participation rates by entry level workers, wages are expected to rise no more than 5% per year through 1995. Based on the indirect parameter estimates of our supply model, small firms are expected to (1) reduce employment of entry level workers, and (2) substitute additional hours by the owner-operator. Clearly a limit exists on (2). Moreover, there is likely a limit on the employment rate level for prime-aged women and teenagers. These limits are not expected to be reached in the next eight years.
REFERENCES


"Change in Labor Force Composition and Male Earnings: A Production Approach," Journal of Human Resources (Spring 1983), 177-96.


