Relative Wages in Aging America: The Baby Boomer Effect

Teresa Ghilarducci, Michael Papadopoulos, and Siavash Radpour
Abstract

Using data from National Accounts of the United States and the Current Population Survey from 1963-2014, The Authors estimate the degree of complementarities between workers grouped by age and sex. An increase in the relative labor supply of older men is associated with lower wages for young women. An increase in the relative labor supply of older women is associated with lower wages for young and prime-aged men. The results imply that policies aimed to encourage older people to stay and enter the labor market, such as increasing Social Security’s full retirement age or raising Medicare eligibility to age 70, may have broad labor market effects by causing wage stagnation.

Keywords: Labor Demand, Elasticity of Complementarity, Heterogeneous Labor, Older Workrs, wage stagnation

JEL Codes: J23, J26, J31

Compiled datasets and copies of the computer programs used to generate the results presented in the paper are available from the lead author at ghilardt@newschool.edu.

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Introduction

The labor market in the United States is facing a new challenge. The boomer generation (born in 1946-1962) is reaching retirement age with two headwinds causing delayed retirement: boomers are a great deal more educated than previous generations and their retirement plans are more likely to be perceived as insecure and inadequate. Thus, boomers will cause the labor supply of older workers (those who are 55 to 74 years old) to increase relative to the labor supply of prime-age and younger workers. This change will likely have unexplored consequences on wages for workers of all ages.

Economic theory suggests an increase in the relative labor supply of older Americans could lower wages, or slow-down the wage growth for younger workers, if older workers are used extensively as their substitutes rather than complements.

Two researchers were forward-looking in their concern about these relative wage effects and conducted one of the few comprehensive studies exploring the substitutability of older and younger workers in 1988. Levine and Mitchell (1988) estimated the elasticities of complementarity of workers by age and sex categories and found that older workers were often used as substitutes for some groups of workers in the 1960s and 1970s.\(^1\)

We expand their study using similar methodologies, slightly different age groups and much more recent data on labor supply and wages. The information is vitally important now because the labor supply of people aged 55 and older is expected to increase by about 7.2 million workers which will be the fastest growing part of the labor force by 2024 (Bureau of Labor Statistics (BLS) 2015; Burtless 2013) because both the older population and their predicted labor force participation are increasing.

During the 30 years from 1984 to 2014, the average real hourly wages of older workers have been growing faster than younger workers’ wages. While older

\(^1\) The National Research Council (2012) claimed the increase in supply of older workers would not decrease the wages of younger workers citing the Levine and Mitchell study. However, they made incorrect inferences from the study.
workers today, on average, are paid much more than older workers were paid 30 years ago, the real wage for jobs occupied by younger workers has changed only slightly in the last 30 years (Figure 1).

We investigate the proposition that an increase in the supply of older workers in the next seven years may lower wages for all workers by 2024 by estimating the elasticities of complementarity among age/sex groups of workers.

[Figure 1]

**Background and Previous Literature**

Studies of new entrants’ labor supply shocks on incumbent workers’ wages subdivide the labor market by demographic variables such as race (Borjas 1983; Grant and Hamermesh 1981), sex (Costrell, Duguay and Treyz 1986; Kaufman 1989; Layard 1982; Lewis, 1985; Merrilees 1982; Rice 1986), age (Ferguson 1986; Freeman 1979; Grant 1979) and country of origin (Altonji and Card 1991; Bean Lowell and Taylor 1988; Borjas 1986a, 1986b, 1987; Grossman 1982; LaLonde and Topel 1991), and treat these subgroups as heterogeneous labor inputs. The choice of categories depends on the research questions and relevant policy analyses. However, all these studies use similar methodologies to answer similar question.

Studies that look at the labor supply effects of different age/sex groups on their own and others’ wages use cross-section data (Grant 1979; Grant and Hamermesh 1981) or time-series data (Ferguson, 1986; Freeman 1979; Hamermesh 1982; Layard 1982; Levine and Mitchell 1988) to estimate each group’s effects on wages of other groups. The choice of method is mainly based on data availability. In cross-section data, labor is mostly aggregated at the firm level or geographical area like states or cities, while in time-series data, the aggregation is usually economy-wide since firm level time-series data is not available (Hamermesh 1996).

Results from cross-section data are likely to be biased because workers move across firms, industries and geographical boundaries to take advantage of higher wages. On the other hand, using time-series data requires us to assume that factor productivities
and elasticities of complementarity or substitution are fixed during the period of study.

Regardless of the methods used, most studies of substitution among age/sex groups have found that most groups are used as substitutes for each other and have significant positive own-elasticities. Studies using translog production functions found larger own-elasticities of substitution. The demand is generally more elastic for younger workers and low skilled labor (Hamermesh 1996).

Using data from 1954 to 1984 to estimate elasticities of factor complementarity and factor price elasticities of sex/age groups Levine and Mitchell (1988) concluded that older men (age 55+) complemented younger (age 20-34) men, and older women substituted for prime-age (age 35-54) men. Using Bureau of Economic Analysis (BEA) and Social Security Administration (SSA) forecasts for the labor force in 2025, Levine and Mitchell (1988) project wage growth for the period 1985-2025. Levine and Mitchell wage growth forecasts were higher than actual wage growth for all age/sex groups. One of the factors that possibly contributed to the overestimation of wages is that both the BEA and SSA underestimated the growth of older workers’ labor supply: the BEA’s underestimate was by over two-thirds, and the SSA by almost one-half (Table 1).

[Table 1]

Young workers’ actual wages decreased by 4.2 percent between 1985 and 2015 whereas Levine and Mitchell (1988) projected a 4.4–7.8 percent increase. Mature workers’ wages increased by 1.8% but Levine and Mitchell (1988) predicted a 5.7–6.1 percent increase. Their SSA-based estimate projected a 1.5 percent increase in older workers’ wages, and the BEA-based estimate projected a 24.3 percent increase. Older workers’ earnings, in fact, rose only 8.3 percent in 30 years (Table 2).

[Table 2]
Model

We calculate the elasticities of factor complementarity\(^2\) among age/gender groups in the United States to estimate the effects of additional older workers in the labor market. Our estimations are based on a translog model for aggregated time-series data similar to the model used by Levine and Mitchell (1988).

A negative elasticity of substitution between two factors implies a slower relative wage growth associated with an increase in the relative supply of the other group. If older workers complement younger labor, then the estimated elasticity of factor complementarity will be positive, implying that an increase in older workers’ share in the labor force will increase in younger workers’ wages.

We classify workers in three categories of young (16 to 34 years old), prime-aged (35 to 55 years old) and old workers (55 to 74 years old) and two sex categories to create six age/sex groups, and assume that labor supply of all groups are exogenous\(^3\). Levine and Mitchell separated teen and young workers, but years of schooling increased rapidly since the 1970s, and fewer and fewer teenagers work.

We assume a translog production function:

\[
\ln(y) = a_0 + \sum_i a_i \ln X_i + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln X_i \ln X_j
\]

where \(y\) is output and \(X_i\) represents the \(i^{th}\) factor of production (capital stock and different categories of labor).

In a competitive labor market where the price of each factor of production is equal to its marginal productivity, the output share of each factor of production (which is equal to their cost share in the total production cost) can be written as:

\[
S_i = \alpha_i + \sum_j \gamma_{ij} \ln X_j
\]

\(^2\)Elasticity of complementarity is the percentage responsiveness of relative factor prices to a 1 percent change in relative inputs; \(c_{ij} = \frac{\gamma_{ij}}{\sum_k \gamma_{ik}}\) (Hamermesh, 1996).

\(^3\) We discuss possible consequences of the exogeneity assumption in the limitations.
where \( X_j \) is the quantity of \( j^{th} \) factor of production and \( S_i \) is the cost share of \( i^{th} \) factor of production in total output.

We run a system of seemingly unrelated regressions using the factor share equations (based on equation 2) to estimate the factor productivity coefficients, by imposing symmetry\(^4\) and linear homogeneity\(^5\) as constraints. We then calculate elasticities of complementarity using the estimated coefficients. Like Levine and Mitchell (1988), the standard deviations and significance of estimated elasticities are calculated by using the delta method\(^6\).

To estimate the percentage change in wages, we use the same approximation method used but Levine and Mitchell (1988):

\[
3) \quad \%\Delta W_i \approx \left( \frac{1}{\bar{S}_j} \right) \sum_j Y_{ij} \%\Delta X_j - \%\Delta X_i + \sum_j \bar{S}_j \%\Delta X_j
\]

where \( \bar{S}_j \) is the average of the \( j^{th} \) factor’s share of output in 2014 and its estimated share of output in 2024.

Data

The quantity of labor inputs and share of each group of workers from total labor share of output are calculated from the CPS-ASEC (Current Population Survey - Annual Social and Economic Supplement) from 1963 to 2015.

Quantity of labor input for each year (Figure 2) is measured in hours worked and calculated by multiplying “number of weeks work last year” by “average hours worked per week last year” in the next year’s survey.

[Figure 2]

The share of each age/sex group out of total labor earnings (Figure 3) is the sum of “Wage and salary income” for all the workers in the category divided by the total

\(^4\) \( Y_{ij} = Y_{ji} \)
\(^5\) \( af(x,y) = f(\alpha x, \alpha y) \)
\(^6\) Estimated Asymptotic \( Var[f(b)] = C[s^2(X'X)^{-1}]C' \), Where \( f(b) \) is a set of continuous and differentiable functions of least square estimators \( b \) and \( C(b) = \frac{\partial f(b)}{\partial b} \). Here \( f() \) represents the elasticities calculated using estimated coefficients, \( b \).
wages, calculates from the next year’s CPS-ASEC. These shares are then multiplied by the total wage share of output to calculate each category’s share of output.

[Figure 3]

Macroeconomic variables - GDP, wage and capital shares and “fixed assets” as a proxy of capital stock - are from the BEA annual national accounts tables.

To estimate the 2024 real wage growth projections, we use the population and capital growth rates estimated by BLS in “Employment Projection - Aggregate Economy Tables” (BLS 2015).

We use two different projections of labor supply in 2024. The two projections are based on the same population forecasts, but vary as a result of different labor force participation rates for older workers. The Bureau of Labor Statistics (BLS) predicts a 3.5 percentage point increase in labor force participation of workers age 55-74 between 2014 and 2024; whereas Burtless (2013) predicts that pension erosion (Poterba 2014), changes in Social Security benefits, social norms, and preferences for work will lead to a larger, 4.8, percentage point increase.

[Table 3] [Table 4]

We use both labor force participation rates estimated by the BLS and Burtless to estimate the labor supply at 2024 (Table 3 and 4). We assume average hours worked are constant for 2014-2024 period for each age/sex category.

Results

The elasticities of complementarity between age/sex groups in the period from 1963 to 2014 indicates that an increase in labor supply of older males and females, among other groups, has significant effects on wages of prime-aged and young workers (see Table 5).

Like Levine and Mitchell (1988), we find older women are used as substitutes for young and prime-aged men. However, unlike Levine and Mitchell, we find older men are used as substitutes for young and prime-aged women. We conclude older
workers are more likely to be used as substitutes for younger workers than they have been in the past.

[Table 5]

Using the BLS labor supply forecasts, we predict that real wages of young and old females, and prime-aged and old males, will increase slightly over ten years (Table 6). However, except for primed-age women, wages will grow much slower for young and primed-age workers. Compared to our projected real wage growth rates of 4.8 percent and 7.48 percent for older women and men, real wages of young women and men will grow only by 1.81 percent and 1.18 percent in a period of ten years.

We project even smaller real wage growth rates when we use Burtless estimation of labor force participation.

Burtless projects different labor force participation rates from BLS for older men and women. Thus, our labor force projections based on Burtless and BLS estimations are only different in the projected labor force supply of older workers, and are similar for other age/sex categories. Therefore, we can see the result of increase in labor force participation rates of older workers in the difference between projected wages using the BLS and Burtless estimations.

[Table 6]

The difference between the projected real wage growth using the BLS and Burtless estimated rates shows that prime-aged women are the only group benefiting from the increase in labor force participation rates of older workers. Young workers, prime-aged men and older workers’ wage growth rates will all decrease because of the increase in the relative supply of older workers in the labor market in the next ten years.
Limitations

The study requires a number of strict assumptions: We assume that labor markets are competitive and wages are only decided by and equal to the factors’ marginal productivity. Since labor’s bargaining power is a major pathway explaining wage growth, and bargaining power varies by unemployment level, a model incorporating involuntary unemployment would be an appropriate area for future research.

We also assume that the labor supply is exogenous. If the labor supply is elastic, part of the changes we capture will be caused by movement alongside the supply curve. As a result, our estimates will be biased. To estimate the effects of immigrant labor supply shocks on wages, Borjas and Monras (2016) use a model that controls for the supply responses as a result of changes in wages. They assume the migrant labor supply to be mostly exogenous, while any change in labor supply of native workers during the one year time period is considered to be endogenous and a reaction to subsequent changes in wages. We cannot impose similar assumptions on labor supply of age/sex groups in the United States, because it’s not possible to separate the possible exogenous changes in labor supply from endogenous reaction to the change in wages.

Despite the possible bias, our results still support our main hypothesis. Borjas and Monras (2016) argue that the endogeneity will result in biased estimations that will underestimate the wage effects of supply shocks. The labor market reacts to negate the wage effects of any supply shocks, thus any negative estimates elasticity will be biased towards zero. If this is the case, then the true value of any estimated elasticity that’s significantly negative, is in fact negative and significant and even larger (in absolute terms).

Using time-series data requires us to assume that factor productivities, and therefore elasticities of complementarity, are fixed from 1963 to 2024. This assumption is constraining because technological and industrial structures change how jobs can accommodate and accept older workers. Thus, we can be confident about the
findings of this study which state most groups, including older workers, are acting as substitutes for other workers.

This problem is also related to the factor classification and lack of controls. We divide the labor force by gender and age since we believe there are meaningful differences among the groups, and not within a specific group, during the period of study. However, educational attainment for all groups has increased drastically. Older workers and women are more educated than they were in 1960s, especially relative to prime-aged workers. It is likely that the “new” older workers are relatively more able to compete with educated prime-aged workers compared to previous generations.

Dividing the factors into smaller groups based on education, as in Grant (1979), could also limit the amount of change in relative productivity of factors. If we were to divide each group by education attainment, such problems would be mitigated. However, the small sample size does not allow for doubling of the number of factors. It is possible, however, to expand the study using the same sample by including measures of human capital of each age and gender group instead of simple supply of labor. This goes beyond the scope of this study.

Because of problems mentioned above, mainly the changes in factor productivity over time, in addition to our small sample size, elasticities of complementarity are sensitive to the sample choice. Running the regression over shorter time periods shows that the estimations, especially those for the earlier years, can be volatile. However, we cannot tell if the problems are only caused by the even smaller size of the subsamples.

**Discussion**

In the next seven years, 7.2 million older workers are predicted to delay a planned or hoped-for retirement into the U.S. labor market, an increase in the overall labor force of almost 5 percent. The magnitude of this surge of older workers compares to
that of other periods in American history when large increases in the labor supply reduced workers’ bargaining power (Figure 4).

[Figure 4]

Using the Burtless (2013) predictions, we expect the labor supply of people aged 55 to 74 to grow an average of 2.0 percent per year, and that of workers aged 65 to 74 to grow 5.8 percent each year between 2014 and 2024. This compares to historic increases in the supply of black and women workers. The number of black workers in the North grew by an average of 4.3 percent each year between 1910 and 1970. The pre-WWII wave of the Great Migration from the American South to the North lowered northern black wages by about 3 percent (Boustan 2009). Furthermore, the labor supply of women grew 3.3 percent each year between 1950 and 2000. Pryor and Schaffer (2000) found that the increasing supply of educated white women workers after 1950 lowered the wages of less-educated men. Many researchers have documented negative cohort effects, especially regarding the baby boom generation, to conclude boomer wages would have been higher if the cohort had been smaller (McMillan and Baesel 1990; Sapozhnikov and Treist 2007). Other examples of groups who affect others wages include the following: college and high school educated workers (Card and Lemieux 2000); older and younger workers in Germany (Peters 2015), black and white workers in manufacturing (Grant and Hamermesh 1981).

The theory and methods of estimating the negative wage effect of older workers remaining in the labor market are the same as those used for estimating the effects migrants on wages of incumbent workers, especially the incumbent workers with whom migrants directly compete (Chassamboulli and Palivos 2014; Borjas, 2009; evidence for less bargaining power of older workers is already showing up in wages, long-term unemployed and decrease in job quality. Older workers make up a larger share of the long-term unemployed than ever before, workers over 55 earn substantially less than people in their late forties (Guvenen 2015), and quality of jobs that older people hold has stopped improving. The share of older workers who say they have very physically demanding jobs is increasing and the share of jobs reported as easy is falling. The incidence of requirements for stooping, bending, and using keen eyesight and intense concentration is increasing (Rho, 2010).
Boudarbat and Lemieux 2014). Firms can use migrants to lower wages and diminish working conditions for incumbent workers when migrants can easily fill jobs that require less language fluency or training in the short run (Dustmann, Frattini and Preston 2013; Liu 2013; Smith 2012).

The true wage effect of migrants is measured by what conditions would be like if they had not come, which is nearly impossible to calculate. But because the Danes have extraordinary data sets that linking workers to firms, Danish economists could directly test the wage effects of migrants on native worker wages and working conditions. Data matching workers to employers allows direct observation of the behavior of firms hiring migrant workers. Incumbent workers are paid lower wages than they would otherwise in firms that hire migrant workers (Malchow-Moller, Munch and Skaksen 2012).

Though the Mariel boatlift of over 125,000 Cuban refugees, former prisoners, and mental health patients increased the supply of mostly unskilled labor in the Miami labor market by 7 percent in just two months in 1980 did not lower the wages of low wage incumbent Cuban-origin workers in Miami (Card 1990). However, the long-term effects may be negative. The influx of Marielitos lowered the wages of high school dropouts in Miami by at least 10 percent Borjas (2015).

Because our analysis estimates the effects of changing labor market shares, rather than absolute growth of labor supply, the comparison to migration is appropriate. But there are differences in how older workers and migrants would affect wages. A major contrast between migrants affecting incumbents entering a labor market and older “domestic migrants” is the state of the labor market they are entering. An influx of migrants is associated with buoyant labor markets and rising wages, because migrants tend to come when conditions are good. We argue that in contrast, older workers may be not staying in the will not necessarily enter the labor market because wages are rising and working conditions are improving, but rather they will enter because their reservation wage fell because their non-labor income is eroding. Instead of being “pulled” into the labor market, they are “pushed.”
Evidence supporting the proposition that labor force participation rate of older people may be especially sensitive to changes in unearned income include Cesarini et. al. (2015) who finds especially large decreases in hours worked by older lottery winners in Sweden. Older California teachers -- aged 55 to 75 -- were 2-3 percent less likely to work an additional year per $100,000 of accrued pension wealth when an unexpected increase in pension generosity was also associated with decreased labor force participation by workers aged 55 to 75 (Brown 2013). Older workers are also more sensitive to temporary net-of-tax wage changes than are younger workers (Reichling and Whalen 2012), including increases in the Earned Income Tax Credit (Blundell, Bozio and Laroque 2013).

Policy Implications

Older workers will not necessarily enter the labor market because wages are rising and working conditions are improving, rather they will enter because their reservation wage fell because their non-labor income eroded. Instead of being “pulled” into the labor market, they are “pushed.” Doubtless the increase in labor supply will lead to economic growth and an absolute increase in the number of jobs available.

Henry Aaron (2013) in a similar way describes two ways policies can increase the labor supply of older workers. Standard economic theory show that increased wages and other pecuniary and nonpecuniary forms of compensation would, through a substitution effect increase the extensive intensive supply of labor. A reduction of non-labor income, through the income effect induces more work. Aaron characterizes pro-work policies that cut pension benefits as “mugging” older people and policies that make work attractive as “bribing” policies. Policies that reduce non-labor income include reducing Social Security benefits by raising the Social Security full retirement age and Medicare eligibility age from 65 to 70. Bribing policies range from the SSA emphasizing the rewards from delaying collecting benefits to age 70 to raising the after-tax wage by reducing taxes for older workers and more labor protections against age discrimination.
There is circumstantial evidence that our estimates could be an understatement of the wage compressing effects of older people working more because of increasing retirement income insecurity. The age people tell surveyors they expect to retire rose since 1991 when 11 percent of workers polled expected to retire after age 65. In 2015, 37 percent said they will retire after age 65, which is the highest percentage of workers ever polled since the Employee Benefits Research Institute began the Retirement Confidence Survey in 1980 (Helman, Copeland and VanDerhei 2015).

We are not recommending that older people should not work. We suggest that a well–functioning retirement system will put a floor under older people’s reservation wage. In the absence of an adequate retirement system older workers remaining in the labor market may impose an unintended cost on younger workers.

**Conclusion**

The increase of 7.2 million workers over a 10-year period will affect labor markets, but will the effect be large enough to make a difference in the wages of younger workers? The answer is most certainly yes. If the shares of each age/sex groups in the workforce stayed constant the wage growth for all workers would increase by 1.7 percent per year between 2014 and 2024.

Based on BLS’s labor force projections, we predict young and old females, and young and old males, will experience an increase in real wages over ten years, by 1.81, 4.80, 1.18 and 7.48 percent. The wages of prime-aged females will increase by 5.52 percent, and prime-aged male wages will increase at a slower rate of 3.37 percent. The gap in the wage growth rates between the groups are much larger than the gaps were in between 1963 and 2014.

In theory, older workers can be substitutes and complements for younger workers. We find the substitution effects to be stronger. Older workers compete with younger workers, resulting in lower wage growth for younger workers.

Older workers’ reservation wage may be falling because pension security is eroding. Older workers with exit ramps out of the labor force may not be readily available in
the labor market and thus not easily used as substitutes for other workers or each other. Policies to attract older workers to increase their extensive and intensive labor force supply which include training, flexible schedules, and other accommodations will better protect the wages and working conditions of all workers, compared to policies that cut Social Security benefits or maintain the voluntary, individual-directed defined contribution system.

If Social Security benefits are cut by increasing the full retirement age, the following increase in the labor force participation of older workers and lower Social Security benefits will have positive effect on Social Security finances. However, the pay-go system depends on a robust payroll tax base. If older workers lower the wages of large numbers of people in the younger cohort, the payroll tax base could be lower and the system has less income than it would otherwise. Also savings derives from income, and if current income grows more slowly than expected, savings will slow too. Low wage growth could negatively affect retirement account balances and ultimately retirement savings adequacy.

This study suggests that increasing the security and adequacy of American workers’ pensions may reduce the labor supply of older workers and help make the wages of younger workers grow.
References


### Tables and Figures

**Table 1:** BEA and SSA Projections Labor Supply Growth by Age and Sex 1985-2020 vs. Actual 1985-2015 (Levine and Mitchell, 1988; BLS, 2016)

<table>
<thead>
<tr>
<th>Age/Sex Group</th>
<th>BEA and SSA Average (1985 projection)</th>
<th>Actual growth in labor supply</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Young (20-34)</td>
<td>3.9%</td>
<td>5.3%</td>
<td>1.35 pp</td>
</tr>
<tr>
<td>Female Mature (35-54)</td>
<td>39.8%</td>
<td>63.3%</td>
<td>23.45 pp</td>
</tr>
<tr>
<td>Female Old (55+)</td>
<td>73.2%</td>
<td>167.5%</td>
<td>94.25 pp</td>
</tr>
<tr>
<td>Male Young (20-34)</td>
<td>-7.3%</td>
<td>-1.0%</td>
<td>6.30 pp</td>
</tr>
<tr>
<td>Male Mature (35-54)</td>
<td>28.1%</td>
<td>45.4%</td>
<td>17.30 pp</td>
</tr>
<tr>
<td>Male Old (55+)</td>
<td>63.6%</td>
<td>109.6%</td>
<td>45.95 pp</td>
</tr>
</tbody>
</table>

**Table 2:** Levine and Mitchell Real Wage Growth Projections vs. Actual (Levine and Mitchell, 1988; BLS, 2016)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Young (20-34)</td>
<td>7.8%</td>
<td>4.4%</td>
<td>-4.2%</td>
</tr>
<tr>
<td>Mature (35-54)</td>
<td>6.1%</td>
<td>5.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Older (55+)</td>
<td>24.3%</td>
<td>1.5%</td>
<td>8.3%</td>
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<tr>
<td>Female Workers</td>
<td>-10.3%</td>
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<td>19.4%</td>
</tr>
<tr>
<td>Male Workers</td>
<td>12.2%</td>
<td>8.6%</td>
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Table 3: Increase in labor supply based on changes in labor force participation predicted by the Bureau of Labor Statistics. (BLS, 2016)

<table>
<thead>
<tr>
<th>Age</th>
<th>Projected LFP, 2024</th>
<th>Labor Force (1000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2024</td>
<td>+/-, 2014</td>
</tr>
<tr>
<td>55-59</td>
<td>74.2% 2.7%</td>
<td>15,069.0</td>
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<tr>
<td>60-61</td>
<td>67.2% 3.7%</td>
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<tr>
<td>62-64</td>
<td>53.2% 3.0%</td>
<td>6,849.4</td>
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<tr>
<td>65-69</td>
<td>36.2% 4.6%</td>
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<tr>
<td>70-74</td>
<td>22.4% 3.5%</td>
<td>3,678.5</td>
</tr>
<tr>
<td>Total</td>
<td>49.4% 3.5%</td>
<td>38,574.0</td>
</tr>
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Table 4: Increase in labor supply based on increased labor force persistence predicted by Burtless (2010).

<table>
<thead>
<tr>
<th>Age</th>
<th>Projected LFP, 2024</th>
<th>Labor Force (1000s)</th>
</tr>
</thead>
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<tr>
<td></td>
<td>2024</td>
<td>+/-, 2014</td>
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<td>73.5% 2.0%</td>
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</tr>
<tr>
<td>60-61</td>
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<td>39.3% 7.8%</td>
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<td>70-74</td>
<td>24.7% 5.7%</td>
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<tr>
<td>Total</td>
<td>50.7% 4.8%</td>
<td>39,557.6</td>
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Table 5: Elasticities of Factor Complementarity, 1963-2014

<table>
<thead>
<tr>
<th>Age/Sex Group</th>
<th>FY</th>
<th>FP</th>
<th>FO</th>
<th>MY</th>
<th>MP</th>
<th>MO</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP</td>
<td>1.35*</td>
<td>-0.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FO</td>
<td>-0.46</td>
<td>0.37</td>
<td>-6.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MY</td>
<td>1.85**</td>
<td>-3.37***</td>
<td>-4.06**</td>
<td>-1.11*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MP</td>
<td>-0.4</td>
<td>.86***</td>
<td>-1.99**</td>
<td>.92***</td>
<td>-1.09***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>-1.76**</td>
<td>-1.09*</td>
<td>4.83*</td>
<td>0.03</td>
<td>-0.17</td>
<td>-6.04***</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>.56*</td>
<td>.97***</td>
<td>2.96***</td>
<td>.96***</td>
<td>.59***</td>
<td>2.23***</td>
<td>-2.48***</td>
</tr>
</tbody>
</table>

Notes: FY – Female Young (16-34), FP – Female Prime-Aged (35-54), FO – Female Older (55-74), MY – Male Young (16-34), MP – Male Prime-Aged (35-54), MO – Male Older (55-74), K – Capital. The diagonal depicts the effect of an increase in the share of an age/sex group on its own wages. * - p < 0.10, ** - p < .05, *** - p < .01

Table 6: Projected Percentage Change in Real Wages 2014-2024 Using BLS and Burtless Projections of Labor Force

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Young Female</td>
<td>0.8%</td>
<td>.18%</td>
<td>.15%</td>
</tr>
<tr>
<td>Prime-Aged Female</td>
<td>1.2%</td>
<td>.55%</td>
<td>.58%</td>
</tr>
<tr>
<td>Old Female</td>
<td>1.3%</td>
<td>.48%</td>
<td>.41%</td>
</tr>
<tr>
<td>Young Male</td>
<td>0.2%</td>
<td>.12%</td>
<td>0.063%</td>
</tr>
<tr>
<td>Prime-Aged Male</td>
<td>0.7%</td>
<td>.35%</td>
<td>.31%</td>
</tr>
<tr>
<td>Old Male</td>
<td>1.1%</td>
<td>.76%</td>
<td>.63%</td>
</tr>
</tbody>
</table>

Notes: Young = 16-34, Prime-Aged = 35-54, Old = 55-74
Source: Authors’ calculation using CPS-ASEC, BLS Projections for Growth in Older Workers’ Labor Supply
**Figure 1:** Average Real Hourly Wages for All Workers (1984 - 2014)

Source: Authors’ calculation using CPS ASEC. CPI index from BEA National Account Tables.

**Figure 2:** Labor Supply of Age/Sex groups by Total Hours Worked, 1963-2014

Source: Authors’ calculation using CPS-ASEC data
Figure 3: Factor Shares of Output, 1963-2014

Source: Authors’ calculation using CPS-ASEC data. Total Wage share of output calculated from BEA National Accounts Tables.

Figure 4: Older Workers’ Labor Supply Compared to Historic Episodes of Labor Shocks

Sources: Authors’ calculations using labor force data from BLS (2014), Burtless (2013), Census Bureau (1910; 1950; 1970; 2000)