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REMOVING THE DISINCENTIVES IN SOCIAL SECURITY FOR LONG CAREERS

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ABSTRACT

Implicit taxes in Social Security, which measure Social Security contributions net of benefits accrued as a percentage of earnings, tend to increase over the life cycle. In this paper, we examine the effects of three potential policy changes on implicit Social Security tax rates: extending the number of years used in the Social Security formula from 35 to 40; allowing individuals who have worked more than 40 years to be exempt from payroll taxes; and distinguishing between lifetime low-income earners and high-income earners who work short careers. These three changes can be achieved in a benefit- and revenue-neutral manner, and create a pattern of implicit tax rates that are much less distortionary over the life cycle, eliminating the high implicit tax rates faced by many elderly workers. The effects of these policies on progressivity and women are also examined.

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I. Introduction

When Social Security was instituted in 1935, the period life expectancy at age 20 for males was 66 and for females 69. Today, 20-year-old males have a period life expectancy of 76 and females, 80. This increase in life expectancy has been accompanied by a corresponding improvement in health at all ages. Cutler, Liebman, and Smyth (2005) find that, in terms of mortality, men at age 68 in 2000 have roughly the same mortality risk as men at age 62 in 1960. Thus, at a same age, men in the year 2000 are roughly six years younger. In terms of self assessed health status, they find that the difference is even larger, approximately ten years. Their bottom line is, “Our best guess is that people aged 62 in the 1960s are in equivalent health to people aged 70 or more today.” In related work, Shoven (2004) suggests that the age of elderly people is more appropriately measured by remaining life expectancy than by years since birth.

These improvements in life expectancy and health status enable individuals to prolong their careers and delay retirement. However, the length of retirement has actually grown by more than the increase in life expectancy at retirement. Figure 1 shows labor force participation rates by age in 1965 and 2003. Both early retirees and median retirees are retiring earlier in 2003 than they were in 1965. Figure 2 displays labor force participation rates by remaining life expectancy rather than age, and shows that the average length of retirement for men has increased almost 50 percent since 1965. In 1965, the average length of retirement for the median male retiree was 13 years. By 2003, it was 19 years. Roughly half of the additional years were due to improvements in life expectancy and half were due to earlier retirement.

Labor Force Participation of Men by Age, 1965 and 2003

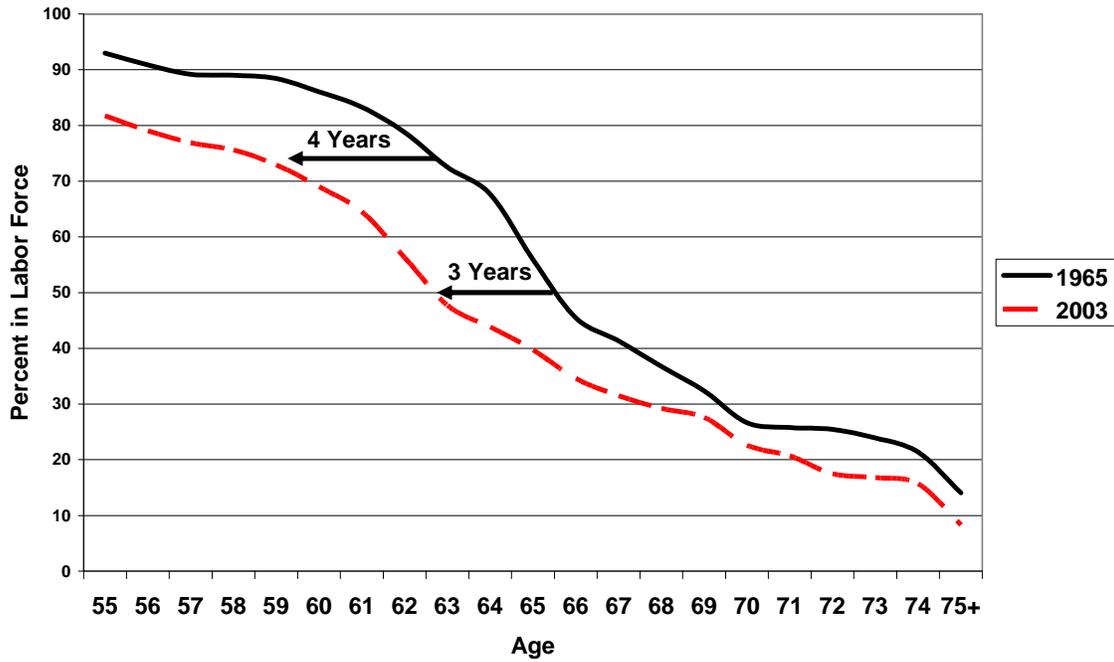


Figure 1

Labor Force Participation of Men by Remaining Life Expectancy, 1965 and 2003



Figure 2

Individuals may choose to use increases in their life expectancy for additional leisure or additional consumption, and it is possible that the shift towards longer retirements is optimal. However, there are a number of features of Social Security that distort incentives towards increased retirement length by imposing high implicit tax rates on longer careers and working at older ages. For example, Social Security benefits are computed based on the average of an individual's highest 35 years of earnings. An individual with fewer than 35 years of earnings has a relatively strong incentive to work for an additional year as the additional earnings clearly raise the average upon which the benefit is based. On the other hand, an individual who has already worked for 35 years has a diminished incentive to work an additional year – the earnings from that year will, at best, replace one of the previous highest-35 in the benefit computation. Thus, the benefit formula encourages careers of 35 years or less. Several other features of the benefit computation – which we will discuss in detail below – contribute to the disincentives for long careers.

In this paper, we examine the disincentives for long careers created by Social Security. Our main finding is that the structure of these programs imposes high implicit tax rates on workers late in their careers. As a result of this distortion, we believe retirements are suboptimally long. The consequences of this distortion are significant: a lot of the stress on public and private pension systems is caused by the increased length of retirement. We also outline ways to reduce or eliminate the implicit taxes on long careers and working at older ages. The potential benefits of a larger work force for Social Security and Medicare (and GDP) are large.

II. Work Incentives in U.S. Social Security

In this section, we investigate the impact of Old Age and Survivors' Insurance (OASI) on the career-length incentives of both stylized and actual workers. In each year of their working life, we compute the workers' present value of Social Security taxes minus benefits under the assumption that they stop working after the current year (i.e., they accumulate no further earnings). The *implicit Social Security tax rate* is defined as the increase in the net tax burden from working an additional year as a percentage of the current year's earnings. In other words, this is the additional net tax the worker incurs by prolonging his or her career by one year. This variable captures the worker's incentive to continue working for an additional year as opposed to retiring. Throughout our analysis, OASI benefits are computed under 2005 law. That is, we sum each worker's highest 35 years of wage-indexed earnings that fall below the earnings cap, and divide this amount by 420 months to get the worker's average

indexed monthly earnings (AIME). We then compute the worker's primary insurance amount (PIA): the PIA is equal to 90 percent of the first \$x of AIME, plus 32 percent of the amount between \$x and \$y, plus 15 percent of the remainder of AIME, where x and y are the constructed bend points for the appropriate retirement year.¹ The worker receives the PIA – indexed for inflation – every month from retirement until death. A minimum of 10 years of work is required to qualify for any benefits. In computing taxes and benefits, we assume an aggregate wage growth rate of 3.5 percent, an inflation rate of 2.5 percent, and a discount rate of 4.5 percent. The OASI tax rate is assumed to be 10.6 percent applied to capped earnings using the historical earnings caps. Benefit streams are discounted for mortality using the Social Security Administration's intermediate scenario mortality rates.

Our analysis is similar to that of Feldstein and Samwick (1992). Feldstein and Samwick compute marginal net tax rates for stylized workers who vary by gender, income, and marital status. They show that the additional tax paid on an additional dollar of income varies significantly across workers, and over a worker's lifetime – in particular, marginal tax rates are significantly higher for single workers, and for younger workers. Their finding that marginal tax rates decline with age comes from the fact that as a worker approaches retirement, the present value of the additional benefit received increases. However, they only compute marginal tax rates for workers between ages 25 and 60, and each year of earnings over this 35-year period is assumed to count in the benefit computation. This assumption overlooks a major disincentive for long careers: after a worker has accumulated 35 years of earnings, additional years are likely to have little, if any, impact on benefits. As we will show below, taking account of this fact implies that older workers face significantly higher implicit tax rates than younger workers.

A. A Stylized Computation

To illustrate our argument, we compute implicit tax rates for a set of four male stylized workers under current law. Three of our stylized workers receive simulated earnings profiles equal to either the average, 10th percentile, or 90th percentile earnings for his age group. In order to simulate wage histories, we use Outgoing Rotation Groups from the 2001 and 2002 Current Population Survey to compute the wage for each of the three earnings levels within each age group. We then divide this by the aggregate average wage across all age groups. This ratio is multiplied by the historical average wage in each year of the worker's life to arrive at a wage for the worker. For example, consider an average

¹ The 2005 bendpoints (\$627 and \$3779) were multiplied by the appropriate wage adjustment factor to be in line with the year in which the worker retires.

male 30-year-old worker in 1950. The national average annual wage in 1950 was \$2,763. According to our computations, a 30-year-old male earns 1.13 times the national average; therefore, his simulated wage would be $\$2,763 \times 1.13 = \$3,122$. A fourth stylized worker earns the historical earnings cap in each year.

We assume that all stylized workers start work at age 20 and retire at the normal retirement age. The implicit Social Security tax rate for a given career length is calculated as described previously. The results of this exercise are shown at the top of Figure 3 and labeled “Current Law.” Note that for less than 10 years of work, the worker is not yet vested in the system and therefore faces an implicit tax rate of the full 10.6 percent. (These years are not shown in Figure 3.)

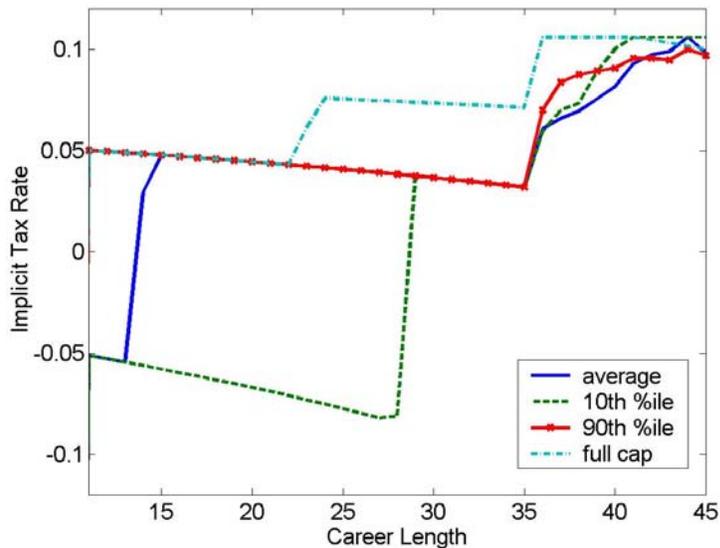


Figure 3

Two points should be clear from the graph. First, all workers experience a sharp increase in their implicit tax rate at 35 years of work. The reason for this increase is that Social Security benefits are calculated based on the highest 35 years of indexed annual earnings. This means that the 33rd, 34th, and 35th year of work noticeably improve retirement benefits because the earnings of that year replace a zero in the calculation of average indexed monthly earnings (AIME). On the other hand, the 36th year of work may or may not enter the calculation, and if it does it will replace a lower year of earnings and not a zero in the calculation. The marginal incentive to work for the 36th year and beyond is much lower than for the first 35 years. Part-time work after a career of 35 years or more will, in particular, usually have no impact on subsequent benefits and therefore the 10.6 percent OASI payroll tax is simply a tax

and has no component of deferred benefits. For people who enter the workforce immediately after high school and who do not leave the labor force for an extended period, 35 years of earnings will be accumulated by the age of 53.

Second, the median and low earners each experience a sharp increase in their implicit tax rate earlier in their careers – for the middle-income earner, after 12 years of work and for the low-income earner, after 22 years of work. This increase results from the fact that the primary insurance amount (PIA) formula is sharply progressive, combined with the fact that the AIME calculation does not distinguish between workers with lower earnings and those with higher earners but shorter covered careers. At the beginning of their careers, workers tend to have a low AIME because they have significantly fewer than 35 years of positive earnings. The benefit computation replaces the missing years of earnings with zeros, and these workers appear to be in a lower income group than their true lifetime earnings would imply. The progressivity of the PIA formula translates this low AIME into a disproportionately high monthly benefit. As workers accumulate positive earnings years, the benefit computation begins to treat them as if they have higher lifetime incomes. A sharp increase in the implicit tax rate occurs when a worker accumulates enough positive earnings years to cross a PIA bend point. Thus, the current formula favors workers with short careers by treating them as if they were low earners. In some cases, for instance where the short career was necessitated by poor health, that may be appropriate. In most cases, however, the current treatment seems inappropriate and blunts the incentive to work long careers. This effect is most pronounced for low-income workers, who face the sharpest increase in their implicit tax rate.

These distortions lead us to evaluate the following three reforms:

- 1. Use 40 years, rather than 35, in the AIME computation.*

If 40 years were used instead of 35, this would remove some of the discouragement currently built into the system for staying in the workforce. An extra five years of work would count towards the calculation of retirement benefits.

- 2. Disentangle career length and progressivity.*

Average indexed monthly earnings could be calculated only for the months with covered earnings (eliminating the zeros from the computation and dividing by the number of months of nonzero earnings rather than 420). The primary insurance amount would be calculated using this modified AIME formula. However, a single person would only get the full PIA at the NRA if they worked a full career (currently 35 years, proposed to be 40 years under the first reform). If they worked fewer years, their

benefits would be reduced proportionately. For example, consider how we currently treat someone with a ten-year high-income career. Their benefits are determined as if they were a relative low earner with the 25 years of zeros in the earnings calculation. The alternative would be to give them 10/35ths of the PIA of a high earner. This would result in a reduction of benefits for short career workers. This reform is illustrated in Figure 4 below.

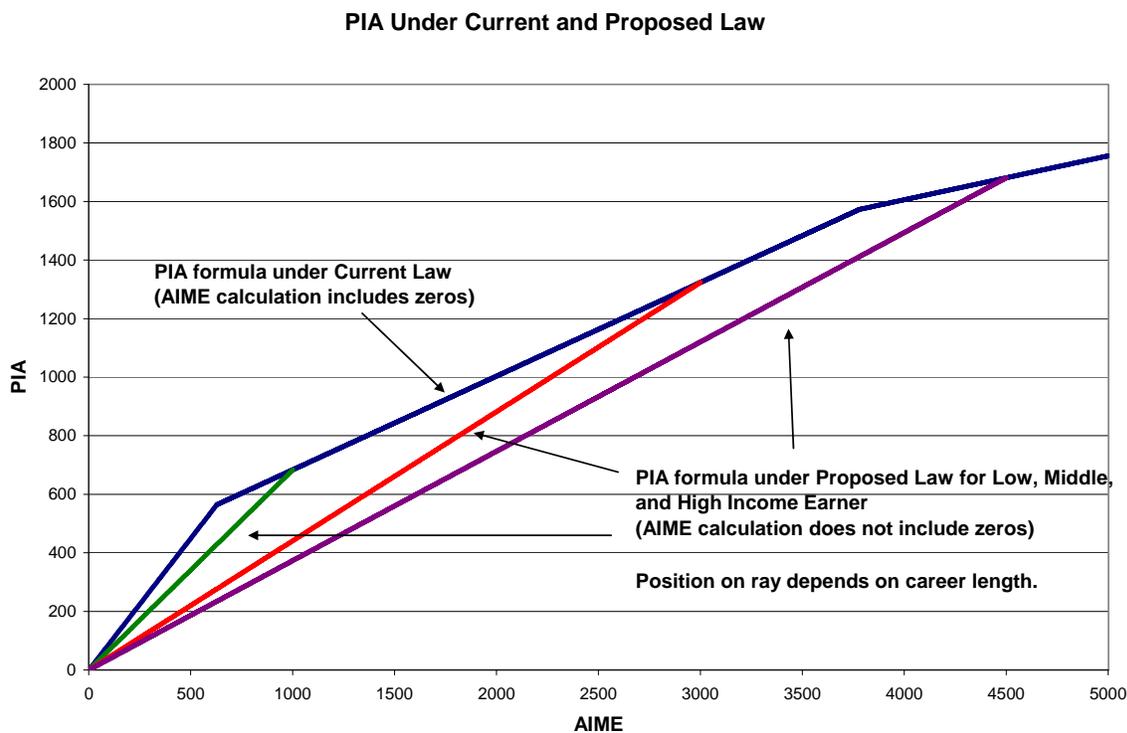


Figure 4

3. *Establish a “paid-up” category of workers who have more than 40 years of contributions.*

Under the first proposed reform, the number of years in the benefit calculation is 40. A complementary policy is to only collect 40 years of payroll taxes from workers. After 40 years of covered employment, the worker would be declared “paid-up” for both Social Security. This should be relatively easy to administer – conceivably an indicator would be added to the individuals Social Security number reflecting the fact that paid-up status had been achieved. A related idea was mentioned in Burtless and Quinn (2002), namely allowing workers who reach the Normal Retirement Age to opt out of additional Social Security contributions.

There is a theoretical justification for these policies. The intuition of optimal tax theory would be to place heavier taxes on more inelastic supply (and demand) and lighter taxes or no taxes on highly elastic behavior. Our hypothesis is that the 41st and 42nd years of work, for instance, are far more sensitive to incentives than the 21st and 22nd years of work. The practical significance of these three

reforms is to make employment of veteran workers more attractive for both the employee and the employer.

Taken together, these three proposals result in a benefit cut. In order to compensate for this and keep the reforms benefit-neutral in aggregate, we increase retirement benefits proportionately in order to keep aggregate benefits constant before and after the reforms. Assuming no behavioral changes, the adjustment needed is a 19.4 percent increase in benefits. The proposals also result in redistribution from those with shorter careers to those with longer ones. Figure 5 illustrates this by depicting our stylized average earner's PIA, as a function of career length, under both the current and the proposed law. Under the proposed law, a worker's PIA would rise more sharply as he or she accumulated years of work – that is, benefits are more responsive to a decision to delay retirement. Workers with fewer than 31 years of covered earnings would receive a smaller PIA than under the current system; however, as their career length extends beyond 31 years, their PIA rises above the current level. A similar result holds for the low and high earners.

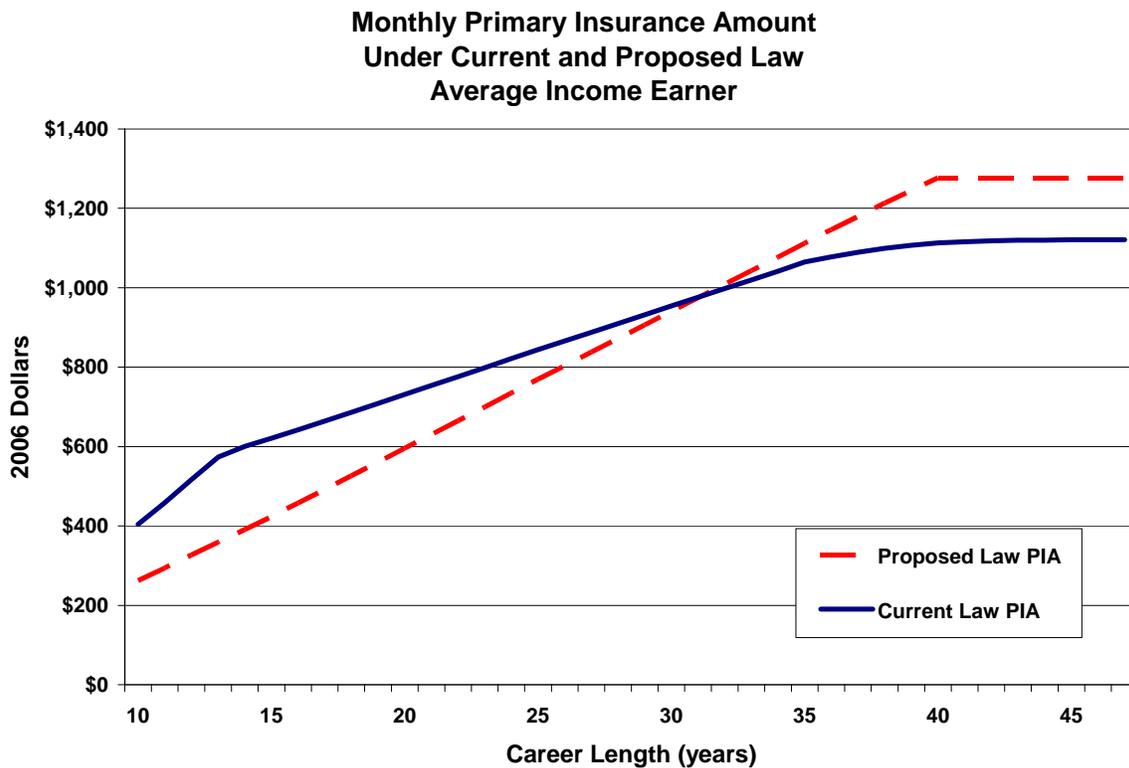
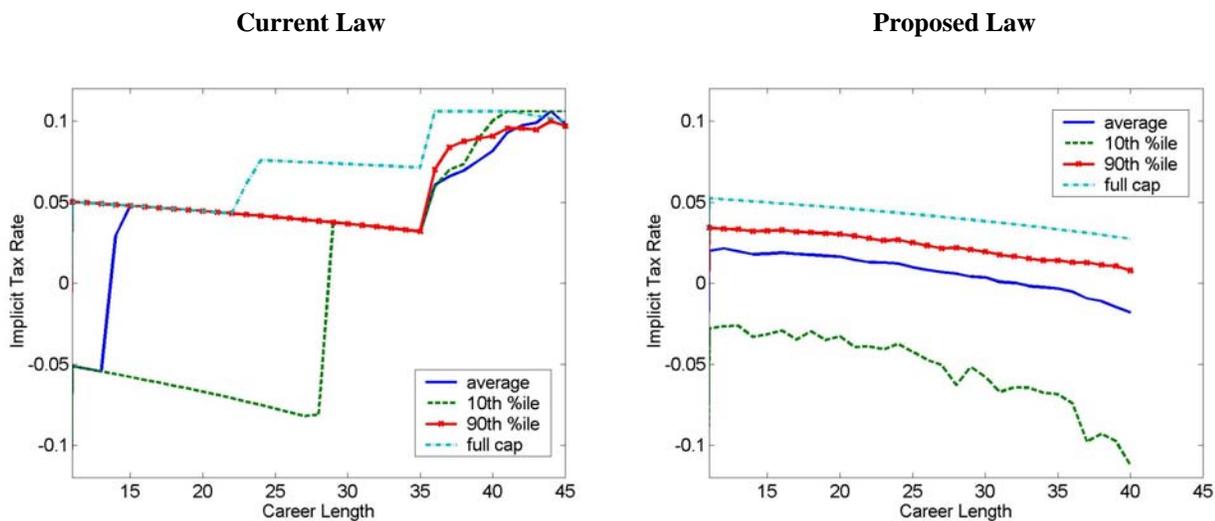


Figure 5

On the revenue side, introducing the “paid-up” category of workers who have worked 40 years constitutes a reduction in the amount of tax revenues the system receives. We estimate that at most 4.35% of OASI revenue comes from income that was earned after an individual worked 40 years.² Thus, instituting the “paid-up” reform would require a payroll tax increase of 0.5%, changing the current OASI tax from 10.6% to 11.1%. All future calculations of the impact of the three proposed reforms account for the tax and benefit adjustments to ensure benefit- and revenue-neutrality.

We repeat our implicit tax rate computations for the four stylized workers under the proposed reforms. The results are shown in Figure 6 and labeled “Proposed Law.” Current Law results are also shown for comparison purposes. Note that implicit tax rates remain roughly constant over each worker’s life, resulting in less distortion of career length choices. Moreover, implicit tax rates for all income groups are closer to zero. The decreasing trend arises from the present value of future benefits increasing as a worker gets closer to the normal retirement age. At 40 years of work, all workers enter the “paid-up” category and no longer participate in the system.

Figure 6



² The estimate of the fraction of OASI revenue earned in years 41+ comes from the Social Security Benefits and Earnings Public-Use File, 2004 described in more detail in the following section. The beneficiaries’ earnings were indexed to 2003 using the historical Social Security average wage index. This estimate is biased upwards because the dataset only includes earnings below the taxable maximum, which has increased significantly over the period 1951-2003. This implies the program has expanded over this time period, and earnings in the earlier part of this period are underrepresented.

The proposed reforms do not effect the overall progressivity of the Social Security system as is shown in Table 1. At the 35-year career length, the average income earner's internal rates of return (IRRs) are constant before and after the reforms at 1.17%. The three policies do not change the relative position of the low and high income earners. After an individual has worked 35 years, he or she is always better off under the proposed reforms.

IRRs for Workers with 35-Year Career

	<u>Current Law</u>	<u>Proposed Law</u>
Low Income Earner	2.47%	2.46%
Average Income Earner	1.17%	1.17%
High Income Earner	0.66%	0.66%

Table 1

B. Data and Results

The drawback of using stylized workers is, of course, that they do not reflect the diversity of actual workers' labor market experiences. In particular, the stylized workers' ages and career lengths are perfectly correlated. This makes it difficult to capture the experience of, for example, a woman who takes time out of the labor force to raise children. Thus, we repeat our computations using the Social Security Benefits and Earnings Public-Use File, 2004 which contains benefit and earnings data on a 1 percent random, representative sample entitled to receive a Social Security benefit in December 2004. The full sample contains data on 473,366 beneficiaries. Unfortunately, this data set provides no way to link couples; therefore, we include only workers who are receiving benefits based on their own earnings records. We limit our attention to beneficiaries receiving retirement benefits who started working in 1951 or later³ which leaves 123,552 individuals born between 1910 and 1942. We continue to use Social Security intermediate scenario assumptions for mortality.

For the actual worker computations under the proposed law, we introduce an earnings threshold: years in which earnings are less than 5 percent of the earnings cap are

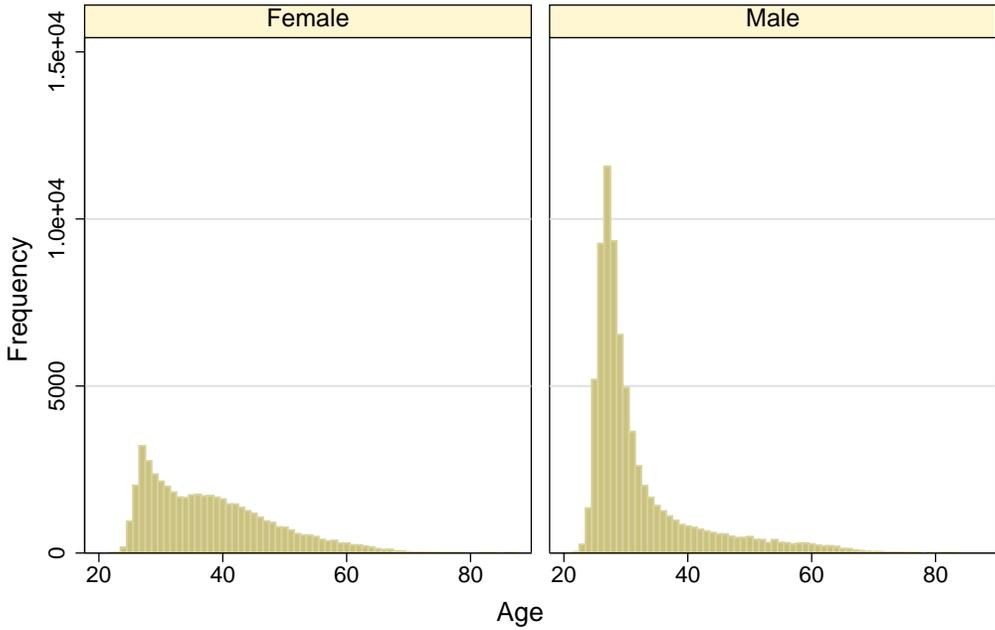
³ Only aggregate earnings are recorded for years 1937-1950.

not counted toward the years of work calculation, but are subject to payroll taxes.⁴ The rationale for the earnings threshold is that many individuals – particularly as they get older – have years in which they work a small number of hours. Without an earnings threshold, these individuals’ benefits would increase disproportionately (given the modified AIME computation and the progressivity of the PIA formula), and they would accumulate years of credit towards the paid up status. The result is that many older individuals in the sample would face large negative implicit tax rates. The earnings threshold reduces this distortion. Of course, this means that years where earnings were under the threshold face the full tax, unless the individual had attained ‘paid-up’ status by working more than 40 years. On balance, however, we find that distortions are significantly less with the earnings threshold. (This issue did not arise with the stylized workers as our simulated earnings profiles never fell below the 5 percent threshold.)

In order to illustrate the complexity of patterns that actual individuals face, we plot histograms of the ages at which individuals attain 10 years of covered earnings (vesting age at which individuals become eligible for benefits), 35 years of covered earnings (the current number used in the benefit computation), and 40 years of covered earnings (the proposed number to be used in the benefit computation). The results are broken down by gender and appear as Figures 7-9.

⁴ This is not unlike the earnings needed to obtain a quarter of coverage in the current system, \$920 in 2005. To receive 4 quarters of coverage, an individual would need \$3,680 in earnings, approximately 4% of the 2005 earnings cap of \$90,000. Earnings below this level are subject to the payroll tax even though benefits are not increased.

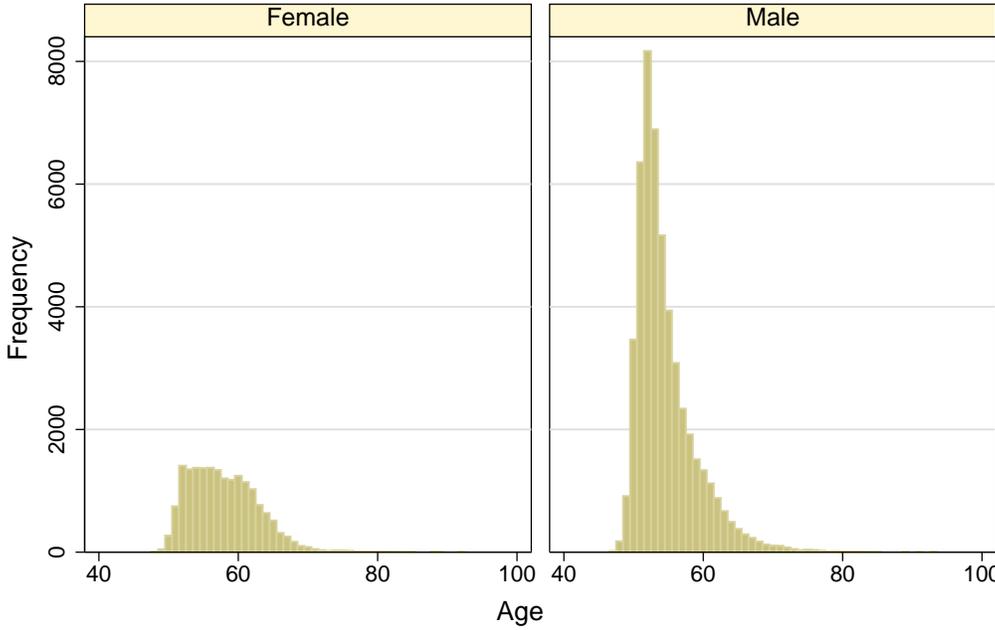
Distribution of Vesting Age



Graphs by gender

Figure 7

Distribution of 35-Year Career Age



Graphs by gender

Figure 8

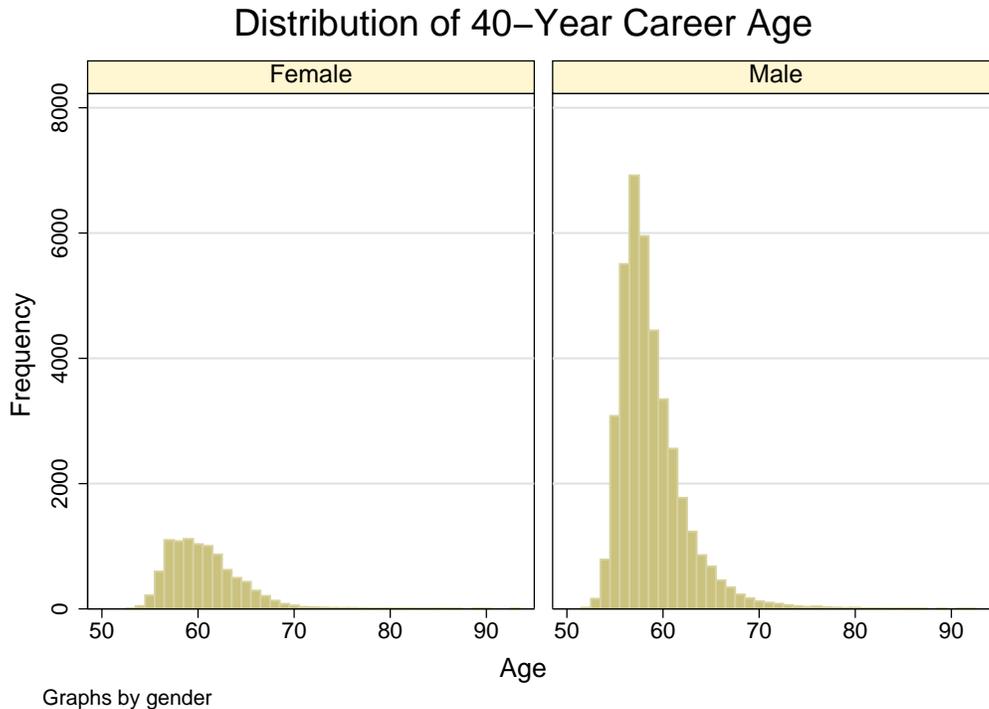
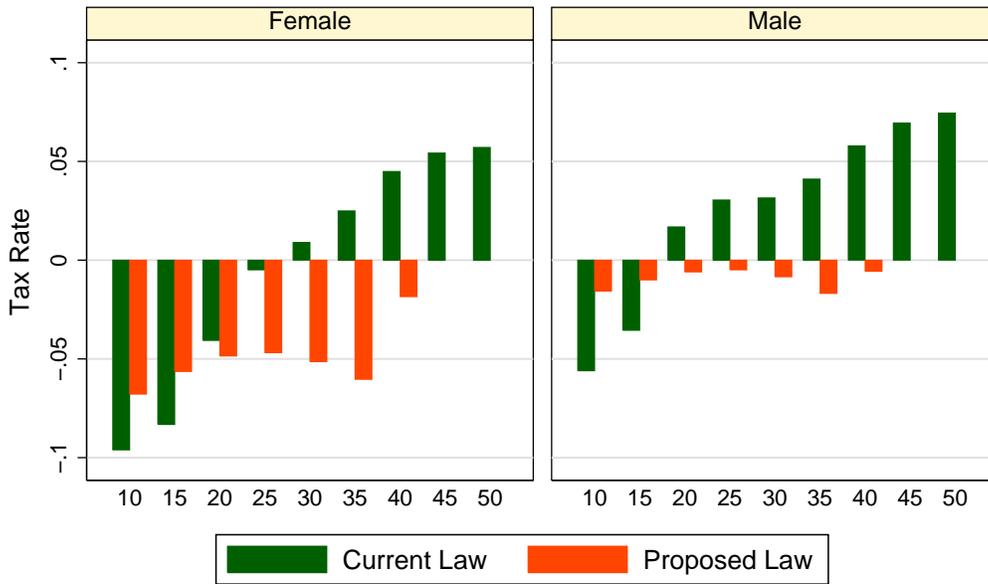


Figure 9

While workers tend to reach 10 years of work at age 30, 35 years at age 55, and 40 years at age 60 (like our stylized workers), there is considerable individual variation, particularly for females. A sizeable number of females reach these experience levels considerably later than assumed in our stylized example. These figures illustrate the importance of using actual workers to study the career length incentives created by the system, particularly if we are interested in the impact on women.

Figures 10 and 11 show our calculations of the average implicit tax rate broken down by career length (Figure 10), age (Figure 11), and gender. The current law computations exhibit the same features as did those for stylized workers. Workers face increases in their implicit tax rates under current law as they age and increase their career length. This is a result of moving from one PIA bend point to the next, and from accumulating 35 years of earnings. This result occurs for both male and female workers, and it is present whether we look at means or medians (not shown).

Average Implicit Social Security Tax Rates By Career Length



Graphs by gender

Figure 10

Average Implicit Social Security Tax Rates By Age



Graphs by gender

Figure 11

Under the proposed law, male workers’ implicit tax rates move closer to zero for all age and experience groups. There is also a much smaller association between implicit tax rate and age. Most of the large, positive implicit tax rates – which occur late in their careers – are eliminated. Those that remain are faced by individuals who earn less than the earnings threshold and therefore are being subject to the full OASI tax rate of 10.6 percent. Individuals with earnings below the threshold drive up the average implicit tax rates faced under the proposed reforms at older ages; however, the average annual income earned by people who face the full OASI tax rate is only \$1,115. One of the main differences between the treatment under the current law and the proposed law is the sharp decrease in the number of people *and* the amount of income facing the full tax rate under the three reforms.

The changes redistribute from short-careered workers to long-careered workers as shown in Figure 12. Individuals who work more than 40 years and are thus subject to the “paid-up” policy reform no longer see earlier earnings years being replaced by later, potentially higher earning years. While this could lead to a decrease in their calculated PIA, the IRR would be higher under the proposed reforms since the added benefit from replacing a year of earnings in the current calculation is small relative to the amount of taxes paid.

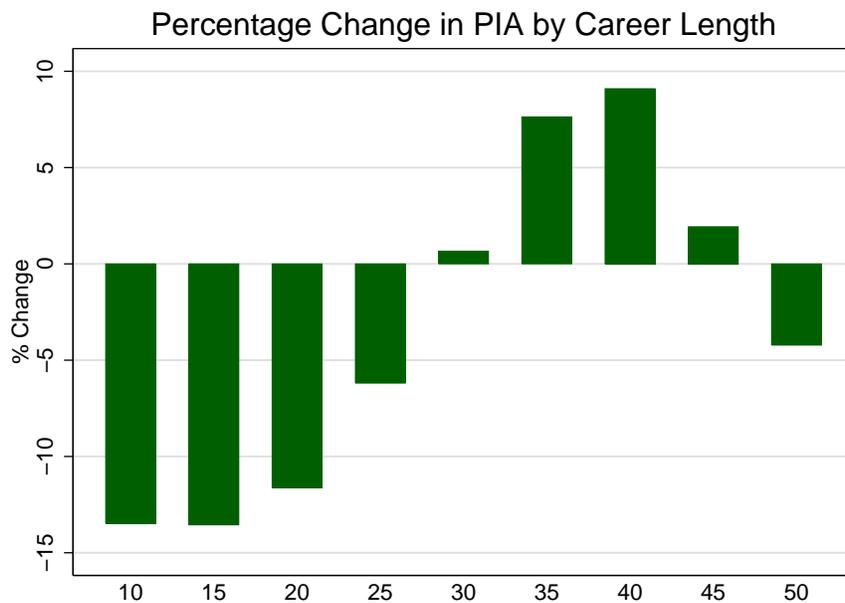


Figure 12

Females tend to experience a larger subsidy under both current law and the proposed policies due to the fact that the system is progressive and females in the sample have lower earnings, and also because their mortality probabilities are more favorable, making the expected future additional benefits larger. We define the Gender Gap to be the difference between average male and female implicit Social Security tax rates. Table 2 summarizes calculations of the Gender Gap under different mortality assumptions, and shows that approximately 40% of the difference between male and female implicit tax rates is due to more favorable female mortality; the remaining is attributed to differences in underlying earnings levels.

Average Implicit Social Security Tax Rates Under Different Mortality Assumptions

<u>Current Law</u>	<u>Average ISST</u>	<u>Gender Gap</u>
Males	0.90%	
Females using Female Mortality	-3.99%	4.89%
Females using Male Mortality	-2.18%	3.08%
Portion of Gender Gap Explained by Mortality Differences		37%

<u>Proposed Law</u>	<u>Average ISST</u>	<u>Gender Gap</u>
Males	-0.93%	
Females using Female Mortality	-5.33%	4.40%
Females using Male Mortality	-3.34%	2.41%
Portion of Gender Gap Explained by Mortality Differences		45%

Table 2

The reforms may disproportionately penalize women, who are more likely to take time out of the labor force for child and/or elderly care and experience shorter careers. Benefit levels are 0.89 percent higher for males but 1.45 percent lower for females under the three reforms. One possible policy to alleviate this effect would be to give women an across-the-board credit for working of one, two, or three years. This policy is similar to the treatment of individuals who take time out of the labor force to raise children in countries such as Germany. In the German system, a child-raising parent is treated as though he or she earned the average wage until the child’s third birthday. The differences between the PIA in the current system and the PIA under the proposed reforms along

with a credit for women are given in Table 3. Note that offering a credit to women of even one year has a substantial effect on the level of benefits.

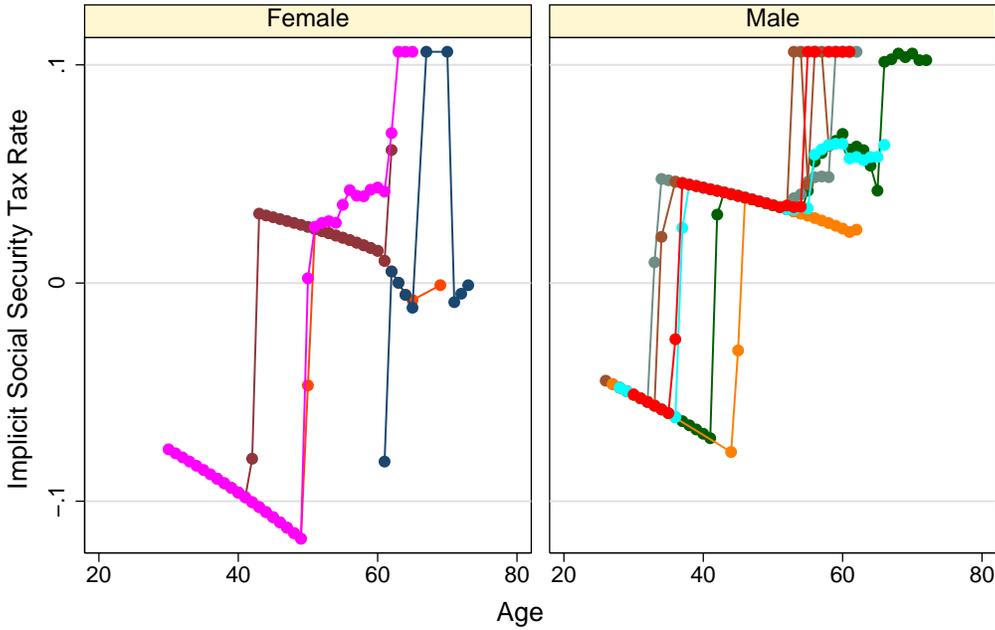
Percentage Change in PIA by Gender and Years of Credit Given for Women

	<u>No Credit</u>	<u>1-Year Credit</u>	<u>2-Year Credit</u>	<u>3-Year Credit</u>
Male Benefits	0.89%	0.89%	0.89%	0.89%
Female Benefits	-1.45%	1.69%	4.73%	7.67%
Total	-0.02%	1.20%	2.39%	3.53%

Table 3

Our calculations of mean implicit tax rates mask a considerable amount of variation across workers. To illustrate this variation, we plot individual implicit tax rates as a function of age for a small subsample of individuals under both current law and the proposed reforms. These are shown in Figures 13 (current law) and 14 (proposed law). Most individuals experience features similar to the stylized workers: under current law, there are sharp increases in implicit tax rate as they cross PIA bend points and another sharp increase when they accumulate 35 years of work. There is considerable variation across workers in the timing of these increases. The proposed law eliminates most of the large positive tax rates for older workers. It also reduces the association between age and tax rate, and moves tax rates closer to zero for most workers in most years of their lives. However, many of the workers experience single years with large negative implicit tax rates. These are years in which earnings are low – these years disproportionately increase PIA (due to the progressivity of the formula) and contribute towards “paid up” status.

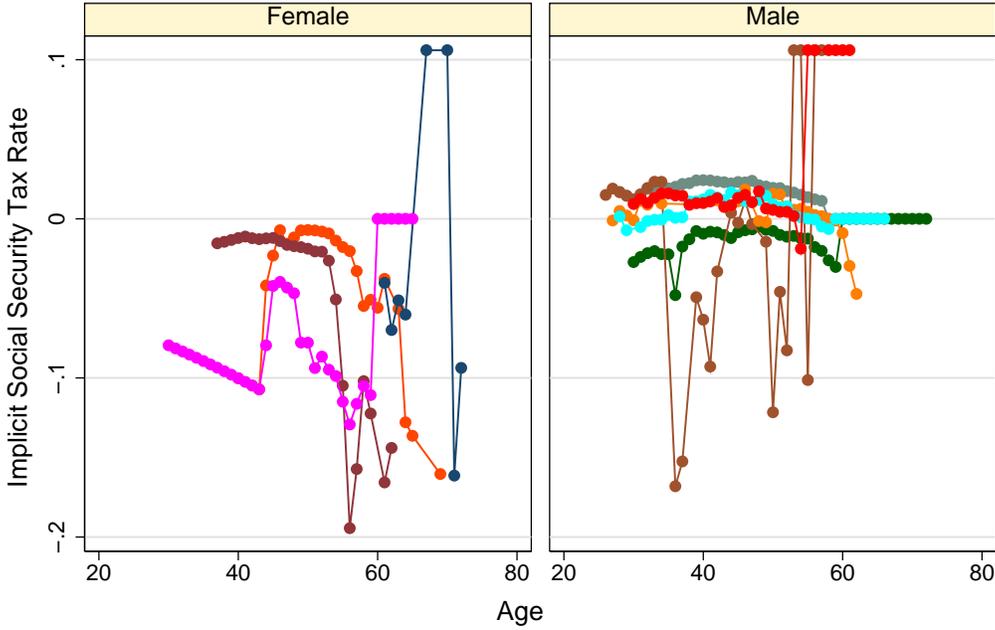
Current Law



Graphs by gender

Figure 13

Proposed Law



Graphs by gender

Figure 14

III. Conclusion

The U.S. labor market has proved to be very flexible in absorbing new workers as evidenced by its ability to accommodate large numbers of workers as women entered the labor force in the past several decades, and the economy has benefited greatly as a result of the larger work force. By eliminating the disincentives against working longer careers, we can capitalize on the good fortunes of increasing life expectancy and favorable health status by paving the way for more capable individuals to stay in the labor force.

References

- Burtless, Gary and Joseph Quinn, "Is Working Longer the Answer for An Aging Workforce?", Center for Retirement Research at Boston College Issue in Brief Number 11, December 2002.
- Butrica, Barbara A., Richard W. Johnson, Karen E. Smith, and Eugene Steuerle, "The Implicit Tax on Work at Older Ages," *National Tax Journal*, 59, 211-234.
- Cutler, David M., Jeffrey B. Liebman, and Seamus Smyth, "How Fast Should the Social Security Retirement Age Rise?" preliminary draft, Harvard and NBER, April 25, 2005.
- Feldstein, Martin and Andrew Samwick, "Social Security Rules and Marginal Tax Rates," *National Tax Journal*, Vol. 45, no. 1, pp. 1-22, March 1992.
- Fenge, Robert, Silke Uebelmesser, and Martin Werding, "Second-Best Properties of Implicit Social Security Taxes: Theory and Evidence," CESifo Working Paper No. 743, June 2002.
- Gruber, Jonathan and David A. Wise, "Social Security and Retirement around the World," NBER Working Paper 6134, August 1997.
- Shoven, John B., "The Impact of Major Improvement in Life Expectancy on the Financing of Social Security, Medicare, and Medicaid," in *Coping with Methuselah: The Impact of Molecular Biology on Medicine and Society*, Henry J. Aaron and William B. Schwartz, eds., The Brookings Institution, Washington D.C., 2004, pp.166-197.