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Does it pay to work? This is a tough question to answer because of the complexity of the tax code and a plethora of dynamic linkages involved. First, earning more today typically alters current saving and, therefore, future capital income taxes. Second, earning more today generally alters future consumption and, therefore, future consumption taxes. Third, changing future levels of income and assets changes the eligibility for and levels received of income- and asset-tested transfer benefits. Fourth, the most important transfer program, Social Security, explicitly links future transfer payments to current earnings. Fifth, income taxes in retirement depend on past earnings because Social Security benefits depend on past earnings and these benefits are subject to federal income taxation. This paper attempts to capture the net effective tax on work by using an intertemporal model capable of carefully determining tax and transfer payments at each stage of the life cycle.

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I. Introduction

Does it pay to work? Given the number and complexity of federal and state tax and transfer systems, this is a tough question to answer. The problem is greatly compounded by the fact that what one earns in one year alters not just current taxes and transfer payments in that year, but in future years as well. There are five dynamic linkages here. First, earning more in the present typically alters current saving and, therefore, future levels of capital income and capital income taxes. Second, changing future levels of income and assets changes the eligibility for and levels received of income- and asset-tested transfer benefits. Third, earning more in the present generally alters not just current, but also future levels of consumption, and, therefore, future consumption taxes. Fourth, the most important transfer program, Social Security, explicitly links future transfer payments to current earnings. Fifth, the income taxation of Social Security benefits means that income taxes in a year Social Security benefits are received depend on past Social Security-covered earnings because the benefits are, themselves, determined by past covered earnings.

Thus, understanding the effective net tax on work and the changes in work taxes associated with policy reforms requires an intertemporal model capable of carefully determining tax and transfer payments at each stage of the life cycle based, in part, on economic choices in prior periods. This study uses *ESPlanner*, a financial planning software program developed by Economic Security Planning, Inc., to study the net work tax levied on workers with different earnings capacities.

ESPlanner smooths households' living standards subject to

their capacities to borrow. In so doing, it makes highly detailed, year-by-year federal and state income tax and Social Security benefit calculations. To produce a comprehensive work tax measure, we added to *ESPlanner* all other major transfer programs, including Food Stamps, Transitional Aid to Families with Dependent Children (TAFDC), Medicaid, Medicare, Housing Assistance, Supplemental Security Income (SSI), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the Low Income Home Energy Assistance Program (LIHEAP).

Our goal is calculating average and marginal net work taxes facing stylized young couples with different levels of earnings. We begin by calculating average lifetime net tax rates defined as the ratio of lifetime net taxes to lifetime earnings. We then present average and marginal net tax rates on working full-time and half-time throughout one's lifetime and the marginal net tax from switching from half-time to full-time work. Finally, we measure marginal net tax rates on working at particular ages.

Our measured present values of spending in both the presence and absence of fiscal policy are actuarial calculations. They adjust for the probability that one or both spouses may die prior to reaching her or his maximum age of life. This actuarial valuation is very important because surviving widows and widowers can face very different taxes and transfers from those they face when married. These survivor-specific fiscal policies are also included in the analysis.

We find seven things. First, our fiscal system is highly progressive. Households earning the minimum wage receive 18 cents

in benefits net of taxes for every dollar they earn. In contrast, households with million dollar salaries pay 54 cents in taxes net of benefits per dollar earned. Second, progressivity is primarily restricted to the bottom end of the income distribution. Average net work tax rates of middle class households are relatively high compared with those of the rich. Third, while the poor face negative average taxes, they face significant positive marginal net taxes on working. Indeed, a minimum wage household that chooses to work is forced to surrender 34 cents of every dollar earned in net taxes. For workers earning one-and-a-half or more times the minimum wage, the marginal net tax on full-time work exceeds 50 percent. Fourth, low-wage workers face confiscatory tax rates on switching from part-time to full-time work. Fifth, the same is true of secondary earning spouses in low-wage households. Sixth, the marginal net tax on working is dramatically higher for most workers when young than when old. Seventh, average and marginal net work tax rates are relatively insensitive to the assumed rate of real wage growth and the discount rate. And eighth, major tax reforms, such as switching from income to consumption taxation, can have a significant affect on the fiscal system's overall progressivity.

The paper proceeds with a brief mention of related prior studies. It next describes the complexity of the tax-transfer system and, by implication, the need to sweat those details to measure net tax rates accurately. It then describes our methodology, *ESPlanner* and its use in this study, the characteristics of our stylized households, our approach to modeling the fiscal system, and our findings. The final section

summarizes and concludes.

II. Prior Studies

Many studies of lifetime fiscal burdens and their distribution have examined one fiscal policy at a time. Boskin, et. al. (1987), Caldwell, et. al. (1999), Gokhale and Kotlikoff (1999), and Myers and Schobel (1993) are all examples of studies of Social Security's lifetime net tax treatment. Poterba (1989) considers the lifetime incidence and distribution of excise taxes. And Fullerton and Rogers (1995) study the lifetime incidence of consumption taxes. None of these studies consider the tax on work per se.

Fullerton and Rogers (1993) represents the first serious attempt to quantify the lifetime burden of the entire U.S. tax system, but, again, not the tax on work. They construct an elaborate life-cycle general equilibrium model and use it to study the incidence of particular U.S. tax systems. Their impressive framework allows them to consider the full incidence of the tax system. Fullerton's and Roger's approach and subsequent related work by Altig et al. (2001) provide significant insight into the burden and distribution of gross tax liabilities. Fullerton and Rogers find that the personal federal income tax is highly progressive, with the lowest income groups paying 5 percent of their lifetime incomes and the highest income groups paying 19 percent.

Although these studies tell us a lot about gross tax liabilities, they are relatively silent about overall net tax liabilities as well as the net tax on work. Moreover, they are highly stylized and do not consider many of the details of the

tax-transfer system that affect its impact. For example, they don't consider tax credits, such as the earned income tax credit and the child tax credit. Nor do they consider the phase-out of itemized deductions, the taxation of social security benefits, or the progressivity of state income taxation.

Hubbard et al. (1995) provide a partial equilibrium analysis of the impact of the fiscal system on saving decisions in a setting with earnings and health expenditure uncertainty. Their focus is on the system's transfer programs, particularly its saving disincentives for the poor. Although their model would permit an analysis of the fiscal system's overall progressivity, they don't use it for that purpose. Nor is it necessarily ideal for such an analysis because it is also highly stylized.

Unlike the studies of Fullerton and Rogers (1993) and Altig et al. (2001), the analysis here is partial equilibrium in nature; i.e., it doesn't take into account feedback effects of fiscal policy on the pretax level of wages or the pretax return to capital. And unlike Hubbard et al. (1995), our model doesn't consider behavioral reactions to fiscal work and saving disincentives. Instead, we investigate the work disincentives of our tax-transfer program without studying the reaction of households or the macro economy to those disincentives. In this respect, our study is close to Pechman's (1985) work, although his focus was comparing annual gross taxes to annual income, as opposed to comparing lifetime net taxes to lifetime income.

III. The Complexity of Our Tax-Transfer System

It's difficult to exaggerate the complexity of the taxes and transfer programs facing American workers. Mastering just the

federal income tax represents a major challenge because it comprises so many special provisions. The list includes the inflation-indexation of tax brackets, the partial, but graduated taxation of Social Security benefits above two non inflation-indexed thresholds, the treatment of retirement account contributions and withdrawals, the phase-out of itemized deductions, the earned income tax credit, the child-tax credit, the alternative minimum tax, and the recently legislated credit to low-income households for contributing to retirement accounts.

If the federal income tax weren't hard enough to follow, almost all states have income taxes with their own special provisions. For example, Massachusetts has a special exemption for the elderly, a child deduction, a rental deduction, and a deduction for employee-paid payroll taxes. Compared to these taxes, the FICA payroll tax may seem straightforward. But workers who want to calculate their lifetime net work taxes must understand its ceiling, how that ceiling changes through time, the degrees to which employer and employee payroll contributions are and are not subject to federal and state income taxation, and the degree to which their employer's retirement account contributions and other fringe benefit payments are and are not subject to payroll taxation.

Figuring out these three tax systems and their interdependencies provides a good apprenticeship for approaching our benefit programs. The most complex of these is surely Social Security, which requires a handbook of over 500 pages to clarify its provisions. Those brave enough to wade through this tomb will learn about eligibility requirements, primary insurance amounts,

partial wage indexation of earnings histories, inflation indexation of benefit levels, benefit reductions for early retirement, recomputation of benefits, the delayed retirement credit, family benefit maximums, the recently modified earnings test, retirement benefits, survivor benefits, mother and father benefits, children benefits, spousal benefits, and divorcee benefits. Unfortunately, reading the Handbook in its entirety raises almost as many questions as it answers – questions that can only be resolved via detailed interrogatories with actuaries at the Social Security Administration.

Although their intricacies pale in comparison with those of Social Security, understanding the details of our other benefit programs can also gray one's hair, particularly those dealing with the relationship of one program's benefits to those of another. Take Medicare and Medicaid. Medicare's co-payments are covered by Medicaid under certain conditions. But if covered, these co-payments reduce the income deduction for Food Stamps and, thus, the ultimate amount of Food Stamps received. And Medicaid benefits are, themselves, income tested, where income includes Social Security and SSI (Supplemental Security Income) benefits.

IV. Defining Net Work Tax Rates

A simple two-period framework motivates the formula we use to calculate net tax rates on working. Let c_y stand for consumption when young, c_o for consumption when old, r for the pre-tax rate of return earned on saving, e_y for earnings from working full time when young, e_o earnings from working full time when old, and $T(e_y, e_o, c_y, c_o, r)$ for the present value, discounted at rate r, of lifetime net tax payments. We write lifetime net tax payments as

a function of earnings when young and old, consumption when young and old, and the pre-tax rate of return, since taxes paid and transfer payments received when young and old depend on all of these variables.[1]

The household's lifetime budget constraint is

(1) $C = E - T(c_y, c_o, e_y, e_o, r)$,

where C stands for the present value of consumption and E for the present value of earnings when the household works fulltime and earns e_y when young and e_o when old.[2] The average work tax rate, $\bar{\tau}$, is defined as.

(3) $$\bar{\tau} = \frac{T(c_y, c_o, e_y, e_o, r)}{E}.$$

To understand our calculation of marginal net work tax rates, let C^* refer to the present value of consumption when earnings are zero (when the household doesn't work), and let c^*_y and c^*_o denote consumption when young and old in that setting. Hence,

(2) $C^* = -T(c^*_y, c^*_o, 0, 0, r)$

Note that C^* can be positive when earnings are zero if the household receives transfers (T^* is negative). The marginal net work tax rate, τ, is given by

(3) $$\tau = \frac{(E + C^*) - C}{E + C^*}$$

To understand this tax rate, note that $E+C^*$ represent the increase

[1] For example, consumption taxes, including sales taxes and excise taxes, depend on consumption when young and old (cy and co); payroll taxes when young and old depend on earnings when young and old (ey and eo); and income taxes depend on total labor plus asset income when young and old (e_y and $e_o + r(e_y - c_y)$).

[2] That is, $C = c_y + c_o/(1+r)$ and $E = e_y + e_o/(1+r)$.

in lifetime spending that would occur if, in going to work, the household could keep it's basic benefits, measured by C^* (the present value of consumption if the household doesn't work), and also keep its entire increase in lifetime earnings, given by E (the present value of full-time earnings). The difference between this amount and C -- what the household actually gets to consume as a result of working – is the numerator of this tax rate. It represents the absolute amount the household loses (or gains, if τ is negative) from working. This net loss divided by the total potential gain is the net tax rate from the household working full time over its lifetime.

Note that E not only equal the present value of earnings; it also equals the present value of consumption that the household would enjoy in the absence of any fiscal policy (the case that $T(e_y, e_o, c_y, c_o, r)=0$ regardless of its arguments). Call that present value C^{**}. Hence, the work tax rates can be expressed solely in terms of present values of consumption; i.e.,

(4) $$\bar{\tau} = \frac{T(c_y, c_o, e_y, e_o, r)}{C^{**}}, \quad \text{and}$$

(5) $$\tau = \frac{(C^{**} + C^{*}) - C}{C^{**} + C^{*}}.$$

These formulae are, with several important caveats, the ones we use to measure average and marginal net tax rates from full-time work as well as from half-time work. The first caveat is that we replace the present values of consumption with their corresponding present values of total spending. Spending includes not just expenditures on consumption goods and services, including housing services, but also spending on life insurance premiums and

special expenditures, like weddings and college tuition paid on behalf of children. Second, since some of spending goes to pay excise, sales, and other taxes on consumption, in measuring the present value of spending in the presence of fiscal policy, we reduce spending by θ percent, where θ is the consumption tax rate. In what follows, "spending" is used to refer to spending net of consumption taxes.

A third important difference in our actual and the model's net tax rates is that our measure of the present value of spending adds in the present value of all transfer payments other than Social Security benefits (which are already included in *ESPlanner*). Effectively, then we treat all non-Social Security transfers (Food Stamps, WIC, TAFDC, Housing Assistance, SSI, WIC, and LIHEAP, Medicare, and Medicaid) as non-fungible and simply add their present value to the present value of spending calculated by *ESPlanner*. Our procedure here assumes that these benefits are spent in the year they are received. This makes sense for most of these transfers, since they are provided in kind, rather than in cash. However, our treatment of TAFDC and SSI, which are provided in cash, as non-fungible is made for computational convenience. Specifically, treating these two benefits as fungible dramatically increases computation time because of the complexity of their income and asset tests.

V. *Actuarial Valuation*

There is a final and very important difference in our actual net work tax formula. In forming the present values of lifetime spending (and consumption, which we need in order to net out consumption taxes), we take into account the fact that neither

spouse may live to her or his maximum age of life (age 95). As a widow or widower, each spouse will pay different amounts of taxes and receive different amounts of benefits than would be the case was she still married. Our precise net work tax formulas are based on the actuarial present values of lifetime spending, where we a) multiply the spending levels in all future years when both spouses are alive by the probability of their both living through those years and b) multiply the spending levels when each spouse is a widow or widower by the probability of that survivorship state occurring. Since the amount a widow or widower spends in a particular year can differ depending on when her or his spouse passed away, we form survivorship probabilities conditional on the age of death of the spouse and calculate spending separately for each spouse conditional on the death age of her/his partner.

VI. *ESPlanner*

ESPlanner uses dynamic programming techniques to smooth a household's living standard over its life cycle to the extent possible without allowing the household to go into debt. In making its calculations, *ESPlanner* takes into account the non-fungible nature of housing, bequest plans, economies of shared living, the presence of children under age 19, and the desire of households to make "off-the-top" expenditures on college tuition, weddings, and other special expenses. In addition, *ESPlanner* simultaneously calculates the amounts of life insurance needed at each age by each spouse to guarantee that potential survivors suffer no decline in their living standards compared with what would otherwise be the case.

ESPlanner's calculates time-paths of consumption expenditure, taxable saving, and term life insurance holdings in constant (2001) dollars. Consumption in this context is everything the household gets to spend after paying for its "off-the-top" expenditures – its housing expenses, special expenditures, life insurance premiums, special bequests, taxes, and net contributions to tax-favored accounts. Given the household's demographic information, preferences, and borrowing constraints, *ESPlanner* calculates the highest sustainable and smoothest possible living standard over time, leaving the household with zero terminal assets apart from the equity in homes that the user has chosen to not sell. The amount of recommended consumption expenditures needed to achieve a given living standard varies from year to year in response to changes in the household's composition. It also rises when the household moves from a situation of being liquidity constrained to one of being unconstrained. Finally, recommended household consumption will change over time if users intentionally specify that they want their living standard to change. *ESPlanner's* algorithm is complicated. But it's easy to check *ESPlanner's* reports to see that, given the inputs, preferences, and borrowing constraints, the program is recommending the highest and smoothest possible living standard that the household can sustain over time.

Since the taxes paid by households depend on their total incomes, which include asset income, how much a household pays in taxes each year depends on how much it has consumed and saved in the past. But how much the household can consume and, therefore, how much it will save depends, in part, on how much it has to pay

in taxes. Thus taxes depend on income and assets, which depend on taxes. This simultaneity means that the time-paths over the household's life cycle of consumption, saving, and tax payments must be jointly determined. *ESPlanner* achieves this simultaneous and consistent solution not only with respect to consumption and saving decisions, but also with respect to the purchase of life insurance.[3]

Because taxes and Social Security benefits make a critical difference to how much a household should consume, save, and insure, casual calculations of these variables is a prescription for seriously misleading financial recommendations.[4] As mentioned, *ESPlanner* has highly detailed federal income tax, state income tax, Social Security's payroll tax, and Social Security benefit calculators. The federal and state income-tax calculators determine whether the household should itemize its deductions, computes deductions and exemptions, deducts from taxable income contributions to tax-deferred retirement accounts, includes in taxable income withdrawals from such accounts as well as the taxable component of Social Security benefits, and calculates total tax liabilities after all applicable refundable and non refundable tax credits.

These calculations are made separately for each year that the couple is alive as well as for each year a survivor may be alive.

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[3] The program not only calculates the appropriate levels of life insurance at each age for each spouse when both are alive. Bit also determines how much life insurance each surviving spouse needs to purchase.

[4] See Gokhale, Jagadeesh, Laurence J. Kotlikoff, and Mark Warshawsky, "Comparing the Economic and Conventional Approaches to Financial Planning," in Laurence J. Kotlikoff, *Essays on Saving, Bequests, Altruism, and Life-Cycle* Planning, Chicago, Ill.: University of Chicago Press, NBER volume, 2001, 489-560.

Moreover, *ESPlanner's* survivor tax and benefit calculations for surviving wives (husbands) are made separately for each possible date of death of the husband (wife). I.e., *ESPlanner* considers separately each date the husband (wife) might die and calculates the taxes and benefits a surviving wife (husband) would receive each year thereafter.

VII. Our Stylized Couples

Our stylized household features a husband and wife, both of whom are initially age 18 and live at most to age 95. The couple has two children, one at age 25 and one at age 27. Both spouses earn the same income and work through age 64. Their initial annual earnings, which grow by 1 percent in real terms each year, are multiples of the minimum wage times 40 hours per week times 52 weeks. Both children attend college between ages 19 and 22. Couples with annual earnings below $105,000 pay one third of their total initial real annual earnings in college tuition/room and board for each child for each year of education. For couples earning $105,000 or more, college support payments are capped at $35,000 (one third of $105,000).

The couple initially rents a house for 25 percent of its total initial annual earnings. But at age 25, the couple purchases a house for three times initial earnings. This purchase is financed with a 20 percent down payment and an 80 percent mortgage carried at an 8 percent nominal interest. The couple earns a 4 percent real pre-tax return on assets. Funeral expenses for each spouse are 10 percent of each spouse's initial annual earnings, up to a maximum of $10,000. There are no bequests apart from the value of home equity when the last spouse dies, since the

couple never sells its home.

VIII. Modeling the Fiscal System

As indicated in the Appendix, our analysis incorporates all major tax-transfer programs at both the federal and state levels. To account for overall labor productivity growth, which we assume underlies the growth in real wages of our stylized couples, we index annual real benefit amounts as well as real benefit brackets in the benefit formulae to an index of the real wage. We assume this index grows at the same rate as the real wages of our stylized couples. The one exception here is the thresholds at which Social Security benefits become taxable under the federal income tax. The federal government has eliminated inflation-indexation of these thresholds in what appears to be an intentional policy of increasing, over time, the share of benefits subject to taxation.

From an economics perspective, employer-paid payroll taxes are no less of a burden on workers than those paid directly by employees. To incorporate these taxes, we gross up each spouse's labor earnings by the amount of the employer-paid payroll taxes and raise *ESPlanner's* rate of payroll taxation from 7.15 percent to 15.3 percent – the combined OASDHI payroll tax rate.[5] For purposes of calculating federal income taxes, however, we do not gross up labor earnings, since employer contributions are an exclusion from the federal income tax base. While making these adjustments makes no change in *ESPlanner's* recommended consumption or total spending in the presence of the tax-transfer system,

[5] To be more precise, we gross up each spouse's labor income by a) 1.45 percent, which is the HI employer payroll tax rate, plus b) 5.7 percent of labor earnings up to the OASDI taxable earnings ceiling, where 5.7 percent is

these values are higher when we turn off all taxes and transfers. In terms of equation (4), *C*** (the present value of spending in the absence of all taxes and transfers), and, therefore, our calculated lifetime net work tax rate, is larger because of this adjustment for employer-paid payroll taxes.

Like employer-paid payroll taxes, federal and state corporate income taxes represent a hidden tax, whose burden (incidence) falls on workers. We treat these taxes in a parallel fashion to employer-paid payroll taxes. Specifically, we a) increase our assumed nominal rate of return by the amount of these taxes and b) adjust *ESPlanner's* calculation of income taxes to include these "corporate" taxes on capital income. By making these two adjustments, *ESPlanner's* recommended consumption and, therefore, present value of spending in the presence of the tax-transfer system remains unchanged, but it is higher when we turn off all taxes and transfers. Again, *C***, and, therefore, our calculated lifetime net work tax rate, is larger because of this adjustment for employer-paid payroll taxes. In making this adjustment for corporate income taxes, we are assuming that the elimination of corporate income taxes would fully redound to the benefit of workers in the form of a higher rate of return earned on their savings.[6]

The Appendix details our calculation of taxes and the benefits from transfer programs. In the case of the various benefit programs, we take into account income and asset tests. We

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the OASDI employer payroll tax rate.

[6]An alternative incidence assumption, which would be appropriate for a small open economy and which we don't pursue here, is to assume that the incidence of corporate income taxes falls on workers in the form of lower wages, rather than lower after-tax rates of return.

also take into account the joint determination of benefits arising from the fact that the level of benefits available from one program may depend on the level of benefits received from another.

IX. Findings

Table 1 presents average net work tax rates from full-time work. This tax rate divides the household's total net taxes associated with working full time through retirement by the present value of spending the household would enjoy in the absence of taxes or transfers. Consider first households earning the minimum wage. Their average net tax rate is a negative 17.8 percent meaning their lifetime spending is 17.8 percent higher from working than it would be in the absence of any fiscal policy. The table's second row indicates that households earning 1.5 times the minimum wage, or $32,100 at the beginning of their careers, face a 25.8 percent average net work tax. For household earning twice the minimum wage, with an initial annual income of $42,800, the average net tax rate is 33.4 percent. For households earning from three to forty times the minimum wage, average work tax rates gradually rise from 40.2 percent to 54.4 percent.

These findings lead to the following three conclusions. First, subsidization of work essentially begins and ends with minimum wage households. Second, most low-income households pay fairly substantial shares of their lifetime economic resources in the form of net taxes. And third, the fiscal system is fairly progressive at the bottom, but is roughly proportional with respect to the treatment of upper middle-income, high-income, and very high-income households.

Tables 2 and 3 clarify the source of these findings. Table 2 shows the present values of the various taxes and transfers for different multiples of the minimum wage. Table 3 scales Table 2's values by the present value of spending in the absence of taxes and transfers. The tables contain seven features worth mentioning. First, the present value of federal income taxes rise from a negative 2.6 percent of spending to a positive 4.0 percent as we move from a 1 minimum wage to a 1.5 minimum wage household. Hence, notwithstanding the earned income tax credit, the child tax credit, and other progressive features of the federal income tax code, federal income taxes are positive, on net, for households with very low, if not the lowest, levels of income. Second, personal federal and Massachusetts' state income taxes are highly progressive, while payroll taxes are highly regressive. Third, consumption taxes are somewhat regressive. Fourth, corporate income taxes, while progressive, are relatively insignificant. Fifth, Medicaid and the other welfare benefits are targeted exclusively to the poor. Sixth, the other transfer programs -- Social Security and Medicare – provide their benefits on a highly progressive basis. And seventh, one cannot assess the overall degree of the fiscal system's progressivity by considering any one tax or transfer program in isolation.

Marginal Net Full-Time Work Tax Rates

Table 4 switches attention from average to marginal net full-time work tax rates. As discussed above, the marginal net full-time work tax considers the net increase in spending that a worker experiences in switching from no work to working full time. In contrast to Table 1, all households face positive and substantial

marginal net full-time work tax rates. Indeed, the minimum wage household faces a 33.6 percent marginal tax on working full time even though its average tax is negative 17.8 percent. The reason for this large difference in average and marginal net tax rates is that households who don't work receive very substantial transfers. These transfers are substantially reduced when the households go to work full time. The net tax on going to work full time is positive both because transfers are reduced and because taxes become positive.

Households earning 1.5 or more times the minimum wage face marginal net full-time work taxes that range between 51.1 percent and 55.4 percent. Hence, in going to work, the vast majority of American households hand over slightly more than half of every dollar they earn to state and federal government. Moreover, the fact that all but the lowest income workers face roughly the same effective marginal net tax rates on full-time work means that the distortion (excess burden) facing the vast majority of workers associated with the decision to work full time is roughly the same share of lifetime spending.

Half-Time Work Tax Rates

Tables 5 through 8 repeat the above analysis for half time rather than full-time work. Table 5 shows a very substantial average subsidy of 121.0 percent given to minimum wage households who work half time. The average subsidy drops to 56.4 percent for households earning 1.5 times the minimum wage and to 17.8 percent for households earning twice the minimum wage. Higher wage households face positive average half-time net tax rates. At three times the minimum wage the net tax rate is 25.8 percent.

The rate rises gradually to 54.0 percent for the 40-times minimum wage household.

Tables 6 and 7 decompose these average net tax rates of Table 5 into their different tax and transfer components. They show that the federal income tax generates a substantial average net subsidy for half-time workers earning at or very close to the minimum wage. Medicaid is the most important transfer provided to poor half-time workers. Indeed, for minimum wage households, Medicaid provides 80 cents for every dollar of spending the household would do in the absence of any fiscal policies.

Table 8 presents marginal net taxes on switching from zero work to working half time. As in Table 4, all marginal tax rates are positive, starting with the minimum wage household, which faces a 13.2 percent net tax rate. Once the household's wage is three or more times the minimum, the marginal tax is above 50 percent. Again, the explanation for the positive sign of marginal net tax rates for the poor is that even half-time work leads to substantial increases in federal income taxes and reductions in benefits from transfer programs.

Table 9 considers a different marginal net work tax rate, namely that imposed on switching from half-time to full-time work. For very low-wage workers as a group, the loss in benefits and the rise in taxes are so large as to eliminate almost any economic gain from the switch. Indeed, households earning 1.5 times the minimum wage who switch from half- to full-time work end up handing away 105 cents for every dollar earned! While less than 100 percent, the net tax rate on moving from half time to full time work is still quite large for middle-income households, but

it drops substantially with earnings for very high earners. The reason for the drop is intuitively clear: High earners pay federal and state income taxes at the highest rate brackets even when working half-time but low and middle-income households become subject to higher marginal income tax rates upon switching from half- to full-time work.

Net Work Tax Rates on Second Earners

Table 9's net tax rates not only indicate the rate of net taxation of both spouses' earnings if both switch from half time to full-time work. They also indicate the net tax rate imposed on a non-working spouse who decides to work full time and earns the same amount as his/her partner. From this perspective, the U.S. fiscal system is very strongly encouraging one spouse in low-wage married households to stay out of the labor force. Because of child rearing, cultural norms, and gender differences in pay, the spouse being forced out of the work force by our fiscal system will typically be the wife.

Age-Specific Net Work Tax Rates

Tables 10 through 14 present net tax rates on working at a particular age given that the household works at all other ages. The experiment here compares a) the increase in lifetime spending from working versus not working at a particular age under the current fiscal system with b) the increase in lifetime spending from working rather than not working at that age in the absence of all taxes and transfers. The value [1–(a/b)]_100 equals the tax bite imposed on working at the age under consideration. At 9.7 percent, the net tax rate on working at age 25 is fairly low for minimum wage workers. However, for workers earning just a little

more--about 1.5 times minimum wage--working at age 25 comes with a hefty tax rate of 59.6 percent. Table 15 shows the changes in different components of taxes and transfers for the experiment of Table 10. It shows that at age 25, those earning 1.5 times minimum wage lose much more by way of Medicaid benefits by working compared to those earning at the minimum wage. In addition, working at age 25 induces an increase in federal income taxes for those earning 1.5 times the minimum wage whereas those earning at the minimum wage receive a subsidy for working by way of the earned income credit. Table 10 shows that the net tax rate for working at age 25 is about 45 percent for those earning between three- to forty-times the minimum wage. That is, the tax on working at age 25 is roughly proportional over most of the earnings distribution.

A similar pattern of net tax rates by income arises for working at age 35 except that the net tax rate falls quite steeply at higher income levels. The reason -- borrowing constraints are less binding on high earners prior to age 35 because children's college expenses are capped for high earning households. This implies that high earners enjoy greater flexibility in adjusting assets prior to age 35. Prior asset accumulation is much greater when not working at age 35 for high earners compared to low earners. But, high prior asset accumulation implies higher capital income taxes. Therefore, by choosing to work rather than not at age 35, high earning households save a lot more on capital income taxes than do middle or low income households--as is evident from Table 16.

Table 12 shows the impact of not working at age 45. Net

marginal tax rates are in the teens at low-income levels and stay relatively flat until 10-times-minimum-wage level of earnings. The tax rates rise sharply for very high earners. By age 45, households have paid off children's college expenses and are beginning to save for retirement. Again, low and middle income households accumulate more assets by age 45 when not working at age 45 compared to working at that age. Hence, as before, they save on capital income taxes prior to age 45 by working at age 45. This translates into saving on capital income taxes on a lifetime basis for low earners.

As can be seen from Table 17, the story is somewhat different for high-income individuals. Although these households also accumulate more assets by age 45 when not working compared to working at that age—thereby saving on capital income prior to age 45—this saving is more than offset by higher capital income tax payments in later years. The cap on college expenditures for high earners implies that their borrowing constraint becomes nonbinding much earlier when they work at age 45 compared to when they do not work. This induces two effects: First, the amount of capital income taxes saved prior to age 45 is not much higher for high earners compared to low earners. Second, because saving for retirement begins earlier when working at age 45 (because the borrowing constraint become non-binding earlier), asset accumulation is much larger prior to retirement and high earners pay much more in capital income taxes after age 45. Hence, high earners pay more in capital income taxes on a lifetime basis when working relative to not working at age 45. This explains the relatively steep increase in the net marginal tax rate on working

at age 45 at high earning levels.

Table 13 shows that tax rates are, again, low at low earning levels but rise sharply beginning at just 3 times minimum wage, quickly reaching the mid-40s in percentage terms. As is clear from Table 18, deciding to work rather than not at age 55 extends and somewhat magnifies the previously described effect on asset accumulation. Now, even low earners end up paying more in capital income taxes on a lifetime basis when they decide to work at age 55.

Table 14 shows the results for the decision to work at age 65. The marginal tax rate on working is roughly 20 percent for households earning between up to twice the minimum wage and rises sharply for households earning 3 or more times the minimum wage. Here, the life-cycle stage of binding borrowing constraints is long past, and the decision to work versus not work at age 65 impacts asset accumulation in prior years as before—working at age 65 implies lower asset accumulation and, therefore a tax-saving on account of capital income taxes. The steep increase in marginal tax rate on working at age 65 across those earning 3 and 4 times the minimum wage seems to arise due to steep increases in federal and state income taxes.

The results of this section point to important role of prior asset accumulation adjustments that consumption smoothing households would undertake when planning to take time off from work in future years. The particular manner in which these adjustments occur and interact with households' borrowing constraints can sizably influence, on a lifetime basis, marginal tax rates from working in particular years. It should be noted

that ESPlanner does not take into account the possibility of adjusting prior year's labor supplies when planning to work/quit work in the future. In general, the decision to work or not in any future year potentially involves dynamic interactions with asset accumulation, labor supplies, and borrowing constraints in other years and, hence, can affect marginal work-tax rates in ways that are difficult to model comprehensively.

Sensitivity of Net Full-Time Work Tax Rates to Assumed Discount and Growth Rates

Tables 20 and 21 show how average and marginal net full-time work tax rates are affected by assuming higher and lower discount rates and growth rates than those used in the base-case calculations. As in the base case, we assume that the household's pre-tax and transfer return to saving is the same as the discount rate and that transfer bracket levels and basic benefits are indexed to the growth rate of real wages.

With the exception of the average net tax rates for low-wage households, the results are very robust to the alternative discount and growth assumptions. For example, the average net full-time work tax rate for a household earning five times the minimum wage is 47.2 percent. Using a 3 (7) percent, rather than a 5 percent discount rate, lowers (raises) the average net tax rate to 44.9 (48.4) percent. And assuming a zero (2 percent) rather than a 1 percent growth rate of real wages lowers (raises) the average net tax rate to 47.1 (48.0) percent.

For minimum wage households, the 17.8 percent base-case subsidy rises to 31.7 percent when a 3 percent discount rate is used. With a 7 percent discount rate, the subsidy falls to 14.7

percent. Lowering the wage growth rate to zero rate lowers the subsidy just slightly--to 15.0 percent, whereas raising wage growth to 2 percent raises the subsidy substantially -- to 25.4 percent.

The effects of the discount rate changes on the average net work tax rates of low-wage households are not surprising given that a larger share of lifetime spending of low-wage households consists of non fungible welfare payments, much of which arrive late in life. The sensitivity at the low end of the wage distribution of average net work tax rates to wage growth rates reflects the fact that the federal income tax, including the earned income tax credit, is inflation rather than wage indexed. For low-wage households, higher real wage growth leads to real bracket creep as well as reductions in the earned income tax credit. High wage households aren't eligible for the earned income tax bracket and aren't subject to real bracket creep because they are already in the top tax bracket.

The Impact of Policy Changes on Net Full-Time Work Tax Rates

Our final tables, Tables 22 and 23, consider how average and marginal full-time net work tax rates would change in response to the following four policies: 1) a 5 percentage point cut in the payroll tax rate, 2) the elimination of the Social Security earnings ceiling, 3) raising the Social Security payroll tax rate by 5 percentage points, 4) replacing federal personal and corporate income taxes with a 25 percent consumption tax levied on final sales, and 5) cutting Social Security benefits immediately and permanently by 25 percent.

Cutting the Payroll Tax Rate by 5 Percentage Points

Cutting the OASDI payroll tax rate is a key feature of current policy proposals for privatizing Social Security. A 5 percentage point cut in the rate appears to be at the outer limit of what might ultimately be adopted. A comparison of the base-case results presented in column three of Table 22 with the results for this policy experiment shown in column four indicate that a payroll tax of this magnitude would be highly progressive. Because of the ceiling on Social Security taxable earnings, the policy makes little difference to the net tax rates facing the rich, but it does lower the average net tax rates of middle- and low-income households. Take, for example, households earning three times the minimum wage, with initial (age 22) income of $64,300. Their average net tax rate is 40.2 percent in the base case and 34.0 percent under the policy reform. And their marginal net tax rate falls from 52.4 percent to 48.0 percent.

Eliminating Social Security's Earnings Ceiling

This is another progressive policy. It makes no difference to the average or marginal net taxes of low-wage households, but it raises those of the rich. Households earning 15 times the minimum wage find both their average and marginal net tax rates higher by more than 5 percentage points. For households earning 40 times the minimum wage, the average net tax rate rises by 9.1 percentage points and the marginal rate rises by 8.8 percentage points.

Raising Payroll Taxes

While some policymakers wish to cut payroll taxes in the context of privatizing Social Security, others favor securing the system's future by raising payroll tax rates. However, Tables 22

and 23 indicate that doing so in the context of a fixed ceiling on Social Security taxable earnings would be highly regressive. The tables consider a 5 percentage point increase in the tax rate. While the policy has a small impact on top earning households, those earning at or just above the minimum wage would bear much higher net tax rates. For a household earning 3 times the minimum wage household, the average net tax rate rises from 40.2 percent to 46.5 percent and their marginal net tax rate rising from 52.4 percent to 57.1 percent.

Switching from Federal Income to Consumption Taxes

The final policy we consider is replacing federal personal and corporate income taxes with a 25 percent retail consumption tax. A 25 percent tax rate appears to be in the neighborhood of what would be needed to maintain revenue neutrality. In considering the regressivity of these results it is important to bear in mind that we are focusing here on households with no initial wealth. Were we to assume that the rich had significant inheritances, the consumption tax would look much more progressive because it taxes consumption spending no matter how financed.

Given that caveat, it's clear that consumption taxation would raise average tax burdens on the poor and middle class and dramatically lower them for the rich. Households earning twice the minimum wage would find their average net tax rate rising by 1.6 percentage points. In contrast, those earning 10 times the minimum wage would experience a 12 percentage point cut in their average tax rate.

An Immediate and Permanent Cut In Social Security Benefits by 25 Percent

Under current tax and benefit rules, one estimate places the U.S. Social Security System's present value actuarial imbalance at more than $8 trillion.[7] One way to redress this imbalance is via a benefit cut. According to Social Security's actuaries, the required magnitude of an immediate and permanent Social Security benefit cut would be 25 percent. Our fifth policy explores the implications of this policy on average and marginal net tax rates. Although a 25 percent benefit cut sounds like a large cut on its own, it makes a relatively minor dent in the lifetime spending of the young and middle-aged because it becomes effective several decades in the future. In addition, for relatively low income households---those earning up to 3 times the minimum wage—reduced Social Security benefits trigger higher Medicaid benefits. As a result, such households experience very small increases, if at all, in their average and marginal net tax rates. Households with earnings between 6 and 8 times minimum wage would bear the largest increases in average and marginal net tax rates from this policy. But even for these households, the average and marginal tax-rate changes—about 1 percentage point for both—is much smaller than those arising from some of the other policies considered in Tables 22 and 23.

X. Summary and Conclusion

The U.S. fiscal system is not your father's Oldsmobile. Thanks to the growth of a variety interrelated of social welfare program, it's vastly more complicated than it was in the middle of the last century. Understanding how this complexity impacts households requires an intertemporal framework because what one

[7] Gokhale and Kotlikoff (2002).

pays in taxes or receives in benefits in one year may depend more on what happens in other periods than in the year in question.

In using *ESPlanner*, a life-cycle consumption smoothing model, to understand lifetime average and marginal net tax burdens, we have included in fine detail every major tax and transfer program affecting American households. What emerges is a picture of a fiscal system that is highly progressive with respect to the average burdens facing very low-wage households. However, the system's generosity toward the poor extends only to those who are very poor. Low-income and lower middle-income households face significant net tax burdens primarily because the earnings and asset tests of our welfare programs limit their availability to all but the poorest members of society. Another key feature of our fiscal system is it's roughly 50 percent average net tax rates imposed on the earnings of upper-income and high-income households.

While very poor Americans receive subsidies, on net and on average, they nonetheless face very high marginal net taxes on working. Minimum wage workers lose a third of every dollar they earn in net taxes when they decide to work full time. Higher wage workers loose between 51 cents and 57 cents on every dollar earned. In addition, low-wage workers face confiscatory taxes in deciding to switch from working half time to full time. So too do non-working low wage spouses whose partners work full time.

Except for the net tax rates of the poor, average and marginal net tax rates are fairly robust to different discount rate and growth rate assumptions. In contrast, making different assumptions about future fiscal policy can greatly alter both

average and marginal net tax rates at all wage levels. In particular, we find that raising payroll taxes or switching to consumption taxation would be highly regressive, while cutting payroll taxes would be quite progressive.

Finally, we find that working when young can be much more costly from a tax perspective than working when old, especially for workers at the lower end of the wage distribution. The reason is that, if they have time to do it and if they are planned in advance, households will save up for work holidays. In so doing they will raise the taxes they end up paying on capital income at the same time they lower the taxes they pay on their labor earnings. Hence, for such households, the decision to take a year off later in life will have smaller tax consequences than doing so when young.

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Appendix

Modeling Taxes and Transfers

This appendix is divided into three sections. Section I discusses our calculation of federal income, payroll, and state income taxes. Section II discusses our calculation of Social Security benefits. And Section III discusses out calculation of non-Social Security benefits.

I. The Calculation of Taxes

The Federal Income Tax

Esplanner's calculations of federal income taxes in each future year assumes that the household 's filing status is "married and filing jointly" for married households and "single" for single households. "Single" is assumed when spouses of married households are by themselves—as is the case when one spouse outlives the other at the end of the planning horizon or when calculating the financial plan for one of the spouses as a part of a surviving household. All federal income tax calculations are based on the new 2001 tax law, which we assume is not phased out at the end of the decade, but, rather is maintained after 2010 with its 2010 provisions.

All tax calculations are made based on nominal income levels by converting real pre-tax income amounts to their nominal counterparts based on the assumed rate of inflation. Thus, if the user inputs a 3 percent inflation rate, all nominal amounts in the user's federal income tax calculation (such as nominal bracket amounts and nominal exemption amounts) are multiplied by 1.03 percent for purposes of calculating 2002 taxes, by 1.03 times 1.03 for purposes of calculating 2003 taxes, and so on. The federal income tax schedule is applied to the program's calculation of federal taxable income. Federal taxable income equals federal Adjusted Gross Income (AGI) less personal exemptions and less the standard deduction of the sum of itemized deductions, whichever is larger.

The AGI for each year includes projected incomes in current dollars from several sources. These are: labor income (wages and salaries), self-employment income, asset income projected by the program based on user inputs of initial non-tax-favored net worth and rates of return, and on the optimal spending plan computed by the program. AGI also includes taxable asset income, taxable social security benefits, taxable special receipts, taxable distributions from defined benefit pension plans and taxable withdrawals from tax-favored saving plans. Each of these items is based upon the user's inputs and preferences. Non-taxable special receipts and withdrawals from Roth IRA accounts are not included in AGI. Deductible contributions to retirement accounts are subtracted from income in calculating each year's AGI. Employer contributions to retirement accounts are not included in AGI. However, withdrawals from these accounts are included.

The Indexation of the Tax Schedule

Tax-rate brackets and infra-marginal tax amounts (all of the dollar amounts listed in the tax schedules) are adjusted for inflation in each year over the household's lifetime. This is done to ensure that the schedule keeps pace with the growth of income in current dollars. The indexation is done using the user-specified rate of inflation. The thresholds for taxing Social Security benefits are not indexed for inflation in accordance with current policy.

Standard Deductions and Exemptions

Standard deductions and exemptions are also indexed for inflation for each future year based on the user-specified future rate of inflation. The number of personal exemptions allowed equals 2 plus the number of children for "married and filing jointly" and 1 plus the number of children for the "single" filing statuses.

The personal exemption amount that can be deducted from AGI in calculating taxable income is phased out if AGI is above certain dollar limits depending upon the filing status. *ESPlanner* takes into account the phase-out of personal exemptions based on these dollar limits indexed for inflation. The year-by-year phase-in of changes in the phase-out provisions enacted in the 2001 tax reform are included in *ESPlanner's* tax calculating code.

The Decision to Itemize

ESPlanner takes the maximum of the standard deduction or sum of itemized deductions, where the latter includes mortgage interest payments, property taxes, state and local income tax payments, and tax-deductible special deductible expenditures that the user specifies, such as charitable contributions. Note that state and local income tax payments are deductible only if they are being withheld from pay or the user makes estimated tax payments during the tax year. *ESPlanner* assumes withholding or pre-payment.

The Phase-Out of Itemized Deductions

As modified in the 2001 tax reform, federal income tax rules phase out itemized deductions for high-income taxpayers (both, married filing jointly and single payers). The reduction does not apply to certain components of the itemized deductions claimed—such as medical care expenses, investment interest, and casualty and theft losses. Because *ESPlanner* does not distinguish between these and other sources of itemized deductions, the phase-out rules are applied to all itemized deductions.

The Child-Tax Credit

The child-tax credit depends on the number of qualifying children in the household. The tax credit is phased out if AGI is over a threshold, the value of which depends on marital status. The phase-out rate is $50 for each $1000 of income in excess of the applicable threshold. The amount of the child-tax credit equals the smaller of a) the computed amount or b) the federal income tax liability net of the earned income tax credit. If the earned income tax credit exceeds the federal income tax liability, the child-tax credit is applied against payroll taxes.

The Earned Income Tax Credit

The program's calculation of the earned income tax credit (EITC) adheres to the EITC worksheet in federal Form 1040. *ESPlanner* first checks for eligibility to receive the EITC based on a) investment income, b) taxable earned income, c) non-taxable earned income (e.g., employer 401(k) contributions), d) earned income thresholds for households with no qualifying children, and earned income thresholds for households with at least one qualifying child. Next, the EITC is computed based on the EITC schedule for taxable and nontaxable income and the household's level of adjusted gross income (AGI).

The Taxation of Social Security Benefits

Social Security benefits are included in the federal income-tax base in the following manner. If the sum of AGI and 50 percent of Social Security benefits falls short of a lower threshold, which is marital-status specific, then none of the benefits are taxable. If the sum exceeds the applicable dollar threshold, but the excess is less than a martial-status specific sum, the smaller of one-half of the excess or 50 percent of the benefit is taxable and is included in the federal income tax base. In addition, if the aforementioned excess is greater than the second dollar threshold, 85 percent of this excess or 85 percent of the benefit, whichever is smaller, is also added to the federal income tax base.

The Low Income Tax Credit for Retirement Account Contributions

This non-refundable tax credit was introduced in the 2001 tax law. The credit reimburses X percent of the individual's first $2,000 in contributions to retirement accounts. The value of X for households with very low incomes is 50 percent, but quickly phases out to zero at higher income levels.

Payroll Taxes

For purposes of this study, *ESPlanner's* payroll tax calculator is modified to incorporate employer-paid payroll taxes. In each year, the payroll tax for a married household is the sum of the two spouses' payroll taxes. Each spouse's tax equals the employee plus employer 12.4 percent OASDI tax rate applied to labor earnings up to the taxable maximum level plus the employee plus employer 2.9 percent HI tax rate applied to all labor earnings.

Massachusetts State Income Taxes

Massachusetts taxes labor and interest and dividend income at a 5.95% rate.[8] The tax base includes earnings from wages and salaries, self-employment income, pension income, and distributions from tax-favored saving accounts, and other taxable receipts such as alimony. Federally taxable Social Security benefits are not included. A rental deduction, available to both single and joint filers, is allowed up to 50 percent of rent paid on one's principal residence or $2,500, whichever is smaller. A single $1,200 deduction is allowed for dependent children under the age of 12. Capital gains are taxed at a lower rate, but this feature of the Massachusetts tax code is not explicitly modeled.

[8] We ignore scheduled future reductions in Massachusetts income tax rates from 5.95 percent to 5.0 percent. Given the current fiscal crisis in Massachusetts, this tax cut is likely to be repealed.

II. The Calculation of Social Security Benefits

Social Security Retirement Benefits

Eligibility

Before *ESPlanner* provides household heads and spouses Social Security retirement benefits, it checks that they are *fully insured*. Individuals must be *fully insured* to receive retirement benefits based on their earnings records. Becoming fully insured requires sufficient contributions at a job (including self-employment) covered by Social Security. For those born after 1929, acquiring 40 *credits* prior to retirement suffices for fully insured status. Earnings between 1937 and 1951 are aggregated and divided by $400, and the result (rounded down to an integer number) are the pre-1952 credits which are added to the credits earned after 1950 in determining insured status. After 1951, workers earn one credit for each quarter of the year they work in Social Security-covered employment and earn above a specified minimum amount. The year of *first eligibility* for retirement benefits is the year in which the individual becomes age 62. The individual is *entitled* to retirement benefits after an application for benefits is submitted, but never before age 62.

Determination of Primary Insurance Amount (PIA)

The PIA is the basis for all benefit payments made on a worker's earnings record. There are several steps in computing the PIA. *Base years* are computed as the years after 1950 up to the first month of entitlement to retirement benefits begins. For survivor benefits, base years include the year of the worker's death.

Elapsed Years

Elapsed years are computed as those years after 1950 (or after attainment of age 21, whichever occurs later) up to (but not including) the year of first eligibility. The maximum number of elapsed years for an earnings record is 40 (it could be shorter, for purposes of calculating survivor benefits if the person dies prior to age 62).

Computation Years

Computation years are calculated as the number of elapsed years less five or 2, whichever is the greater. Earnings in base years (up to the maximum taxable limit in each year, and through age 60 or two years prior to death, whichever occurs earlier) are wage-indexed according to economy-wide average wages. Of these, the highest earnings in years equaling the number of computation years are added together and the sum is divided by the number of months in computation years to yield *Average Indexed Monthly Earnings* (*AIME*).

Bend Points

The AIME is converted into a PIA using a formula with *bend points*. The bend point formula is specified as 90 percent of the first X dollars of AIME plus 32 percent of the next Y dollars of AIME plus 15 percent of the AIME in excess of Y dollars. The dollar amounts X and Y are also wage indexed and are different for different eligibility years. The dollar amounts pertaining to the year of

attaining age 60 (or, for survivor benefits, the second year before death, whichever is earlier) are applied in computing the PIA.

Benefits

A person who begins to collect benefits at his or her "normal retirement age" (currently age 65) receives the PIA as the monthly retirement benefit. In subsequent years, the monthly benefit is adjusted according to the Consumer Price Index (CPI) to maintain its purchasing power.

Increases in Normal Retirement Ages

After 2003 normal retirement ages are scheduled to increase by 2 months for every year that a person's 65th birthday occurs later than the year 2003. This progressive increase in the normal retirement age for those born later ceases between the years 2008 through 2020; those attaining age 65 in these years have a normal retirement age of 66. The postponement in retirement ages resumes after 2020 such that those born after 2025 have a normal retirement age of 67. All cohorts attaining age 65 after that year have a normal retirement age of 67.

Reductions for Age

A person who begins to collect retirement benefits earlier than the normal retirement age receives a *reduction for age.* The reduction factor is 5/9 of 1 percent for each month of entitlement prior to the normal retirement age. The reduced benefit payment (except for the inflation adjustment) continues even after the person reaches or surpasses the normal retirement age. If the number of months of reduction exceeds 36 months (for example, in case of entitlement at age 62 when the normal retirement age is 67), then the reduction factor is 5/12 of 1 percent for every additional month of early entitlement.

Delayed Retirement Credits

Those who begin to collect benefits after their normal retirement age (up to age 70) receive *delayed retirement credits*. The amount of the delayed retirement credit for each month of delayed entitlement depends on the year in which a person attains normal retirement age. For example, those attaining age 65 in 1997 receive an additional 5 percent in monthly benefits for each year of delay in entitlement. However, those attaining age 65 in the year 2008 will receive an additional 8 percent in benefits for each year of delayed entitlement.

Earnings Test

If a person continues to work and earn after the month of entitlement and the person is under age 65, benefits are reduced because of an *earnings test*. Beneficiaries lose $1 for each $2 earned above an earnings limit. The earnings limits are scheduled to grow with average wages in subsequent years. All benefits payable on a worker's earnings record, including the worker's own retirement benefits and spousal and child dependent benefits, are proportionally reduced by the testing of the worker's earnings.

Recomputation of Benefits

Earnings in any year after entitlement to benefits are

automatically taken into account in a recomputation of the PIA for determining the subsequent year's benefit amount. However, these earnings are not indexed before they are included in the AIME calculation. If such earnings are higher than some prior year's earnings (indexed earnings through age 60 or unindexed earnings after age 60), they result in an increase in the PIA and benefit payable. If they are lower than all previous year's earnings, they will not lower the PIA or benefits since only the highest earnings in base years are included in the calculations.

Spousal and Child Dependent Benefits

Eligibility
Wives and husbands of insured workers (including divorced spouses) are entitled to *spousal benefits* if the couple was married for at least 10 years at the time of application for spousal benefits, the spouse is over age 62 or has in care a child under age 16 entitled to benefits under the insured worker's record, and the insured worker is collecting retirement benefits. Children of insured workers under age 16 are entitled to *child dependent benefits* if the child is unmarried and the worker is collecting retirement benefits.

Benefits
Spousal and child benefits equal 50 percent of the insured worker's PIA (each). Child dependent benefits may be lower only if the *family maximum* applies. Spousal benefits may be lower due to the family maximum, a reduction for age, the application of the earnings test, or the spouse’s receipt of retirement benefits based or her or his own earnings record.

Family Maximum
All benefits paid under a worker's record (except retirement benefits or divorced spousal benefits) are reduced proportionately to bring them within the family maximum benefit level. The maximum benefits payable on a worker's earnings record is determined by applying a bend point formula to the PIA similar to that applied to the AIME in calculating the PIA. For example, the family maximum equals 150 percent of the first $X of PIA plus 272 percent of the next $Y of the PIA plus 134 percent of the next $Z of the PIA plus 175 percent of the PIA greater than $X+$Y+$Z. The values X, Y, and Z are adjusted for each year of the calculation according to the growth in economy-wide average wages. In case the spousal benefit is eliminated for any reason, the benefits payable on the insured worker's record are subjected to the family maximum test again, treating the spouse as though he/she were not eligible for spousal benefits. This may result in higher benefits for children who may be eligible for dependent benefits under the worker's record.

Reduction of Spousal Benefits for Age
Spouses eligible for the spousal benefit may elect to receive (may become entitled for) their benefits before normal retirement age. In this case the spousal benefit is reduced by 25/36 of 1 percent for each month of entitlement prior to normal retirement age. If the number of months of reduction exceeds 36 months (for example,

in case of entitlement at age 62 when the normal retirement age is 67), then the reduction factor is 5/12 of 1 percent for every additional month of early entitlement.

Earnings Testing of Spousal Benefits
If a spouse is earning above the amount allowed by the earnings test, the spousal benefits he or she is eligible to receive will be earnings tested according to the pre- and post-normal retirement schedule described above.

Redefinition of Spousal Benefits
If a spouse is already collecting retirement benefits, the spousal benefit is redefined as the greater of the excess of the spousal benefit over the spouse's own retirement benefit or zero.

Survivor Benefits (Widow(er), Father/Mother, and Children)

Eligibility
The surviving spouse of a deceased worker is eligible for *widow(er) benefits* if the widow(er) is at least age 60, is entitled (has applied for widow[er] benefits), the worker died fully insured, and the widow(er) was married to the deceased worker for at least 9 months. The widow(er) of a deceased worker is eligible for *father/mother benefits* if the widow(er) is entitled to benefits (has applied), the worker died fully insured, the widower has in care a child of the worker. A surviving child is eligible for *child survivor benefits* on the deceased worker's record if the child is under age 18 and is entitled (an application has been filed) and the worker was fully insured.

Survivor Benefits
Monthly benefits equal 100 percent of the worker's PIA for a widow(er); they equal 75 percent of the PIA for father/mother and child survivor benefits. Widow(er) and child survivor benefits may be lower only if the family maximum applies. Widow(er)s may become entitled to (elect to receive) survivor benefits earlier than normal retirement age, but not earlier than age 60. In this case the reduction is 19/40 of 1 percent for each month of entitlement prior to normal retirement age. After the widow(er) is 62, he or she is may become entitled to (elect to receive) retirement benefits based on her own past covered earnings record. In this case the widow(er) benefits are redefined as the excess over own retirement benefit or zero, whichever is greater. Finally, widow(er) survivor and own retirement benefits are also subject to the earnings test. If the deceased worker was already collecting a reduced retirement insurance benefit, the widow(er)'s benefit cannot be greater than the reduced widow(er) benefit or the greater of 82.5 percent of the worker's PIA or the worker's own retirement benefit. If the deceased worker was already collecting a retirement insurance benefit greater than the PIA because of delayed retirement, the widow(er) or is granted the full dollar amount of the delayed retirement credit over and above the (reduced) widow(er) benefit. Father/mother benefits are not similarly augmented by delayed retirement credits that the deceased worker may have been receiving.

Father/Mother Benefits

These benefits may be reduced if the family maximum applies or if the father or mother is entitled to the own retirement benefit. In this case the father/mother benefit is redefined as the excess over the father or mother's own retirement benefit or zero, whichever is greater. Father /mother benefits are also subject to the earnings test. On the other hand, they are not reduced for age. For those eligible to receive both widow(er) and father/mother benefits, the program calculates both and takes the larger benefit.

Calculation of a Deceased Worker's PIA

The calculation of survivor benefits in the case of a widow(er) benefits uses the larger of two alternative calculation's of the deceased worker's PIA. These are the "wage indexing" method and the "re-indexing" method. Moreover, the year up to which the worker's wages are indexed may be different depending upon whether the deceased worker would have become age 62 before or after the widow(er) attains age 60.

The Wage-Indexing Method

The last year for indexing earnings is the earlier of a) the year the worker dies minus 2 years or b) the year worker would have attained age 60. Bend point formula dollar amounts are taken from the earlier of the year the worker dies or the year the worker would have attained age 62. The PIA thus calculated is inflated by the CPI up to the year the widow(er) turns age 60 (if later) to obtain the PIA value on which widower benefits would be based. Where applicable, these benefits are then adjusted for the family maximum, reduction for age, delayed retirement credits, and the earnings test.

The Re-indexing Method

The worker's original earnings are indexed up to the earlier of the year the widow(er) attains age 58 or b) the year the worker attains age 60. The elapsed years are computed as the number of years from 1951 (or the worker's age 22 if later) through the year the widow(er) attains age 60. The computation years equal elapsed years minus 5 years (computation years cannot be less than 2). Bend point formula dollar values are applied from the year the widow(er) attains age 60. There is no subsequent indexing of the PIA for inflation.

The Sequencing of Widow(er) Benefit Calculations

Widow(er) benefit reductions proceed in a particular sequence: First the widow(er) plus children's benefits are subjected to the family maximum. Second, the widow(er) benefit is reduced for early entitlement (of the widow(er) prior to normal retirement age). Third, the widow(er) benefit is compared to the widow(er) own retirement benefit if entitled to the latter. Fourth, the widow(er) benefit is redefined as the excess over own benefit if own benefit is positive. Finally the earning's test is applied, first to the widow(er)'s own benefit and then to the widow(er) benefit that is in excess of own benefit. If the widow(er) benefit is eliminated as a result of these tests, the benefits payable on the insured worker's record are subjected to the family maximum

test again, treating the widow(er) as though he/she were not eligible for the widow(er) benefit. This procedure can potentially increase children's benefits if the family maximum limit was binding the first time through.

III. The Calculation of Non-Social Security Benefits

The calculation of non Social Security benefits occurs in two stages. First, fungible (cash) benefits are calculated within *ESPlanner* taking into account each fungible benefit programs' asset and income tests and eligibility restrictions. Second, the household's non-fungible benefits in each year are calculated based on the household's asset accumulation and income path as determined by *ESPlanner*. While non-fungible benefits are not incorporated in *ESPlanner's* consumption smoothing optimization, they are included in the calculation of average and marginal net tax rates. Specifically, in the formulae for those tax rates specified above, the non-fungible benefits in a particular year are treated as additional spending in that year for purposes of determining the expected present values of spending when the fiscal system is assumed to be operational.

The first stage calculations involve dynamic programming in which fungible benefit levels are determined in each year for each possible level of household assets and income in that year. This first stage also includes the calculation of federal income, state income, and payroll taxes.

The fungible benefits incorporated in *ESPlanner's* consumption smoothing are:

- Social Security Retirement, Spousal, Survivor, Mother, Father, Child, and Divorcee Benefits
- Transitional Assistance to Families with Dependent Children (TAFDC)
- Supplementary Security Income (SSI)
- Housing Assistance Programs
- Low-Income Home Energy Assistance Program (LIHEAP)

The non-fungible benefits calculated in the second stage and treated as additional spending are:
- Food Stamps (FS)
- Special Supplemental Nutrition Program For Women, Infants And Children (WIC)
- Medicaid
- Medicare

Family Composition and Benefit Eligibility

In computing how much fungible and non-fungible benefits are available to particular households in a particular year, we take into account how eligibility for particular benefits within each program depends on the size and composition of the family. For example, in a year when a couple has two children at home with them, eligibility is defined based on the income standards for a family of four; but when the children have left the household upon reaching age 19, it's defined based on the income standards for a

family of two.

Asset Tests

We include asset tests for each type of benefit that stipulates such a test. The following table indicates asset limits for program eligibility.

Program	Asset Test Limits
TAFDC	$2,500 for a family
SSI	$2,000 for a single or $3,000 for a couple
Medicaid	no asset test under 65; over 65 same as SSI
QMB/SLMB	$4,000 for a single; $6,000 for a couple
Food Stamps	$2,000 for a family with members under 60; $3,000 for a family with memb

Pre-paid funeral arrangements, up to a certain limit, are usually treated as non-countable assets. In implementing our asset tests, we assume that the first $3,000 in assets held by a couple is exempt from the asset test and treated a funeral arrangement.

Our asset test calculates, for each program, the amount of assets in excess of that program's asset limit and reduces that program's benefits by the amount of excess assets, with the maximum reduction being the entire benefit. Such reduction in benefit is equivalent to the cases when individual, after being disqualified for a number of months from receiving benefits and after spending down his/her excess assets, gains eligibility and applies again for the benefit. In case of receiving medical assistance, government typically pays the bill for the qualified individuals only after such individuals pay first the amount equivalent to their excess assets.

Growth in Benefits Over Time

In our explanation of the benefits calculation below, we omit a description of our adjustment of real benefit levels in light of growth over time in economy-wide living standards. But we do make such an adjustment. Specifically, we assume that all benefit amounts, brackets, premiums, and deductions grow in real terms at the assumed rate of labor productivity. In our base case, this rate is 1 percent.

Adjusting for the Probability of Benefit Receipt

In our analysis we incorporate the probability of benefit receipt in the case of benefits triggered by illness (e.g., Medicare and Medicaid benefits) or that come from the rationing of program participation (e.g., Housing Assistance, the Low Income Housing Energy Assistance Program (LIHEAP), and the Special Supplemental Nutrition Program For Women, Infants And Children (WIC)). For both types of programs, we first determine the average benefit (net of the asset test) per recipient in a particular program and then multiply by the probability of actually receiving the benefit in question.

In forming our measures of average benefits received, we assume

that our household members apply for all benefits for which they may potentially be eligible. For example, when we calculate average Medicaid benefits received by 70-year old males who meet the Medicaid income-eligibility test, we assume that all such males apply for those benefits. As another example, in the case of Housing Assistance, we assume that all income-eligible households apply, but that their chance of receiving the average housing benefit obtained by actual recipients equals the ratio of the number of recipient households to the number of applicant households.

Modeling Specific Benefit Programs

Each program has eligibility rules and benefit formulae that deal with special cases. We consider the rules and benefit formulae that apply to the standard cases. We describe below the eligibility rules and benefit formulae for each of the transfer programs.

Transitional Aid to Families with Dependent Children -- TAFDC

Transitional Aid to Families with Dependent Children (TAFDC) is a cash assistance program designed to assist needy families with dependent child or pregnant women. TAFDC is the formal name in Massachusetts of the program formerly known as AFDC (Aid to Families with Dependent Children). Most states have adopted the name Temporary Assistance to Needy Families (TANF). The terms "transitional" and "temporary" reflect the new objective of the programs, namely to provide short-term assistance to needy families and to encourage such families to return to the labor force. Under the current rules of the TAFDC, eligible household may generally receive assistance for no more than 24 months within any 5-year period.

There are several steps in defining eligibility for benefits. The calculations needed to determine eligibility, both non financial and financial, and benefit levels can be complicated even for the standard cases we consider.

Non-Financial Eligibility requires that the child must be deprived of the care or support of at least one parent. Deprivation factors include: death, continued absence, physical or mental incapacity, unemployment or underemployment of (a) parent(s). A dependent child may be under age 19 or, if a full-time school student, age 19. We assume that our family units meet these program-specific requirements.

TAFDC Financial Eligibility Stan

Household Size	Eligibility Standard (185% of the Need Standard)	Need Standard / Payment Standard
2	958	518
3	1,143	618
4	1,319	713

To meet requirements for Financial Eligibility a household must pass *two* income tests. First, family unit gross income cannot exceed 185 percent of the Need Standard that applies given family size. Second, gross income minus certain applicable

deductions cannot exceed the Need Standard itself.

Standard monthly deductions include
- a $90 deduction for each employed family member.
- an extra $30 plus one-half of gross income above $120 deduction for the employed TAFDC benefit recipients or applicants who received benefits in the previous 4 months.
- dependent-care deductions that range between $50 to $200 for a child under two and $44-$175 for a child 2 or over, depending on the hours worked by a recipient.

We applied the $90 deduction per working individual for all 12 months of each year of eligibility and the maximum deduction levels for childcare for children between ages 1 and 5. However, we did not implement the extra deduction to avoid complications in our dynamic programming algorithm.

If the family unit passes both income tests it gets financial assistance defined as the difference between the maximum payment standard and net income after deductions. In accordance with standard program restrictions on the length of benefit receipt, we limited the receipt of benefits to no more than 24 months within any five-year period. Hence, for those of our stylized households who are eligible for assistance, benefits follow a cyclical pattern: two years on followed by three years off, provided the asset test criterion is met. Hitting the TAFDC asset test limits, however, would disqualify household for receiving benefits for certain period in one of the years and would result in modification of TAFDC lifetime benefits pattern in levels and/or in timing. TAFDC regulation in Massachusetts assumes that families receiving benefits may also receive $40 of monthly housing allowance, which we add on top of the monthly TAFDC benefit.

Sources

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3. Gretchen G. Kirby, et al. *Income Support and Social Services for Low-Income People in Massachusetts*. Urban Institute, 1997. Internet: http://newfederalism.urban.org/html/MAincome1.html
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Supplementary Security Income (SSI)

Supplementary Security Income is a federal program that makes monthly payments to people who have limited income and resources

if they are 65 or older or are disabled. In our study we ignore payments to the disabled. If individuals meet the program's income limits, after deductions, they receive monthly benefits. Payments up to the Federal income limits are received from the federal government, while states provide supplements that are calculated as the difference between Federal and state income limits. In 2001, income limits in Massachusetts were $659 and $998 for an individual and a couple correspondingly.

Standard deductions are $20 per month plus the sum of a) an additional $65 per month if labor income exceeds $65 per month and b) one-half of wages over $65. In Massachusetts, an SSI-eligible person is automatically enrolled in Medicaid.

For every year we first determine age eligibility for each spouse, and then income eligibility for the household. When both are eligible, their combined benefit equals the difference between the income limit for a two-person household and the spouses' combined income after deductions. When only one spouse is age eligible, the eligible spouse's benefit is calculated according to the regulations using either an individual- or couple-income limit depending on the level of the income of the ineligible spouse. The SSI asset test was implemented as described above.

Sources

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2. *SSI In Massachusetts.* Social Security Administration, 2000;
3. *Code of Federal Regulations. Title 20--Employees' Benefits. CHAPTER III--Social Security Administration. Part 416--Supplemental Security Income For The Aged, Blind, And Disabled.* Social Security Administration, 1999. Internet: http://www.ssa.gov/OP_Home/cfr20/416/416-0000.htm
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Food Stamps

The purpose of the Food Stamp Program is to improve the diet of low-income families by increasing their food purchasing power. Households must satisfy both state and federal requirements to qualify for food stamps. There are several steps in determining program eligibility and calculating the value of the stamp benefits.

First, gross monthly (earned and unearned) income cannot exceed the limits specified in the table below for households of different sizes. Unearned income includes Social Security and private pension benefits, SSI benefits, unemployment insurance benefits, and TAFDC payments. In our study we include SSI and TAFDC payments as part of the income used to calculate the value of food stamps.

The following monthly deductions apply:

- $134 per household.
- 20 percent of gross income.
- Dependent day care: under 2 years of age, up to $200 per month; over 2 years of age, up to $175 per month. We apply here the TAFDC program dependent care deduction for every child between the ages of 1 and 5.
- Medical expenses of individuals over 60 years old are deductible beyond the first $35. These expenses were calculated as the sum of payments for prescription drugs, Medicare premiums, deductibles, and coinsurance payments (see below).
- Excess housing costs, which are defined as housing expenses in excess of half of the household's income after other deductions. Prior to age 60 there is a maximum level of $300 for deductible excess housing costs. We included Housing Assistance benefits (see below) as part of gross monthly income for calculating of Food Stamps benefits.

Food Stamps: Financial Eligibility Sta

Household Size	Gross Monthly Income Limitation		Monthly Net Income Limits	Maximum monthly allotment
	Under 60 years	Over 60 years or disabled		
1	905	1,149	696	130
2	1,219	1,548	938	238
3	1,534	1,947	1,180	341
4	1,847	2,344	1,421	434

Net monthly income (monthly income after deductions) cannot exceed the family-size specific limits given in the table below. The value of the stamps is the maximum monthly allotment less 30 percent of net income. The 30 percent figure reflects the expectation that recipient households will spend about 30 percent of their resources on food.

As indicated, calculating the annual value of Food Stamps benefits for Medicare recipients requires adjusting for Medicare deductibles and co-insurance payments. The co-insurance payments depend on actual utilization of medical services. Our estimate of Food Stamp benefits is determined by the weighted average of four possible medical outcomes; the husband and only the husband receives medical services subject to Medicare co-payments; the wife and only the wife receives medical services subject to Medicare co-payments; both spouses receive medical services subject to Medicare co-payments; and neither spouse receives medical services subject to Medicare co-payments.

In calculating the Food Stamp benefits for the three cases in which one or both spouses receive Medicare-covered medical services, we assume that all medical services are paid for in a single month that differs for the two spouses.

The weights used in forming the weighted average benefit are determined by the age-specific probabilities of the husband and wife receiving Medicare benefits in each year.

As explained above, Food Stamp benefits, because they are not fungible, were not included in *ESPlanner's* consumption smoothing which is used to generate each household's lifetime profile of tax payments and asset accumulation. However, this asset accumulation

profile is used to implement the Food Stamps asset test. We apply this test by simply reducing benefits from that program by the value of excess assets in each year.

Sources

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2. *Do You Qualify for Food Stamps? Do You Know Someone Who May? "Long Form" Qualification Test.* The Food Stamp Program, 1999. Internet: http://www.foodusa.org/long2000.html
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Food Stamps Deduction for Out-of-Pocket Expenditures on Prescription Drugs

The elderly spend a considerable part of their income on the prescription drugs. Most are covered by one or another form of private or public medical insurance that pays for part or all of prescriptions. However, about one-third of the Medicare beneficiaries have no insurance-drug coverage from any source.

The Food Stamp program provides a deduction for the elderly against income based on out-of-pocket health expenses. From the sources listed below, we estimated relative profiles by age of out-of-pocket spending on prescription drugs in 1996 for the elderly. We did this separately for those who were covered by drug insurance and those who were not. We then applied these profiles to the average estimated 1999 values of out-of-pocket expenditures by different groups of Medicare beneficiaries to obtain age- and sex-specific average out-of-pocket prescription drug expenditures for the following two groups: those covered by Medicaid and those having other coverage, including no coverage. Next we inflated those values to get to 2001 levels. Corresponding monthly amounts were deducted in determining net income used to calculate food stamp benefits as medical-related deductions for individuals over 60. Annual values are given in the table below; we extended average prescription drug expenditures of the group aged 65-70 to the group of 60-64.

2001 Estimates of the Out-of-pocket Expence

age	Medicaid eligib		Others	
	M	W	M	W
60-69	199	233	361	426
70-74	209	244	410	483
75-79	252	295	440	519
80-84	241	282	456	537
> 85	256	299	455	536

Sources

1. "Universal Prescription Drug Benefit Necessary to Ensure Affordable Coverage for All Medicare Beneficiaries". HCFA. March 2000. Internet: http://www.hcfa.gov/childhealth/news/pr2000/pr000306.htm
1. "Out-of-Pocket-Spending on Prescription Drugs by Women and Men Age 65 And Older: 1999 projections". Prepared by Mary Gilbson and Lisa Foley. AARP. April 2000.
2. "Effects Of Prescription Drug Coverage On Spending And Utilization". Internet: http://www.aspe.hhs.gov/health/reports/drugstudy/chap02.htm
1. Testimony of Michael Hash, Deputy Administrator HCFA, on Prescription Drug Coverage for Medicare Beneficiaries before the House Commerce Committee, Subcommittee on Health & Environment. September 28, 1999. Internet: http://www.hcfa.gov/testimony/1999990928.htm

Special Supplemental Nutrition Program For Women, Infants And Children (WIC)

WIC is a program designed to improve the health of pregnant women, new mothers, and their infants. WIC targets population groups that have low income and are at risk nutritionally, specifically:

- pregnant women through pregnancy and up to 6 weeks after birth or after pregnancy ends
- breastfeeding women through their infant's first birthday;
- infants through their first birthday.
- children up to age 5.

WIC benefits include: supplemental nutrition, nutrition counseling, and screening services. In most WIC State agencies, WIC participants receive either actual food items or food vouchers to purchase specific foods to supplement their diets. Different food packages are provided for different categories of participants.

Although federally funded, WIC is administrated by state agencies and managed by local agencies. The WIC Program has certain eligibility requirements that are based on income and nutritional risk. In order to qualify, WIC applicants must show medically verified evidence of health or nutrition risk. In addition, their family income generally must be below 185 percent of the federal poverty level (FPL). Certain applicants can be judged income-eligible for WIC based on their participation in Food Stamps,

Medicaid, and AFDC/TANF programs.

WIC does not serve all eligible individuals - participation is limited by the availability of Federal funding. Usually, program applicants are ranked by need. The program is estimated to serve about 81 percent of women, infant, and child applicants.

The reported 2000 average monthly WIC benefit for actually WIC recipients (be they women, infants, or children) in Massachusetts is $29. For the nation as a whole, the average monthly WIC benefit is estimated at $33. In our model for simplicity, when the household is eligible for Food Stamp benefits, we assume the family also applies for WIC. Pregnant women, infants, and young children are allocated the average WIC benefit with an 81 percent probability. The annual value of the $29 multiplied by .81 is $282.

Sources

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2. *WIC Program*. Food And Nutrition Service. Program Data. Internet: http://www.fns.usda.gov/pd/wichome.htm
3. 1998 Green Book. Program Descriptions. Internet: http://aspe.hhs.gov/98gb/15bother.htm

Medicare

Medicare is a federal health insurance program for the aged and disabled (we ignore disability benefits and focus on the benefits for the aged only). It incorporates two parts: Hospital Insurance (HI), also known as “Part A”, and Supplementary Medical insurance (SMI), also known as “Part B”. Hospital Insurance is generally provided automatically to individuals aged 65 and over who are entitled to Social Security benefits. Part A helps pay for: care in hospitals, skilled nursing facilities, hospice, and some home health care. Enrolling in SMI is optional; part B helps pay for: doctors, outpatient hospital care, clinical laboratory tests, durable medical equipment, most supplies, and some other services not covered by Part A.

Medicare Part A is primarily financed through a mandatory 2.9 percent payroll tax. Part B is financed in part by participant premium payments of $45.50 per month regardless of benefits received. In addition, there are specific cost-sharing arrangements. In particular, under Part A in each benefit period a recipient of benefits pays: $776 for a hospital stay of 1-60 days; an additional $194 per day for days 61-90; an additional $338 per day for days 91-150; and all costs for each day beyond 150 days.

We assume that at age 65 both husband and wife enroll in both Part A and Part B. It is typical for individual to enroll in both plans (in 1998, 95% of all the enrollees were enrolled in both Plan A and Plan B at the same time). We assumed that in each year an individual, if s/he receives benefits, stays in the hospital less than 60 days and so pays the fixed fee of $776. Under Part B, participants receiving benefits must first meet an annual $100

deductible and, in most cases, cover 20 percent of the approved amount after the deductible.

In our calculations, we impute to each age-eligible spouse at a particular age their expected Medicare benefits at that age. If a participant is exempt from cost sharing and/or premium payments, we considered that Medicaid covers those costs, as described in the section below on Medicare-Medicaid interactions. Any actual out-of-pocket cost sharing and premium payments were correspondingly deducted from the gross income in calculations of the Food Stamps benefits for eligible individuals.

Our calculation of average expected Medicare benefits at a given age multiplies the age- and sex-specific probability that participants receive benefits by the average benefit received at that age by benefit recipients (we applied same probability for the Part A and Part B). According to 1996-1997 data, 76.9 percent of elderly male participants and 84.7 percent of elderly female participants received Medicare benefits.

Reimbursement per Person Enrc
1997 Preliminary Annual Su

	Part A		Part B	
Age	**Men**	**Women**	**Men**	**Womer**
65 & over	3062	3024	1674	1565
65, 66	1748	1526	1178	1173
67, 68	1982	1709	1312	1250
69, 70	2301	1987	1451	1376
71, 72	2548	2220	1581	1471
73, 74	2867	2578	1699	1546
65-69	1930	1676	1279	1239
70-74	2638	2328	1607	1488
75-79	3493	3144	1887	1668
80-84	4534	4132	2107	1806
85 & over	5562	5253	2139	1847

Our data on Medicare benefits for aged in 1997 come from the Health Care Financial Administration (HCFA). HCFA provides average Medicare benefits under Part A and under Part B classified by age and sex. We also found that, in the aggregate, average benefits per person enrolled were 26 percent and 5 percent greater, respectively, under Plan A and Plan B, in Massachusetts compared to the national averages, so we incorporated that adjustment for all age cohorts and both sexes. We converted all 1997 amounts to 2001 dollars using CPI.

Sources

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2. *The 2000 Green Book: MEDICARE.* Internet: http://aspe.hhs.gov/2000gb/sec2.txt

Medicaid

Medicaid is a joint federal-state program that provides medical care to the poor. In 1996 Medicaid recipients constituted 14 percent of the US population. Among those aged 0 to 5 and 85 and older, the coverage rate reached 35 percent. The 1998 Current Population Survey explored health insurance coverage of low-income, single-family married households with two children. The survey indicates that over 50 percent of all Medicaid income-

eligible infants, children, and adults had no access to any other form of private or public health insurance. However, not all eligible individuals apply for Medicaid. Of Medicaid eligibles with no any other type of insurance, only 60 percent of infants, 40 percent of children, and 20 percent of adults were enrolled in Medicaid in 1998[9]. For purposes of this study, however, we assume that our households, when eligible, do apply and receive all Medicaid benefits to which they are entitled.

Medicaid covers most, but not all, medically necessary medical care and services provided to eligible individuals. Each state establishes its eligibility standards and general rules. The policies are complex and vary considerably from state to state. In Massachusetts, Medicaid is officially known as MassHealth. In addition to serving the poor in general, MassHealth incorporates special programs to assist poor pregnant women and children, the disabled, and immigrants who are in need of emergency care.

MassHealth provides the following services:
- Inpatient hospital services
- Outpatient services: hospitals, clinics, doctors, dentists (limited dental coverage for adults), family planning, and home-health care
- Medical services: lab tests, X rays, therapies, pharmacy services, dental services, eyeglasses, hearing aids, medical equipment and supplies, adult day health, and adult foster care
- Mental health and substance abuse services: inpatient and outpatient
- Living in nursing homes
- Payment of the Medicare premium, coinsurance, and deductibles for certain groups of elderly

Like Medicare, Medicaid operates as a vendor payment program; recipients receive benefits directly in the form of medical services provided by qualified vendors. Benefits are provided as long as the individual meets general and financial eligibility criteria. Financial eligibility criteria include income eligibility requirements, which may be different for different family members, and assets eligibility requirements. MassHealth Standard Program specifies that the family monthly income before taxes and deductions cannot exceed:

- 200 percent of the FPL (Federal Poverty Level) for pregnant women and infants
- 150 percent of the FPL for children under age 19
- 133 percent of the FPL for parents with children under age 19

Under MassHealth the income limit for an eligible individual (couple) aged 65 and over is 100 percent of FPL. In addition, in Massachusetts if an individual is eligible for SSI, s/he would

[9] Besides providing full exclusive coverage for the eligibles, in many cases Medicaid may supplement and/or subsidize coverage provided by other parties (e.g., employers). In fact, Medicaid benefits that we impute in our study to the eligible households represent average amounts over the whole array of types of health care financing provided by Medicaid.

also be eligible for Medicaid. The table below presents the respective income limits.

Federal Poverty Levels

family size	100%	133%	150%	200%
1	696	926	1,044	1,392
2	938	1,248	1,407	1,876
3	1,180	1,569	1,770	2,360
4	1,421	1,890	2,132	2,842

Medicaid eligibility may be extended to individuals with incomes greater than the above income limits if they are deemed "medically needy." States provide residual financing of such individuals' medical treatment costs, provided they spend their excess resources (income and assets) down to the eligibility limits. This is particularly the case for individuals moving into nursing homes with insufficient resources to fully finance their stays. For simplicity, we do not consider cases of the medically needy in this analysis.

In each year we determine for each family member of a particular age and sex if s/he meets appropriate income standards of eligibility and then allocate to that individual the Medicaid age- and sex-specific benefit projected to prevail in that year. Fortunately, statistics on Medicaid eligibles, recipients, and total vendor payments are available by sex and age. When the beneficiary in our stylized case is a child under 19, we ignore gender difference in benefits. Our estimates of the average benefits for the most recent data, for 1998, are presented in the table below[10].

We make an adjustment to these benefit amounts for Medicaid payment of Part B Medicare premium for certain low-income individuals.

If a person over age 65 is eligible for Medicaid, his/her Medicare cost-sharing will be partially or fully financed by Medicaid. There are two broad groups of dual-eligibles: those for whom Medicaid pays only Medicare part B premiums (so-called, SLMB eligibles), and those who get extensive coverage from Medicaid (see the discussion on Medicaid-Medicare interactions below). Our calculated average benefit values for aged eligibles reflect Medicaid payments made for both these groups. However, we impute full Medicaid benefits only to the elderly with incomes less than 100 percent of the federal poverty line; and we treat SLMB eligibles separately. Specifically, for those over 65, who are eligible for the full coverage, we adjusted the average Medicaid benefits by excluding payments for SLMB eligibles, using data on the fraction (4.6 percent) of those receiving benefits from both

[10] To adjust for the fact that for some age groups the data in Massachusetts show a greater number of recipients than eligibles, in calculating average benefits we divided total expenditures by the maximum of a) the number of eligibles and b) the number of recipients.

Medicare and Medicaid who are SLMB recipients, the size of the SLMB Medicaid benefit (equal to the annual Part B premium), and the overall average Medicaid benefit. Our final calculated adjusted age- and sex-specific Medicaid benefits in Massachusetts for 1988 are presented in the table below.

Finally we estimated benefits per eligible in Massachusetts by applying 1997 Massachusetts age-specific probabilities of being eligible and getting benefits. We used the CPI to measure 1998 benefit levels in 2001 dollars.

1998 Medicaid Benefits in Massachusetts

Recipients, Expenditure, Average Benefits, and Estimated Benefits per Eli

Age	Recipients		Expenditures, th$		Avg Benefit per Recipient		Avg Benefit Net of SLMB benefits		1997 Probabilities for Eligibles	Avg Net Benefit Eligible	
	Male	Female	Male	Female	Male	Female	Male	Female		Male	Female
Under 1	18,610	17,711	64,353	58,028	3,458	3,276	3,458	3,276	82%	2,838	2,68
1 - 5	65,209	61,518	107,692	90,325	1,651	1,468	1,651	1,468	88%	1,459	1,29
6 - 14	91,847	86,622	163,627	125,250	1,782	1,446	1,782	1,446	90%	1,596	1,29
15 - 20	33,759	45,247	77,841	114,959	2,306	2,541	2,306	2,541	89%	2,048	2,25
21 - 44	73,722	171,695	544,446	675,932	7,385	3,937	7,385	3,937	86%	6,338	3,37
45 - 64	43,183	60,868	424,169	484,932	9,823	7,967	9,823	7,967	88%	8,650	7,01
65 - 74	14,281	28,541	140,319	220,832	9,826	7,739	10,273	8,086	94%	9,638	7,58
75 - 84	11,590	32,914	146,416	418,177	12,633	12,705	13,216	13,291	100%	13,216	13,29
85 & Over	8,867	42,056	106,515	545,501	12,013	15,349	12,565	16,062	100%	12,565	16,06

In each year we determine for each family member of a particular age and sex if s/he meets appropriate income standards for eligibility and then allocate to that individual the Medicaid age- and sex-specific benefit projected to prevail in that year. When the beneficiary in our stylized case is a child under 19, we ignore gender difference in benefits.

Sources

1. *HCFA-2082 Report for Federal Fiscal Year 1998*. Internet: http://www.hcfa.gov/medicaid/msis/2082%2D98.htm
2. *Information about MassHealth*. The Division of Medical Assistance. Massachusetts. Internet: http://www.state.ma.us/dma/masshealthinfo/applmemb_IDX.htm
3. *MassHealth Member Booklet*. Internet: www.state.ma.us/dma/masshealthinfo/memberbklt.pdf
4. *Medicaid.* Health Care Financial Administration. Internet: http://www.hcfa.gov/medicaid/medicaid.htm

Adjustment for Nursing Home Benefits

A large fraction of elderly Medicaid recipients receive benefits in form of Medicaid-paid nursing home services. Considering contingency of receiving such benefits as part of the Medicaid coverage, we correspondingly adjusted benefits from the SSI and the Food Stamp programs. When a Medicaid beneficiary lives in such facility, s/he receives no food stamps and her/his SSI benefits

are limited by the maximum monthly amount of only $65.

Using the survey data on the elderly population in poverty and the data on the nursing home residents who entered the facilities with Medicaid as a primary funding source, we determined the probability that a person of a particular age who earns less than the poverty measure (which defines eligibility for Medicaid for the elderly) will reside in a nursing home. Our probabilities are 6%, 16%, and 49% correspondingly for the cohorts of 65-74, 75-84, and 85 years of age or older. We make no adjustment for those under 65.

In our calculations we use an 8-month average duration for Medicaid-financed nursing home stays. Let *Ph* stand for the probability for the husband in a particular year to be Medicaid eligible and live in a nursing home, and let *Pw* be such probability for wife:

1. *Ph _ Pw* is the probability that both spouses live in a nursing home for 8 months and collect benefits from the SSI and Food Stamps for only 4 months that year;
2. *Ph _ (1- Pw)* is the probability that the husband spends 8 months in a nursing home and his family receives only partial benefits from the other programs (that depends on her own income at home) during these 8 months and full benefits during the other 4 months;
3. *Pw _ (1- Ph)* is the probability that the wife spends 8 months in a nursing home and her husband receives only partial benefits from the other programs during these 8 months and full benefits during the other 4 months;
4. *(1- Ph) _ (1- Pw)* is the probability that neither of the spouses lives in nursing home in a particular year and the family receives full amount of benefits from the other programs during the year.

Expected benefits from the SSI and the Food Stamp programs were correspondingly calculated using combinations of these probabilities, average duration of stay in nursing home, and the values of original benefits in each situation. During periods when one spouse lives home and the other one is in a nursing home, we calculate SSI and Food Stamp original benefit based on the income of the spouse who stays home. We also incorporated a similar adjustment in the cases when one of the spouses is either deceased of ineligible for Medicaid-financed nursing home stay.

We ignored waiting periods for eligibility to the various welfare programs.

1. Sources*The National Nursing Home Survey: 1997 Summary.* National Center for Health Statistics. Internet: http://www.cdc.gov/nchs/data/series/sr_13/sr13_147.pdf
2. *The 2000 Green Book. Appendix A. Data On The Elderly. Table A-7: Poverty Rates of the Elderly By Age, Sex, and Marital Status, 1998.* Internet: http://aspe.hhs.gov/2000gb/appena.txt

Medicaid's Confiscation of the Income of Nursing Home Residents

Medicaid confiscates the incomes of Medicaid recipients residing in nursing homes in excess of $60 per month. Hence, net Medicaid benefits are income-sensitive. To adjust for this income tax we used the above-defined probability that a Medicaid eligible would reside in a nursing home. We also assumed that the average income of an individual staying in nursing home on a Medicaid subsidy is 50 percent of the Medicaid income-eligibility threshold (about $350 per month). Noting that the reported Medicaid benefits are based on the average income of the nursing home residents, we then adjusted the Medicaid benefit by reducing (increasing) it by the amount of the difference between the individual's income and the assumed average income of the nursing home residents financed by Medicaid.

Medicaid-Medicare Interactions

Medicare beneficiaries with low incomes and limited resources may receive help to pay Medicare premiums and other cost-sharing payments from their state Medicaid programs. The extent of assistance that Medicaid offers varies based on the Medicare beneficiary characteristics. Medicare beneficiaries who are eligible for Medicaid assistance fall into two categories: those who are sufficiently poor and qualify for full Medicaid benefits, and those who receive partial assistance from Medicaid. In the second group, the two most important categories are Qualified Medicare Beneficiaries (*QMB*) and Specified Low-Income Beneficiaries (*SLMB*). To qualify one has to meet assets restrictions and have limited income, as specified in the table. For QMBs, income must be below 100 percent of the Federal Poverty Level (FPL), while for SLMBs it can be below 120 percent of the FPL. The state pays Medicare premiums as well as deductibles and coinsurance for QMBs. The basic difference between the fully covered and the QMBs is that states may impose limits on payments to QMBs. For SLMBs, Medicaid pays only Part B monthly premiums. The asset test limits for QMB and SLMB programs are $4,000 and $6,000 for an individual and a couple, respectively.

For persons enrolled in both Medicare and Medicaid, the latter is always "payer of last resort", which means that any Medicare-covered services are paid for by Medicare before any payments are made by the Medicaid program. In 1995 there were 6 million dual-eligible beneficiaries nation wide. They constituted 16 percent of the Medicare enrollees and 17 percent of the Medicaid population. In 1996, 4.6 percent of the dual-eligibles were SLMBs, 45 percent were QMBs, and 50.4 percent received full Medicaid coverage.

The presence of dual eligibles means that the reported Medicaid payments for individuals over 65 will include Medicare cost-sharing payments as well as other Medicaid-provided services. Assuming also that any out-of-pocket Medicare co-payments are deducted from the gross income included in calculation of value of Food Stamp benefits, we had to develop a measure of combined net payments from Medicare, Medicaid, and Food Stamps.

Those who are not qualify for QMB or SLMB status pay Medicare co-payments and premiums in the full amounts, and their out-of-pocket health expenditures are included as medical-related deductions in our model's Food Stamp benefit calculations. The households involved here have annual incomes ranging between around $14,200 and $18,600, - when they no longer qualify for Medicare co-payment subsidies, but are still eligible for Food Stamps (given higher Food Stamps gross income standards for the seniors). Generally, these households receive no Medicaid benefits, fully cost share with Medicare, but receive somewhat higher Food Stamps benefits as a result of these additional medical cost deductions.

For those who are SLMBs (couples with annual incomes between roughly $11,900 and $14,200), Medicaid covers only Medicare Part B premiums, which we include as a transfer payment. We do not impute to them any other Medicaid benefits; SLMBs still cost-share with Medicare, and their out-of-pocket Medicare cost-sharing payments, which do not involve the Part-B premiums paid on their behalf, are deductible in the Food Stamps income calculation.

Finally, poor elderly couples (those with annual incomes that are less than roughly $11,900) pay no Medicare costs whatsoever and have no Medicare related deductions when it comes to determining income by the Food Stamps program. We did not distinguish between fully covered and QMB beneficiaries: when income of our household falls below 100% of the FPL, we simply impute calculated average Medicaid benefits from the table and do not deduct Medicare related premium, deductibles, and coinsurance from their gross income. When, based on the asset test, individuals temporarily loose their eligibility for the full Medicaid coverage or receive reduced benefits, we assumed that that they remain eligible for the Medicaid subsidy of Medicare co-payments under the QMB program, provided they meet requirements of the asset test of the QMB program.

Sources

1. "A Profile Of QMB-Eligible And SLMB-Eligible Medicare Beneficiaries." Barents Group LLC: Prepared for Health Care Financial Administration. April 7,1999.
2. *List And Definition Of Dual Eligibles*. Internet: http://www.hcfa.gov/medicaid/dualelig/bbadedef.htm

Housing Assistance[11]

A number of Federal programs address the housing needs of lower income households. There are different types of housing aid available. The three broad categories are: *subsidized rental housing*, *public housing*, and *homeownership opportunities* for low income, first-time homebuyers.

Rental assistance programs generally reduce tenants' rent payments by a fixed percentage -- usually 30 percent or higher, depending on the treatment of heating costs -- of their adjusted income,

[11] This section and the next section draw heavily on the housing program descriptions cited as data sources.

with the government paying the remaining portion of the rent. In Massachusetts, there are three types of rental assistance programs: The “Section 8” program, the Massachusetts Rental Voucher Program (MRVP), and the Alternative Housing Voucher Program (AHVP). The federal government funds “Section 8” assistance, and the state funds the MRVP and AHVP programs. While the income-eligibility limit for the “Section 8” program is 80 percent of the area median income ($50,200 for a family of 4 in Boston), a participant of the state rental voucher program or the alternative program can earn no more than 200 percent of the federal poverty level ($34,100 for a household of 4, as of April 2000). Income limits depend on the size of the household.

Public housing apartments are built and subsidized by either the state or federal government. The rent a public housing tenant pays is based on household income and whether the costs of any utilities are included: 30 percent of net income for rent if the rent includes any basic utilities and 25 percent of net income if no utilities are provided. To be eligible to live in public housing a household must typically earn no more than 80 percent of the area median income. Income limits also vary depending on the number of persons in the household and the region.

There are a variety of programs available to help low- or moderate- income people purchase a home. Most programs are limited to first-time homebuyers. The Federal Government assistance comes with the long-term commitments to reduce mortgage interest, when interest subsidies are provided for mortgages financed by private lenders. Those programs generally limit combined mortgage payments, property taxes, and insurance costs to a fixed percentage of income. The current percentage is 28. As an example, the Soft Second Mortgage Program is a state-funded program that helps households purchase their first homes. The program requires a minimum 5 percent down payment. The state will subsidize a second mortgage on behalf of a homeowner who also has a conventional mortgage. In 1997, 11 percent of all the assisted units were newly purchased first homes; the rest were rental units.

Housing assistance is not provided to all households that qualify for aid. Each year a limited amount of Federal funds is allocated to fund new and existing housing assistance commitments. As a result, in most cases new applicants are put on very long (1 to 2 year) waiting list.

Several studies of housing and welfare reform document that in 1996 approximately one quarter of the families receiving AFDC/TANF benefits lived in assisted housing. However, this ratio varied significantly from state to state. Barbara Sard and Jennifer Daskal (1998) analyzing data for Massachusetts show that estimates of the percentage of AFDC households that also received housing assistance in 1996 ranged between 32 percent and 43 percent. Daskal (1998) presents estimates of the percentage of the poor receiving housing assistance classified by various characteristics. At the aggregate level, she shows that 40 percent of the families with incomes less than 50 percent of the

FPL received some form of rent subsidies. For incomes between 50 percent and 99 percent of the FPL, between 100 percent and 149 percent of the FPL, and between 149 percent and 200 percent of the FPL, respective recipient rates were 33 percent, 21 percent, and 12 percent. These rates are used in our analysis as income-specific probabilities of a household's receiving some form of subsidy.

In our stylized cases, our households rent living accommodations, and if they are income-eligible, we assume that they apply to the rent assistance program. The just-described income-specific recipient rates refer to population of AFDC recipients; we extend these rates to the whole population of the households with qualifying levels of income. In so doing, we disregard factors of age and the presence of child in a family that may make actual probabilities differ from those used in the study.

Following the regulations, we assume that rent in excess of 30 percent of family income is subsidized by the authorities. We simply treat this difference (multiplied by the probability of receiving the benefit) as an additional government transfer payment.

Housing subsidies become part of the gross monthly income that we use in determining eligibility for the Food Stamps program.

Sources

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1. Barbara Sard and Jennifer Daskal. Housing and Welfare Reform: Some Background Information. November 5, 1998. Internet: http://www.cbpp.org/hous212.htm
1. Jennifer Daskal. In Search of Shelter: The Growing Shortage of Affordable Rental Housing. Center on Budget and Policy Priorities. 1998. Internet: http://www.cbpp.org/615hous.pdf
1. The 1998 Green Book. Program Descriptions. Federal Housing Assistance. (AND) Transitional Assistance to Families with Dependent Children. Internet: http://aspe.hhs.gov/98gb/15other.htm

Low-Income Home Energy Assistance Program (LIHEAP)

LIHEAP is a block-grant program of the Federal Government that allocates funds between states to operate various home energy assistance programs for needy households. The funds may be used for the purposes of home heating and cooling assistance, energy-crisis intervention, and low-cost weatherization or other energy-related home repairs.

LIHEAP assists eligible low-income households in meeting the

heating or cooling portion of their residential energy needs. Low-income households are defined as households with incomes that cannot exceed the greater of 150 percent of the poverty level or 60 percent of state median income ($28,135, $34,755, and $41,375 for 2-, 3-, and 4- person families respectively in Massachusetts in 2001). The states have flexibility of setting their income eligibility at or below this maximum standard. LIHEAP payments can be made to households where one or more persons are receiving Supplemental Security Income (SSI), Aid to Families with Dependent Children (AFDC/TANF), or food stamps. Priority may be granted to those households with the greatest energy cost in relation to income, taking into consideration the presence of children and elderly.

In Massachusetts in 1995, 140 thousand households received an average of $348 from the single largest program component -- heating assistance. However, only one fifth of LIHEAP-eligible households received heating and/or winter crisis assistance in that year.

We treat LIHEAP benefits in our analysis in the same way as housing assistance benefits. With a probability of 20 percent (the national estimate) we add the CPI-inflated value of the annual benefit to the income of eligible households.

Sources

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2. *Low Income Home Energy Assistance Program (LIHEAP).* US Department of Health and Human Services. Internet: http://www.acf.dhhs.gov/programs/liheap/liheap.htm
1. *The 1998 Green Book. Program Descriptions. Low-Income Home Energy Assistance Program (LIHEAP).* Internet: http://aspe.hhs.gov/98gb/15other.htm
2. *The Low-Income Home Energy Assistance Program (LIHEAP). Report for Congress.*
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Table 1

Average Net Full-Time Work Tax Rates

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending with Taxes and Transfers Assuming Full-Time Work	Present Value of Spending without Taxes or Transfers Assuming Full-Time Work	Full-Time Career Average Net Work Tax Rate (percent)
1	21.4	625.3	530.6	-17.8
1.5	32.1	590.5	795.9	25.8
2	42.8	707.2	1061.2	33.4
3	64.3	952.6	1591.8	40.2
4	85.7	1185.9	2122.7	44.1
5	107.1	1401.2	2654.1	47.2
6	128.5	1587.1	3185.5	50.2
7	150.0	1787.0	3717.0	51.9
8	171.4	1991.3	4233.2	53.0
9	192.8	2210.2	4707.7	53.1
10	214.2	2432.2	5182.2	53.1
15	321.4	3485.1	7554.8	53.9
20	428.5	4562.3	9927.4	54.0
30	642.7	6704.8	14672.7	54.3
40	857.0	8845.2	19417.9	54.4

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is column 3 and b is column 4.

Source: Authors' calculations.

Table 2

Present Values of Taxes and Transfers of Full-Time Workers

(thousands of 2000 dollars)

Multiple of Minimum Wage	Initial Annual Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps and WIC	Housing Benefits	Medicare	Medicaid
1	21.4	134.8	10.5	-14.0	27.5	0.9	23.2	1.6	2.1	6.9	2.2	26.0	172.6
1.5	32.1	202.2	23.1	32.0	35.1	1.2	28.5	0.0	0.9	0.1	0.0	26.0	21.5
2	42.8	269.7	36.6	66.8	43.6	1.7	33.7	0.0	0.1	0.1	0.0	26.0	11.8
3	64.3	404.5	63.5	152.5	59.2	2.9	44.2	0.0	0.0	0.2	0.0	26.0	0.0
4	85.7	539.3	90.3	268.4	72.1	3.9	54.6	0.0	0.0	0.1	0.0	26.0	0.0
5	107.1	674.2	117.1	395.4	85.1	4.6	59.8	0.0	0.0	0.1	0.0	26.0	0.0
6	128.5	809.0	144.2	551.8	95.7	5.4	64.7	0.0	0.0	0.0	0.0	26.0	0.0
7	150.0	943.8	171.0	694.6	107.7	6.1	69.6	0.0	0.0	0.0	0.0	26.0	0.0
8	171.4	1,049.4	198.4	842.0	120.2	7.4	73.2	0.0	0.0	0.0	0.0	26.0	0.0
9	192.8	1,074.9	226.3	1,005.2	134.0	9.3	73.2	0.0	0.0	0.0	0.0	26.0	0.0
10	214.2	1,100.5	254.1	1,164.3	149.4	11.2	73.2	0.0	0.0	0.0	0.0	26.0	0.0
15	321.4	1,228.3	393.3	2,020.5	224.0	20.7	73.2	0.0	0.0	0.0	0.0	26.0	0.0
20	428.5	1,356.0	534.2	2,837.0	300.5	32.7	73.2	0.0	0.0	0.0	0.0	26.0	0.0
30	642.7	1,611.6	816.7	4,475.2	452.8	57.9	73.2	0.0	0.0	0.0	0.0	26.0	0.0
40	857.0	1,867.2	1,099.3	6,113.9	605.1	83.2	73.2	0.0	0.0	0.0	0.0	26.0	0.0

Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 3

PV of Taxes and Transfers of Full-Time Workers as Percent of PV of Spending in Absence of Taxes and Transfers

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps and WIC	Housing Benefits	Medicare	Medicaid
1	21.4	25.4	2.0	-2.6	5.2	0.2	4.4	0.3	0.4	1.3	0.4	4.9	32.5
1.5	32.1	25.4	2.9	4.0	4.4	0.2	3.6	0.0	0.1	0.0	0.0	3.3	2.7
2	42.8	25.4	3.4	6.3	4.1	0.2	3.2	0.0	0.0	0.0	0.0	2.4	1.1
3	64.3	25.4	4.0	9.6	3.7	0.2	2.8	0.0	0.0	0.0	0.0	1.6	0.0
4	85.7	25.4	4.3	12.6	3.4	0.2	2.6	0.0	0.0	0.0	0.0	1.2	0.0
5	107.1	25.4	4.4	14.9	3.2	0.2	2.3	0.0	0.0	0.0	0.0	1.0	0.0
6	128.5	25.4	4.5	17.3	3.0	0.2	2.0	0.0	0.0	0.0	0.0	0.8	0.0
7	150.0	25.4	4.6	18.7	2.9	0.2	1.9	0.0	0.0	0.0	0.0	0.7	0.0
8	171.4	24.8	4.7	19.9	2.8	0.2	1.7	0.0	0.0	0.0	0.0	0.6	0.0
9	192.8	22.8	4.8	21.4	2.8	0.2	1.6	0.0	0.0	0.0	0.0	0.6	0.0
10	214.2	21.2	4.9	22.5	2.9	0.2	1.4	0.0	0.0	0.0	0.0	0.5	0.0
15	321.4	16.3	5.2	26.7	3.0	0.3	1.0	0.0	0.0	0.0	0.0	0.3	0.0
20	428.5	13.7	5.4	28.6	3.0	0.3	0.7	0.0	0.0	0.0	0.0	0.3	0.0
30	642.7	11.0	5.6	30.5	3.1	0.4	0.5	0.0	0.0	0.0	0.0	0.2	0.0
40	857.0	9.6	5.7	31.5	3.1	0.4	0.4	0.0	0.0	0.0	0.0	0.1	0.0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 4

Marginal Net Full-Time Work Tax Rates

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending with Taxes and Transfers Assuming No Work	Present Value of Spending without Taxes or Transfers Assuming Full-Time Work	Present Value of Spending with Taxes and Transfers Assuming Full-Time Work	Full-Time Career Marginal Net Work Tax Rate (percent)
1	21.4	411.3	530.6	625.3	33.6
1.5	32.1	411.3	795.9	590.5	51.1
2	42.8	411.3	1061.2	707.2	52.0
3	64.3	411.3	1591.8	952.6	52.4
4	85.7	411.3	2122.7	1185.9	53.2
5	107.1	411.3	2654.1	1401.2	54.3
6	128.5	411.3	3185.5	1587.1	55.9
7	150.0	411.3	3717.0	1787.0	56.7
8	171.4	411.3	4233.2	1991.3	57.1
9	192.8	411.3	4707.7	2210.2	56.8
10	214.2	411.3	5182.2	2432.2	56.5
15	321.4	411.3	7554.8	3485.1	56.3
20	428.5	411.3	9927.4	4562.3	55.9
30	642.7	411.3	14672.7	6704.8	55.6
40	857.0	411.3	19417.9	8845.2	55.4

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity: 1 minus the ratio of a to b, where a is column 5 and b is the sum of columns 3 and 4.
Source: Authors' calculations.

Table 5

Average Net Half-Time Work Tax Rates

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending With Taxes and Transfers	Present Value of Spending With No Taxes or Transfers	Half-Time Career Average Net Work Tax Rate (percent)
1	10.7	587.4	265.8	-121.0
1.5	16.1	623.6	398.7	-56.4
2	21.4	625.3	530.6	-17.8
3	32.1	590.5	795.9	25.8
4	42.8	707.2	1061.2	33.4
5	53.6	825.5	1326.5	37.8
6	64.3	952.6	1591.8	40.2
7	75.0	1070.3	1857.1	42.4
8	85.7	1185.9	2122.7	44.1
9	96.4	1295.9	2388.4	45.7
10	107.1	1401.2	2654.1	47.2
15	160.7	1885.4	3982.7	52.7
20	214.2	2432.2	5182.2	53.1
30	321.4	3485.1	7554.8	53.9
40	428.5	4562.3	9927.4	54.0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is column 3 and b is column 4.
Source: Authors' calculations.

Table 6

Present Values of Taxes and Transfers of Half-Time Workers

(thousands of 2002 dollars)

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	10.7	67.4	0.4	-49.2	19.4	0.1	14.8	52.1	8.1	39.5	2.5	26.0	233.9
1.5	16.1	101.1	4.7	-35.8	25.1	0.2	20.6	20.2	3.6	21.5	2.1	26.0	218.4
2	21.4	134.8	10.5	-14.0	27.5	0.9	23.2	1.6	2.1	6.9	2.2	26.0	172.6
3	32.1	202.2	23.1	32.0	35.1	1.2	28.5	0.0	0.9	0.1	0.0	26.0	21.5
4	42.8	269.7	36.6	66.8	43.6	1.7	33.7	0.0	0.1	0.1	0.0	26.0	11.8
5	53.6	337.1	50.0	105.9	51.8	2.2	38.9	0.0	0.0	0.1	0.0	26.0	0.0
6	64.3	404.5	63.5	152.5	59.2	2.9	44.2	0.0	0.0	0.2	0.0	26.0	0.0
7	75.0	471.9	76.9	209.4	65.7	3.4	49.4	0.0	0.0	0.2	0.0	26.0	0.0
8	85.7	539.3	90.3	268.4	72.1	3.9	54.6	0.0	0.0	0.1	0.0	26.0	0.0
9	96.4	606.7	103.7	329.4	78.6	4.3	57.3	0.0	0.0	0.1	0.0	26.0	0.0
10	107.1	674.2	117.1	395.4	85.1	4.6	59.8	0.0	0.0	0.1	0.0	26.0	0.0
15	160.7	1011.2	184.6	766.8	113.6	6.6	72.1	0.0	0.0	0.0	0.0	26.0	0.0
20	214.2	1100.5	254.1	1164.3	149.4	11.2	73.2	0.0	0.0	0.0	0.0	26.0	0.0
30	321.4	1228.3	393.3	2020.5	224.0	20.7	73.2	0.0	0.0	0.0	0.0	26.0	0.0
40	428.5	1356.0	534.2	2837.0	300.5	32.7	73.2	0.0	0.0	0.0	0.0	26.0	0.0

Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 7

PV of Taxes and Transfers of Half-Time Workers as Percent of PV of Spending in Absence of Taxes and Transfers

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	10.7	25.4	0.1	-18.5	7.3	0.1	5.6	19.6	3.1	14.8	0.9	9.8	88.0
1.5	16.1	25.4	1.2	-9.0	6.3	0.1	5.2	5.1	0.9	5.4	0.5	6.5	54.8
2	21.4	25.4	2.0	-2.6	5.2	0.2	4.4	0.3	0.4	1.3	0.4	4.9	32.5
3	32.1	25.4	2.9	4.0	4.4	0.2	3.6	0.0	0.1	0.0	0.0	3.3	2.7
4	42.8	25.4	3.4	6.3	4.1	0.2	3.2	0.0	0.0	0.0	0.0	2.4	1.1
5	53.6	25.4	3.8	8.0	3.9	0.2	2.9	0.0	0.0	0.0	0.0	2.0	0.0
6	64.3	25.4	4.0	9.6	3.7	0.2	2.8	0.0	0.0	0.0	0.0	1.6	0.0
7	75.0	25.4	4.1	11.3	3.5	0.2	2.7	0.0	0.0	0.0	0.0	1.4	0.0
8	85.7	25.4	4.3	12.6	3.4	0.2	2.6	0.0	0.0	0.0	0.0	1.2	0.0
9	96.4	25.4	4.3	13.8	3.3	0.2	2.4	0.0	0.0	0.0	0.0	1.1	0.0
10	107.1	25.4	4.4	14.9	3.2	0.2	2.3	0.0	0.0	0.0	0.0	1.0	0.0
15	160.7	25.4	4.6	19.3	2.9	0.2	1.8	0.0	0.0	0.0	0.0	0.7	0.0
20	214.2	21.2	4.9	22.5	2.9	0.2	1.4	0.0	0.0	0.0	0.0	0.5	0.0
30	321.4	16.3	5.2	26.7	3.0	0.3	1.0	0.0	0.0	0.0	0.0	0.3	0.0
40	428.5	13.7	5.4	28.6	3.0	0.3	0.7	0.0	0.0	0.0	0.0	0.3	0.0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 8

Marginal Net Half-Time Work Tax Rates

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending with Taxes and Transfers Assuming No Work	Present Value of Spending with no Taxes or Transfers Assuming Half-Time Work	Present Value of Spending with Taxes and Transfers Assuming Half-Time Work	Half-Time Marginal Net Work Tax Rate (percent)
1	10.7	411.3	265.8	587.4	13.2
1.5	16.1	411.3	398.7	623.6	23.0
2	21.4	411.3	530.6	625.3	33.6
3	32.1	411.3	795.9	590.5	51.1
4	42.8	411.3	1061.2	707.2	52.0
5	53.6	411.3	1326.5	825.5	52.5
6	64.3	411.3	1591.8	952.6	52.4
7	75.0	411.3	1857.1	1070.3	52.8
8	85.7	411.3	2122.7	1185.9	53.2
9	96.4	411.3	2388.4	1295.9	53.7
10	107.1	411.3	2654.1	1401.2	54.3
15	160.7	411.3	3982.7	1885.4	57.1
20	214.2	411.3	5182.2	2432.2	56.5
30	321.4	411.3	7554.8	3485.1	56.3
40	428.5	411.3	9927.4	4562.3	55.9

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is column 5 and b is the sum of columns 3 and 4.
Source: Authors' calculations.

Table 9

Net Tax Rate on Switching from Half-Time to Full-Time Work

Multiple of Minimum Wage	Initial Household Income When Working Full Time	Present Value of Spending from Working Full-Time with Net Taxes	Present Value of Spending from Working Half-Time with Net Taxes	Percentage Increase in Spending from Switching from Part-Time to Full-Time Work	Net Tax Rate on Switching from Part-Time to Full-Time Work
1	21.4	625.3	587.4	6.4	93.6
1.5	32.1	590.5	623.6	-5.3	105.3
2	42.8	707.2	625.3	13.1	86.9
3	64.3	952.6	590.5	61.3	38.7
4	85.7	1185.9	707.2	67.7	32.3
5	107.1	1401.2	825.5	69.7	30.3
6	128.5	1587.1	952.6	66.6	33.4
7	150.0	1787.0	1070.3	67.0	33.0
8	171.4	1991.3	1185.9	67.9	32.1
9	192.8	2210.2	1295.9	70.6	29.4
10	214.2	2432.2	1401.2	73.6	26.4
15	321.4	3485.1	1885.4	84.9	15.1
20	428.5	4562.3	2432.2	87.6	12.4
30	642.7	6704.8	3485.1	92.4	7.6
40	857.0	8845.2	4562.3	93.9	6.1

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate. The net tax rate on switching from part-time to full-time work is calculated as 100 minus the ratio of a) column 3 minus column 4 to b) column 4 in Table 8.
Source: Authors' calculations.

Table 10

Net Marginal Tax Rates on Working at Age 25

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending				Net Marginal Tax Rate on Working at Age 25 (percent)
		Taxes and Transfers		No Taxes or Transfers		
		Earnings at Age 25	No Earnings at Age 25	Earnings at Age 25	No Earnings at Age 25	
1	21.4	657.5	637.4	646.2	624.0	9.7
1.5	32.1	639.2	626.9	644.3	614.0	59.6
2	42.8	769.6	751.0	779.3	740.0	52.8
3	64.3	1045.5	1013.7	1064.4	1003.3	47.9
4	85.7	1308.0	1264.7	1336.6	1254.7	47.1
5	107.1	1552.0	1497.5	1590.1	1487.9	46.7
6	128.5	1764.9	1700.4	1815.9	1691.1	48.4
7	150.0	1993.7	1919.7	2054.0	1910.7	48.3
8	171.4	2222.3	2137.2	2291.8	2128.6	47.9
9	192.8	2446.8	2351.0	2525.7	2342.8	47.6
10	214.2	2674.5	2568.1	2763.0	2560.5	47.4
15	321.4	3754.6	3598.4	3894.1	3594.3	47.9
20	428.5	4861.1	4643.4	5048.2	4652.6	45.0
30	642.7	7064.5	6738.7	7343.9	6759.2	44.3
40	857.0	9268.5	8837.0	9638.7	8866.4	44.1

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is the difference between column 3 to column 4 and b is the difference between columns 5 and 6.
Source: Authors' calculations.

Table 11

Net Marginal Tax Rates on Working at Age 35

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending				Net Marginal Tax Rate on Working at Age 35 (percent)
		Taxes and Transfers		No Taxes or Transfers		
		Earnings at Age 35	No Earnings at Age 35	Earnings at Age 35	No Earnings at Age 35	
1	21.4	657.4	642.8	651.2	634.7	11.5
1.5	32.1	639.1	631.2	644.0	623.7	61.1
2	42.8	769.6	757.2	776.4	750.1	52.9
3	64.3	1045.5	1023.6	1059.5	1017.3	48.2
4	85.7	1307.8	1277.8	1328.4	1272.2	46.7
5	107.1	1551.8	1514.0	1578.1	1508.8	45.5
6	128.5	1764.6	1720.8	1797.5	1715.8	46.2
7	150.0	1993.5	1942.5	2031.2	1938.0	45.2
8	171.4	2222.1	2162.5	2266.7	2158.5	44.9
9	192.8	2446.6	2378.9	2494.7	2375.4	43.2
10	214.2	2674.3	2598.2	2727.2	2595.2	42.3
15	321.4	3754.4	3640.3	3835.1	3639.8	41.6
20	428.5	4860.9	4707.5	4968.6	4709.6	40.8
30	642.7	7064.3	6832.1	7189.0	6839.4	33.6
40	857.0	9268.2	8948.5	9408.7	8969.9	27.1

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is the difference between column 3 to column 4 and b is the difference between columns 5 and 6.

Source: Authors' calculations.

Table 12

Net Marginal Tax Rate on Working at Age 45

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending				Net Marginal Tax Rate on Working at Age 45 (percent)
		Taxes and Transfers		No Taxes or Transfers		
		Earnings at Age 45	No Earnings at Age 45	Earnings at Age 45	No Earnings at Age 45	
1	21.4	657.4	647.6	659.9	648.0	16.7
1.5	32.1	639.1	627.8	642.0	628.4	16.6
2	42.8	769.6	755.1	771.8	755.9	9.5
3	64.3	1045.5	1023.8	1050.4	1024.9	14.8
4	85.7	1307.8	1280.3	1314.1	1281.7	15.3
5	107.1	1551.8	1520.5	1559.4	1522.2	16.1
6	128.5	1764.6	1732.3	1773.5	1734.2	17.8
7	150.0	1993.5	1956.5	2004.6	1958.5	19.7
8	171.4	2222.1	2182.0	2234.9	2184.3	20.7
9	192.8	2446.6	2402.7	2460.5	2405.4	20.3
10	214.2	2674.3	2626.2	2689.1	2629.2	19.6
15	321.4	3754.4	3693.0	3780.6	3697.7	25.9
20	428.5	4860.9	4799.0	4896.8	4805.4	32.2
30	642.7	7064.3	7005.5	7120.3	7013.9	44.7
40	857.0	9268.2	9187.2	9343.3	9199.2	43.8

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is the difference between column 3 to column 4 and b is the difference between columns 5 and 6.
Source: Authors' calculations.

Table 13

Net Marginal Tax Rates on Working at Age 55

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending				Net Marginal Tax Rate on Working at Age 55 (percent)
		Taxes and Transfers		No Taxes or Transfers		
		Earnings at Age 55	No Earnings at Age 55	Earnings at Age 55	No Earnings at Age 55	
1	21.4	657.4	652.6	658.5	652.9	12.7
1.5	32.1	639.1	632.5	640.7	633.0	14.2
2	42.8	769.6	762.2	771.1	762.9	10.4
3	64.3	1045.5	1036.8	1050.5	1037.8	31.7
4	85.7	1307.8	1298.2	1314.7	1299.3	37.9
5	107.1	1551.8	1540.5	1560.8	1541.8	40.3
6	128.5	1764.6	1752.2	1775.9	1753.8	43.4
7	150.0	1993.5	1978.9	2007.5	1980.9	45.2
8	171.4	2222.1	2205.3	2238.4	2207.6	45.5
9	192.8	2446.6	2428.3	2464.2	2431.1	44.6
10	214.2	2674.3	2654.2	2694.6	2657.6	45.6
15	321.4	3754.4	3719.4	3789.5	3725.6	45.2
20	428.5	4860.9	4812.4	4909.4	4822.2	44.3
30	642.7	7064.3	6991.7	7140.2	7009.1	44.6
40	857.0	9268.2	9168.6	9370.5	9194.8	43.3

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is the difference between column 3 to column 4 and b is the difference between columns 5 and 6. Source: Authors' calculations.

Table 14

Net Marginal Tax Rates on Working at Age 65

Multiple of Minimum Wage	Initial Household Income	Present Value of Spending				Net Marginal Tax Rate on Working at Age 65 (percent)
		Taxes and Transfers		No Taxes or Transfers		
		Earnings at Age 65	No Earnings at Age 65	Earnings at Age 65	No Earnings at Age 65	
1	21.4	657.4	655.1	658.4	655.3	24.5
1.5	32.1	639.1	634.7	640.8	635.2	21.6
2	42.8	769.6	763.8	771.4	764.4	17.7
3	64.3	1045.5	1036.9	1051.2	1038.0	35.2
4	85.7	1307.8	1297.1	1316.6	1298.6	40.7
5	107.1	1551.8	1539.2	1562.6	1541.5	40.5
6	128.5	1764.6	1750.7	1778.7	1753.4	44.9
7	150.0	1993.5	1977.5	2010.8	1980.9	46.5
8	171.4	2222.1	2203.8	2242.2	2207.9	46.7
9	192.8	2446.6	2426.8	2470.2	2431.9	48.3
10	214.2	2674.3	2652.5	2700.8	2658.7	48.2
15	321.4	3754.4	3716.8	3798.4	3729.6	45.3
20	428.5	4860.9	4808.5	4922.1	4828.8	43.8
30	642.7	7064.3	6984.9	7160.5	7020.0	43.6
40	857.0	9268.2	9159.5	9398.2	9210.4	42.1

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate. The net tax rate is calculated as 100 times the quantity 1 minus the ratio of a to b, where a is the difference between column 3 to column 4 and b is the difference between columns 5 and 6.
Source: Authors' calculations.

Table 15

Increase in Net Taxes and Transfers Paid or Received at Age 25 from Working Full-Time at Age 25

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	21.4	2895	238	-2267	1350	-434	2	-1	0	1090	33	0	0
1.5	32.1	4342	708	182	1751	-561	3	-1	-1	-263	24	0	-12118
2	42.8	5789	1186	1809	2208	-714	4	-1	0	-263	0	0	-12120
3	64.3	8684	2178	4578	3154	-1017	5	-1	0	-263	0	0	-12119
4	85.7	11579	3233	9397	3955	-1273	7	-1	0	-263	0	0	-12119
5	107.1	14474	4289	14300	4748	-1528	4	-1	0	-263	0	0	-12119
6	128.5	17368	5359	20437	5454	-1732	5	-1	0	-263	0	0	-12119
7	150.0	20263	6419	27027	6136	-1972	5	-1	0	-263	0	0	-12119
8	171.4	22466	7476	32481	6916	-2220	-2	-1	0	-263	0	0	-12119
9	192.8	23015	8536	39053	7676	-2459	-2	-1	0	-263	0	0	-12119
10	214.2	23563	9597	45690	8431	-2697	-2	-1	0	-263	0	0	-12119
15	321.4	26307	14917	82497	11962	-3822	-2	-1	0	-263	0	0	-12119
20	428.5	29050	20222	117156	15640	-5001	-2	-1	0	-1	0	0	-2731
30	642.7	34537	30824	184922	23107	-7388	-2	-1	0	-1	0	0	-2
40	857.0	40024	41424	252246	30605	-9784	-2	-1	0	-1	0	0	-2

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate.
Source: Authors' calculations

Table 16

Increase in Net Taxes and Transfers Paid or Received at Age 35 from Working Full-Time at Age 35

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	21.4	1913	191	-1456	1262	-592	1	-2221	0	2142	0	0	0
1.5	32.1	2870	491	245	1621	-745	0	-6	0	-2	0	0	-8522
2	42.8	3827	778	1094	2058	-952	-2	-6	0	-3	0	0	-8531
3	64.3	5740	1380	2627	2973	-1399	-4	-6	0	-3	0	0	-8531
4	85.7	7653	2020	5491	3755	-1775	-4	-6	0	-3	0	0	-8531
5	107.1	9567	2702	8318	4512	-2002	-8	-6	0	-3	0	0	-8531
6	128.5	11480	3434	12699	5093	-2045	-8	-6	0	-3	0	0	-8531
7	150.0	13393	4110	16292	5787	-2296	-8	-6	0	-3	0	0	-8531
8	171.4	14884	4718	19108	6618	-2789	-13	-6	0	-3	0	0	-8531
9	192.8	15246	5300	23143	7409	-3381	-13	-6	0	-3	0	0	-8531
10	214.2	15609	5907	26643	8228	-3883	-13	-6	0	-3	0	0	-8531
15	321.4	17422	9146	47364	11902	-5634	-13	-6	0	-3	0	0	-8531
20	428.5	19236	12379	66514	15717	-7409	-13	-6	0	-3	0	0	-8531
30	642.7	22862	18848	104820	23352	-10954	-13	-6	0	-3	0	0	-8531
40	857.0	26489	25311	142855	31023	-14517	-13	-6	0	-3	0	0	-9

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 17

Increase in Net Taxes and Transfers Paid or Received at Age 45 from Working Full-Time at Age 45

Multiple of Minimum Wage	Initial Household Income	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	21.4	1257	5	-226	853	-903	1	0	0	1090	0	0	0
1.5	32.1	1886	241	611	1088	-862	1	0	0	-3	0	0	0
2	42.8	2515	430	1154	1380	-996	1	0	0	-3	0	0	0
3	64.3	3772	737	1857	2074	-1640	2	0	0	-3	0	0	0
4	85.7	5030	1132	3564	2621	-1984	2	0	0	-3	0	0	0
5	107.1	6287	1674	6279	2974	-1791	1	0	0	-3	0	0	0
6	128.5	7545	2451	10094	3067	-740	1	0	0	-3	0	0	0
7	150.0	8802	2974	11986	3507	-617	2	0	0	-3	0	0	0
8	171.4	9804	3477	15885	3793	-566	0	0	0	-3	0	0	0
9	192.8	10043	4011	19045	4152	-401	0	0	0	-3	0	0	0
10	214.2	10281	4542	21896	4532	-245	0	0	0	-3	0	0	0
15	321.4	11473	7632	40981	5711	2114	0	0	0	-3	0	0	0
20	428.5	12664	11815	65249	5491	8468	0	0	0	-3	0	0	0
30	642.7	15048	20515	115544	4784	22404	0	0	0	-3	0	0	0
40	857.0	17431	27192	154449	6635	28940	0	0	0	-3	0	0	0

All amounts are in thousands of 2002 dollars. Present values are actuarial and assume a 5 percent real discount rate.
Source: Authors' calculations

Table 18

Increase in Net Taxes and Transfers Paid or Received at Age 55 from Working Full-Time at Age 55

Multiple of Minimum Wage	Initial Household Income*	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	21.4	804	99	234	450	-269	0	0	0	-8	0	0	0
1.5	32.1	1206	255	642	600	-225	0	0	0	-7	0	0	-3
2	42.8	1608	482	1443	656	71	0	0	0	-7	0	0	0
3	64.3	2411	952	3311	751	648	0	0	0	-7	0	0	0
4	85.7	3215	1411	5962	786	1187	0	0	0	-7	0	0	0
5	107.1	4019	1837	8139	907	1599	0	0	0	-7	0	0	0
6	128.5	4823	2234	10863	997	1909	0	0	0	-7	0	0	0
7	150.0	5626	2617	12789	1155	2170	0	0	0	-7	0	0	0
8	171.4	6282	2989	14824	1309	2387	0	0	0	-7	0	0	0
9	192.8	6434	3371	17689	1421	2637	0	0	0	-7	0	0	0
10	214.2	6586	3749	20286	1556	2877	0	0	0	-7	0	0	0
15	321.4	7348	5264	29861	2817	2703	0	0	0	-7	0	0	0
20	428.5	8110	6910	39913	3913	3010	0	0	0	-7	0	0	0
30	642.7	9633	10471	61007	5877	4605	0	0	0	-7	0	0	0
40	857.0	11157	13832	80399	8127	5473	0	0	0	-7	0	0	0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors' calculations

Table 19

Increase in Net Taxes and Transfers Paid or Received at Age 65 from Working Full-Time at Age 65

Multiple of Minimum Wage	Initial Household Income*	Payroll taxes	State Taxes	Federal Taxes	Consumption Taxes	Corporate Taxes	Social Security Benefits	TAFDC	SSI	Food Stamps	Housing Benefits	Medicare	Medicaid
1	21.4	478	116	193	206	59	62	0	-17	-25	0	0	-288
1.5	32.1	717	152	337	350	-124	93	0	-19	-19	-5	0	-13
2	42.8	956	204	687	464	-262	124	0	-10	-16	0	0	-12
3	64.3	1433	328	1281	694	-487	186	0	0	-17	-1	0	0
4	85.7	1911	511	2306	840	-502	249	0	0	-21	0	0	0
5	107.1	2389	708	3251	974	-464	146	0	0	-17	0	0	0
6	128.5	2867	901	4539	1100	-434	175	0	0	-17	0	0	0
7	150.0	3344	1062	5605	1264	-527	204	0	0	-17	0	0	0
8	171.4	3742	1220	6510	1443	-630	231	0	0	-17	0	0	0
9	192.8	3833	1388	8089	1575	-697	231	0	0	-17	0	0	0
10	214.2	3924	1559	9215	1742	-750	231	0	0	-17	0	0	0
15	321.4	4376	1999	12074	3135	-2546	231	0	0	-17	0	0	0
20	428.5	4829	2536	15271	4370	-3984	231	0	0	-17	0	0	0
30	642.7	5735	3850	22733	6661	-5984	231	0	0	-17	0	0	0
40	857.0	6640	4975	29086	9164	-8675	231	0	0	-17	0	0	0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors’calculations

Table 20

Sensitivity of Average Net Full-Time Work Tax Rates to Discount and Growth Rates

Multiple of Minimum Wage	Initial Household Income	Base Case	Discount Rate Equals 3 Percent	Discount Rate Equals 7 Percent	Growth Rate Equals Zero Percent	Growth Rate Equals 2 Percent
1	21.4	-17.8	-31.7	-14.7	-15.0	-25.4
1.5	32.1	25.8	12.7	31.8	31.2	21.3
2	42.8	33.4	25.0	37.3	36.1	29.7
3	64.3	40.2	36.1	42.2	40.5	39.2
4	85.7	44.1	40.9	45.8	44.5	44.7
5	107.1	47.2	44.9	48.4	47.1	48.0
6	128.5	50.2	48.3	51.2	49.6	50.9
7	150.0	51.9	50.5	52.8	51.8	52.8
8	171.4	53.0	51.9	53.6	52.2	54.2
9	192.8	53.1	52.5	53.5	52.4	54.3
10	214.2	53.1	53.0	53.3	52.4	54.4
15	321.4	53.9	54.9	53.7	52.9	55.3
20	428.5	54.0	55.8	53.6	53.7	55.5
30	642.7	54.3	56.7	53.5	54.1	55.8
40	857.0	54.4	57.3	53.5	54.4	56.0

All amounts are in thousands of 2002 dollars. Present values are actuarial assuming a 5 percent real discount rate.
Source: Authors’calculations

Table 21

Sensitivity of Marginal Net Full-Time Work Tax Rates to Discount and Growth Rates

Multiple of Minimum Wage	Initial Household Income	Base Case	Discount Rate Equals 3 Percent	Discount Rate Equals 7 Percent	Growth Rate Equals Zero Percent	Growth Rate Equals 2 Percent
1	21.4	33.6	25.9	36.6	35.6	29.5
1.5	32.1	51.1	42.5	55.7	54.8	48.1
2	42.8	52.0	46.0	55.3	54.1	49.4
3	64.3	52.4	49.3	54.5	52.8	51.7
4	85.7	53.2	50.5	54.9	53.6	53.7
5	107.1	54.3	52.3	55.6	54.3	55.0
6	128.5	55.9	54.3	57.0	55.5	56.5
7	150.0	56.7	55.4	57.7	56.6	57.5
8	171.4	57.1	56.2	57.8	56.5	58.2
9	192.8	56.8	56.3	57.3	56.3	58.0
10	214.2	56.5	56.4	56.9	55.9	57.8
15	321.4	56.3	57.3	56.2	55.4	57.6
20	428.5	55.9	57.6	55.5	55.6	57.3
30	642.7	55.6	57.9	54.8	55.4	57.0
40	857.0	55.4	58.2	54.5	55.4	56.9

All amounts are in thousands of 2002 dollars.
Source: Authors' calculations.

Table 22

Sensitivity of Average Net Full-Time Work Tax Rates to Policy Changes

Multiple of Minimum Wage	Initial Annual Income *	Base Case	Cut Payroll Tax Rate by 5 Percentage Points	Eliminate Social Security Earnings Ceiling	Raise Payroll Tax Rates by 5 Percentage Points	Switch from Federal Income to Consumption Taxes	Immediate Cut In Social Security Benefits by 25 Percent
1	21.4	-17.8	-26.7	-17.8	-9.4	-7.0	-17.7
1.5	32.1	25.8	18.9	25.8	32.8	30.4	26.8
2	42.8	33.4	26.8	33.4	40.0	35.7	33.1
3	64.3	40.2	34.0	40.2	46.5	39.2	40.5
4	85.7	44.1	38.1	44.1	50.3	40.1	45.5
5	107.1	47.2	41.4	47.2	53.2	41.1	48.5
6	128.5	50.2	44.6	50.2	55.9	41.8	51.3
7	150.0	51.9	46.5	51.9	57.6	42.3	53.0
8	171.4	53.0	47.7	53.4	58.4	42.2	53.9
9	192.8	53.1	48.5	54.7	58.1	41.1	53.9
10	214.2	53.1	49.0	55.7	57.7	40.2	53.8
15	321.4	53.9	51.4	59.6	57.3	37.7	54.4
20	428.5	54.0	52.4	61.1	56.8	36.4	54.5
30	642.7	54.3	53.5	62.7	56.5	35.0	54.6
40	857.0	54.4	54.1	63.5	56.3	34.4	54.7

All amounts are in thousands of 2002 dollars
Source: Authors' calculations.

Table 23

Sensitivity of Marginal Net Full-Time Work Tax to Policy Changes

Multiple of Minimum Wage	Initial Annual Income	Base Case	Cut Payroll Tax Rate by 5 Percentage Points	Eliminate Social Security Earnings Ceiling	Raise Payroll Tax Rates by 5 Percentage Points	Switch from Federal Income to Consumption Taxes	Immediate Cut In Social Security Benefits by 25 Percent
1	21.4	33.6	30.0	33.6	37.2	39.7	33.7
1.5	32.1	51.1	47.3	51.1	55.1	54.1	51.7
2	42.8	52.0	47.9	52.0	56.3	53.6	51.8
3	64.3	52.4	48.0	52.4	57.1	51.7	52.7
4	85.7	53.2	48.6	53.2	58.1	49.9	54.4
5	107.1	54.3	49.6	54.3	59.2	49.0	55.4
6	128.5	55.9	51.2	55.9	60.8	48.5	56.9
7	150.0	56.7	52.0	56.7	61.6	48.0	57.7
8	171.4	57.1	52.5	57.5	62.0	47.3	58.0
9	192.8	56.8	52.7	58.3	61.3	45.8	57.6
10	214.2	56.5	52.9	58.9	60.7	44.6	57.2
15	321.4	56.3	54.0	61.6	59.4	40.9	56.8
20	428.5	55.9	54.4	62.6	58.5	38.9	56.3
30	642.7	55.6	54.8	63.6	57.7	36.8	55.8
40	857.0	55.4	55.0	64.2	57.2	35.7	55.6

All amounts are in thousands of 2002 dollars.
Source: Authors' calculations.

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