

Chapter 8. Revenue recycling and environmental policy

Recognizing that market-based environmental policies generate substantial revenues for any meaningful emissions reductions, assumptions must be made regarding their disposition. Taxes, like all prices, provide incentives to do some things and not others. In short, taxes can distort behavior. As examples, income and wealth taxes can reduce incentives for work, saving and investment, sales taxes on clothing but not on food can bias purchasing decisions, and taxes on gasoline, cigarettes and alcoholic beverages can discourage their use. Clearly, there are economic consequences associated with the level and structure of the nation's tax codes. Equally clearly, there are possible economic benefits from using the revenues raised under various climate change initiatives to reduce the burdens of other distorting taxes. There simply are better and worse ways to distribute the proceeds from climate change policies (e.g., Goulder (1994), Jorgenson et.al. (1996, 1998, 2000), Nordhaus (1994), Norland and Ninassi (1998), and Repetto and Austin (1997)).

A fully private allocation plan for tradable permits distributes the permits to existing polluters. The market value of these permits accrues to shareholders and business owners. In IGEN households are the ultimate owners of the nation's private stock of capital. Given the model's aggregation to a representative consumer, a private allocation plan is equivalent to distributing permit revenues in lump-sum fashion. For lump-sum distributions the transfers are independent of taxpayer behavior and are non-distorting. Because of this, they are among the least attractive mechanisms available for re-introducing permit revenues into the economy.

This chapter considers alternative permit ownership and revenue recycling schemes as part of an overall emissions reduction policy. In these alternative plans, permits or a portion of them are publicly rather than privately owned. They are auctioned by the U.S. government and the revenues are used either to reduce the marginal tax rate on labor income or to compensate the introduction of an economy-wide investment tax credit. The timing and magnitudes of emissions reductions are proportionally identical across the simulations; only the recycling plan is altered. Any remaining general equilibrium adjustments necessary to achieve revenue and-or deficit neutrality restore the level of government purchases through lump-sum transfers.

We apply these recycling alternatives to three recent analyses of Congressional initiatives conducted for the U.S. Environmental Protection Agency (EPA). These are the House Energy

and Commerce and Senate Finance Committees versions of the American Clean Energy and Security Act of 2009 (ACES) and the Lieberman-Warner Climate Security Act of 2008 (S.3036).

In the ACES simulations, we only consider adjustments in the marginal tax rate on labor income. For the House version of the ACES Act, we vary the revenues being recycled covering four possible arrangements. In the first, all allowances not specifically allocated to various stakeholders are presumed auctioned. In the second, there are no allocations and 100% of the permit supply is auctioned. In the third, recycling is valued according to permit demand and not a portion or all of permit supply. While equivalent to a carbon tax, this arrangement also is equivalent to a cap-and-trade policy in which the U.S. government owns and controls the bank account or one in which a “safety valve” time path of allowances is triggered. Our final arrangement is one in which revenues are recycled so as to hold consumers harmless in terms of foregone consumption. For the Senate version of the ACES Act, we simulate two possibilities – a recycling of revenues that follows the valuation of unallocated permit supply and one that follows the valuation of unallocated permit demand.

In the S.3036 analysis, we examine the effects of both the marginal labor tax and the investment tax credit. We simulated the portion of allowances in each year that were designated in S.3036 for auction and revenue recycling. We also evaluated the 100% supply and 100% demand arrangements.

To simplify comparisons, we summarize our findings in terms of economic welfare as measured by the equivalent variations in full wealth and full expenditure. The equivalent variation in full wealth is the present value of lifetime changes in household utility for full consumption (goods, services *and* leisure) valued at base case prices and interest rates. Alternatively, the equivalent variation in full expenditure is the present value of lifetime changes in household utility for consumption (goods and services only) valued at base case prices and interest rates. These are shown in Table 8.1.

Table 8.1: The Impacts of Revenue Recycling on Full Wealth and Full Expenditure				
Percent change from Base				
			<u>Welfare Measure</u>	
	<u>Tax</u>	<u>Government</u>	<u>Full</u>	<u>Full</u>
	<u>Instrument</u> [*]	<u>Target</u>	<u>Wealth</u>	<u>Expenditure</u>
<u>American Clean Energy and Security Act of 2009</u>				
<i>House Energy and Commerce Committee (Draft)</i>				
Unallocated supply auctioned	Lump Sum	Nominal	-0.06	-0.77
Unallocated supply auctioned	Labor	Nominal	-0.08	-0.51
100% supply auctioned	Labor	Nominal	-0.09	-0.24
100% demand auctioned	Labor	Nominal	-0.11	-0.01
Auctions to achieve consumption neutrality	Labor	Nominal	-0.11	0.00
<i>Senate Finance Committee</i>				
Unallocated supply auctioned	Lump Sum	Nominal	-0.08	-0.87
Unallocated supply auctioned	Labor	Nominal	-0.11	-0.43
Unallocated demand auctioned	Labor	Nominal	-0.12	-0.20
Unallocated supply auctioned	Lump Sum	Real	-0.11	-0.90
Unallocated supply auctioned	Labor	Real	-0.08	-0.41
<u>Lieberman-Warner Climate Security Act of 2008</u>				
Designated supply auctioned	Lump Sum	Nominal	-0.06	-1.01
Designated supply auctioned	Labor	Nominal	-0.09	-0.58
Designated supply auctioned	Capital	Nominal	0.02	-0.54
Designated supply auctioned	Lump Sum	Real	-0.21	-1.05
Designated supply auctioned	Labor	Real	-0.18	-0.56
Designated supply auctioned	Capital	Real	-0.13	-0.57
100% supply auctioned	Labor	Nominal	-0.11	-0.14
100% supply auctioned	Capital	Nominal	0.09	-0.05
100% demand auctioned	Labor	Nominal	-0.13	0.07
100% demand auctioned	Capital	Nominal	0.13	0.13
*Labor refers to reductions in the marginal tax rate on labor income.				
Capital refers to the introduction of an economy-wide investment tax credit.				

Households fare measurably better in terms of full expenditure when the permit revenues are used to reduce marginal tax rates on labor income. They do increasingly well as more revenue is recycled; varying the arrangements from unallocated or designated supply to 100% supply and then to 100% demand is welfare-improving. The improvements are by thirds for the House initiatives and by halves or more for the Senate proposals. This pattern should be no

surprise. Following the cap, permit supply involves more significant revenues from generously front loading the auctions in the early years even at the lower prices. Following demand generates still greater revenues from the temporal shifting of near-term allocations to the later years when permit prices are much higher.

Incomes and production are higher when the marginal tax rate on labor income is lowered. The distorting influence on energy and other prices from climate policy replaces an even greater distorting influence on the price of labor to producers and the income from work for consumers. Under this view, the emissions constraint raises prices to producers and consumers. Permit revenues are returned to households in the form of reductions in labor tax rates. Since a significant fraction of total household income arises from work, this plan increases the opportunity cost of choosing more leisure in terms of the goods and services that must be sacrificed to obtain it. Thus, households substitute toward consumption and away from leisure. Equivalently, they offer additional labor services at a reduced pre-tax rate of compensation. Gross compensation per employee need not be as high because tax rates now are lower. Producers absorb this additional, now lower-cost labor, restructuring inputs toward labor. Unit production costs and commodity prices are lower as the pre-tax labor cost declines.

Reduced labor tax rates favor work and consumption because of lower costs and commodity prices and because of the substitution away from leisure. However, saving and investment also are favored. Saving is higher because the stimulus to consumption due to lower prices, combined with these lower prices, lags behind the stimulus to income from a greater labor supply. Investment is higher because of more saving and because the decline in commodity prices permits more capital goods to be purchased from each dollar of investment. Additional investment adds to capital availability so that the economy now has more labor and capital. Nevertheless, the capital-labor ratio declines due to increased labor.

In terms of full wealth, as measured by good, services *and* leisure, households fare worse when the permit revenues are used to reduce marginal tax rates on labor income. In addition, they fare increasingly worse as more revenue is recycled. This seeming anomaly arises because real government purchases crowd out real consumption spending when deficit neutrality is targeted by restoring nominal government purchases. The lower labor tax results in lower prices economy-wide as the pre-tax reservation wage now is lower. Lower prices combined with base case nominal government expenditures mean that real government purchases rise largely at the

expense of real household purchases. Consumption cannot increase enough to offset the reduction in leisure due to the increase in labor supply and demand. This explains the welfare effects. If full consumption were re-defined to cover government as well as private consumption and leisure, revenue recycling with the labor tax would be unambiguously welfare-improving. As it stands, the crowding out by governments leads to a counter-intuitive, yet entirely logical, general equilibrium outcome.

The seemingly perverse ordering in the welfare rankings disappears when deficit neutrality is targeted by restoring government purchases in real terms. The change in real government purchases is directionally the same and numerically comparable in the recast scenarios. However, consumption is no longer crowded out and revenue recycling is welfare-improving in terms of both full expenditure and full wealth. The slight gain in consumption is sufficient to compensate the reduction in leisure that follows from the increase in labor supply, thus, securing the offsetting improvement in full wealth.

There is no theoretically correct choice for achieving deficit neutrality. This degree of freedom arises in IGEM because its numeraire price is the after-tax wage received by households, and not the GDP price deflator. The saving-investment balance in IGEM is expressed in nominal terms and it seems logical to deal with deficit neutrality in the budgetary sense. Moreover, achieving deficit neutrality by targeting nominal expenditures simultaneously results in revenue neutrality. However, it is equally true that government budgets envision a particular market basket of physical goods and services that should be maintained. Here deficit neutrality by targeting real purchases seems the logical choice, recognizing that revenue neutrality then must be sacrificed.

In many of IGEM's policy analyses, there are no alternative recycling considerations beyond subsidies, rebates and lump sum redistributions. Under lump sum recycling and, indeed, the other recycling mechanisms, the nominal versus real targeting of government purchases has subtle effects and matters very little in terms of the macroeconomic and inter-industry effects of climate policy. The magnitudes of GDP, consumption, investment, and other changes are qualitatively identical and numerically quite similar. Indeed, the distinction matters significantly only for the welfare rankings in simulation runs involving adjustments in the marginal tax rate on labor income and only because it produces a theoretically anomalous outcome.

Recycling revenues through an economy-wide investment tax credit or through reductions in the tax rates on capital income or property is welfare improving in terms of both full wealth and full expenditure. This conclusion holds irrespective of whether deficit neutrality is achieved through the targeting of nominal or real government expenditures. At the lower levels of revenue and relative to lump sum redistributions, the benefits to full expenditure are comparable to those from labor tax recycling. However, for full wealth, there are greater benefits from the use of the capital instrument and these relative improvements over lump-sum recycling increase as the amounts of revenue being recycled increase.

As before, climate change policy raises prices to producers and consumers. Any increases in government revenues here are returned to the private sector through the introduction of the tax credit. This reduces the rental price of capital services and raises the returns on saving and investment. Use of this instrument clearly favors capital formation over consumption although increases in the former enhance the possibilities for increases in the latter. The increased availability of capital helps insulate the economy from the adverse price effects of climate policy. This dampens but does not eliminate the dominant substitution of leisure for the consumption of goods and services. The increases in leisure for the investment tax credit lie generally between the larger ones from lump-sum recycling and the smaller ones from labor tax recycling. As capital substitutes for labor, increases in leisure and the additional consumption arising from increased capital availability contribute to the welfare gains or smaller losses associated with using capital instruments.

While capital holds the superior edge in the present-value rankings of recycling mechanisms, there are important differences in timing that merit consideration. These are illustrated in Figure 8.1 which shows the effects on real household consumption arising from the various recycling combinations. Clearly, lump-sum recycling is an inferior choice. However, in comparing the labor and capital instruments, recycling with labor taxes secures an early advantage that diminishes over time becoming a disadvantage as the longer run benefits from investment tax credits materialize. Thus, it is in the intermediate-to-long-run sense that capital becomes the preferred instrument.

Figure 8.1: Impacts of Revenue Recycling on Real Consumption
 Designated auctions in Senate Bill S.3036

