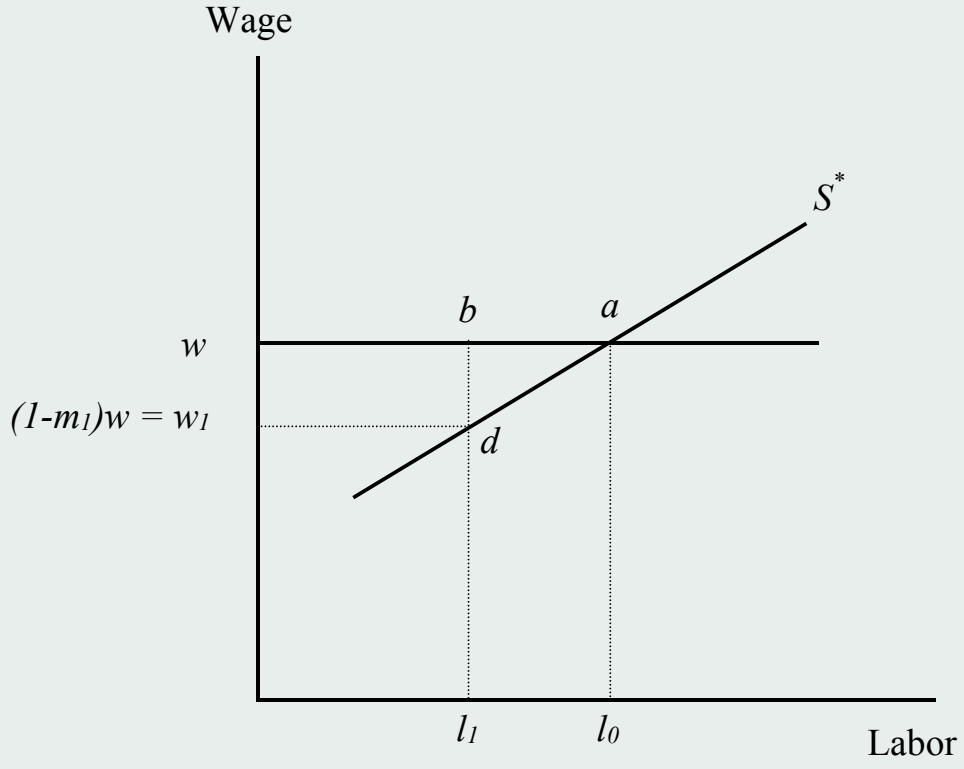
Appendix

Welfare Cost Formula

Simply put, the welfare loss of a tax system is the extra burden to taxpayers, in dollar terms, that is above and beyond the tax revenue collected by government. The welfare cost has many components. For example, taxpayers must spend time complying with tax codes of government at various levels, and government must use resources to run the tax system. Since no tax system is foolproof, some taxpayers try to evade tax payments. This imposes costs on both tax evaders and tax collectors. The former conceals tax-eligible economic activities. The latter fights tax-evading behavior. Of course, all costs of tax evasion are ultimately borne by taxpayers.

The most important welfare cost of taxation occurs when taxpayers lawfully modify their behavior to avoid or reduce tax payments. For example, when wages are taxable, workers perceive the value of their labor supply to be below its social value. As a result, they work less than is socially optimal. This welfare cost of taxation derives from the fact that a worker's economic behavior determines his tax payments. In fact, any tax other than a lump-sum tax, which is unaffected by worker activities, distorts taxpayer behavior and causes welfare costs. Thus, to determine the welfare cost of a tax system, the lump-sum tax serves as a benchmark.

Browning (1987) defines this major form of welfare cost from tax avoidance as the difference between the tax revenue that is actually collected and the revenue that could be collected with the lump-sum tax that leaves taxpayers as well-off as they are under the actual tax system.[20] This definition is universally

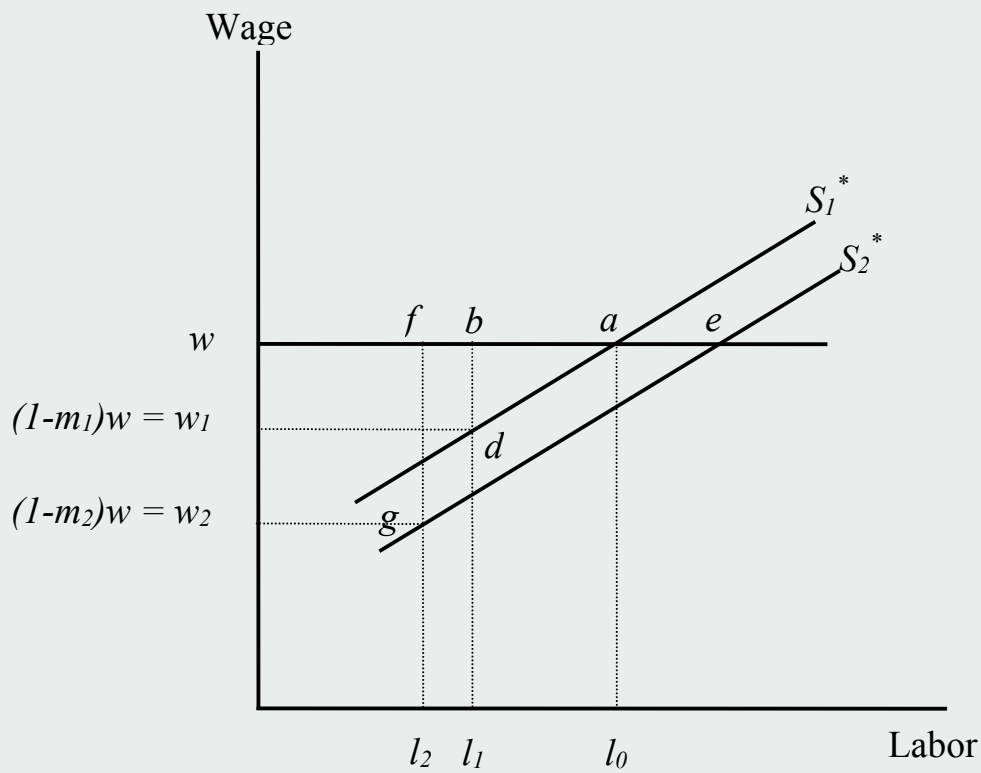


[20] For footnote 20 see http://www.ncpa.org/pub/st/st252/st252notes.html#20.

applicable for any tax, but we will focus on the tax on labor income here since the Social Security payroll tax is levied on labor income. The welfare cost of a labor income tax can be illustrated with the Harberger Triangle below.

In the figure, w is the wage rate, m_1 is the marginal tax rate on labor income (hence $w(1-m_1)=w_1$ is the after tax wage rate), point d is the equilibrium in the presence of the tax, l_1 is the corresponding labor supply, and S^* is the compensated labor supply curve passing through the equilibrium d. The rectangle ww_1db is a measure of tax revenue from labor income. At the same time, economic theory tells us that the area ww_1da is a measure of the revenue that could be collected with the lump-sum tax that leaves the taxpayers as well off. By definition, the triangle abd, the difference between the actual tax collection and the tax that could be collected with a lump-sum tax, is a measure of the welfare cost of labor income taxation.[21]

Social Security is not the only tax on labor income. It adds to the existing taxes on labor income, such as income taxes and other payroll taxes. Suppose the aggregate marginal tax rate on labor income is m_1 before the Social Security tax and m_2 after the tax. What then would be an appropriate measure of the welfare cost of Social Security payroll tax? Clearly it is not simply the triangle abd in the above figure with m_1 being replaced by m_2-m_1. The additional welfare cost caused by the Social Security payroll tax is the total welfare cost under marginal tax rate m_2 minus the total welfare cost under marginal tax rate m_1. In the figure below, the welfare cost under m_1 is abd, as already noted. To calculate the welfare cost under m_2, we must recognize that there is a new compensated labor supply curve S_2^* passing through the new equilibrium g. Then, the welfare cost under m_2 is measured by the larger triangle efg. Thus, the additional welfare cost caused by the Social Security payroll tax is $\Delta wc = efg - abd$.



[21] For footnote 21 see http://www.ncpa.org/pub/st/st252/st252notes.html#21.

Following the tradition of Browning (1987), using only those parameters that can be observed at the realized outcome in the economy, we derive an approximate formula for the change in the welfare cost, ΔWC, that by referring to the previous figure is:

$$\Delta WC = efg - abd = \frac{1}{2}(ef \times fg - ab \times db),$$

where
$$fg = m_2 w$$
$$db = m_1 w$$
$$ef = \frac{dl}{dw} m_2 w$$
$$ab = \frac{dl}{dw} m_1 w.$$

Relating $\frac{dl}{dw}$ to η, the compensated labor supply elasticity evaluated at the realized equilibrium (w_2, l_2), we have

$$\frac{dl}{dw} = \frac{\eta l_2}{w_2} = \frac{\eta l_2}{(1-m_2)w}.$$

Substituting, we arrive at

$$\Delta WC = \frac{m_2^2 - m_1^2}{2(1-m_2)} \eta w l_2.$$

or, measured as a percentage of wage earnings,

$$\frac{\Delta WC}{w l_2} = \frac{m_2^2 - m_1^2}{2(1-m_2)} \eta.$$

To calculate the additional welfare cost caused by Social Security, we require estimates of a weighted-average combined marginal tax rate on labor income for all taxes other than the Social Security tax (m_1), a weighted-average combined marginal tax rate on labor income including the Social Security tax (m_2), a weighted-average compensated elasticity of labor supply (η), and the total wage earnings (wl_2). We require weighted-average marginal tax rates and labor supply elasticity because different groups of workers face different marginal tax rates and labor supply elasticities. Unlike the uncompensated labor supply elasticity, the compensated labor supply elasticity is not directly observable. It can only be approximated based on the uncompensated elasticity and income elasticity. Existing estimates of η range from 0.2 to above 0.6. We use a low number 0.3 and a high number 0.5 for our calculations.

The uncompensated labor supply elasticity does not play an explicit role in estimating the welfare cost from the labor supply distortion of Social Security payroll tax. However, its value is relevant. First, the value of uncompensated labor supply elasticity underlies the value of the compensated elasticity. Second and more important, in obtaining the statutory Social Security payroll tax rates for future years, the effect of the tax rate on wage earnings, through its effect on labor supply, needs to be accounted for. Empirical estimates of uncompensated labor supply elasticity vary from one group to another. For example, men in their prime earning years have a slightly negative uncompensated labor supply elasticity. In contrast, women who are second wage earners in a family have a significantly positive uncompensated labor supply elasticity. As a result, overall uncompensated labor supply elasticity is believed to be close to zero. Therefore, we treat the uncompensated effects of tax rates falling on labor income and on labor supply, and hence wage earnings, as negligible in this study.

The marginal tax rates are combined because, in addition to federal and state income taxes, some other taxes either are directly levied on labor income (e.g., Medicare) or effectively fall on labor income (e.g., sales and excise taxes). These taxes distort labor supply in a way similar to income taxes and, in any consideration of the welfare cost of the Social Security payroll tax, they should be regarded as part of the preexisting distortion in the labor market.