MICHIGAN
ROSS SCHOOL OF BUSINESS

Product Number WP 2007-1
May 31, 2007

OTPR
OFFICE OF TAX POLICY RESEARCH

From the
Office of Tax Policy Research

WORKING PAPER SERIES

Excess Burden of Taxation

by

James R. Hines Jr.
University of Michigan and NBER

The Office of Tax Policy Research, established in 1987, promotes policy-oriented research in taxation, and serves as a liaison between the academic, business, and policy making communities. We are committed to using state-of-the-art methods to analyze tax policy issues, and to disseminate our findings, and those of a broader academic community, to people in the policy making community.

Excess Burden of Taxation

James R. Hines Jr.
University of Michigan and NBER

May 2007

This is prepared as an entry for *The New Palgrave Dictionary of Economics*, 2nd ed., edited by Lawrence E. Blume and Steven N. Durlauf.

Excess Burden of Taxation

ABSTRACT

The excess burden of taxation is the efficiency cost, or deadweight loss, associated with taxation. Excess burden is commonly measured by the area of the associated Harberger triangle, though accurate measurement requires the use of compensated demand and supply schedules. The generation of empirical excess burden studies that followed Arnold Harberger's pioneering work in the 1960s measured the costs of tax distortions to labor supply, saving, capital allocation, and other economic decisions. More recent work estimates excess burdens based on the effects of taxation on more comprehensive measures of taxable income, reporting sizable excess burdens of existing taxes.

JEL Classifications: H21, D61.

James R. Hines Jr.
Department of Economics
University of Michigan
343 Lorch Hall
611 Tappan Street
Ann Arbor, MI 48109-1220

jrhines@umich.edu

1. Introduction

The excess burden of taxation is the efficiency cost, or deadweight loss, associated with taxation.

The total economic burden of a tax includes both payments that taxpayers make to the government and any lost economic value from inefficient activities undertaken in reaction to taxes. Since direct tax burdens take the form of revenue that taxpayers remit to governments, the excess burden of taxation is the magnitude of the economic costs of accompanying economic distortions. For example, a tax on labor income typically discourages work by encouraging inefficient substitution of untaxed leisure for taxed paid work. At low tax rates this substitution entails only modest excess burdens, since, in the absence of other distortions, the welfare cost of substituting an untaxed for a taxed activity simply equals the tax rate, the difference between pretax and after-tax returns to the taxed activity. At high tax rates this difference is quite large, and as a result, residents of economies with high tax rates may face substantial excess burdens of taxation. Indeed, it is entirely possible for the excess burden of a tax to exceed the revenue collected; a tax imposed at so high a rate that it eliminates the taxed activity clearly has this feature.

The excess burden of taxation is commonly measured by the area of the associated "Harberger triangle" (Hines, 1999). The base of the Harberger triangle is the amount by which economic behavior changes as a result of price distortions introduced by the tax, and the height of the Harberger triangle is the magnitude of the tax burden per unit of economic activity.

2. The many excess burdens

One of the difficulties that arise in evaluating the excess burden of taxation is that there is more than one possible measure of excess burden. This multiplicity does not imply that all measures are equally desirable or useful. For example, the use of uncompensated (Marshallian) demand and supply curves to construct Harberger triangles produces measures of the excess burden of taxation with a number of known problems. In the (realistic) case in which a government uses multiple taxes, a measure of total excess burden based on uncompensated demand and supply curves is path dependent, meaning that its value depends on the order in which the taxes are imagined to be imposed. As the order of the taxes is perfectly arbitrary, path dependence is troubling – most importantly because it reflects the imprecision of excess burden measures constructed in this way.

Path dependence is one consequence of this imprecision; another is that a tax system that produces a higher level of economic welfare might have a greater measured excess burden than an alternative that raises the same revenue. If excess burden is to be useful in the evaluation and formation of tax policies, it is necessary that the measure correspond, at least approximately, to the economic cost of taxation – and assign greater excess burden to tax systems that are in fact more burdensome.

Path dependence and inaccurate welfare orderings need not arise if excess burden is measured by Hicksian consumers' surplus, based on schedules that hold utility, rather than income, constant as prices vary. Because actual tax policy changes typically do not hold utility constant, it is necessary to construct a measure based on a conceptual experiment that does. One intuitive experiment is to imagine that, as a tax is imposed, utility is held constant at its pre-tax level. Excess burden is then defined as the amount, in excess of tax revenue, that the

government must compensate consumers to maintain initial utility in the face of a tax-induced price change. The amount of compensation, which corresponds to the Hicksian measure of the *compensating variation* of the price change, may be calculated in roughly the same way that Harberger triangles are commonly measured.

An alternative conceptual experiment is to begin with the tax already in place and then remove it, extracting from consumers in lump-sum fashion an amount that prevents them from changing their utility levels while the tax is removed. Because the initial tax is distortionary, it is necessary to extract more from consumers than the tax revenue, the difference representing the excess burden of the initial tax. This differs from the previous measure in corresponding to a Hicksian *equivalent variation* measure of excess burden. One virtue of an equivalent variation measure of excess burden, compared to the compensating variation measure, lies in the fact that, in comparing tax systems raising equal revenue, the tax system with the lowest excess burden as measured by equivalent variation also produces the highest level of consumer welfare (Kay, 1980).

Although these compensating variation and equivalent variation measures are the most intuitive, they are actually just examples drawn from a class of measures based on arbitrary levels of utility and arbitrary reference price vectors. As King (1983) and others note, the use of compensated supply and demand schedules together with fixed reference price vectors guarantees that resulting excess burden measures have desirable properties, though the interpretation of the resulting magnitudes depends on the choice of utility levels and price vectors. These measures then can be naturally generalized to include marginal excess burden, the change in excess burden arising from a given tax change, and to treat excess burden in settings in which costs of production vary with output levels (Auerbach and Hines, 2002).

3. Empirical measurement of excess burden

While the theory of excess burden measurement has a long and colorful history that dates back to the nineteenth century contributions of Jules Dupuit (1844) and Fleeming Jenkin (1871/72), economists seldom measured actual excess burdens prior to the pioneering work of Arnold Harberger in the 1960s. In two influential papers published in 1964, Harberger (1964a) derived an approximation used to measure excess burden and (1964b) applied the method to estimate excess burdens of income taxes in the United States. Harberger shortly thereafter (1966) produced estimates of the excess burden of U.S. capital taxes. A generation of empirical studies by other scholars followed the publication of Harberger's subsequent survey article (1971).

The empirical work that followed Harberger's efforts focused on the use of simple excess burden formulas to estimate the welfare impact of a wide array of tax-induced distortions, including those to labor supply (Browning, 1975), saving (Feldstein, 1978), corporate taxation (Shoven, 1976), and the consumption of goods, such as housing and non-housing consumption items, that are taxed to differing degrees (King, 1983). In addition, some attention was devoted to refining the approximations used in applying estimated behavioral parameters to calculate excess burdens. A variant of the excess burden formula used by Harberger, in which a form of uncompensated demand is used in place of compensated demand, approximates a compensated measure of welfare change. One question of interest to subsequent investigators is the practical difference between results obtained using Harberger-style approximations and those available from more exact measures. As Mohring (1971) and subsequent authors note, it is often the case that the same demand information necessary to calculate approximations can, if properly

modified, be used to calculate Hicksian excess burden measures. The extent to which these two methods generate different answers is, of course, an empirical question. Rosen (1978) finds that measures of excess burden based on compensated and uncompensated demand and supply schedules track each other rather closely, but Hausman (1981) offers some examples in which they differ considerably.

A major practical difficulty in measuring the excess burden of a single tax, or of a system of taxes, is that excess burden is a function of interactions that are potentially very difficult to measure. For example, a tax on labor income is expected to affect hours worked, but may also affect the accumulation of human capital, the intensity with which people work, the timing of retirement, and the extent to which compensation takes tax-favored (e.g., pensions, health insurance, and workplace amenities) in place of tax-disfavored (e.g., wage) form. In order to estimate the excess burden of a labor income tax, it is in principle necessary to estimate the effect of the tax on these and other decision margins. Analogous complications are associated with estimating the excess burdens of most other taxes. In practice, it can be very difficult to obtain reliable estimates of the impact of taxation on just one of these variables.

It is in reaction to the complicated nature of the problem of separately estimating the effect of taxation on all of a taxpayer's decision margins that a number of recent studies estimate excess burdens based on the effects of taxation on reported taxable income. Taxable income incorporates not only any effects of taxation on work effort, but also tax avoidance of various forms, including deliberate hiding of income and legal avoidance such as making tax-deductible charitable contributions. Properly measured, excess burden as calculated by the effect of taxation on taxable income should accurately capture all of the necessary interactions to evaluate the welfare consequences of taxation (Feldstein, 1999).

Several empirical studies, including Feldstein (1995), Auten and Carroll (1999), and Goolsbee (2000), consider the responsiveness of taxable income to tax rates, relying on major U.S. tax changes to provide variation in tax rates. The evidence indicates that taxable income is generally quite responsive to tax changes, particularly among the high-income population, thereby implying an excess burden of U.S. taxes considerably greater than that produced by studies using estimated effects of taxation on work hours and saving. The estimates suggest excess burdens of taxation that might be as high as 75 percent of tax revenue collected (Feldstein, 2006), though there is still considerable uncertainty over its true magnitude.

References

Auerbach, Alan J. and James R. Hines Jr. 2002. Taxation and economic efficiency. In *Handbook of Public Economics*, vol. 3, eds. Alan J. Auerbach and Martin Feldstein. Amsterdam: North-Holland, 1347-1421.

Auten, Gerald and Robert Carroll. 1999. The effect of income taxes on household income. Review of Economics and Statistics 81, 681-693.

Browning, Edgar K. 1975. Labor supply distortions of social security. Southern Economic Journal 42, 243-252.

Dupuit, Arsène Jules Étienne Juvénal. 1844. De la mesure de l'utilité des travaux publics. Annales des ponts et chaussées, Second series, 8. Translated by R.H. Barback as On the measurement of the utility of public works, International Economic Papers, 1952, 2, 83-110; reprinted in: Kenneth J. Arrow and Tibor Scitovsky, eds., Readings in welfare economics (Richard D. Irwin, Homewood, IL, 1969), 255-283.

Feldstein, Martin. 1978. The welfare cost of capital income taxation. Journal of Political Economy 86, S29-S51.

Feldstein, Martin. 1995. The effect of marginal tax rates on taxable income: A panel study of the 1986 Tax Reform Act. Journal of Political Economy 103, 551-572.

Feldstein, Martin. 1999. Tax avoidance and the deadweight loss of the income tax. Review of Economics and Statistics 81, 674-680.

Feldstein, Martin. 2006. The effects of taxes on efficiency and growth. NBER Working Paper No. 12201.

Goolsbee, Austan. 2000. What happens when you tax the rich? Evidence from executive compensation. Journal of Political Economy 108, 352-378.

Harberger, Arnold C. 1964a. The measurement of waste. American Economic Review 54, 58-76.

Harberger, Arnold C. 1964b. Taxation, resource allocation, and welfare. In *The role of direct and indirect taxes in the federal revenue system*, ed. John F. Due. Princeton, NJ: Princeton University Press, 25-70.

Harberger, Arnold C. 1966. Efficiency effects of taxes on income from capital. In *Effects of corporation income tax*, ed. Marian Krzyzaniak. Detroit: Wayne State University Press, 107-117.

Harberger, Arnold C. 1971. Three basic postulates for applied welfare economics: An interpretive essay. Journal of Economic Literature 9, 785-797.

Hausman, Jerry A. 1981. Exact consumer's surplus and deadweight loss. American Economic Review 71, 662-676.

Hines, James R., Jr. 1999. Three sides of Harberger triangles. Journal of Economic Perspectives 13, 167-188.

Jenkin, Henry Charles Fleeming. 1871-1872. On the principles which regulate the incidence of taxes. Proceedings of the Royal Society of Edinburgh, 618-631; reprinted in: Sidney Colvin and J.A. Ewing eds., Papers, literary, scientific, &c. by the late Fleeming Jenkin, vol. 2 (Longmans Green, London, 1887), 107-121.

Kay, John A. 1980. The deadweight loss from a tax system. Journal of Public Economics 13, 111-120.

King, Mervyn A. 1983. Welfare analysis of tax reforms using household data. Journal of Public Economics 21, 183-214.

Mohring, Herbert. 1971. Alternative welfare gain and loss measures. Western Economic Journal 9, 349-368.

Rosen, Harvey S. 1978. The measurement of excess burden with explicit utility functions. Journal of Political Economy 86, S121-S135.

Shoven, John B. 1976. The incidence and efficiency effects of taxes on income from capital. Journal of Political Economy 84, 1261-1283.