

Might Fundamental Tax Reform Increase Criminal Activity?

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ABSTRACT

There is a widely held perception that fundamental tax reform would reduce the level of criminal and other “underground” economic activity. The popular argument relies on the idea that replacing the income tax with a sales tax would implicitly tax the return to criminal activity, whereas the return to crime is effectively untaxed by an income tax. This paper finds instead that the impact of tax reform on the underground sector of the economy depends on the relative labor intensity of production in the legitimate and illegitimate sectors of the economy. In the likely event that illegal output is produced using more labor-intensive techniques than is legitimate output, then replacing an income tax with a sales tax reduces the cost of criminal and other underground activity, thereby increasing such activity.

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1. Introduction.

One of the most important and vexing challenges that national tax systems confront is the problem of taxing unreported, or “underground,” economic activity. The underground economy consists of criminal activity, such as drug sales, bookmaking, loansharking, prostitution, gambling, and a host of other unsavory enterprises, as well as otherwise-legal transactions that are conducted in cash and simply unreported to authorities. While available statistics on underground activity are necessarily imprecise and often incomplete, existing estimates suggest that the scope of unreported economic activity ranges from as low as 8-10 percent of GDP in certain OECD countries to more than 50 percent of GDP in some developing countries in Asia and Africa.¹

The inability of governments to tax underground activity is problematic for at least three reasons. The first is that tax rates on legitimate activity must rise, and with them the associated efficiency costs, in order to compensate for revenues not collected from underground sources. The second problem is that the distribution of the tax burden is shifted from the illegitimate to the legitimate sector of the economy, which is inconsistent with widely-held normative notions of equitable assignments of the tax burden. And the third problem is that the non-taxation of the underground sector acts as an implicit subsidy to underground economic activity, thereby encouraging such activity at the expense of the legitimate sector. This implicit subsidy is particularly ironic and troubling in the case of criminal activity such as extortion and drug dealing, since governments devote considerable resources to discouraging and penalizing such behavior.

¹ See the evidence reported by Schneider and Enste (2000, p. 80).

Advocates of fundamental tax reform typically advance their reform proposals on the basis of enhancing economic efficiency and social justice, with occasional supplemental appeals to other possible salutary effects of reform. One popular claim is that the replacement of income taxes with national sales taxes, value-added taxes, or “flat” taxes would reduce the magnitude of illegal and underground activity.² This claim has a certain intuitive appeal, since major crime figures are unlikely to report much of their income to the government; in the absence of effective enforcement, criminal income is therefore not subject to income taxation. If instead the government were to rely on a national sales tax to raise revenue, then criminals would at least pay implicit taxes on the things that they buy with their ill-gotten income. This viewpoint suggests that the return to criminal and other underground activity is taxed under the sales tax and not under the income tax, so fundamental reform that replaces income with sales taxation would reduce returns to underground activity, and therefore the level of such activity.

The purpose of this paper is to evaluate the impact of fundamental tax reform on the size of the illegal and underground sectors of the economy. There are three steps to this analysis. The first step is to consider the commonsense argument that a national sales tax is more effective than an income tax in taxing the return to illegal and underground activity. This claim is inconsistent with the realities of tax noncompliance in the underground sector of the economy. Firms engaged in illegal and underground activity are no more likely to pay sales taxes than their owners and employees are to pay income taxes. As a result, sales taxes are collected only on sales of legitimate output, and a sales tax regime therefore provides a cost advantage for underground production. To a first approximation, this cost advantage equals that provided by

² See, for example, Boskin (1996, p. 22).

an income tax regime in which the return to factors used to produce underground output is untaxed, since in both cases only the legitimate sector of the economy is subject to taxation.³

The second step in analyzing the effect of tax reform on the criminal and underground sectors of the economy is to evaluate the impact of tax reform on relative factor prices.

Replacing an income tax with a sales tax effectively eliminates the taxation of capital income, shifting the burden of taxation entirely onto labor income and thereby influencing relative factor prices. Firms in the legitimate sector of the economy respond to the tax change by demanding more capital and less labor at pre-reform prices, which in turn bids up the pre-tax cost of capital relative to wages. The induced change in factor prices then affects the size of the criminal and underground sector of the economy. In particular, illegitimate activity will expand if it is more labor-intensive than legitimate activity, since the relative cost of labor falls following fundamental tax reform.

The third part of the analysis evaluates existing evidence of the factor intensity of criminal and underground activity compared to the factor intensity of legitimate activity. The evidence is by its nature extremely sketchy, though it consistently suggests that criminal and underground activity is more labor-intensive than is economic activity as a whole. As a result, there is reason to expect fundamental tax reform that replaces income taxation with sales taxation – or any fundamental reform that reduces the taxation of capital income – will indirectly stimulate an expansion of criminal and other illegitimate activity.

2. Tax reform and factor prices.

In order to evaluate the impact of fundamental tax reform on illegal activity, it is necessary to consider a model of an economy with two sectors, one legitimate and the other

³ Metcalf (1996, p. 98), and Murray (1997, p. 176), among others, make this observation.

illegitimate. A unit of output of the legitimate sector is taken to be the numeraire. Competitive identical firms populate the legitimate sector, producing output using capital (K) and labor (L) inputs, and a production function $f(K, L)$ that is homothetic and exhibits constant returns to scale. Identical competing suppliers in the illegitimate sector likewise use capital (\tilde{K}) and labor (\tilde{L}) inputs, producing output with a possibly very different constant returns production function $g(\tilde{K}, \tilde{L})$. Income generated by the legitimate sector is subject to tax at flat rate given by τ , while income generated by illegitimate activity is untaxed. Sales of the legitimate sector are taxed at a flat rate t .

A well-known proposition in public finance is that sales taxes (at unchanging rates) do not reduce after-tax returns to investment. This feature of sales taxation follows from the fact that the opportunity cost of investment is the value of foregone consumption, on which sales taxes would have to have been paid. Sales taxes thus reduce the cost of investment to the same degree that they tax the return to investment, thereby effectively leaving investment income untaxed. Hence it is appropriate to model the sales tax base as the difference between output and the return to capital, whereas the income tax base equals total output (assuming labor and capital income to be taxed at identical rates).

A legitimate firm chooses factor inputs to maximize after-tax profits, which are given by:

$$(1) \quad (1-t-\tau)f(K, L) - wL - (1-t)rK,$$

in which w is the (after-tax) wage received by workers, and r is the (after-tax) return to those who supply capital. This formulation incorporates that the firm pays income taxes on behalf of its workers and its owners, which simplifies the expression. The first-order conditions

corresponding to interior profit-maximizing factor choices are: $\frac{\partial f(K, L)}{\partial K} = \frac{(1-t)r}{(1-t-\tau)}$ and

$\frac{\partial f(K, L)}{\partial L} = \frac{w}{(1-t-\tau)}$. It follows that the slope of the firm's isoquant is given by:

$$(2) \quad \frac{\partial f(K, L)/\partial K}{\partial f(K, L)/\partial L} = \frac{(1-t)r}{w} \equiv c$$

in which c is the ratio of the after-tax cost of capital and the after-tax cost of labor.

Factor demands by legitimate firms can be expressed conditional on output levels, so that $L(q, c)$ is labor demand at output level q and relative price c , and $K(q, c)$ is the corresponding demand for capital. Taking the illegitimate sector of the economy to be very small relative to the legitimate sector, it follows that factor market equilibrium requires:

$$(3a) \quad L(q, c) = L(w)$$

$$(3b) \quad K(q, c) = K(r),$$

in which q is the output level of the legitimate sector, $L_s(w)$ is aggregate labor supply, and $K_s(r)$ is aggregate capital supply.

The analysis can be greatly simplified by considering tax reforms that gradually replace the income tax with a sales tax (in a revenue-neutral manner), starting from the point that $t = 0$. The level of legitimate output is assumed not to be affected by this tax change, which is a simplification that assists in the analysis, and the implications of which are discussed at the end of this section. Differentiating (3a) and (3b) with respect to t produces

$$(4a) \quad \frac{\partial L}{\partial c} \frac{dc}{dt} = L'_s(w) \frac{dw}{dt}$$

$$(4b) \quad \frac{\partial K}{\partial c} \frac{dc}{dt} = K'_s(r) \frac{dr}{dt}$$

It is useful to introduce η , the elasticity of factor substitution, defined as

$$\eta \equiv \frac{\partial[K(q,c)/L(q,c)]}{\partial c} \frac{c}{(K/L)}. \text{ From the definition of } \eta \text{ it follows that:}$$

$$(5) \quad \frac{\eta}{c} = \frac{1}{K} \frac{\partial K}{\partial c} - \frac{1}{L} \frac{\partial L}{\partial c}.$$

The elasticity of labor supply can be defined as $\varepsilon_L \equiv \frac{L'_s(w)w}{L_s(w)}$, and the elasticity of capital supply

as $\varepsilon_K \equiv \frac{K'_s(r)r}{K_s(r)}$. Using these definitions together with (4a), (4b) and (5) produces:

$$(6) \quad \frac{dc}{dt} \frac{\eta}{c} = \frac{\varepsilon_K}{r} \frac{dr}{dt} - \frac{\varepsilon_L}{w} \frac{dw}{dt}.$$

From the definition of c , it follows that $\frac{dc/dt}{c} = \frac{-1}{(1-t)} + \frac{1}{r} \frac{dr}{dt} - \frac{1}{w} \frac{dw}{dt}$, which, together with (6),

implies:

$$(7) \quad \frac{1}{w} \frac{dw}{dt} (\varepsilon_L - \eta) + \frac{\eta}{(1-t)} = \frac{1}{r} \frac{dr}{dt} (\varepsilon_K - \eta).$$

Unchanging aggregate output implies that $r(1-t)K'_s(r) \frac{dr}{dt} + wL'_s(w) \frac{dw}{dt} = 0$. This

condition can be rewritten as:

$$(8) \quad \frac{\varepsilon_K}{r} \frac{dr}{dt} = - \frac{\varepsilon_L}{w} \frac{dw}{dt} s,$$

in which $s \equiv \frac{Lw}{Kr(1-t)}$ is the ratio of returns to labor and capital. Combining (7) and (8) yields:

$$(9) \quad \frac{1}{w} \frac{dw}{dt} = \frac{\eta}{(1-t) \left[\varepsilon_L - \eta + \frac{\varepsilon_L}{\varepsilon_K} s (\varepsilon_K - \eta) \right]}.$$

Equation (9) describes the change in wages due to a small change in t . This expression has the reassuring feature that it conforms to standard partial-equilibrium reasoning. In particular, if

labor supply is inelastic, so $\varepsilon_L = 0$, then starting from zero sales taxation produces $\frac{1}{w} \frac{dw}{dt} = -1$:

the burden of greater sales taxation is borne entirely by labor in the form of lower real wages. If the elasticity of factor substitution equals zero, then real wages are unaffected by tax reform, while in the more general case that $0 > \eta > -\infty$, real wages fall to intermediate degrees.

Since legitimate output is the numeraire, its price is unaffected by tax changes. In a competitive market, this requires that the non-tax cost of legitimate output be unchanging (since

any change in t is compensated by a revenue-neutral change in τ). Applying the envelope theorem, and starting from $t = 0$, it follows that $\frac{dw}{dt}L = -\frac{dr}{dt}K$. The per-unit cost of criminal and underground output is given by $\tilde{N} \equiv w\tilde{L} + r\tilde{K}$, in which \tilde{L} is labor employed in the illegitimate sector per unit of output, and \tilde{K} is capital per unit of output; the initial level of \tilde{N} can without loss of generality be normalized to unity. Tax changes may affect per unit costs in the illegitimate sector, as given by: $\frac{d\tilde{N}}{dt} = \frac{dw}{dt}\tilde{L} + \frac{dr}{dt}\tilde{K}$. Together with the derivative of the zero-profit condition in the legitimate sector, this implies that:

$$(10) \quad \frac{d\tilde{N}}{dt} = \frac{dw}{dt} \left(\tilde{L} - \frac{L\tilde{K}}{K} \right).$$

Since $w\tilde{L} + r\tilde{K} = 1$, (10) implies:

$$(11) \quad \frac{d\tilde{N}}{dt} = \frac{\frac{dw}{dt} \left(\tilde{L} - \frac{L\tilde{K}}{K} \right)}{w\tilde{L} + r\tilde{K}} = \frac{1}{w} \frac{dw}{dt} \frac{\left(1 - \frac{L\tilde{K}}{\tilde{L}K} \right)}{\left(1 + \frac{r\tilde{K}}{w\tilde{L}} \right)}.$$

Defining $\tilde{s} \equiv \frac{\tilde{L}w}{\tilde{K}r}$ to be the ratio of the returns to labor and capital in the illegitimate

sector, (9) and (11) together imply:

$$(12) \quad \frac{d\tilde{N}}{dt} = \frac{\eta \left(1 - \frac{s}{\tilde{s}}\right)}{\left[\varepsilon_L - \eta + \frac{\varepsilon_L}{\varepsilon_K} s (\varepsilon_K - \eta) \right] \left(1 + \frac{1}{\tilde{s}}\right)}.$$

Since unit costs equal prices in competitive markets, equation (12) indicates the extent to which tax changes affect the relative prices of legitimate and illegitimate output. If relative labor intensities are identical, so that $\tilde{s} = s$, then relative prices do not change, while if illegitimate output is produced in a more labor-intensive manner than legitimate output ($\tilde{s} > s$), then the relative price of illegitimate output falls (since $\eta < 0$). Suppose, for example, that labor supply is inelastic ($\varepsilon_L = 0$), $s = 0.6$, and $\tilde{s} = 0.8$. Then, from (12), $\frac{d\tilde{N}}{dt} = -0.11$: the price of illegitimate output falls by 0.11 percent relative to the price of legitimate output for any (revenue-neutral) 1 percent rise in the sales tax rate. The extent to which this price change translates into a change in levels of illegitimate output then depends on the extent to which consumers respond to price differences.

The analysis in this section takes the level of legitimate output to be unaffected by tax reform, which is unlikely if the same tax reform influences the level of illegitimate output. The assumption that the level of legitimate output is unaffected by tax changes is imposed in order to simplify the analysis; it also reflects the reality that the legitimate sector of the economy is much larger than the illegitimate sector, particularly in high-income countries. As a general matter, price effects of fundamental tax reform are likely to be attenuated by the endogeneity of aggregate output, since expansion of the economy in the labor-intensive illegitimate sector is likely to raise wages. Furthermore, small increases in sales tax rates introduce additional

economic distortions at values of $t > 0$, adding to the burden they impose on the legitimate sector.

3. Evidence.

In order to evaluate the likely impact of fundamental tax reform on the scale of underground and illegal economic activity, it is necessary to contrast the prevailing mode of production in the underground economy with that in the legitimate sector. Unfortunately, extensive investigation has revealed relatively little in the way of reliable information about the nature of illegitimate production, no doubt due largely to incentives for concealment of underground activity.⁴ While casual observation suggests that criminal and underground economic activity tends to be very labor-intensive compared to legitimate economic activity, impressionistic evidence of that sort is considerably less persuasive than economy-wide information would be.

Schneider and Enste (2000) and Schneider (2000) survey existing evidence of the sizes of underground economies around the world. Various indirect measures are available to assess the magnitude of underground economic activities, including the fraction of the labor force reported to hold underground employment, and correlates of aggregate output, such as aggregate electricity use, other physical inputs, and cash balances held for transactions purposes. It is possible to estimate the relative labor intensity of underground production by comparing fractions of the labor force reported to be engaged in underground employment to ratios of underground output to GDP. Indications that the fraction of the labor force participating in underground production exceeds the size of the underground economy as a fraction of GDP

⁴ For surveys of the determinants and measurement of underground economic activity, see Feige (1989), Cowell (1990), Thomas (1992), Schneider and Enste (2000), and Friedman et al. (2000).

would provide suggestive, albeit far from conclusive, evidence that underground production is relatively labor-intensive.

Schneider and Enste (2000, p. 108) provide comparisons of labor force participation and aggregate underground output for selected European countries in recent years. In the cases of Austria, Denmark, Germany, and Italy, recent figures indicate that the fraction of the population working in the underground economy significantly exceeds the ratio of underground production to GDP.⁵ In other countries data limitations make it difficult to perform this comparison, though the available evidence from France suggests that the fraction of the labor force engaged in underground production is less than the ratio of underground production to GDP. Schneider (2000, p. 39) summarizes available evidence for different regions of the world in 1997/1998. Unfortunately it is not possible to perform this comparison for the OECD countries as a group, since labor force participation rates in the underground economy are available only for seven OECD countries. Outside the OECD, however, the evidence strongly suggests that labor force participation rates in the underground economy significantly exceed ratios of underground production to GDP.⁶

The very limited available micro-evidence of criminal production is consistent with these aggregate patterns. Levitt and Venkatesh (2000) provide a financial picture of a drug-selling gang that uses very little capital, including working capital that includes stocks of drugs, relative to its labor inputs. Strumpf (2003) analyzes illegal bookkeeping, which is likely to be one of the

⁵ For example, 20-35 percent of the Italian labor force is estimated to work in the underground sector, whereas the ratio of Italian underground production to GDP is 16.7 percent. Similarly, 22 percent of the German labor force is reported to work in the underground sector, while underground production in Germany is estimated to be 14.7 percent of GDP.

⁶ For example, Schneider reports that, in the transition economies of the former Soviet Union and Central and Eastern Europe, an average of 49 percent of the labor force works in the underground economy, the final output of which accounts for 24.1 percent of GDP. In African countries, 54.2 percent of the labor force works in the underground economy, which in turn produces 25.7 percent of GDP. Schneider reports similar figures for Asian countries and Central and South American countries.

most capital-intensive of illegal activities, since bookkeepers must hold significant cash reserves; nonetheless he reports that only a small fraction of the returns are attributable to capital invested. Given the endogeneity of labor supply to tax evasion opportunities,⁷ it is perhaps not surprising that criminal and underground activities become particularly labor-intensive over time.

If the illegal and underground sectors of the economy are more labor-intensive than the legitimate sector, then countries relying more heavily on indirect rather than direct taxes should have larger underground sectors, all other things equal. Available longitudinal evidence is consistent with this implication. Hill and Kabir (1996) find that, over time, greater Canadian reliance on indirect taxes, and reduced reliance on direct taxes, coincides with expansions in the underground economy. Schneider and Neck (1993) report similar results for Austria, in that the underground economy grows as the government relies more heavily on indirect taxes.⁸ Johnson et al. (1999) and Friedman et al. (2000) analyze large cross sections of countries, finding that high tax rates and heavy tax burdens are generally associated with smaller underground sectors, no doubt reflecting the impact of omitted variables that are correlated with tax rates. They report suggestive evidence that taxes of different types (income taxes, payroll taxes, value-added taxes, import duties) may affect underground activity to differing degrees, but the associated standard errors are sufficiently large that it is difficult to draw definitive conclusions.

4. Conclusion.

Governments confront enormous difficulties in attempting to control the extent of illegal and underground economic activity. It is tempting to embrace fundamental tax reform as a solution, but it is important to bear in mind that the impact of any given tax reform depends

⁷ See, for example, Cowell (1985) and Lemieux et al. (1994).

critically on its impact on relative prices. In particular, replacing the income tax with indirect alternatives such as sales, excise, or value-added taxes is likely to reduce the relative cost of labor and thereby stimulate the growth of labor-intensive sectors of the economy, including the criminal and underground sectors. Reforms of tax policies and other government policies nevertheless can be used to reduce the level of criminal and underground economic activity, but in order to do so effectively, they need to be tailored to move relative prices in the right directions.

⁸ Schneider and Neck (1993) attribute the effect of indirect taxation to its lack of complexity, which makes legal avoidance difficult for taxpayers and therefore drives economic activity underground.

References

- Boskin, Michael J., A framework for the tax reform debate, in Michael J. Boskin ed., *Frontiers of tax reform* (Stanford, CA: Hoover Institution Press, 1996), 10-24.
- Cowell, Frank A., Tax evasion with labour income, *Journal of Public Economics*, February 1985, 26 (1), 19-34.
- Cowell, Frank A., *Cheating the government: The economics of evasion* (Cambridge, MA: MIT Press, 1990).
- Feige, Edgar L., *The underground economies: Tax evasion and information distortion* (Cambridge, UK: Cambridge University Press, 1989).
- Friedman, Eric, Simon Johnson, Daniel Kaufmann, and Pablo Zoido-Lobaton, Dodging the grabbing hand: The determinants of unofficial activity in 69 countries, *Journal of Public Economics*, June 2000, 76, 459-493.
- Hill, Roderick and Muhammed Kabir, Tax rates, the tax mix, and the growth of the underground economy in Canada: What can we infer? *Canadian Tax Journal*, 1996, 44 (6), 1552-1583.
- Johnson, Simon, Daniel Kaufmann, and Pablo Zoido-Lobaton, Corruption, public finances and the unofficial economy, World Bank Policy Research Paper 2169, August 1999.
- Lemieux, Thomas, Bernard Fortin, and Pierre Frechette, The effect of taxes on labor supply in the underground economy, *American Economic Review*, March 1994, 84 (1), 231-254.
- Levitt, Steven D. and Sudhir Alladi Venkatesh, An economic analysis of a drug-selling gang's finances, *Quarterly Journal of Economics*, August 2000, 115 (3), 755-789.
- Metcalf, Gilbert E., The role of a value-added tax in fundamental tax reform, in Michael J. Boskin ed., *Frontiers of tax reform* (Stanford, CA: Hoover Institution Press, 1996), 91-109.
- Murray, Matthew N., Would tax evasion and tax avoidance undermine a national retail sales tax? *National Tax Journal*, March 1997, 50 (1), 167-182.
- Schneider, Friedrich, The value added of underground activities: Size and measurement of the shadow economies and shadow economy labor force all over the world, Working Paper, Johannes Kepler University of Linz, Austria, July 2000.
- Schneider, Friedrich and Dominik H. Enste, Shadow economies: size, causes, and consequences, *Journal of Economic Literature*, March 2000, 38 (1), 77-114.
- Schneider, Friedrich and Reinhard Neck, The development of the shadow economy under changing tax systems and structures: Some theoretical and empirical results for Austria, *Finanzarchiv*, 1993, 50 (3), 344-369.

Strumpf, K Coleman S., Illegal sports bookmakers, Working Paper, University of North Carolina, February 2003.

Thomas, J.J., *Informal economic activity* (Ann Arbor, MI: University of Michigan Press, 1992).