

ESTIMATING THE SHADOW ECONOMY

Peter Reuter

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The Rand Corporation, 1700 Main Street, P.O. Box 2138, Santa Monica, CA 90406-2138

## ESTIMATING THE SHADOW ECONOMY: A COMMENT\*

Peter Reuter  
The Rand Corporation  
Washington, D.C.

In a series of recent articles,<sup>1</sup> Frey and Weck (F-W) attempt to measure the relative sizes of the "shadow economy," the part of GNP that escapes measurement as the result of evasion. Their work represents a substantial methodological innovation in research on the shadow economy. They base their approach on factors that they believe affect the size of that economy, rather than employing measures, such as the ratio of currency to demand deposits (Gutmann, 1977) or the ratio of transactions to measured GNP (Feige, 1979), to estimate its magnitude indirectly.

We shall use F-W (1983b), the most ambitious of the series, to provide a statement of their general approach. F-W identify four sets of variables as determining the size of the shadow economy in a nation: tax and regulatory burdens, tax "morality," changes in the tax burden, and a number of labor sector measures (participation rate, length of work week, and unemployment rate).

Using observed values for these variables (to establish rank orderings) and a "plausible" range of weights in a linear equation to predict the share of GNP originating in the shadow economy, F-W classify OECD member nations into three groups. The first group contains nations for which the shadow economy is estimated to be substantial regardless of the weighting; that group consists of the Netherlands, Belgium, Austria, Italy, and France. The second group consists of nations in which the shadow is small regardless of weights; the United States, Finland, Japan, and Switzerland make up this group. All other members

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<sup>1</sup>F-W have published three articles using the same approach. Frey and Weck (1983a) analyze sources of recent *growth* in the shadow economy. F-W (1983b) develop rankings of the relative size of the shadow economy in 17 OECD member nations. Together with Pommerehne (1982), they estimate the growth of the shadow economy in West Germany, from 1960 to 1978. These comments are applicable to all three papers.

fall into a third category, in which the significance of the shadow economy is sensitive to the weights used. Since existing estimates of the size of shadow economies in each nation vary greatly, these predicted values could not usefully be compared to observed values.

While basing estimates of the size of the shadow economy directly on causal variables is a promising approach, Frey and Weck's paper contains three important shortcomings. First, it is too aggregative. Taxes and regulations are very heterogeneous collections of instruments, with widely differing consequences for the size of the shadow economy. Second, inappropriate surrogates are chosen for some of the variables. The result is that the rankings of nations, particularly with respect to tax and regulatory burdens, may be incorrect. Third, the labor force variables should be treated not as causal but as endogenous. For example, a low official labor force participation rate is a consequence, not a cause, of a large shadow economy.

#### MEASURING TAX AND REGULATORY BURDEN

F-W properly identify regulation and taxation as two of the prime sources of the growth of the shadow economy. Indeed, with the important exception of the production of illegal goods and services (such as heroin and loan-sharking), these are the sole incentives for efforts to evade measurement.<sup>2</sup> In an economy without taxation or regulation, individuals or businesses should have no reason to fail to supply information requested by the government, although reporting is itself a burden, and there is obviously the question of how (and why) the government finances the measurement activity.

Higher taxation and more onerous regulation increase incentives for participation in the shadow economy. F-W measure the tax burden by total tax revenues as a share of GNP. Regulatory burden is measured by the share of the work force in public administration. They concede that both are rough measures.

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<sup>2</sup>Obviously, there are sources of national income measurement error other than evasion; see Morgenstern (1963, Chapter XIV). F-W's estimate, unlike those of other authors, are unaffected by these other sources of measurement error.

In fact, both taxes and regulation need to be disaggregated. Different taxes provide different opportunities for evasion. Compare, for example, the consequences for a given economy of imposing two equal yield taxes. One is an excise tax on the production of natural gas; it is collected through a state franchised monopoly, selling primarily to industrial customers. The other is a sales tax on the purchase of food; it is collected through a vast network of retailers, who are required to impose the tax on all customers.

The probability that the first of these taxes is evaded is negligible; the monopolist has small incentive or opportunity for failing to collect or report the tax. Quite the opposite is true for the second tax. Even with a large inspectorate there is considerable evidence that retail sales are underreported by small retail outlets (Due and Mikesell, 1980), who may indeed compete on the basis of the percentage of sales tax they evade and the percentage of this evasion that they pass on to their customers.

The first tax then does not engender significant shadow economy activity, except inasmuch as some customers substitute alternative energy sources, such as coal, for natural gas and find shadow economy suppliers. That would seem to be distinctly a second order effect. The imposition of a sales tax on food, on the other hand, motivates some recorded enterprises to move a larger share of their transactions "off the books" and may lead to the entry of enterprises (such as street corner peddlers) that have no recorded existence at all.

Of course, the example used here is an extreme one. It compares an easily shifted tax that is subject to almost costless collection with a tax that probably presents greater collection problems than does any other. More generally, taxes may be arrayed along a spectrum in terms of the incentives and opportunities they provide for shadow economy participation. The number of payers, their ability to shift the tax burden, the level of inspection and the penalties for noncompliance, and certain characteristics of the ultimate base (employees, customers, etc.) all determine the consequences of particular taxes for the size of the shadow economy.

Moreover, even a given tax will have different consequences in economies with different structures. A nation whose retail sector is dominated by large-scale chain stores (the United States) may collect a much higher share of potential sales tax revenues than one consisting mainly of small, owner-operated stores (France). The latter can more easily shift transactions off the books, so as to reduce tax burdens; large-scale organizations have internal control requirements that limit their ability to do so.

In light of this, the use of aggregate tax burden as an indicator of the incentive for shadow economy participation is highly questionable. OECD nations show marked differences in the share of total taxes derived from different bases. For example, in 1980, income and profit taxes accounted for 46.2 percent of total tax revenue in Canada; in Ireland, the same figure was 36.6 percent (OECD, 1982, Table 7). Sales and excise taxes, which are somewhat more difficult to evade through shadow economy participation, were only 32.8 percent (of total taxes) in Canada, but were 43.6 percent in Ireland. A simple comparison of the tax burden in these two countries shows them roughly equal: 29.5 percent for Canada, and 31.5 percent for Ireland. In terms of tax incentives for shadow economy participation, there seem to be large differences between the two nations.

Feige (personal communication) has pointed to another problem with the F-W tax burden variable, namely, the ratio of tax revenues to official GNP. For a causal model, the proper variable is the ratio of taxes to total GNP, including the shadow economy contribution. In their estimating equation, they then have the problem of measurement error in an exogenous variable correlated with the endogenous variable. A high ratio of taxes to official GNP may reflect either high effective tax rates or a large shadow economy arising from non-tax factors.

The problems with the F-W measure of regulatory burden are even more fundamental. Not only is regulation a heterogeneous set of incentives for shadow economy participation, but the measure, share of labor force in public sector administration, may be negatively, rather than positively, related to shadow economy activity.

A simple example again indicates the difference in shadow economy consequences of various regulations. The United States has tight regulations for the construction and operation of nuclear power plants. Many cities have stringent regulations covering the operation of taxicabs; in particular, some cities limit the number of licenses. Power plant operators may attempt to evade the first regulation, but that creates no shadow economy activity.<sup>3</sup> The evasion of taxicab regulation, however, may generate substantial shadow economy activity, as cabdrivers enter the industry with unlicensed cabs, probably reporting little, if any, of the income generated.

Moreover, the measure used by F-W is uncertainly related to the evasion-incentive effect of a given regulation. Regulation *per se* has minor public sector employment implications. *Enforcement* of regulation, rather than its writing, leads to such employment. But if that is the case, then public sector employment (for regulatory purposes) may be inversely related to shadow economy activity. The larger the number of inspectors employed (*cet. par.*), the less the ability to evade and generate shadow economy activity. This implies that public sector employment should be negatively weighted in estimating relative sizes of the shadow economy.

## LABOR MARKET MEASURES

F-W assert:

*Proposition 3.* The lower the (official) participation rate, the higher the (official) rate of unemployment, and the shorter (official) working hours, the larger is the shadow economy. (p. 33)

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<sup>3</sup>The increased price of (regulated) nuclear power may engender substitution of other forms of energy, which may offer more opportunities for shadow economy supply. That seems likely to be a third order effect.

This proposition ignores many complexities. Participation rates are determined by a multitude of factors (Bowen and Finegan, 1967). If participation rates actually are causal, one would need at least age-adjusted participation rate estimates for the F-W purposes (compare Denison, 1982).

Another problem is even more fundamental than the choice of participation measure. The official labor force participation rate is not a determinant of second economy activity levels, but rather a partial measure of it. A higher official labor force participation rate suggests a smaller percentage of the work force employed full-time in unrecorded or shadow economy activities. To include it as an explanatory variable in a single equation model creates spurious correlations.<sup>4</sup>

The work week variable has a more ambiguous interpretation, as indicated in a related article by Frey, Weck, and Pommerehne (1982). If the work week is determined by collective bargaining agreement for the bulk of the labor force, then it is, for the individual, a given. The longer the hours which he/she must work in order to maintain a regular sector job, the fewer hours available for shadow economy participation. Leisure-income trade-offs are also affected by the lengthening of the work week. In that case, Frey and Weck are correct to treat this variable as exogenous.

For many members of the work force, such as the self-employed, however, the length of the work week is at least somewhat discretionary. For these workers, the official measure of hours worked is, like the labor force participation rate, a consequence rather than a cause of shadow economy activity. Use of this as an explanatory variable again introduces *spurious* correlation.

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<sup>4</sup>F-W are not unaware of the general problem of two-way dependency (p. 29). They note, for example, that tax rates may be affected by the extent of tax evasion. However, they assert that this is a second order interaction that does not significantly affect their procedure for classifying nations. That does not seem a reasonable view of the relationship between shadow economy activity and the official participation rate, as shown in studies of the Italian shadow economy (Contini, 1982).



Finally, unemployment presents a very different problem.<sup>5</sup> Two factors affect interaction between official unemployment rates and shadow economy activity: the extent to which shadow economy participation complements recorded employment and the method by which the unemployment rate is measured. If most participants in the shadow economy are supplementing wage and salary income from regular jobs, there is little effect on recorded unemployment rates; the length of the official working week will pick up most of the variation. If the unemployment rate is measured through household surveys, shadow economy participation may affect either participation or unemployment rates. If it is measured using establishment data, then it will not affect measured unemployment, except inasmuch as the two sectors provide substitute employment.

#### CONCLUDING COMMENTS

An approach to estimating the size of the shadow economy in terms of a reasonably complete specification of its causes is certainly attractive. The current state of research in this area, with models that depend on some simple heuristics and are enormously sensitive to parameters about which no information is likely to be obtainable, such as the relative velocities of money circulation in the shadow and recorded economies, is highly unsatisfactory.

However, the task is not a simple one. The shadow economy is a very heterogeneous set of activities, probably differing greatly in composition among nations. Overly aggregative analyses, such as that of Frey and Weck, are unlikely to yield results that are either empirically plausible or conceptually fruitful.

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<sup>5</sup>A detailed discussion of the effect of shadow economy participation on recorded unemployment is presented in Reuter (1982), in the context of U.S. unemployment statistics.

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