

DRAFT

“SIZING” THE PROBLEM OF THE HARD-TO-TAX

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I. Introduction

It is well accepted that most people do not like to pay taxes, and, because of this fundamental reason, it is hard to levy and collect taxes anywhere and any time. However, as all tax practitioners are well aware, taxing certain kinds of activities, sectors, or individuals – the so-called “hard-to-tax” – is an additional challenge for tax administrations in both developing and developed countries.

In recent years, the policy emphasis in tax enforcement around the world has been on large taxpayers and also, but perhaps less so, on the rest of the formal sector. This approach has made sense because scarce resources for tax enforcement can be much more productive in the development of large taxpayer units. Although they represent a very small percentage of all taxpayers, large taxpayers typically account for two-thirds and upwards of all tax revenues. However, there has been growing policy interest in the “hard-to-tax” (HTT), and not only because the HTT are perceived to represent a growing slice of potential tax revenues. Even aside from lost tax revenues, there are other important tangible effects, such as the improvement in horizontal and vertical equity. There are also significant intangible effects, including higher overall tax morale in the country. A growing sense of the inability of the tax authorities to catch tax evaders and the resulting unfairness of relative tax burdens can lead over time to much lower tax yields than the lower tax yields due directly to the problem of the HTT.

Although developed countries like France and Spain have recently been phasing out special tax regimes that had quite successfully been applied to the HTT, at the same time tax administrations in developing and transitional countries have given increasing scrutiny to the HTT, often out of the necessity to increase overall revenues and to reduce deficits. There are clearly many unresolved issues in the HTT, and it seems unlikely that the problems associated with the HTT are going to disappear any time soon. Indeed, with the steady advance of such processes as globalization, internet commerce, and capital mobility, it seems more likely that, if anything, the issues in taxing the hard-to-tax will become even more pressing.

In this paper we analyze the hard-to-tax, asking the basic question: Why should the HTT matter to policy makers? We begin in Section Two by attempting to identify both the HTT and the main parameters of the problem. Section Three examines some of the impacts of the hard-to-tax, looking at revenue collections and at the structure of tax systems. Section Four explores the impact of the HTT on the allocation of resources in the economy and on the process of economic development. Section Five then looks at the impact of the HTT on equity and the distribution of income. The paper concludes with some implications for the design of tax policy design and for the administration and enforcement of tax policy.

II. Identifying and Sizing the Hard-to-tax

All taxpayers are hard to tax in one way or another. However, as argued above, there is a group of taxpayers that it is considerably more difficult to tax than the rest. Who are they and how do we identify them?

No precise definition exists of the hard-to-tax. However, as noted by Terkper (2003), these are taxpayers who often fail to register voluntarily. Even when they do register, they generally fail to keep appropriate records of their earnings and costs, they often do not promptly file their tax returns, and they frequently tend to be tax delinquent.

Das-Gupta (1994) attempts to develop a theory of the HTT groups based on the number of transactions involved in the derivation of income. Thus, while salaried employees derive income from a single transaction with their employers and find it hard to hide their income, professionals derive their income from multiple transactions with clients and find it easier to hide their incomes. In the context of the classical Allingham and Sandmo (1972) model of tax evasion, Das-Gupta (1994) argues that the penalties and taxes due decrease as the number of income-generating transactions increases. However, this approach fails to have general appeal because it is easy to find counterexamples of economic agents deriving income in multiple transactions (e.g., hotels, restaurants) that do not fall into the category of the hard-to-tax.

Independently of the right definition or model, there is considerable consensus in the tax literature regarding the identity of the hard-to-tax. Musgrave (1990) identifies the hard-to-tax with small-and-medium-sized firms, professionals, and farmers.¹ Similarly, Tanzi and Casanegra (1989) identify the hard-to-tax mainly with individual proprietorships, farmers, and professionals. There appears to be consensus also that the more sophisticated hard-to-tax activities, such as electronic commerce or multinational corporations with highly mobile capital and sophisticated transfer pricing activities, should not be considered part of the hard-to-tax. More recently, the HTT are more often identified with “small and medium-size taxpayers or firms”, although quite clearly these are the same taxpayers more traditionally identified as the hard-to-tax.²

What is interesting is that the HTT include taxpayers in both the informal and the formal sectors of the economy. In the informal sector, the hard-to-tax may include unregistered merchants and professionals who are involved in cash transactions or even barter. As Terkper (2003) points out, these individuals may have genuine difficulty in keeping even simple accounts, and may not be familiar with banking and other financial transactions. In the formal sector, the HTT may include professionals with college educations, as well as small manufacturing firms and commercial farms who are capable of keeping accounts and who often do so for purposes other than paying taxes. Thus both types of the hard-to-tax may or may not operate in a cash economy, and they may or may not be capable, but are always unwilling, to provide the tax authorities with relevant information that the tax authorities have a hard time extracting from them (Bird and Oldman, 1990).

¹ The term “hard-to-tax” appears at least as far back as the Musgrave Report for Colombia of 1971. We thank Victor Thuronyi for bringing this to our attention.

² See Terkper (2003) and Engelschalk (2003).

The idea of the hard-to-tax is related to several other important concepts, including the shadow economy and tax evasion. These two sets of issues have separately received considerable attention in the literature, and more is known about them than about the hard-to-tax.

In terms of their economic base, individuals in the hard-to-tax sector are likely to be similar to those who operate in the shadow economy. As defined by Schneider and Enste (2000), the “shadow economy” includes income unreported to the tax authorities that is generated from the production of legal goods and services, often by means of clandestine labor, involving monetary or barter transactions by agents that are not registered or do not pay taxes.³ This definition does not precisely match a strict definition of the HTT, though there appears to be considerable overlap between the two. However, there also appear to be some differences. For example, the HTT include individuals who eventually pay taxes either as a presumptive tax or by other means; such individuals generally will not be included in the measurement of the shadow economy. Also, there may be some forms of tax evasion that are included in the various measures of the shadow economy but that are not truly part of the hard-to-tax, though examples are not easy to find.

As for the relationship between the HTT and tax evasion, it seems evident that the entire problem of tax evasion is a much larger problem than the hard-to-tax. Many forms and types of tax evasion would fall outside the purview of the HTT, such as evasion by large corporations and even by ordinary common taxpayers.⁴

Nevertheless, these various notions are clearly related. As discussed below, it seems a plausible notion that there is a high correlation between the shadow economy and the HTT. If one accepts this notion, then we can try to quantify some of the impacts of the hard-to-tax on the economy. The proxy measure that we use for the size of the HTT sector is Schneider’s (2000) measurement of the shadow economy in different countries. (See the data appendix at the end of the paper.) Table 1 reports several of these simple correlation coefficients.

The relative importance of the HTT is likely to vary across countries and over time, and to vary according to some obvious determinants. A priori, the hard-to-tax should be expected to have a larger relative presence when there are more taxpayers unprepared to keep books of accounts and where the tax administration lack the means to help and also to audit those other taxpayers who can keep their accounts but refuse to keep them or disclose them to the authorities. Thus, the problem of the HTT is likely to

³ The boundary between the shadow economy and criminal activities is that in the latter both production and output are illegal while in the former only production is illegal (Thomas, 1992). The hard-to-tax excludes criminal activities.

⁴ We do not discuss here other possible relationships and distinctions among these concepts. See Feinstein (1999) and Lippert and Walker (1997) for discussions of the relationship between tax evasion and the shadow economy. Lippert and Walker (1997), for example, argue that tax evasion more often involves financial transactions with the objective of concealing income, while the shadow economy more often involves the production of goods and services with labor and other inputs.

decrease in importance with the level of economic development. This hypothesis receives some support from the simple correlation coefficient between our proxy for the hard-to-tax and gross domestic product (GDP) per capita in Table 1.

The problem of the hard-to-tax could also be seen as becoming more serious when the public sector is trying to raise more taxes, exercising a higher tax effort. Perhaps surprisingly, however, this hypothesis is not supported by the correlation coefficient between the size of the HTT sector and tax effort in Table 1, although this result may reflect that the fact that tax effort is highly correlated with GDP per capita. For the same level of general economic development, as measured by GDP per capita, we would expect the size of the HTT sector to increase with the relative share of agriculture in GDP and decrease with the share in GDP of manufacturing.⁵ Although we are not controlling for the level of development, the positive correlation coefficient for the share of agriculture in Table 1 supports the notion of higher incidence of the hard-to-tax with a larger relative presence of agriculture. We would also expect the problem of the HTT to become more acute in societies with higher levels of corruption. We measure the latter through the CPI score from Amnesty International (see the data appendix), which “...relates to perceptions of the degree of corruption as seen by business people, risk analysts and the general public, and ranges between 10 (highly clean) and 0 (highly corrupt)”. This hypothesis is supported by the correlation coefficient in Table 1. Thus, the hard-to-tax and the shadow economy are highly complementary with corruption: a corrupt economy tends to be an economy with a larger HTT sector.

We have no information on how the problem of the hard-to-tax has evolved through time in any particular country. Schneider and Enste (2000) review several reasons to expect growth over time of the shadow economy. These reasons include the increasing burden of taxes and social security contributions, and the increasing complexity of the tax systems and government regulations.⁶ All of these can also be seen as good reasons to expect growth in the HTT sector.

Table 1					
Some Simple Correlation Coefficients between the Shadow Economy as a Percent of GNP with Selected Variables					
	GDP per Capita	Tax Revenue/GDP	Manufacturing Value Added/GDP	Agriculture/GDP	Corruption Index
Shadow Economy/GNP	-0.50	-0.26	0.02	0.45	-0.60
Source: Calculations by authors.					

⁵ Of course, we do not know precisely the relative predominance of the self-employed in developing and developed economies. Long a feature of developing economies, the self-employed seem to be increasing in importance in mature economies.

⁶ This process can be more pronounced in some developing countries caught in a “bad equilibrium” (Johnson, Kaufman and Zoido-Lobaton, 1998): high taxes and high regulatory burdens lead to increases in the shadow economy, which may lead to still higher taxes and higher regulations, and so on.

III. The Impact of the Hard-to-tax on Revenues and Tax Structure

The most immediate effect of the hard-to-tax is to reduce the revenue potential of any given tax structure. In addition, however, we argue in this section that it is likely that the presence of the hard-to-tax affects not only the level of tax effort and the effectiveness of tax administration but also affects the choice of tax structure.

To our knowledge, there exists very limited direct information on the revenue losses implied by the HTT. For the United States, Kenadjian (1982) reports on the findings of a 1979 IRS study that estimated total unreported legal sector income of US \$ 74.9 billion in 1976, of which self-employment income was US\$ 33 billion; a considerable share of unreported self-employment income could be considered as belonging to the hard-to-tax group.⁷ Also, Terkper (2003) states that developing countries lose tax revenue in proportionally greater amounts than developed countries from the informal sector because small and medium traders (e.g., the hard-to-tax) tend to thrive in underground economies. He estimates that the tax losses could constitute as much as 35 to 55 percent of GDP. As discussed below, our calculations lend some credence to Terkper's (2003) conjectures.

There are at least two possible ways that we can examine the impact of the HTT on tax revenues. First, we can explore how the presence of the HTT affects the overall tax effort in any country. There is a quite extensive literature on the determination of tax effort (Bahl, 1971). There are also some important critiques of this literature (Bird, 1980); for example, all other things equal, national preferences for public and private goods should affect the level of tax effort, but generally we cannot quantify these preferences.

Despite these concerns, our hypothesis is that a greater presence of the HTT will reduce the tax effort in any country. The regressions in Table 2 explore the effects of the relative size of the HTT on "tax effort", defined as total tax revenues in 2000 divided by gross national produce (GNP) for the same year. We follow the literature on tax effort in our specification of different models. We include as one control variable GNP per capita, and we interact the relative size of the HTT with GNP per capita to allow for a decreasing impact of the hard-to-tax as the level of development increases. In Model 1, we also introduce a group of variables that account for the existence of particular tax handles or that represent features of the economy that may facilitate tax collections (e.g., the share of mining in GNP) or impede tax collections (e.g., the share of agriculture in GNP). Because of the lack of data on these two variables, the number of usable observations becomes quite small. Therefore, we run another equation (Model 2) without some of the

⁷ In fact, the IRS definition of self-employment bears a significant resemblance to an operational definition of the hard-to-tax: "...self-employment income covers net earnings of farm and non-farm proprietorships and partnerships (at times referred to as unincorporated business income) as well as net earnings of self-employed individuals working outside the context of regularly established businesses in the legal sector" (Kenadjian, 1982).

control variables but with more observations. These results are of course only suggestive.

The impact of the HTT on tax effort in Table 2 is consistent across both models. As conjectured, the intensity of the HTT reduces overall tax effort for a sample of developed and developing countries in 2000. However, the impact of the hard-to-tax on effort gets dampened with increases in the level of economic development.

Independent Variable	Model 1	Model 2
GNP per Capita	-0.02 (-3.58)	-0.01 (-2.69)
Shadow Economy/GNP	-0.40 (-2.06)	-0.23 (-2.59)
(Shadow Economy/GNP) X GDP per Capita	.0001 (3.53)	9.17E-05 (3.42)
Taxes on Internal Trade/GNP	-2E-05 (-0.55)	-1.1E-05 (-0.46)
Agriculture/GNP	-0.001 (-0.72)	---
Mining/GNP	0.003 (2.02)	---
Constant	0.32 (4.37)	0.24 (5.94)
Observations	15	41
R-squared	0.83	0.34
^a The dependent variable is total tax revenue divided by GNP in year 2000. White corrected t-statistics are in parentheses. The equations are estimated by OLS methods. Source: Calculations by authors		

The second approach to examining the impact of the hard-to-tax on tax revenues is to estimate directly the revenue losses induced by this group. To do this, we continue to make use of the assumption that the tax base of the hard-to-tax can be approximated by the size of the shadow economy, and we also assume that the effective average tax rate in the formal (non-shadow) economy is also the effective average tax rate that would apply to the hard-to-tax. Both assumptions are open to question, and so our approach is only suggestive. Indeed, our estimates of the revenue loss from the HTT seem likely to be upper-boundary estimates, for several reasons. First, the actual size of the hard-to-tax may be smaller than the underground economy. Second, the effective average tax rate that would apply to the HTT is likely to be lower than that of the regular formal economy.

Sample	Observations	Mean	Standard Deviation	Minimum	Maximum
Developing	57	0.25	0.07	0.11	0.40
Industrialized	19	0.15	0.05	0.08	0.22
Whole World	76	0.22	0.07	0.08	0.40
Source: Calculations by authors using World Bank Indicators and Schneider and Enste (2000).					

Table 3 shows the summary statistics for the losses in revenues from the hard-to-tax for two groups of developing and developed countries, with the losses in revenues expressed as a percentage of potential tax revenues (calculated as actual tax revenues plus losses in revenues). Revenue losses from the HTT tend to be considerably higher (in relative terms) in developing countries than in developed countries; they also tend to show higher dispersion in developing countries. The estimates of losses can represent up to 40 percent of total potential revenues in developing countries.

Figures 1 and 2 show the plots of the estimates of relative revenue losses versus GNP per capita, for developing countries (Figure 1) and for developed countries (Figure 2). Although there is a high level of dispersion, clearly there is a tendency in both developing and industrialized countries for relative revenue losses to become smaller with the level of development. This result tends to support the perception that the HTT problem is more serious in developing than in developed economies.

Consider now the impact the hard-to-tax on the structure of the tax system itself. Shoup (1990), among others, points out the constraints imposed by economic structure, administrative capabilities, and taxpayer voluntary compliance on the choice of tax structure. Clearly, a higher presence of the HTT in developing countries and also in developed countries may constrain the optimal choice of the tax mix. A heavy presence of the HTT leaves less room for sophisticated taxes requiring more reporting by taxpayers and more complex auditing by tax administrators. Thus, we hypothesize that a larger hard-to-tax sector should be associated with more reliance on indirect taxes (especially excises), on taxes on international trade, and on natural resource extraction.⁸

⁸ See Boadway et al. (1994) for an analysis of the impact of tax evasion on the direct-indirect tax mix. These authors show that a tax mix is favorable to other methods of taxation when individuals are able to evade certain taxes.

Figure 1

Developing Countries

("Developing Countries" corresponds to High Income classification of World Bank indicators (2002), with per capita GDP of \$9,265 or less)

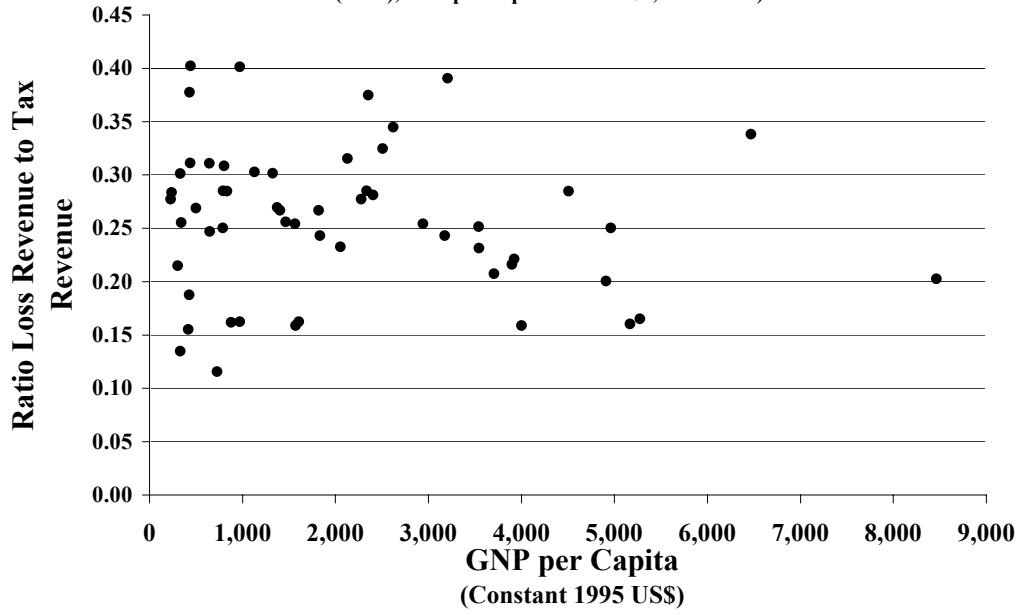
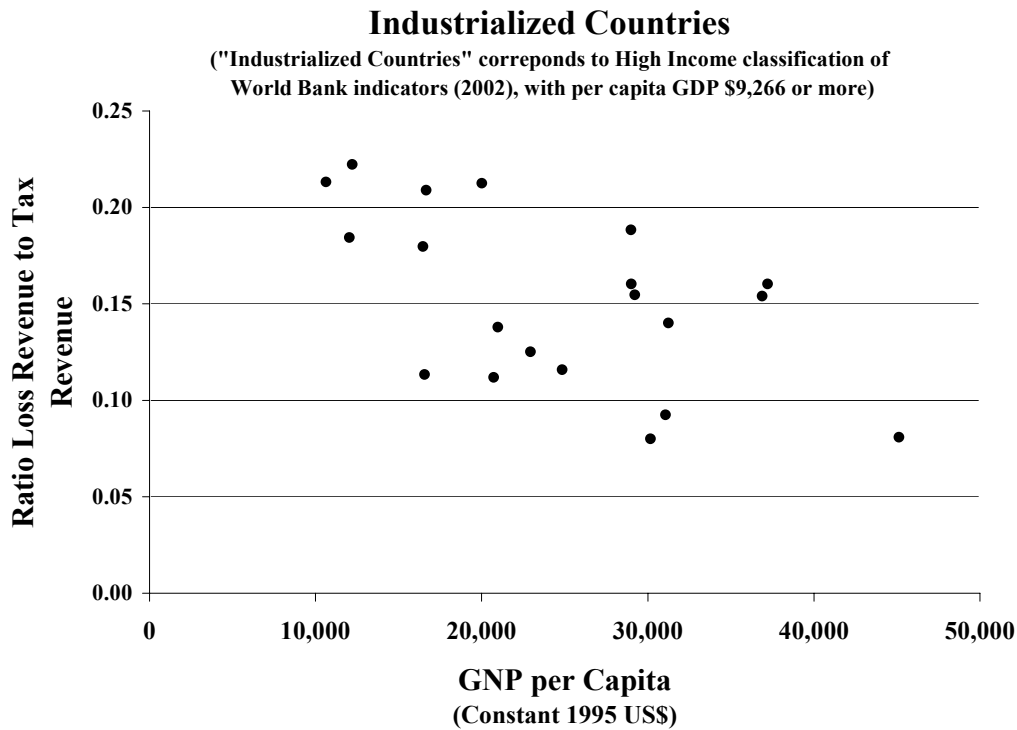


Figure 2



Before we examine some preliminary evidence on this hypothesis, it is important to note that we can also expect to find a reverse causality between the impact of the tax mix on the hard-to-tax and the shadow economy in general. For example, Brou and Collins (2001) study the impact of the tax mix on the informal economy in a general equilibrium model, and they conclude that direct taxation is a better instrument to raise revenues when government is concerned with controlling the growth of the informal sector.⁹ They also blame recent policy changes favoring indirect taxation for the rapid growth internationally of the informal economy. In this paper, we look at some preliminary evidence on the hypothesis that a more significant presence of the hard-to-tax leads countries to rely more heavily on indirect and simplified methods of taxation. Empirically we find no evidence of simultaneity between the hard-to-tax and tax structure.

We can approximate the tax mix in a variety of ways. Five possible measures, or dependent variables, are:

Ratio of Direct Taxes to Indirect Taxes:

⁹ With direct taxation, Brou and Collins (2001) argue that lower taxes on labor than on capital will help shrink the labor-intensive informal sector.

$$Dependent\ 1 = \frac{\text{Taxes on Income, Profit, and Capital Gains}}{(\text{Domestic Taxes on Goods and Services} + \text{Taxes on International Trade})}$$

Ratio of Direct Taxes to Indirect Domestic Taxes:

$$Dependent\ 2 = \frac{\text{Taxes on Income, Profit, and Capital Gains}}{\text{Domestic Taxes on Goods and Services}}$$

Ratio of Special Taxes to Total Tax Revenue:

$$Dependent\ 3 = \frac{(\text{Excises} + \text{Taxes on International Trade})}{\text{Total Tax Revenue}}$$

Ratio of Direct Taxes to Total Tax Revenue:

$$Dependent\ 4 = \frac{\text{Taxes on Income, Profit, and Capital Gains}}{\text{Total Tax Revenue}}$$

Ratio of Domestic Taxes on Goods and Services to Total Tax Revenue:

$$Dependent\ 5 = \frac{\text{Domestic Taxes on Goods and Services}}{\text{Total Tax Revenue}}$$

Table 4 shows the results of simple OLS regressions explaining the variation across the sample of countries in tax mix, measured in the above five possible ways; independent variables include the relative size of the HTT sector (measured by the share of the shadow economy in GDP), as well as several control variables, including GDP per capita, the share of the manufacturing sector in GDP, and the openness of the economy.

The results in Table 4 are generally supportive of the hypothesis that, after controlling for the level of economic development and other factors, a larger HTT sector leads to a heavier reliance on indirect taxation. As expected, the coefficient for the shadow economy is negative and statistically significant in Equations one, two, and four, and positive and significant in Equation five. Not surprisingly, the openness of the economy also leads to a heavier reliance on indirect taxation. It is, however, surprising that higher levels of GDP per capita seem to lead to greater reliance on indirect taxation. To test for the potential simultaneity of the HTT sector and tax structure we run a Hausman Chi-square test with corruption as an instrument for the HTT and fail to detect any presence of simultaneity.

Table 4					
Shadow Economy Effects on Tax Composition (2000)^a					
<i>Explanatory Variable</i>	<i>Dependent 1</i>	<i>Dependent 2</i>	<i>Dependent 3</i>	<i>Dependent 4</i>	<i>Dependent 5</i>
GDP per capita	0.21 (0.92)	-0.02 (-1.55)	-0.02 (2.36)	0.001 (0.29)	0.005 (3.08)
Shadow Economy /GNP	-1.48 (-2.34)	-2.71 (-1.85)	-0.04 (-0.24)	-0.34 (-2.15)	0.41 (2.94)
Manufacturing Valued Added/GDP	-0.01 (-0.51)	-0.05 (-0.81)	-0.002 (-0.56)	-0.001 (-0.30)	-0.005 (-1.17)
Openness	-0.004 (-2.04)	-0.006 (-1.62)	-0.001 (-1.56)	-0.002 (-2.41)	0.001 (1.55)
Constant	1.72 (2.03)	3.38 (1.70)	0.44 (3.46)	0.52 (3.96)	0.29 (2.61)
Observations	41	42	38	43	42
R-squared	0.11	0.10	0.24	0.21	0.19
^a White corrected t-statistics for the OLS regressions are in parentheses. Source: Calculations by authors.					

IV. The Impact of the Hard-to-tax on the Efficiency of Resource Allocation

The presence of the hard-to-tax is likely to distort the allocation of economic resources in the economy. It is also quite likely that a wider presence of the hard-to-tax may represent an impediment to economic development.

Das-Gupta (1994) identifies several types of inefficiencies associated with the HTT. First, the use of cash, barter, and other less efficient means of payments among the HTT should lead to excess burdens. Second, there may be losses in economies of scale if the hard-to-tax utilize many smaller transactions as opposed to larger ones in order to avoid detection. Third, there may be a larger-than-optimal allocation of labor and other resources in the hard-to-tax sectors due to the differential tax burdens.¹⁰

This last type of inefficiency is similar to that identified by Alm (1986) in the context of the shadow economy. The existence of a sector to which resources may move in order to evade taxation means that taxes drive a wedge between the returns to factors in different sectors. For example, if factors of production are mobile between taxed and untaxed activities, then they will move between these sectors until the net-of-tax return in the taxed sector equals the return in the untaxed sector. However, the gross-of-tax return to a factor measures the social productivity of the factor, and the gross-of-tax return will be higher in the taxed sector by the amount of the tax. Consequently, a tax on a factor in

¹⁰ Das-Gupta raises the important point that there will be this type of inefficiency only if decisions on the allocation of resources are affected by tax evasion opportunities. For example, Marelli (1984) and Yaniv (1988) show that in the presence of certain tax and enforcement regimes, risk-averse firms do not change their resource allocation decisions when there is a possibility of evading taxes, provided that it is optimal for the firms to pay some tax.

only some of its uses encourages overallocation of factors to untaxed activities and so generates an excess burden.

A similar source of potential inefficiency is discussed by Palda (1998), also in the context of the shadow economy. In the presence of different abilities to enter the shadow economy (or the HTT sector in our case), markets will tend to select producers for both their ability to evade and their ability to have low costs of production. An excess burden arises when efficient firms are crowded out by inefficient firms with greater ability to evade taxes.

There are also other possible sources of inefficiencies that arise from the existence of tax evasion (Martinez-Vazquez, 1996) and that might also be relevant in the presence of the hard-to-tax. One might be termed the “anxiety costs” of tax evasion, or the loss in utility suffered by risk-averse individuals engaged in tax evasion activities (Yitzhaki, 1987). There are also out-of-pocket costs that often accompany tax evasion. These include such costs as the expenses incurred by taxpayers to cover their evasion (including payments to tax professionals and bribes to tax officials), the costs borne by the tax agency in its enforcement activities, and costs imposed on other taxpayers who must comply with stricter information and disclosure requirements. If tax evasion and the accompanying revenue loss prompt the government to increase tax rates on other taxes to offset the revenue loss, then these rate increases generate additional excess burdens; on the other hand, if the government responds by reducing government services, then there is a welfare loss from the diversion of resources from the public sector. Finally, there may well be a cost that arises because cheating imposes a negative externality on others in the form of “unhappiness” that some are not paying their “fair share” of taxes. Note that this externality can exist independently of any loss of tax revenues from tax evasion.

Of course, there can also be efficiency gains, and there are plausible reasons to expect the various inefficiencies to be dampened and even reversed. For example, Schneider and Enste (2000) note that in the shadow economy the small scale of services and manufacturing may contribute to more dynamic entrepreneurship, more competition, and greater limits on government encroachment and regulations. All these factors can be growth enhancing. Bahl and Martinez-Vazquez (1992) make a similar argument for tax evasion. With highly inefficient and corrupt governments, the presence of tax evasion may lead to higher growth and development by leaving more funds in a potentially more efficient private sector.

Put differently, the presence of a hard-to-tax sector suggests that there are what might be considered “static” excess burdens as resources are misallocated at a point in time, as well as “dynamic” effects on efficiency due to the accumulation of these static effects over time. It is therefore useful to focus our analysis on these static and dynamic effects. In the next subsection, we estimate one component of the static misallocations of the HTT for a stylized economy, and in the following section we present preliminary evidence on the dynamic impact of the HTT on economic growth.

A. Measuring the Static Excess Burden of the Hard-to-tax

One component of the excess burden of the HTT – the misallocation of factors between sectors because of differential taxation – can be measured using an extension of the general equilibrium model of tax incidence pioneered by Harberger (1962). This model can also be used to measure some aspects of the incidence of the HTT, as discussed in Section Five below.

Let a typical stylized economy be divided into three sectors: a fully taxed sector that produces output X , a sector Y that is legally exempt from taxation, and a hard-to-tax sector Z that is legally subject to taxation but that escapes taxation because activities there are “hard-to-tax”. Demand for each output is a function of relative prices, and all agents (including government) are assumed for simplicity to have the same average and marginal propensity to consume each commodity. Each good is produced under competitive conditions with a linearly homogeneous production function that depends upon the amount of capital (K) and labor (L). Capital and labor are assumed to be fixed in supply; they are also assumed to be perfectly mobile among sectors. Because of perfect mobility, net factor returns must be equalized across sectors, where factor returns are assumed to be adjusted for the presence of any risk premia that may exist in the untaxed sectors. All physical units are chosen such that initial prices are unity.

Since capital and labor in sectors Y and Z are assumed to be untaxed, there are only two taxes: a tax on capital (T_K) and a tax on labor (T_L) in the taxed sector X .¹¹ As discussed above, the taxation of capital and labor in only some its uses creates an incentive for resources to flow from the taxed sector (X) to the untaxed sectors (Y and Z). This movement has both allocative and distributional effects. The allocative effects are the focus here; the distributional effects are discussed in Section Five.

In differential equation form, this stylized economy can be represented as follows (where $\hat{\cdot}$ denotes the percentage change in the relevant variable):

$$(1) \quad \hat{X} = E_{XX}(\hat{P}_X - \hat{P}_Z) + E_{XY}(\hat{P}_Y - \hat{P}_Z)$$

$$(2) \quad \hat{Y} = E_{YX}(\hat{P}_X - \hat{P}_Z) + E_{YY}(\hat{P}_Y - \hat{P}_Z)$$

$$(3) \quad \hat{X} = f_K \hat{K}_X + f_L \hat{L}_X$$

$$(4) \quad \hat{Y} = g_K \hat{K}_Y + g_L \hat{L}_Y$$

$$(5) \quad \hat{K}_X - \hat{L}_X = s_X(\hat{r} + T_K - \hat{w} - T_L)$$

$$(6) \quad \hat{K}_Y - \hat{L}_Y = s_Y(\hat{w} - \hat{r})$$

¹¹ The only other tax that might be imposed is a tax on consumption of X (or T_X), and this tax is equivalent to an equal-rate tax on capital and labor in X .

$$(7) \quad \hat{K}_Z - \hat{L}_Z = s_Z (\hat{w} - \hat{r})$$

$$(8) \quad \hat{K}_X K_X + \hat{K}_Y K_Y + \hat{K}_Z K_Z = 0$$

$$(9) \quad \hat{L}_X L_X + \hat{L}_Y L_Y + \hat{L}_Z L_Z = 0$$

$$(10) \quad \hat{P}_X = f_K (\hat{r} + T_K) + f_L (\hat{w} + T_L)$$

$$(11) \quad \hat{P}_Y = g_K \hat{r} + g_L \hat{w}$$

$$(11) \quad \hat{P}_Z = h_K \hat{r} + h_L \hat{w}$$

$$(13) \quad \hat{P}_Z = 0$$

where E_{ij} is the compensated elasticity of demand for i with respect to a change in the price of good j , defined to be nonpositive ($i, j = X, Y$); P_i is the price of good i ($i = X, Y, Z$); r is the price of capital; w is the price of labor; f_j is the initial share of factor j in sector X ($j=K, L$); g_j is the initial share of factor j in sector Y ($j=K, L$); h_j is the initial share of factor j in sector Z ($j=K, L$); s_i is the elasticity of substitution between capital and labor in sector i , defined to be nonpositive ($i=X, Y, Z$); and T_j is the tax on factor j in sector X ($j=K, L$).

Equations (1) and (2) express the percentage change in compensated demand as a function of the percentage change in the relative product prices of X and Y , respectively.¹² Equations (3) and (4) describe the change in output of X that results from changes in factor usage in the sector. Equations (5), (6), and (7) relate the change in factor proportions in the sectors to changes in relative factor prices via the elasticity of substitution in production. Equations (8) and (9) follow from the assumption of fixed factor supplies of capital and labor. Equations (10), (11), and (12) show the relationships between changes in factor prices (including taxes where appropriate) and the resulting changes in product prices. Equation (13) defines the price of good Z as the numeraire. All physical units are chosen such that initial prices are unity.¹³

These equations constitute a thirteen-equation, thirteen-unknown system, where the unknowns are \hat{X} , \hat{Y} , \hat{K}_X , \hat{K}_Y , \hat{K}_Z , \hat{L}_X , \hat{L}_Y , \hat{L}_Z , \hat{P}_X , \hat{P}_Y , \hat{P}_Z , \hat{r} , and \hat{w} . This system can be reduced by substitution and then solved for the remaining unknowns by Cramer's Rule.

¹² In deriving these equations, use is made of the homogeneity condition for compensated derivatives.

¹³ Equations similar to these are derived and discussed by Harberger (1962). See also Kotlikoff and Summers (1987).

Measuring the excess burden of taxation then requires knowledge of the responses of K_X and L_X to the various taxes. This information is contained in the reduced form solutions for these variables. To illustrate, consider the tax on capital in sector X , or T_K . In the absence of the tax, factor mobility will assure that the equilibrium price of capital will be the same in both sectors. In the presence of the tax, however, capital will move from sector X until the gross-of-tax price of capital in X exceeds the price of capital in Y and in Z by the amount of the tax. Capital thus moves from higher productivity uses in the formal sector to lower valued uses in the informal sector. The excess burden of this single tax on capital in sector X is measured by the usual welfare "triangle" of $(-1/2 T_K \Delta K_X)$. When there are also taxes on labor in X , the combined excess burden becomes $(-1/2 T_K \Delta K_X - 1/2 T_L \Delta L_X)$. Here, ΔK_X and ΔL_X represent the changes in factors that result from both taxes simultaneously. Estimation of the excess burden therefore requires knowledge of these total factor responses. Assuming that the relevant derivatives are constant, it is straightforward to show that the excess burden EB is measured by:

$$(14) \quad EB = -1/2 T_K [(\partial K_X / \partial T_K) T_K + (\partial K_X / \partial T_L) T_L] - 1/2 T_L [(\partial L_X / \partial T_K) T_K + (\partial L_X / \partial T_L) T_L],$$

where, for example, $\partial K_X / \partial T_K$ is the partial derivative of K_X with respect to T_K . These partial derivatives allow for all general equilibrium adjustments in production and in demand, and so may be viewed as "reduced form" coefficients that show the equilibrium responses of capital and labor in the taxed sector to changes in the taxes. Because the solution of the system of equations gives \hat{K}_X and \hat{L}_X as a function of the two taxes (and the other parameters of the system), these partial derivatives can be directly calculated.

As is evident from the underlying equations of the general equilibrium system, measurement of the excess burden requires estimates of the amounts and the shares of capital and labor in the three sectors, the taxes on the factors in the taxed sector, and the various elasticities of demand and of substitution. These estimates are based upon a highly stylized version of a developing country.

Using dollars as the unit of currency for purposes of discussion, the size of sector X is assumed to equal \$75, and this also equals the sum of the gross-of-tax income of capital and labor in the sector. Similarly, sector Y is assumed to equal \$25; the legally untaxed sector Y is therefore 1/3 the size of the taxed sector. The amounts paid gross-of-tax to K and L in the taxed sector are assumed to equal \$20 and \$55, respectively, so that the shares of capital and labor in sector X are $f_K = 0.2667$ and $f_L = 0.7333$. The amounts paid to K and L in sector Y are assumed to equal \$5 and \$20, respectively. The factors shares in sector Y are therefore $g_K = 0.2$ and $g_L = 0.8$.

Recall that units are chosen so that one unit of a factor is the amount that earns \$1 net of taxes. Because capital and labor in sector Y are not taxed, there are 5 units of capital and 20 units of labor in the sector. For sector X , the number of units depends on the burden of taxation. We assume that total taxes equal 25 percent of output in sectors X and Y , with \$8 of taxes coming from capital in sector X and \$17 coming from labor in X . Because units of capital and labor are chosen so that one unit of a factor is the amount that earns \$1 unit net of all taxes, there are 12 (=20-8) units of capital in X and 38 (=55-

17) units of labor. This procedure also generates estimates of the tax rate on capital and labor. The tax rate is calculated by dividing the total taxes borne by the factor by its net-of-tax income. The tax rate on capital in sector X is 0.6667 ($=\$8/(\$12)$), while the tax rate on labor is 0.4474 ($=\$17/(\$38)$). Capital and labor in sector Y are untaxed.¹⁴

As for the hard-to-tax sector, we make two alternative assumptions about its size. We assume that sector Z equals either 25 percent of formal sector ($X+Y$) output, or \$25, or that it equals 50 percent (\$50) of formal sector output. In either case, we assume that this sector is highly labor-intensive, with factor shares for labor and capital of $g_L=0.9$ and $g_K=0.1$, respectively; the amounts of labor and capital therefore equal (22.5, 2.5) and (45, 5) in the two alternative scenarios. As discussed below, sensitivity analysis indicates that the excess burden estimates do not vary substantially with variations in the size of the sector.

We assume various combinations of the elasticities of substitution, from 0 to $-1/2$ to -1 . As for the compensated elasticities of demand, we assume that the own-elasticities (E_{XX}, E_{YY}, E_{ZZ}) are equal to each other, and that the cross-elasticities of demand of Y and Z with respect to the price of the taxed good X are equal to one another. Together with the requirement of symmetry in compensated responses, these assumptions imply that choosing a value for E_{XX} determines the values of the other elasticities. We assume that E_{XX} equals $-1/2$ or -1 . As discussed below, variations in the elasticities of demand and of substitution have a more significant impact on the welfare cost estimates.

Table 5 presents some estimates of the excess burden in this stylized economy, under a variety of alternative assumptions. The excess burden is expressed as a percent of tax revenues and as a percent of formal sector output. In all cases, the existence of a hard-to-tax sector, in combination with a legally untaxed sector, generates a large excess burden, somewhere between 11 and 27 percent of taxes and between 3 and 7 percent of formal sectors output. These estimates are especially sensitive to the compensated elasticity of demand (E_{XX}). They are also somewhat sensitive to the various elasticities of substitution in production. They do not depend significantly on the assumption regarding the size of the HTT sector.

Table 5					
Estimates of Excess Burden from the Hard-to-tax					
Hard-to-tax Sector				Excess Burden	
Equals 25% of Formal Sectors				As Percent of	As Percent of Formal
s_X	s_Y	s_Z	E_{XX}	Taxes	Sector Output
-1/2	0	0	-1/2	11.1%	2.8%
-1/2	0	0	-1	22.5	5.6
-1	0	0	-1/2	11.9	3.0
-1	0	0	-1	23.7	5.9
-1/2	-1/2	-1/2	-1/2	11.5	2.9

¹⁴ See Harberger (1962) or Alm (1986) for more discussion of this procedure.

-1/2	-1/2	-1/2	-1	22.8	5.7
-1	-1/2	-1/2	-1/2	12.3	3.1
-1	-1/2	-1/2	-1	24.7	6.2
-1/2	-1	-1	-1/2	11.8	3.0
-1/2	-1	-1	-1	23.2	5.8
-1	-1	-1	-1/2	13.3	3.3
-1	-1	-1	-1	26.1	6.5
Hard-to-tax sector					
Equals 50% of Formal Sectors				Excess Burden	
s_X	s_Y	s_Z	E_{XX}	As Percent of Taxes	As Percent of Formal Sector Output
-1/2	0	0	-1/2	11.5%	2.9%
-1/2	0	0	-1	22.9	5.7
-1	0	0	-1/2	12.3	3.1
-1	0	0	-1	24.2	6.1
-1/2	-1/2	-1/2	-1/2	11.9	3.0
-1/2	-1/2	-1/2	-1	23.4	5.9
-1	-1/2	-1/2	-1/2	12.8	3.2
-1	-1/2	-1/2	-1	25.3	6.3
-1/2	-1	-1	-1/2	12.4	3.1
-1/2	-1	-1	-1	23.9	6.0
-1	-1	-1	-1/2	13.8	3.5
-1	-1	-1	-1	26.9	6.7
Source: Calculations by authors.					

It should also be remembered that there are many other sources of inefficiencies, as well as possible efficiencies, from the HTT sector. The overall effects of the HTT on dynamic efficiency, as measured by economic growth, are discussed next.

B. Estimating the Impact of the Hard-to-tax on Economic Growth

With all of the various impacts – positive and negative – of the hard-to-tax on the allocation of resources, it is likely that these processes will combine to affect economic growth in those countries suffering a higher incidence of the hard-to-tax. We use our cross-country data set to investigate the presence of any negative or positive effects of the HTT on economic growth. For this purpose, we use a standard specification of the neoclassical growth equation, which accounts for the growth of labor and capital inputs in different countries, as well as the degree of openness of the economy and other control variables. These results are present in Table 6.

These results show that the coefficient for the hard-to-tax is statistically insignificant. Thus we fail with our cross-section data set to find evidence of a negative or a positive relationship between the HTT and economic development. It may well be

that the various effects combine largely to cancel each other, leaving no significant impact of the HTT on economic growth.

Table 6	
Shadow Economy Effects on Economic Growth^a	
Explanatory Variables	Coefficient (t-statistic)
Shadow Economy/GNP	-0.55 (-0.22)
Openness	0.01 (2.16)
Annual Growth Rate of Gross Capital Formation	0.10 (3.43)
Annual Growth Rate of Labor Force	-25.46 (-1.29)
Inflation	.8 xE-3 (0.10)
Foreign Direct Investment	-0.10 (-1.81)
Dummy Variable equal to 1 for Industrialized Countries	-0.43 (-0.58)
Constant	3.73 (3.12)
Observations	83
R-squared	0.27
^a The dependent variable is the annual growth rate of GDP. White corrected t-statistics for the OLS regressions are in parentheses. Source: Calculations by authors.	

V. Equity and Income Distribution: What is the Incidence of the Hard-to-tax?

Analyzing the impact of the hard-to-tax on the distribution of income is an enormously difficult undertaking, given the range of issues that must be considered. In this section, we identify some of the more important of these issues, and we present some initial and suggestive results on the distributional effects.

One issue relates to the impact on **vertical equity** of the traditional HTT (e.g., street vendors, small farmers). The failure to tax such groups is likely to have a negligible impact on vertical equity. Since these groups are likely to be lower income, their presence in the HTT sector may even improve vertical equity to some degree by increasing the effective progressivity of tax systems. However, the impact on vertical equity is likely to be quite different when we expand our definition of the hard-to-tax to include higher income groups like professionals, doctors, and lawyers, all of whom fall into higher income groups.

On the other hand, it would appear that **horizontal equity** will suffer as the result of the HTT. Lower income groups subject to taxation in the formal sector may do less well than those at the same income level in the informal sector who do not pay taxes. In fact, wage earners in developing countries generally feel that they are overtaxed in relation to those of the same level of income that are self-employed. Bird and Oldman (1990) mention three types of remedies often used to level the field between these groups. One approach is to use different taxes as in a schedular income tax. A second approach is to create compensating tax allowances and credits for wage earners. A third possible remedy is to increase the burden on the self-employed by using some kind of “minimum tax” or “presumptive tax.”

Another issue is that the existence of a HTT sector may limit the **government’s ability to redistribute income**, given the erosion of the tax base from the HTT. However, this erosion may also reduce the scope for **public sector rent-seeking**, with uncertain effects on the distribution of income.

Ultimately, reaching any conclusion on the distributional impact of the hard-to-tax requires some understanding of the tax incidence that accompanies the HTT activities. However, it is far from clear what the actual incidence of a hard-to-tax sector really is; that is, who actually benefits from the lower tax burden that falls on HTT activities?

In this regard, it should be emphasized that the standard conclusion about the incidence of the hard-to-tax is that the beneficiaries of a hard-to-tax sector are those who directly participate in the HTT sector themselves. However, this conclusion is certainly incomplete and, indeed, is likely to be incorrect. Those who actually benefit from the existence of a HTT sector are not necessarily the individuals participating in that sector; indeed, these participants may not benefit at all. Using an analogy from the incidence of tax evasion (Martinez-Vazquez, 1996), the standard conclusion ignores the fact that in many situations tax evasion is similar to a tax advantage generated by the tax laws. If there is any advantage at all, we would expect replication and competition (if possible) to work toward the elimination of this advantage; that is, a general equilibrium process of adjustment should occur through changes in the relative prices of both commodities and factors of production, and these changes should tend to eliminate (or at least reduce) the tax advantage of the HTT.¹⁵ A complete analysis of the incidence of the HTT therefore requires the consideration of these general equilibrium effects. In such an analysis, whether the advantages associated with the HTT are eroded will depend on the degree of competition or free entry that exists wherever the HTT is present. At one extreme, with no entry or competition, those participating in the hard-to-tax sector are the final beneficiaries, as the standard conclusion would predict. However, at the other extreme, with perfect competition and absolute free entry, the HTT participants may hardly benefit at all as any initial benefit from the absence of taxation is eroded via entry and competition.

¹⁵ Any advantage from tax evasion may also be dissipated by direct means, such as bribes to corrupt officials (Shaw and Whalley, 1990).

The failure to consider these adjustments can lead to a variety of mistakes. As one example, Skinner and Slemrod (1985) argue that, if labor income is more likely to be generated in the hard-to-tax sector than capital income, then the existence of the HTT makes the tax system more progressive. However, if the advantages realized by workers get capitalized or competed away by market processes, then this conclusion is incorrect. The failure to tax, say, domestic help may actually benefit higher-income households who hire these services because entry into domestic help means that the households pay lower prices for the domestic services. Similarly, immigrant or undocumented workers working in, say, the garment industry may not benefit from their failure to pay taxes. Instead, with entry it is rather the buyers of garments who benefit from lower prices of the various commodities that are produced.

A second example is demonstrated by Persson and Wissen (1984), who analyze the relationship between the actual distribution of income, which income on which no taxes are paid, and the distribution of officially reported income. Given the differences between the two, they conclude that government policies aimed at reducing the inequality in the distribution of reported income could be counterproductive in terms of actual income distributions. However, they implicitly assume that the incidence of the HTT is simple and direct: participants in the hard-to-tax sector benefit exclusively and fully from their failure to pay taxes. If the incidence of evasion is more indirect and more complicated, then the government could stop redistribution efforts based on the belief that certain groups are already benefiting from tax evasion, when actually they are not.

Empirical studies of the distribution, of tax burdens provide a third, and perhaps the most important, example of the use of naive assumptions about the incidence of evasion. It is a traditional exercise in public finance to examine the progressivity or regressivity of a particular tax system, and the study of the overall incidence of new proposals for tax reform is almost always part of the background work accompanying the reform. Frequently, findings of vertical and horizontal incidence are adjusted to take into account the impact of existing evasion, such as in the case of professionals or unskilled workers employed in the informal sector of the economy (Alm, Bahl, and Murray, 1991). These adjustments are made under the assumption that the evading groups benefit exclusively and in full from the assumed tax evasion. Of course, in many cases this assumption is incorrect.

What are the basic elements of a model that conceptually captures the main distributional implications of the HTT?

First, the model should be able to capture the potential general equilibrium effects of the HTT. The general equilibrium effects induce changes in the relative prices of factors of production and goods and services via market equilibrium forces. If there exists an advantage in terms of (expected) factor incomes or (expected) profits, then (potential) competition and factor mobility will lead to price adjustments until any advantage disappears. In this regard, the general equilibrium model utilized in the previous section to examine the efficiency effects of the hard-to-tax has some important uses in the analysis of the distributional effects.

Second, the model should allow for different degrees of competition or entry across sectors in the economy. This includes the mobility both of labor (e.g., the movement of labor into the HTT sector), but also of capital (e.g., firm entry into the HTT sector to avoid/evade sales taxes or corporate income taxes). The element of mobility is fundamental to an understanding of how much of the tax advantage may be kept by the initial participants in the HTT sector and how much is shifted via factor and commodity price changes.

Third, the model should incorporate any element of uncertainty that may be present in the individual decision to participate in the hard-to-tax sector. This uncertainty may reflect the element of tax evasion present in the HTT; more broadly, it may simply reflect the possibility that the HTT may at some point be subject to taxation. The presence of uncertainty is an essential characteristic, and allows any excess burdens associated with uncertainty to be accounted for.

There are several other features that would be desirable in a complete model. For example, it would be desirable to allow for differences in preferences among individuals so that different groups may benefit differently from changes in relative prices. It would also be desirable to incorporate any the externality effects that HTT participants may impose on others.

The key phenomenon that any model should explain is to extent to which any advantage of the HTT gets capitalized or competed away via price changes, including the identification of gainers and losers from this process. A complete model of incidence should also allow us to reach a wide variety of conclusions. As noted above, at one extreme we might have the case in which there is “no shifting” at all (for example, because there is no mobility or no free entry). In this case, those in the HTT sector keep all unpaid taxes in their entirety, and there are no changes in relative prices of factors of production or commodities as a result of the HTT activity itself.¹⁶ At the other extreme we might have the case in which the tax advantage gets “fully shifted” because entry is unrestricted and the supply response is large enough to compete away any residual tax advantage. This could happen if, for example, there is a very elastic supply of potential taxpayers who may have no choice but to work in the HTT sector, such as the presence of unskilled laborers in a developing economy with limited opportunities for employment, or the existence of undocumented workers in a developed economy also with limited opportunities. In these cases, it is unlikely that workers would be able to keep any benefit from working in a hard-to-tax sector. Instead, the likely beneficiaries are buyers of the goods and services produced in the HTT sectors.¹⁷

¹⁶ Limits to entry may reflect the fact that buyers prefer to buy from reputable merchants with products under warranty. Limits to entry may also come from risk aversion, higher costs for concealing taxes, fear of stigma, or even the need to show some degree of compliant behavior to conceal other taxes due from the authorities. See Kesselman (1989).

¹⁷ A special case here is one in which the commodities are consumed exclusively by higher income groups.

Although incomplete according to our model criteria, the general equilibrium model used in Section Five to estimate the excess burden of the HTT has some of the elements required to examine the distributional effects of the HTT. In particular, this model allows us to calculate the impact on relative product and factor prices of the existence of a hard-to-tax sector, in combination with a legally untaxed sector. Recall that the taxed sector was assumed to be capital-intensive and that the tax rate on capital was also assumed to be greater than that on labor. As a result, the taxation of capital in sector X generates general equilibrium adjustments that always reduce the relative price of capital, and that also always increase the relative price of the product of sector X . The ultimate impact on the equity of the tax system then depends upon how one evaluates these changes.

VI. Summary and Conclusions

In this paper we have analyzed some reasons why the hard-to-tax should matter to tax policy makers. We find that the HTT can have a significant impact on tax revenues, especially for developing countries. Thus raising taxes needed to provide critical social services and infrastructure in many developing and transition countries will require addressing the problem of the hard-to-tax. A larger HTT sector also leads to a greater reliance in tax structures on indirect taxation; indirect taxation can, of course, have significant effects on the overall incidence of the tax system.

We also find that the hard-to-tax may be associated with an array of welfare losses driven by the induced misallocation of resources, and these excess burdens can be quite large. However, we do not detect any impact of the hard-to-tax on long run economic development. Finally, we find that the impact of the hard-to-tax on equity is complicated by the final incidence of the forms of tax evasion represented by the hard-to-tax. Nevertheless, even though it may often be the case that HTT groups do not benefit directly from evasion because of the final incidence of this form of tax evasion, it seems uncontroversial that having the hard-to-tax pay their fair share of taxes will improve the overall equity of the tax system.

This paper does not deal with the question on what to do about the hard-to-tax. Still, we believe that this issue is more important for a country's public finances than might appear to be the case. As we point out, in recent years the policy emphasis around the world has been on large taxpayers, and this focus has been well justified from a revenue production perspective; indeed, from this same perspective – a strict calculus of costs versus additional revenues – it can probably be argued that tax administrations may be dedicating too many resources to the hard-to-tax. Nevertheless, as Terkper (2003) and others have emphasized, the attention paid to the hard-to-tax may well be justified in order to control the negative externalities imposed by the hard-to-tax: reducing tax compliance morale and increasing the risks of generalized non-compliance. Besides, as noted by Tanzi and Casanegra (1989), the presumptive taxation of hard-to-tax groups may not only reduce evasion and increase revenue collections and equity, but it may also

lead to significant efficiency gains, given that higher effort and the resulting higher incomes are usually not penalized by presumptive taxes.¹⁸

¹⁸ There is even scope for increasing revenue under presumptive taxation without necessarily undermining economic stability. See Erbas (1993).

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Data Appendix

Table A.1
Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Tax Revenue /GDP	46	0.21	0.08	0.09	0.38
Shadow Economy/GDP	110	0.33	0.14	0.09	0.67
GDP per Capita (Constant 1995 US\$)	107	7,833	11,781	115	46,736
Tax Revenue (Current Local Currency)	56	387,434	1,510,847	537	11,200,000
Manufacturing Value Added/GDP	79	16.35	7.43	4.05	34.52
Agriculture Value Added/GDP	92	17.49	13.55	0.14	52.33
Corruption Index	79	4.76	2.40	1.20	10.00
Agriculture/GDP (1997)	29	13.63	10.65	0.12	38.77
Mining/GDP (1997)	27	8.72	12.44	0.03	42.47
Economic Growth Rate (1990-2000)	107	4.11	2.62	-4.88	11.50
Openness (1999)	95	73.44	38.42	19.10	261.15
Gross Capital Formation (annual growth)	104	1.28	13.76	-39.21	47.08
Labor force (annual growth)	109	0.02	0.01	-0.01	0.04
Inflation	108	11.65	23.24	-6.57	185.03
Foreign Direct Investment	106	3.91	4.12	-2.97	24.27

Notes: If not otherwise indicated, variables are for FY (2000).

Sources: World Bank Indicators (2002), Transparency International, and Schneider (2002) for the shadow economy data (see Table A.2).

Table A.2
The Relative Size of the Shadow Economy in Different Countries,
1999/2000

Country	Shadow Economy as Percent of GNP 1999/2000	Country	Shadow Economy as Percent of GNP 1999/2000
Albania	33.4	Guatemala	51.5
Algeria	34.1	Honduras	49.6
Argentina	25.4	Hong Kong, China	16.6
Armenia	46.3	Hungary	25.1
Australia	14.3	India	23.1
Austria	10.2	Indonesia	19.4
Azerbaijan	60.6	Iran	18.9
Bangladesh	35.6	Ireland	15.8
Belarus	48.1	Israel	21.9
Belgium	23.2	Italy	27
Benin	45.2	Jamaica	36.4
Bolivia	67.1	Japan	11.3
Bosnia-Herzegovina	34.1	Jordan	19.4
Botswana	33.4	Kazakhstan	43.2
Brazil	39.8	Kenya	34.3
Bulgaria	36.9	Republic of Korea	27.5
Burkina Faso	38.4	Kyrgyz Republic	39.8
Cameroon	32.8	Latvia	39.9
Canada	16	Lebanon	34.1
Chile	19.8	Lithuania	30.3
China	13.1	Madagascar	39.6
Colombia	39.1	Malawi	40.3
Costa Rica	26.2	Malaysia	31.1
Cote d'Ivoire	39.9	Mali	41
Croatia	33.4	Mexico	30.1
Czech Republic	19.1	Moldova	45.1
Denmark	18.2	Mongolia	18.4
Dominican Republic	32.1	Morocco	36.4
Ecuador	34.4	Mozambique	40.3
Egypt	35.1	Nepal	38.4
Ethiopia	40.3	Netherlands	13
Finland	18.3	New Zealand	12.8
France	15.3	Nicaragua	45.2

Georgia	67.3	Niger	41.9
Germany	16.3	Nigeria	57.9
Ghana	38.4	Norway	19.1
Greece	28.6	Pakistan	36.8
Panama	64.1	Taiwan, China	19.6
Peru	59.9	Tanzania	58.3
Philippines	43.4	Thailand	52.6
Poland	27.6	Tunisia	38.4
Portugal	22.6	Turkey	32.1
Romania	34.4	Uganda	43.1
Russian Federation	46.1	Ukraine	52.2
Saudi Arabia	18.4	United Arab Emirates	26.4
Senegal	43.2	United Kingdom	12.6
Singapore	13.1	United States	8.7
Slovak Republic	18.9	Uruguay	51.1
Slovenia	27.1	Uzbekistan	34.1
South Africa	28.4	Venezuela	33.6
Spain	22.6	Vietnam	15.6
Sri Lanka	44.6	Yemen	27.4
Sweden	19.1	Yugoslavia	29.1
Switzerland	8.8	Zambia	48.9
Syria	19.3	Zimbabwe	59.4

Source: Schneider (2002). The physical input (electricity) method, the currency method, and the model (DYMIMIC) approach are used for the developing countries in Africa, Asia, and South America; the information is taken from Tables 2, 3, and 4 on pp. 7, 9, and 12, respectively of Schneider (2002). The size of the shadow economy in transition countries is estimated using similar methods, and the information is taken from Table 5 on p. 14 of Schneider (2002). For all OECD countries except New Zealand, the size of the shadow economy is calculated using the currency demand method and taken from Table 8 (p. 21) of Schneider (2002); for New Zealand, the shadow economy is estimated using both the MIMIC-method and the currency demand approach.