
A Critical Review of the Empirical Research on Canadian Tax Compliance

Brian Erard
Carleton University

September 1997

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Prepared for the
Technical Committee on Business Taxation

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Abstract

This paper reviews the evidence on tax non-compliance and the “underground economy” in Canada, with an emphasis on the reporting activities of self-employed individuals and businesses. Indirect methods of estimating the size of the unrecorded sector are found to generate widely varying, and in a number of cases implausible, estimates of underground activity. More direct evidence from enforcement activities indicates that non-compliance varies across classes of taxpayers according to the same basic patterns observed in the United States. A major share of all tax non-compliance appears to be attributable to businesses. For both incorporated and unincorporated small businesses, much of the observed non-compliance from audits is in the form of unreported net income. In contrast, most observed non-compliance for larger corporations pertains to aggressive interpretations of the tax laws rather than income understatements.

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"Any attempt to measure a social phenomenon whose raison d'être is to defy observation is fraught with complex conceptual and empirical difficulties."

(Edgar L. Feige, 1989, p. 26)

1. Introduction

This paper reviews the evidence on tax non-compliance and the “underground economy” in Canada, with an emphasis on the reporting activities of self-employed individuals and businesses. The paper is organized as follows. In Section 2 several alternative definitions of the underground economy are presented, and the relationship between each definition and the concept of income tax non-compliance is analysed. Section 3 provides a critical review of the alternative approaches that have been employed to measure underground economic activity in Canada. In Section 4 the results from direct audits of business income tax returns and surveys on tax non-compliance in Canada and the U.S. are examined to obtain a more detailed perspective on the sources, levels and patterns of non-compliance by individuals and businesses. A brief conclusion is offered in Section 5.

2. The Underground Economy and Tax Non-compliance

The focus of this paper is on business income tax non-compliance in Canada; i.e. the extent to which income taxes for both incorporated and unincorporated Canadian businesses are owed but not voluntarily reported. Although there exists very little direct evidence on this issue, a number of studies have attempted to evaluate the size (and in a few cases, the determinants) of the “underground economy” in Canada. In principle, these studies might provide clues as to the nature of tax non-compliance for individuals and businesses. The concept of the underground economy (which also has been referred to as black, subterranean, informal, irregular, shadow, unobserved, parallel, second, clandestine, hidden, invisible, and untaxed) has been defined in several different ways. In this section, the relationship among three common definitions and the concept of income tax non-compliance is considered.

What is the “Underground Economy”?

When researchers refer to the underground economy, they usually have in mind a set of economic activities that either are not measured at all by some given observer, or are mismeasured.

Usually, this observer is the official statistical agency that is in charge of the national accounts, although it sometimes is another agency such as the national revenue department. The metric used by the observer in assessing economic activities is generally their dollar value, which may be observed from market transactions (e.g. wages and salaries paid) or may be imputed (e.g. the shadow value of rental services generated through owner-occupied housing). Some economic activities may be excluded from measurement altogether (e.g. unpaid household production

activities, such as child-care or cleaning), while others may be included but difficult to properly account for (e.g. “off the books” income).

Broadly defined, the underground economy represents the subset of all economic activity (whether legal or illegal, market or non-market) over a given period, such as a year, that goes unrecorded in official statistics. Most attempts to quantify underground activities, however, rely on a narrower concept of unrecorded activity. A common measure is the difference between total market-based income (whether from legal or illegal sources) in the domestic economy and recorded GDP (or ideally, the portion of recorded GDP attributable to market transactions). This measure of unrecorded GDP (which alternatively will be referred to as the “GDP gap”) typically is employed in studies based on monetary aggregates, such as those that rely on the currency demand or transaction methods of estimation described below in Section 3. A related but more restrictive measure, involving only unrecorded legal sector market-based income (the “legal sector GDP gap”) has been used by statistical agencies in evaluating the scope for error in their GDP estimates.¹

The extent to which official statistics, such as GDP, inflation and the unemployment rate are biased owing to unrecorded transactions in the underground economy has important implications for policy and research. If, for example, GDP is understated or inflation or unemployment is overstated to a substantial extent, this might lead to inappropriate monetary and/or fiscal policies and also may promote a misunderstanding of the relationship between economic performance and its determinants. Although this is an important issue, the focus of this paper is on tax non-compliance, particularly among self-employed individuals and businesses. Therefore, the extent to which recorded GDP is understated is of only indirect interest.

What is Tax Non-compliance?

For each of the above measures of underground activity, the statistical agency is taken to be the observer, and GDP is used as the reference income concept. In contrast, when the focus of a study is on tax non-compliance, the observer typically is taken to be the national revenue department, and the reference income concept is the level of taxable income. In some studies, the deviation between actual and reported taxable incomes for a specific group (e.g. self-employed taxpayers) is of central importance, while in others it is the aggregate level of unreported taxable income by all individuals and/or businesses. Frequently, estimates of the extent to which taxable income has been under-reported are converted into estimates of understated taxes by applying an assumed tax rate to undeclared income.

Tax non-compliance is an important subject that is intricately connected to the public finance issues of equity, efficiency and incidence. If, for instance, higher-income taxpayers can systematically evade a larger share of their taxes than lower-income taxpayers, the effective tax system will be less progressive than the legislated one. Moreover, the difference between the

¹Attempts also have been made to estimate a broader measure of unrecorded GDP that includes non-market income such as the implicit value of unpaid housework and child-care. (See, for example, Smith, 1994.) However, since only a small share of all non-market income that belongs in GDP (e.g. the portion accounted for by unmeasured barter activities belonging in GDP) would be taxable, this measure is not discussed in the text.

taxes paid by compliant and non-compliant taxpayers facing similar economic circumstances is a source of horizontal inequity. It is clear from these examples that the distribution of tax burden (i.e. tax incidence) is determined not only by the statutory tax rules but also by the extent to which (and how) individuals and firms choose to comply with those rules. It is not an easy task to identify precisely how the incidence of the tax system is influenced by evasion. Just as the burden of taxes in the absence of evasion may be shifted from those who are legally required to pay them to other parties, some of the benefits and costs of tax-evasion activities may be passed along from the evader to other individuals. For example, a contractor who evades the GST may pass on some of the “savings” in the form of lower prices to his customers or higher wages to his employees. On the other hand, his compliant competitors would be placed at a disadvantage by such actions, forcing them to reduce profit margins or take other costly actions to remain competitive. Furthermore, compliant citizens may be forced to accept a higher tax burden and/or a lower level of publicly provided goods and services as a result of the tax revenue shortfall created by evasion.

Of course, tax evasion does not only alter the distribution of tax burden. It also impacts on the size and pattern of economic distortions. Any efforts at tax evasion are themselves a socially unproductive use of scarce resources, and the presence of evasion can magnify the distortions created by the tax system. In particular, given a fixed revenue requirement, evasion means that higher and more distortionary taxes on reported income may be needed. Moreover, the existence of differential opportunities for tax evasion across activities will tend to promote a redistribution of resources from relatively more productive activities with low evasion opportunities to relatively less-productive activities with greater evasion opportunities.

Is Unrecorded GDP equivalent to Tax Non-compliance?

Although unrecorded GDP and unreported taxable income are distinct concepts, some researchers have used their estimate of the former as a measure of the latter. In particular, they have assumed that the entire GDP gap reflects income that should have been reported to the tax authority as taxable income but was not. Intuitively, it is reasonable to expect that much of underground activity is driven by a desire to avoid paying taxes. However, there are a number of problems with equating unrecorded GDP and unreported taxable income. First, not all income is taxable. To the extent that the GDP gap is attributable to individuals whose income is below the filing threshold or that it takes the form of income not subject to taxation (e.g. income received by tax-exempt institutions or from tax-exempt activities), the measure of unreported taxable income will tend to be overstated. Second, taxable income is in some important ways broader than the GDP concept. For example, it includes realized capital gains and various types of transfers that do not enter GDP computations. The extent to which these sources of income are understated on tax returns would not be picked up in the GDP gap. Third, owing to the way that GDP is measured, some income that goes unreported on tax returns is nonetheless likely to be captured in the national accounts. For example, while many taxpayers apparently do not fully report their rental income to the tax authority, Statistics Canada does not rely on tax returns to measure this form of income. Rather, it employs independent information on the stock of rented housing and the average monthly rent paid by tenants. Although the rental income computed from this data is likely to be understated to some extent as a result of difficulties in enumerating the rented housing stock, the computed amount greatly exceeds the amount of rental income

reported on tax returns.² Taking into account all of the above difficulties, it is likely that on balance, the GDP gap is smaller than the gap between actual and reported taxable income. In practice, however, the high margin of error in measuring the GDP gap could result in an estimate that actually overstates the extent to which taxable income is not reported. The sources of error in estimating the GDP gap are taken up in Section 3.

A further difficulty is that it is not clear what tax rate should be applied to unreported taxable income to compute the extent to which taxes have been understated. Depending on the sources and the overall level of income received, one or many different taxes at different levels of government may apply (individual income tax, corporate income tax, sales tax, property tax, etc., at the federal, provincial or local level), and the rate of taxation for any particular tax may differ as a result of graduated rate schedules, exemptions and other factors. Without precise information on the type of income that is under-reported and other relevant details about the recipient, it is not feasible to accurately estimate the amount of unpaid tax. Perhaps as a consequence, Canadian researchers have applied widely varying tax rates to compute their measures of understated taxes. For example, Drummond (1994) focusses on federal taxes in general and applies a tax rate of 17.5 percent to derive the revenue implications of his unrecorded GDP estimate. This rate is an average tax measure representing the share of total federal taxes in GDP. In contrast, Mirus (1984) applies what he considers a “conservative” 25-percent marginal income tax rate to his measure of unrecorded GDP to compute his estimate of the conceptually narrower concept, federal individual income tax non-compliance. Focussing on combined federal and provincial individual income taxes, Spiro (1994) applies a marginal tax rate of approximately 42 percent to his estimate of the growth in unrecorded GDP between 1991 and 1993, to produce his estimate of the growth in combined federal and provincial income tax non-compliance over this period. Hill and Kabir (1996) employ 11 alternative tax rate measures in their analysis, and find that their estimate of the growth in the size of the underground economy is sensitive to the measure selected.

In the case of income taxes, the use of a marginal rate seems more appropriate than an average rate for computing foregone revenue if the unreported income is attributable to filers. On the other hand, if the income is attributable to illegal non-filers, an average tax rate would seem more appropriate. However, the measure of unreported taxes so obtained should be netted against any taxes withheld from non-filers to compute the actual revenue loss. In the case of GST and sales taxes, it is necessary to know, among other things, what share of unrecorded income is attributable to taxable sales to deduce the correct rate of taxation. Thus, it is far from straightforward to convert a measure of unrecorded GDP into an estimate of unpaid taxes.

Another difficulty with computing a measure of tax non-compliance from the GDP gap is that under-reporting of net income represents only one source of tax non-compliance. Many individuals and businesses overstate deductions, credits and exemptions that would not be captured in a GDP-based measure of non-compliance. As discussed in Section 4, in the case of medium and large-sized corporations, only a very small share of non-compliance is likely to take

² For example, Gervais (1994) reports that the difference in estimated net rental incomes between these two sources for 1991 was \$1.7 billion.

the form of unreported income. Rather, aggressive interpretations of the tax code resulting in favourable treatments of such items as depreciation and transfer prices are common sources of audit assessments for these businesses. Therefore, studies that focus on unreported income typically will provide only an imprecise and partial estimate of non-compliance. Section 4 reviews what is known from audit and survey data in the U.S. and Canada to obtain a broader and more precise understanding of tax non-compliance.

3. Estimation Methodologies

This section provides a critical review of the main approaches that have been employed to measure underground economic activities and tax non-compliance in Canada. Methods for estimating unrecorded GDP are presented first, followed by methods for estimating unreported taxable income.

Methods for Estimating Unrecorded GDP

Methods for estimating unrecorded GDP fall into two main categories: methods based on monetary aggregates and methods based on the judgment of experienced analysts. Within the former category are two basic approaches: the currency ratio approach and the transaction method. Each of these approaches represents an indirect technique for measuring underground activity by the traces it leaves in observed monetary statistics.

Table 1 provides a selective review of the findings from Canadian studies of unrecorded economic activity based on the alternative approaches described in this subsection. It is clear from the table that there exists a wide variety of estimates of unrecorded national income. In general, judgment-based approaches yield the lowest estimates, and the transaction method yields the highest. However, even within a given approach there is rather substantial variation in estimates. The methodologies used to develop these estimates are described below and the relative merits of the different approaches are considered.

The Currency Ratio Approach

The currency ratio approach, which was first introduced by Cagan (1958), is based on the commonly accepted notion that currency is the main medium of exchange in unreported transactions. Its simplest variant relies on three key assumptions. First, all unreported transactions are in the form of currency. Second, the ratio of currency to demand deposits in the observed (formal) sector is constant over time. Third, the income velocity of currency and demand deposits (the ratio of income to currency and demand deposit holdings) in the observed sector is the same as the income velocity of currency in the underground sector. Under these assumptions, Feige (1989) shows that unrecorded GDP (Y_u) takes the following functional form:

$$Y_u = Y_0 \frac{(C - k_0 D)}{(k_0 + 1)D}, \quad (1)$$

where Y_o represents recorded income, C represents the overall currency stock, D represents the overall stock of demand deposits, and k_o represents the ratio of the stock of currency in the formal sector to the stock of demand deposits in the formal sector. With the exception of k_o , each of these variables is observable. A measure of k_o commonly is obtained by taking the ratio of C to D for an earlier period during which the underground economy is presumed to have been negligible.³ The assumption that all underground transactions are in the form of currency is a conservative one that, *ceteris paribus*, would tend to produce an underestimate of the GDP gap. What is less clear is the direction of potential bias resulting from the assumption that the income velocity is the same in the two sectors. However, as Feige points out, to the extent that underground transactions take place disproportionately within the service sector, this would tend to make the assumption a fairly conservative one. The most contentious of the three assumptions is that k_o is constant over time. As pointed out by Mirus, Smith, and Karoleff (1994), financial innovations such as the introduction of credit cards and automatic banking machines as well as automatic transfers from savings to checking accounts have undoubtedly had a major impact on the ratio of currency to demand deposits in the formal sector. Moreover, even in the absence of these changes, one would expect this ratio to vary with such factors as the opportunity cost of holding currency, per-capita income levels, the level of foreign demand for currency, and the degree of urbanization. As is apparent from equation (1), another potential difficulty with this approach is that any improvement in measuring GDP (such as the imputation of unreported taxable income) leads to an increase (rather than decrease) in the estimated size of the GDP gap. It therefore is important to net out the portion of recorded GDP attributable to unreported income before applying the procedure. However, it does not appear that such an adjustment has been made in any of the Canadian studies using this approach.

³An alternative approach to estimating k_o involves substituting an independent estimate of the ratio of Y_u to Y_o for a given year into equation 1, and deriving the implied value of k_o .

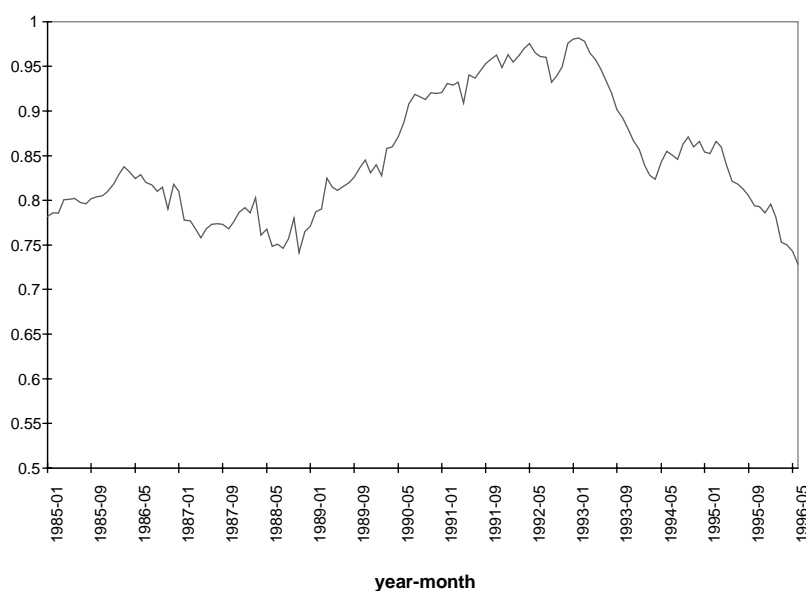
TABLE 1

Selective Review of Indirect Attempts to measure Unrecorded GDP

Study	General Approach	Year(s) Measured	Findings
Mirus and Smith (1981)	Currency Ratio	1976	16.3% of GNP unrecorded
Spiro (1993)	Currency Ratio	beg. 1991 - mid. 1992	0.8% growth in unrecorded GDP over period
Spiro (1994, 1997)	Currency Ratio	beg. 1991 - end 1993	2.0% growth in unrecorded GDP over period
Mirus, Smith and Karoleff (1994)	Currency Ratio	1990	30.0% of GNP unrecorded
Mirus and Smith (1981)	Tanzi	1976	Between 4.9% and 7.2% of GDP unrecorded
Ng and Karolyi (1984)	Tanzi	1982	Between 12% and 16% of GDP unrecorded
Éthier (1985)	Tanzi	1973-1981	Unrecorded GDP grew from 6% in 1973 to 8.4% in 1977 and then fell to 5.9% in 1981
Pouftis (1993)	Tanzi	1946-1990	Upward trend in unrecorded GNP since 1960s, with exception of brief dip in the early 1970s; represented 2.44% of GDP in 1960 and 12.98% in 1990
Mirus, Smith and Karoleff (1994)	Tanzi	1990	5.1% of GDP unrecorded in 1990
Hill and Kabir (1996)	Tanzi	1964-1995	Unrecorded GDP growth between 1964 and 1995 of 3 to 11 percent
Mirus and Smith (1981)	Transaction Method	1976	28% of GDP unrecorded
Mirus (1984)	Transaction Method	1976	10% of GDP unrecorded
Mirus, Smith and Karoleff (1994)	Transaction Method	1990	23.9% of GDP unrecorded
Gervais (1994)	Judgment	1992	A maximum of 2.7% of <i>legal sector</i> GDP unrecorded
Smith (1994)	Judgment	1992	A maximum of 3.7% of GDP unrecorded, counting the illegal sector

Mirus and Smith (1981) employ the currency ratio approach using GNP in place of GDP as the reference income measure, and find that the implied level of unrecorded GNP amounted to \$31.3 billion, or about 16 percent of recorded GNP in 1976.⁴ More recently, Mirus, Smith and Karoleff (1994) have updated this estimate. Their results indicate that unrecorded GNP rose to \$185 billion in 1990, or nearly 30 percent of recorded GNP. They conclude that the implied growth in unrecorded transactions since 1976 is implausibly large, and attribute the finding to a relatively rapid decline in demand deposit holdings throughout the 1980s rather than any increase in currency demand. They hypothesize that the decline in demand deposits was driven by increasing ease in converting demand deposits into checkable savings deposits, investment of demand deposits overnight, and a rise of “near” banks providing financial services. Figure 1 illustrates the ratio of currency to demand deposits from 1985 to 1996. This ratio rises steeply during the early 1990s, hits its peak in 1993, and then falls precipitously thereafter. These dramatic changes over a short period of time cast further doubt on the reliability of this ratio as an indicator of underground activity. Mirus, Smith and Karoleff also investigate the ratio of currency to the broader all checkable deposits ratio. However, they find no “consistent picture” from the trend in this ratio. In particular, they observe that the ratio rose steadily between 1967 and 1981, fell sharply between 1981 and 1985, and then rose again for reasons that are not well understood.

FIGURE 1
Ratio of Currency to Demand Deposits



Source: Cansim matrices B1604 and D20113

⁴ Wong and Rose (1980) also employ the currency ratio approach, but they do not convert their result into a measure of unrecorded GNP. However, using a variant of this approach, they conclude that the rate of growth in money could not have supported very much growth in the underground economy.

In a different variation on the currency ratio approach, Spiro (1993) investigates the ratio of currency to monthly personal consumption expenditures over time. He notes that this ratio fell steadily from 1981 to 1990, when it hit a low of approximately 56 percent. By 1992, however, the ratio had risen to more than 60 percent. To control for the influence of interest rates on this ratio, Spiro performs a regression of the quarterly percentage change in the stock of currency over time, from 1980 to 1990, on the percentage changes in personal expenditures and interest rates, using a distributed lag specification. He then employs his results to forecast the stock of currency in the second quarter of 1992. Attributing the difference between the actual and predicted stock of currency to growth in the underground activity (spurred on by the introduction of the GST in 1991), he applies an estimate of the income velocity of currency to conclude that unrecorded consumer expenditures in GDP grew by \$5.7 billion between the beginning of 1991 and the middle of 1992, which translates into 1.4 percent of recorded personal expenditures or 0.8 percent of GDP.

Spiro (1994, 1997) provides updated figures and suggests that unrecorded personal expenditures may have grown by 2 percent of GDP between the beginning of 1991 and the end of 1993.⁵ These results are consistent with the available anecdotal evidence that the introduction of the GST prompted an increase in underground activity. However, Spiro's regression procedure does not properly address the potential simultaneity between currency demand and personal expenditures, which raises the possibility that his estimates are biased.⁶ It also is worth noting that the ratio has continued to increase in recent years, from approximately 62 percent in the first quarter of 1992 to nearly 67 percent at the end of 1995. Although no attempt has been made to control for interest rate changes, this would seem to suggest, based on Spiro's approach, that the underground economy has continued to grow at a rather surprising rate throughout the past several years. In any case, Spiro concludes that the GDP gap amounted to between 8 and 11 percent of recorded GDP in 1993. However, this is based on a much lower estimate of the income velocity of currency than that used by other researchers; a more typical velocity estimate would result in a much larger figure for the GDP gap.

Another variant of the basic currency ratio approach was introduced into the literature by Tanzi (1983). This variant represents an attempt to get around the contentious assumption that k_0 is constant over time. The ratio of currency to M2 or an alternative measure of the money stock (the most appropriate measure remains an unsettled issue) is taken to be a function of the rate of interest, the level of per-capita income, the share of wages and salaries in national income, and tax factors. It is assumed that as the interest rate or per-capita income rises, the demand for currency relative to demand deposits falls. The share of wages and salaries has an uncertain relationship with the currency ratio. Salaries tend to be paid by cheque and are reported on information returns, which would tend to reduce the currency ratio. On the other hand, wages more frequently are paid in cash, and thereby tend to increase the ratio. One or more measures of

⁵ In Spiro (1994) a tax rate variable is included as an additional regressor. With this modification, the approach has become more similar to Tanzi's approach described below.

⁶ Spiro (1993) reports that the results are similar whether or not the current percent change in expenditures is included as a regressor; however, the deletion of an endogenous regressor is not an appropriate correction for simultaneity bias.

the rate of taxation also are included under the assumption that high rates of taxation promote increased underground activity. Tanzi regresses the currency ratio against these explanatory variables. He then predicts what the ratio would have been in the absence of taxes (i.e. with zero tax rates).⁷ An estimate of the income velocity of money balances is then applied to the discrepancy between the actual currency ratio and the predicted ratio with no taxes to obtain an estimate of unrecorded GDP.

Porter and Bayer (1989) show that when Tanzi's approach is applied to U.S. data, the results are highly sensitive to the period of estimation and that many specifications yield inappropriate coefficient sign estimates.⁸ Another criticism of this approach is that it is based on the strong assumptions that all underground activity is driven by a desire to avoid taxes and takes place in the form of cash transactions. Many illegal income-generating activities would presumably exist even in the absence of taxation. Moreover, the approach relies only on one or two average tax rate measures, whereas for most individuals it would seem to be the combined effects of the marginal rates for the various forms of taxation that would drive behaviour. A further difficulty is that the regression specification employs variables that are believed to be mismeasured (such as the recorded level of income and the implied rate of taxation in place of the correct values). These measurement errors will tend to bias the resulting estimates, although the direction of this bias is unclear.⁹ Finally, as discussed by Hill and Kabir (1996), the results are sensitive to the choice of income velocity measure, and the most appropriate measure is an unresolved issue.

Éthier (1985) employs Tanzi's approach for Canada, and estimates that unrecorded GDP trended upward from 6 percent of GNP in 1973 to 8.4 percent in 1977, and then fell back to around 6 percent in 1981. She further finds that the currency ratio is elastic with respect to the tax rate, increasing by 1.75 percent in response to a 1-percent increase in taxes. Pouftis (1993) also employs Tanzi's approach, using a slightly different base specification than Éthier, and concludes that there was a general upward trend in unrecorded GDP since the 1960s, with the exception of brief dip in the early 1980s. His estimates of the level of unrecorded income are of the same order of magnitude as Éthier's for the 1970s. For 1990, he estimates that unrecorded GDP was somewhere between 7.4 and 13 percent of GDP, depending on the precise specification employed. Using a similar approach, Mirus, Smith and Karoleff (1994) report a somewhat lower estimate of unrecorded GDP for 1990, representing 5.1 percent of recorded GDP. As this is similar to the estimate by Mirus and Smith (1981) for 1976, their finding conflicts with the general upward trend reported by Pouftis in unrecorded GDP since the 1960s.

Hill and Kabir (1996) perform a similar analysis using a variety of alternative tax rate measures. Their preferred set of estimates places, the rate of growth in the underground sector in the rather wide band between 3 and 11 percent of GDP for the period ranging from 1964 to 1995. Similar

⁷ As an alternative to simulating the currency ratio under no taxes, researchers have sometimes predicted its value using the actual tax rates from a period when these rates were at historically low levels.

⁸ They also find that the results are quite sensitive to the form of simulation. In particular, if a dynamic rather than static simulation is performed, a much larger estimate of unrecorded GDP is obtained.

⁹ Another econometric issue that commonly is ignored by researchers using this approach is the potential non-stationarity of the time series data used in the analysis. See Giles (1995) for a treatment of this problem using data from New Zealand.

to the finding of Pouftis, they conclude that the underground economy grew steadily from 1964 to 1973, levelled off by the end of the 1970s, and then began to grow again about a decade later. Interestingly, the most recent period of estimated growth begins in 1989, before the introduction of the GST, and extends to the end of the estimation period in 1995. The highest estimates of unrecorded income based on a variant of Tanzi's analysis come from Ng and Karolyi (1984) who place it at between 12 and 16 percent of recorded GDP in 1982. Overall, then, Tanzi's method produces a fairly wide range of estimates of the level of unrecorded GDP, representing from 5 to 16 percent of recorded GDP. The temporal pattern of underground activity is also uncertain, with available evidence suggesting either that it has represented a rather stable share of GDP or a growing share in recent decades.

It is important to recognize that, like the basic currency ratio approach, Tanzi's method will tend to overestimate the level of unrecorded GDP to the extent that unreported income (e.g. rental income not reported to the tax authority) is captured in the national accounts. Ideally, the portion of recorded GDP attributable to income that has been under-reported to the tax authority should be netted out before computing the income velocity. In practice, however, it does not appear that such a correction has been made in any of the Canadian studies using this method. On the other hand, the assumption that underground activity is driven solely by tax factors will tend to produce an underestimate of the GDP gap to the extent that income from illegal activities that are not primarily tax-motivated (sales of illegal drugs, prostitution, etc.) is missed in official GDP statistics.

The Transaction Method

The other main approach to estimating the GDP gap (or, alternatively, the GNP gap) that involves monetary aggregates is the transaction method pioneered by Feige (1979). This approach builds on the familiar exchange identity, $MV = PT$, which relates the total volume of payments in an economy (MV) to the total volume of transactions (PT). Feige assumes that the latter is proportional to final income (GDP or GNP), and that the constant of proportionality is stable over time. With an estimate of this constant from an earlier time period during which underground activity is considered to have been negligible, he is then able to generate an estimate of unrecorded GNP.¹⁰

In essence, the procedure works as follows. Information on total payments is used to generate an estimate of total transactions (PT). This is converted into an estimate of total GNP using an estimate of the constant of proportionality between the two aggregates. Recorded GNP is then subtracted from the measure of total GNP to yield an estimate of unrecorded GNP. In practice, however, several important adjustments are required to construct a workable measure. First, the estimated volume of payments must be related to a conceptually appropriate income variable. In practice, the payments series exclude transactions of the federal government, which suggests that federal government expenditures should be deducted from recorded GNP for consistency. In this way, both payments and income generated within the federal sector are excluded from the

¹⁰Alternatively, an estimate of this constant of proportionality can be obtained based on any time period for which an independent estimate of unrecorded GNP is available.

analysis. Given that underground activity within the government sector is presumably negligible, very little of the GNP gap would appear to be lost from the exclusion of this sector. The exchange identity relates only to monetary transactions. Therefore, a second adjustment for consistency involves subtracting from recorded GNP any imputations for non-monetary income.

The above modifications pertain to deriving an income measure that is conceptually consistent with the available payments series. Additional modifications are required to ensure that the relationship between total transactions and recorded income is likely to be stable over time. In particular, the relationship between transfer payments and final income may fluctuate over time as a result of changes in fiscal policy. Similarly, periodic financial innovations may alter the relationship between purely financial transactions and final income. Therefore, to the extent possible, Feige removes major transfers and financial transactions from the gross payments series.

In principle, the transaction method has many advantages over the currency ratio approach and its variants. Currency is not assumed to be the exclusive medium of exchange in the underground economy, no special assumptions are required about the ratio of currency to cheque use, and the results do not depend on an assumed equality of income velocities in the formal and underground sectors. Moreover, since the GNP gap is determined as a residual, improvements in measuring GNP that result in a higher recorded figure properly lead to a reduction (rather than an increase) in the estimated magnitude of the gap. In practice, however, there are some important drawbacks to the approach. The main difficulties associated with employing the transaction method to estimate the GNP gap are the estimation of appropriate turnover rates for currency and the elimination of financial transactions from gross payments. The latter difficulty appears to be particularly severe, and calls into question the reliability of transactions-based estimates for recent periods. For example, a careful analysis by Feige (1989) produces estimates that indicate the U.S. GNP gap more than doubled as a share of recorded GNP between 1979 and 1982. Feige finds this change implausible, and attributes the results to his inability to properly adjust the payments series for purely financial transactions.

Mirus, Smith and Karoleff (1994) apply Feige's approach to recent Canadian data, and compare their results to the earlier transactions-based estimates of Mirus and Smith (1981). Surprisingly, they find that the estimated GDP gap actually fell between 1976 and 1985, from 28 percent of recorded GDP to 23.9 percent. A transactions-based estimate by Mirus (1984) for the former period, however, put the gap at only about 10 percent of recorded GDP. It is not clear what differences in methodology are responsible for this substantial discrepancy in estimates for 1976. Mirus' estimate, however, is on the same order of magnitude as the results obtained for Canada based on Tanzi's method. The other transactions-based estimates suggest a much wider GDP gap.

A Judgment-Based Approach

Researchers within the statistical agencies charged with producing the national accounts have taken a very different approach to measuring the GDP gap than the monetary methods described above. In particular, they have broken down either the income or expenditure side of the national accounts into various individual components. Then for each component, the researchers have

used their judgment and available information to produce an estimate of the maximum level of unrecorded income or expenditure. These estimates are then aggregated to produce an upper-bound estimate of the overall size of the legal sector GDP gap, representing the maximum extent to which market income from legal activities is understated in GDP.

An early application of this approach for the U.S. was by Carson (1984). Berger (1986) published a similar analysis for Canada two years later, and more recently, Gervais (1994) performed a detailed analysis of the expenditure side of GDP using this approach. She concludes that the maximum size of the legal sector GDP gap in 1992 was \$18.5 billion, or 2.7 percent of recorded GDP. Of course, this estimate represents an educated guess rather than a statistical projection. As Gervais indicates, about \$18 billion out of the \$18.5 billion figure is based on “plausible, but not fully tested conjectures” (p. 51). Smith (1994) argues on the basis of some 1984 statistics on illegal drug production and distribution that income from illegal production is unlikely to represent more than 1 percent of recorded national income. Adding this to Gervais’ figure, he produces an upper-bound estimate of unrecorded GDP (from both legal and illegal market transactions) that represents just 3.7 percent of recorded GDP. This is smaller than all of the estimates based on monetary approaches, but is by no means trivial. It represents an average unrecorded expenditure of about \$2,500 for every Canadian household that year.

Methods for Estimating Unreported Taxable Income

One of the arguments commonly used to explain why the level of unrecorded GDP could not be too great is that many of the underground transactions that are not captured on the income side of the national accounts will nonetheless be captured on the expenditure side, where there is less incentive for misreporting. This suggests that the discrepancy between the expenditure-based and income-based estimates of GDP might provide a useful estimate of income that is not reported to government agencies such as the tax authority. Of course, to the extent that both income and expenditures are understated, this approach will tend to underestimate the level of unreported income. Another difficulty is that the statistical discrepancy is tabulated in Canada only after the two sides of the national accounts have been reconciled to a substantial extent. As a consequence, the difference between the two estimates is so small that it cannot be taken seriously as a measure of the level of underground activity. Indeed, much of what remains of the discrepancy between the two estimates following reconciliation might be accounted for by sampling and other measurement errors rather than actual underground activity. Table 2 displays the annual discrepancy between the expenditure-based and income-based measures of GDP from 1981 to 1995. On average, the discrepancy over this period amounted to a mere 0.3 percent of GDP. Moreover, the income-based measure actually exceeded the expenditure-based one in both 1988 and 1989, which casts further doubt on the usefulness of such a comparison.¹¹

¹¹ In fact, the statistical discrepancy represented a larger share of GDP in 1940 (about 2 percent), even though this period has been taken by other researchers as one during which the size of the underground economy was believed to be negligible.

TABLE 2
Statistical Discrepancy

Year	Discrepancy (\$ million)	Discrepancy/GDP
1981	346	0.0010
1982	699	0.0019
1983	4494	0.0111
1984	1725	0.0039
1985	89	0.0002
1986	1617	0.0032
1987	3420	0.0062
1988	-3974	-0.0066
1989	-402	-0.0006
1990	2488	0.0037
1991	2357	0.0035
1992	3765	0.0055
1993	5336	0.0075
1994	4620	0.0062
1995	1813	0.0023

Although the statistical discrepancy clearly does not provide a suitable measure of the level of unrecorded income, two researchers (Gervais, 1994 and Drummond, 1994) have suggested that the growth in the absolute magnitude of the discrepancy between 1990 and 1993 may be an indication of growth in the underground economy over this period. Based on preliminary figures, these researchers conclude that the extent of income under-reporting may have grown between \$4 billion to \$5 billion, or about 0.6 to 0.7 percent of GDP.¹² The updated figures presented in Table 2 show a smaller growth in the statistical discrepancy over the 1990 to 1993 period, amounting to 0.38 percent of GDP, or about \$2.7 billion. Moreover, in the period since 1993, the size of the discrepancy actually fell, and by 1995 its value was smaller than its 1990 level. Applying the same methodology as these researchers, one would be tempted to conclude that all of the earlier growth in the underground economy has been eliminated. Perhaps a more reasonable conclusion, however, is that the methodology itself is flawed. As emphasized above, much of the discrepancy may be attributable to sampling and other measurement errors rather than underground activity. The erratic pattern in this statistic over time is consistent with this hypothesis. This is not to say that the volume of underground activity has been stable over time, but rather that the statistical discrepancy does not provide clear and convincing evidence of any changes that may have taken place.

¹² These estimates exclude any growth in tobacco smuggling, which Drummond assumes may have increased by 0.3 percent of GDP, or \$2 billion, over the period.

As discussed in Section 2, not all unreported income goes unrecorded in the national accounts. The difference between the national accounts estimates for some sources of income and the corresponding taxation statistics may therefore provide a rough estimate of the amount of unreported taxable income captured in the national accounts. Of course, to the extent that unreported taxable income is not recorded in the national accounts (e.g. much income derived from illegal activities would be excluded from both measures), the discrepancy would tend to understate the extent to which income is hidden from the tax authorities.

In the case of wages and salaries, such a measure is of very little value because of the heavy reliance of the national accounts estimates on taxation statistics, as well as certain conceptual differences in the way that wages and salaries are measured. Similarly, a comparison of recorded corporate profits from the two sources is problematic, both due to substantial conceptual differences among the two measures and the tendency for the national accounts estimates to overstate profits.¹³ The national accounts estimates of net income for unincorporated businesses also involve some conceptual differences from taxation statistics, and are not fully independent of the latter. However, Gervais (1994) argues that with certain adjustments (principally, netting out the imputed net rental income on owner-occupied housing from the national accounts figures and removing farm income from both sets of figures), a meaningful comparison is possible. Her results indicate that the discrepancy in net non-farm income for unincorporated businesses (excluding all rental income) was roughly flat at \$3 billion between 1986 and 1989, but then rose to \$4 billion in 1991. This finding is consistent with the notion that underground activities increased after 1990. Her results for rental income (exclusive of that imputed for owner-occupied housing) indicate an ever-widening gap over the late 1980s from \$349 million in 1987 to \$998 million in 1989, followed by a dramatic increase to \$1.8 billion in 1990 and then a slight decrease to \$1.7 billion in 1991.¹⁴ Again, while there may be other explanations for the growth in this statistic over time, the finding is consistent with the popular belief that there was a substantial increase in underground activity among unincorporated businesses in the early 1990s.

The above two approaches represent attempts to identify the extent of income under-reporting through discrepancies in official aggregate statistics. Recently, an approach (Pissarides and Weber, 1989) that relies on discrepancies in micro-level survey information on income and food expenditures has been developed to estimate unreported taxable income by self-employed taxpayers. The approach has been applied to Canadian data by Mirus and Smith (1996). The approach involves a comparison of the ratio of reported food consumption to reported income for households with and without significant amounts of self-employment income. The key assumptions underlying the technique are that: (1) food expenditures are accurately reported on the survey; (2) the same level of income is reported on the survey that is reported on household tax returns; and (3) self-employed individuals have the same expenditure patterns for food as other survey participants. While these assumptions may serve as a reasonable approximation to reality, this should not be taken for granted. For example, food expenditures may not be accurately recalled by survey respondents, and questions regarding such expenditures might be

¹³ See Gervais (1994) for a more detailed discussion of this issue.

¹⁴ Éthier (1985) performs a similar comparison for the period from 1964 to 1981, but she is unable to net out the figures for farm income, making the analysis inconclusive.

misinterpreted; taxpayers may not recall their true incomes or even the amounts of income reported for tax purposes; and self-employed individuals may tend to spend a higher share of their incomes on food consumption because they eat out more often. With regard to the last issue, Mirus and Smith do provide some evidence that the ratio of restaurant to store food expenditures is fairly similar for individuals with and without substantial amounts of self-employment income.

To develop a measure of income under-reporting by self-employed individuals, the regression relationship between food consumption and various explanatory factors (such as income and family size) is estimated for households with relatively little or no self-employment income. The implied income associated with a given level of consumption by a household with significant self-employment income is then deduced from this relationship, and the deviation between this income measure and reported income is taken as an estimate of unreported taxable income. Mirus and Smith apply this approach to the 1990 Survey of Family Expenditures. Their results indicate that 12.5 percent of taxable income was under-reported by their reference group of self-employed individuals. The authors extrapolate their findings to the national level, and conclude that self-employment income may have been understated in 1990 by as much as \$6 billion, or about 1 percent of total personal income. Mirus and Smith also investigate the relationship between the average rate of taxation for self-employed taxpayers and the extent of income under-reporting. They find a significant positive relationship between the level of income understated and the rate of taxation.

Implications of Research

Each of the above approaches to estimating unrecorded or unreported income in Canada is subject to large potential measurement errors, which makes it difficult to assess either levels or trends in behaviour. However, even the lowest estimate suggests that as much as 3.7 percent of market-based income (both legal and illegal) may elude measurement in the national accounts. Given that every one percent of recorded GDP today represents an average annual expenditure of nearly \$800 per Canadian household, an estimate that several percent of national income could be missing from official statistics is not to be taken lightly from the standpoint of tax collection agencies. As mentioned in Section 2, on balance it is likely that the amount of taxable income that goes unreported exceeds the amount of GDP that goes unrecorded.

Based on statistics compiled by Gervais (1994) on the discrepancy between national accounts statistics on factor incomes and taxation statistics for 1992, Smith (1994) argues that the amount of unreported taxable income may exceed the GDP gap by as much as 1.5 percent of recorded GDP. Thus, even a rather conservative analysis would not rule out the possibility that total unreported taxable income amounts to 5.2 percent of recorded GDP, or roughly \$40 billion. Some researchers have concluded that unrecorded GDP, and by extension unreported taxable income, is much larger than this amount. For example, Mirus, Smith and Karoleff (1994) suggest that the GDP gap may have accounted for 15 to 20 percent of total economic activity in 1990. As pointed out by Gervais (1994) and Drummond (1994), however, this would imply a very large amount of unrecorded expenditures for the average family. A 15-percent gap would imply that the average household was spending about \$12,000 per year “under the table” – a rather sizable share of its total income. Although a gap of this size is perhaps conceivable, it is hard to accept as a plausible estimate without supporting evidence on where such a large amount of income

originates and, more importantly, how it is spent without being captured in the national accounts. Unfortunately, the monetary approaches that yield the larger estimates of unrecorded activity are incapable of providing this information.

4. Evidence from Tax Audits and Compliance Surveys

The literature reviewed in Section 3 provides only a very rough indication of the portion of the tax base that is not disclosed to the tax authority. Moreover, it offers only limited information about the likely sources of income under-reporting, and virtually no insight into other forms of tax non-compliance, such as the misreporting of credits, deductions and exemptions. Since such forms of non-compliance are likely to be important, particularly for larger businesses, this is a non-trivial omission. In this section, evidence from enforcement programs and compliance surveys in the U.S. and Canada is presented to gain an improved understanding of these issues.

Evidence from the U.S.

The U.S. Internal Revenue Service (IRS) periodically publishes estimates of the federal “tax gap” – the difference between federal income taxes owed and taxes voluntarily reported – for individuals and corporations (from legal activities). For individuals and small corporations, the primary source of information for these estimates is the Taxpayer Compliance Measurement Program (TCMP). Under this program, stratified random samples of federal individual and corporate income tax returns are periodically subjected to intensive audits by experienced examiners. National projections based on the examiner-recommended audit assessments are then produced and incorporated within the tax gap estimates. For certain groups, such as non-filers and proprietors who work largely “off the books,” the results from special research studies are used to supplement the TCMP estimates. In the case of large corporations, projections based on ordinary operational audits are employed to derive an estimate of the tax gap.

U.S. Federal Individual Income Tax Gap

The most recent estimate of the U.S. federal individual income tax gap (U.S. IRS, 1996) places the gap at \$87 billion in tax year 1992, or about 16 percent of the estimated true tax liability.¹⁵ Table 3 provides a breakdown of the various components of the overall gap. About two thirds of the total gap is attributed to under-reported net income, with the balance roughly evenly split between overstated offsets (adjustments, deductions and exemptions used to derive taxable income from total net income) and credits by filers and net taxes owed by non-filers. Under-reported income by sole proprietors (including informal suppliers and farmers) and partnerships accounts for over 40 percent of the entire individual income tax gap and 60 percent of the portion attributable to understated net income.

¹⁵ This figure does not include the IRS estimate of \$8.4 billion in taxes that were voluntarily reported but not paid on time.

TABLE 3
Profile of 1992 U.S. Individual Income Tax Gap

Tax Gap Component	Amount (US\$ billions)	% of Total Gap
FILERS	73.1	84.1
Understated Net Income	58.6	67.4
Non-Business Income	18.7	21.5
Business Income	39.9	45.9
Non-farm Sole Proprietor	16.9	19.4
Informal Supplier	12.3	14.2
Farm	3.4	3.9
Partnership and Small Bus. Corp.	3.6	4.1
Rental and Royalty	3.7	4.3
Offsets to Income	8.2	9.4
Adjustments	0.2	0.2
Deductions	5.1	5.9
Exemptions	2.9	3.3
Tax Credits	6.2	7.1
Net Mathematical Errors	0.1	0.1
NON-FILERS	13.8	15.9
TOTAL TAX GAP	86.9	100.0

A breakdown provided in U.S. General Accounting Office (1990) indicates that the percentage of taxes understated by sole proprietors varies by gross receipts category, ranging from nearly 40 percent for proprietors with receipts of less than US\$25,000 to less than 20 percent for those with receipts over US\$100,000. The percentage of taxes under-reported tends to be the greatest among proprietors in the following industrial activities: fixed location sales (including stores and restaurants), transportation (including communication and utilities), retail sales outside of the fixed locations category, and production (including construction and manufacturing). The lowest non-compliance percentages are reported for proprietors in the finance, agriculture and wholesale industries.

One of the apparent reasons for the relatively high rates of non-compliance among sole proprietors is the lack of information reporting on business income. For example, wages of salaried employees, which are subject to both information reporting and withholding, are understated only by an estimated 1 percent. Similarly, IRS figures indicate that 98 percent of all interest income and 92 percent of all dividend income (both of them income sources subject to substantial information reporting) are properly reported. Much of the underreporting of net income by sole proprietors appears to be the result of understatements of gross income. Indeed, about 72 percent of understated net sole proprietor income is attributed to unreported gross income in the IRS tax gap estimates for tax year 1988, with the remainder attributed to overstated

business expenses. Underreporting of gross income is also a significant problem among farmers. Approximately 56 percent of the understated net farm income in tax year 1988 is attributed to underreporting of gross income.

In preparing the tax gap estimates, the IRS distinguishes what it calls “informal suppliers” from other types of non-farm sole proprietors. The former are defined as:

“... individuals who provide products or services through informal arrangements which frequently involve cash-related transactions or ‘off the books’ accounting practices. Child-care providers, street-side vendors, and moonlighting professionals are among this type of non-farm sole proprietor” (U.S. Internal Revenue Service, 1996, p. 43.)

In addition to the examples listed in the above definition, informal suppliers commonly are identified with the following tasks: home repairs and additions, domestic services, auto repair, music lessons, appliance repairs, cosmetic services and catering. Estimates of the extent of tax non-compliance among informal suppliers are based primarily on a survey IRS commissioned (Smith and Adams, 1987) on the expenditures made by consumers on goods and services provided by these suppliers. Adjustments were made to the resulting gross receipts figure to produce an estimate of net informal supplier income, and this figure was compared against an estimate of the amount of informal supplier income reported on tax returns. The latter estimate was obtained by identifying returns that were likely to belong to informal suppliers on the basis of occupation code, industry code, income and business expenses. For tax year 1992, the net income unreported by informal suppliers who filed returns amounted to an estimated US\$59.6 billion, or 21 percent of the estimated aggregate amount of net income under-reporting by all filers. Overall, informal suppliers are estimated to report only about 20 percent of their net business income. This compares to 68 percent for non-farm sole proprietors who operate formal businesses.

Overall, the IRS estimates that net income was understated on tax year 1992 individual income tax returns by \$284 billion, or about 5 percent of GDP. This figure, which does not account for income that goes unreported by non-filers, is somewhat higher than the 4.2-percent figure Smith (1994) proposes as an upper bound for understated legal source taxable income in Canada, but it is well below most of the alternative estimates based on monetary methods.

Feige (1989) contends that the IRS estimate may be too low, however. Although the IRS allows for potential non-detection by its TCMP examiners of unreported income from sources not subject to information reporting, it does so in an ad-hoc way based on a rather dated study of examiner detection errors. Feige suggests that a much larger adjustment may be necessary for non-detection than the one employed by the IRS. However, a careful econometric study by Feinstein (1992) results in an estimate of undetected income that is similar to the one produced by the IRS. Although income under-reporting may in principle be a somewhat larger problem in Canada than in the U.S. owing to the presence of the GST and higher overall tax rates, this is by no means obvious. As a first approximation, it would seem reasonable to expect income

under-reporting as a share of GDP to be of a similar order of magnitude in the two countries. It is noteworthy that many studies of the underground economy in the U.S. based on indirect methods have generated very large estimates of the GDP gap, just as in Canada. However, the more direct TCMP evidence does not support such large estimates.

For tax year 1988, the IRS conducted a careful study of non-filers based on a national sample of individuals who had not submitted a tax return. Erard and Ho (1996) use this data to compare the characteristics of households that file a return with those of households that are legally required to file a return but fail to do so. They report that non-filing households have a much lower average taxable income (US\$11,000 compared to US\$23,000), receive a higher share of their total income from self-employment (20 percent compared to 5 percent) and capital gains (11.60 percent compared to 4.3 percent), and receive a much smaller share of their income from wages and salaries (62.3 percent compared to 72.2 percent). Non-filers also are disproportionately represented in the manual labour, sales, services and creative arts occupations. Filers, on the other hand, make up a disproportionate share of the professional and administrative occupations. Based on procedures developed by Erard and Ho (1995), the IRS has employed its non-filer data base to estimate the size of the non-filer population and the size of the non-filer tax gap. An estimated 7.7 million U.S. households failed to comply with their requirement to submit a 1988 federal income tax return, representing approximately 7 percent of the overall population of households that are required to file a return. These non-filing households had an estimated aggregate tax liability of US\$23.4 billion. However, they had made tax prepayments (e.g. through withholding or instalment payments) of US\$12.2 billion, leaving a net tax gap of US\$11.2 billion.

U.S. Federal Corporate Income Tax Gap

Table 4 summarizes the most recent estimates (U.S. Internal Revenue Service, 1988) of the U.S. federal corporate tax gap. Like the IRS estimate of the tax gap for individuals, the estimated gap for small corporations (with assets under US\$10 million) is based largely on the TCMP. Table 4 indicates that small corporations understated taxes by US\$5.2 billion (or 20.7 percent of taxes owed) on their 1987 returns, with almost an even split between unreported gross income and overstated expenses, deductions, and credits. Therefore, whether a small business is incorporated or unincorporated, a substantial share of income apparently goes unreported. Furthermore, for both types of business, examiners report that record keeping is often inadequate. A study of the corporate TCMP by Rice (1992) indicates that compliance tends to be higher among publicly traded firms, which he attributes to their need to disclose more information to the public about their operations. Rice also finds that non-compliance is lower among corporations with profits below the industry median, highly profitable corporations, and businesses that have dealings with tax haven countries.

TABLE 4
Profile of 1987 U.S. Federal Corporate Tax Gap

Tax Gap Component	Tax Gap US\$ billion	% of Total Tax Liability
Small Corporations	5.2	20.7
Unreported gross income	2.5	10.0
Overstated expenses, deductions and credits	2.7	10.7
Large Corporations (assets over US\$10 million)	15.8	16.7

The tax gap for large corporations is based on the examiner-recommended tax assessments from ordinary operational audits. The IRS employs estimated yield curves to extrapolate from these figures what the level of assessments would be at 100 percent audit coverage. Since these figures are based on less-intensive audits than those employed for the TCMP and are not corrected for undetected non-compliance, they may understate the true extent of non-compliance. On the other hand, the extrapolation from current audit coverage rates to a 100 percent rate is subject to a high degree of imprecision. Of particular concern is the possibility that the extrapolation procedure may not properly account for diminishing marginal audit yields at higher levels of coverage, owing to the success of audit selection procedures in identifying the most “productive” cases at current coverage rates. This could result in non-compliance being overestimated. As a result of these considerations, the estimated tax gap for large corporations is more speculative than that for individuals and small corporations. As displayed in Table 4, the estimated large corporation gap amounted to \$15.8 billion in tax year 1987, or 16.7 percent of taxes owed. The percentage of unreported taxes is slightly higher than the 16 percent figure discussed above for individuals, but well below the 20.7-percent figure quoted for small corporations.

A study of audit results for the very largest U.S. corporations (U.S. Government Accounting Office, 1990) indicates that recommended assessments are largest among the petroleum, banking, food and beverage, insurance, and utility industries. Unlike sole proprietorships and small corporations, for which under-reported income is a major source of non-compliance, examinations of large corporations rarely encounter cases of unreported income. Rather, improper accounting of reported income and deductions as well as aggressive interpretations of the tax rules are the most important sources of audit assessments for large corporations. Some common issues identified during audits involve the timing of income or deductions, depreciation claims, and allocations of income and deduction among related businesses. For multinational corporations, the reporting of foreign-source income is also a common source of compliance problems.

The above estimates are based on examiner-recommended assessments. The IRS (U.S. Internal Revenue Service, 1990) has also published alternate estimates of the tax gap based on actual assessments after all appeals. For all corporations as a whole, this alternate estimate amounts to

\$11.8 billion, or 10.6 percent of taxes owed. Thus, the overall estimated corporate gap of \$21 billion is reduced by more than 40 percent when an appeals-based assessment measure is employed.

Not all of the federal income tax gap goes uncollected. Enforcement recovers a portion of this gap. For tax year 1987, an estimated 23.2 percent of the combined individual and corporate tax gap (based on examiner-recommended assessments) was recovered through enforcement.¹⁶

The official estimates for the U.S., based largely on direct audit evidence, indicate that federal income tax non-compliance in that country is substantial, but far less than has been suggested by indirect techniques such as those based on monetary aggregates. A very sizable share of individual income tax non-compliance is attributed to sole proprietors, especially those operating as informal suppliers. In the case of corporations, small corporations tend to exhibit similar compliance patterns to sole proprietors, with a high percentage of all non-compliance in the form of undeclared income. Large corporations tend to report a higher share of their taxes than small businesses and rarely fail to report income. Rather, non-compliance among large corporations typically involves aggressive interpretations of the tax laws, particularly in the area of international issues. These findings underscore the point made in Section 3 that measures of tax non-compliance that focus on unreported income provide only a partial measure of unpaid taxes. Such measures will tend to exclude much of the tax non-compliance by large corporations and significant share of non-compliance by individuals and small businesses.

Evidence from Canadian Enforcement Activities

Revenue Canada does not have in place a program comparable to the U.S. TCMP from which national estimates of tax gap can be generated. However, information from its enforcement programs provide some evidence on the sources and levels of non-compliance. During the 1995-96 fiscal year, verification and enforcement efforts by Revenue Canada resulted in \$4.8 billion in additional assessments. Under the rather tenuous assumption that audit revenues represent a similar proportion of the tax gaps in Canada and the U.S., a very crude estimate of the overall Canadian tax gap can be obtained. As mentioned above, an estimated 23.2 percent of the combined federal individual and corporate income tax gap in the U.S. is recovered through audit assessments. Dividing the \$4.8 billion in Canadian assessments by this percentage yields an estimated gap for all federal Canadian taxes combined of approximately \$21 billion, or roughly 20 percent of total tax revenue. However, unlike the U.S. enforcement revenue figure, which pertains to a single tax year, the Canadian figure includes an unknown portion of revenue from multi-year audits. Consequently, the \$21 billion figure may very well overstate the extent of Canadian tax non-compliance for a single tax year.

Well over 60 percent of total verification and enforcement revenue in Canada is from businesses. Audits of small businesses (with annual revenues of \$800,000 or less) in Canada have uncovered compliance problems similar to those found for small businesses in the United States. In

¹⁶ This figure is based on U.S. Internal Revenue Service (1990), and the estimated recovery excludes interest and penalty assessments on unreported taxes.

particular, major compliance problems include not reporting all income or sales, claiming inflated expenses, and not filing a return. During fiscal year 1995-96, Revenue Canada was able to identify over 100,000 business non-filers and approximately 6,600 GST non-registrants through matching programs. Another problem identified in both countries is the failure of many small businesses to maintain adequate books and records. In the case of larger Canadian businesses, the compliance problems identified through enforcement activities also tend to mirror those found in the United States. In particular, assessments commonly pertain to issues surrounding interpretations of ambiguous tax rules, tax-planning measures, and international transactions.

Much of the enforcement activity involving individual taxpayers in Canada is focussed on self-employment income, unincorporated business income, foreign-source income, interest income, and income provided in the form of employer-provided benefits. Special underground initiatives are undertaken to uncover non-compliance among both incorporated and unincorporated businesses that serve as what has been referred to previously as “informal suppliers.” These initiatives have concentrated on the home renovation, construction, auto sales, repairs, jewelry, hospitality and other service sectors.¹⁷

As in the case of small businesses, individuals who fail to file required returns are targeted for enforcement activities. Based on a comparison of tax records with population statistics, Revenue Canada estimates that approximately 5 percent of Canadians who are required to file an individual income tax return do not do so voluntarily. However, an estimated 60 percent of these individuals eventually file as the result of enforcement actions. Among those who do file, an important source of non-compliance is overstated offsets. In the U.S. this accounts for about 15 percent of the total individual income tax gap.

Some evidence on overstated credits and deductions by individual Canadian taxpayers is available from Revenue Canada’s Processing Review Program. Under this program, claims for a variety of credits and deductions are verified post-assessment. For each of the two return categories, paper and electronically filed (EFILE), two separate samples are drawn for verification each year: a random sample and a “compliance” sample. The latter sample is meant to represent those claimants who are most likely to require reassessments, whereas the former is meant to be representative of the overall population of claimants. The results based on the random sample therefore provide an indication of the incidence of non-compliance among all claimants in the general population for the various credits and deductions subjected to review.

Some statistics from this program are presented in Auditor General of Canada (1995). Random sample results for 13 different offsets are reported for tax year 1993: child-care expenses, moving expenses, northern resident deduction, equivalent to married amount, infirm dependents amount, tuition fees, education amount, tuition/education transfer, medical expenses, amounts transferred from spouse, charitable donations, political contributions, and alimony/maintenance. The adjustment rate (the percentage of all claims that are reassessed) ranges from a high of over 40 percent for moving expenses to a low of less than one percent for alimony/maintenance for

¹⁷ The above discussion is based on Revenue Canada (1997).

both types of returns. Other than moving expenses, the offsets with the highest adjustment rates for EFILE returns are infirm dependents amount (40 percent), medical expenses (20 percent), northern residents deduction (20 percent), child-care expenses (17 percent) and tuition fees (17 percent). In the case of paper returns, the other offsets with the highest adjustment rates include infirm dependents amount (26 percent), child-care expenses (18 percent), and tuition/education transfer (13 percent). The average dollar adjustment over all claims reviewed (including those with no adjustment) ranged from \$1 to about \$200 for the various offsets. Thus, for a number of offset items, a fairly substantial proportion of claimants appears to be filing improper reports with relatively modest tax implications (typically, well under \$1,000).

The Auditor General of Canada (1996) recently performed an assessment of the available data on federal revenue loss from evasion of excise duties and taxes on motive fuels, tobacco, beer, spirits and jewelry. Based on the available information, the estimated overall federal revenue loss for 1994-95 amounted to between \$425 and \$630 million, principally due to smuggling activities. This represents on the order of 7 percent of the federal excise revenue collected for these commodities.

Evidence from Canadian Surveys

Two national surveys undertaken in the 1990s provide a sense of individuals' perceptions of tax non-compliance and their attitudes toward government. The first was undertaken by Canadian Facts for the KPMG Centre for Government Foundation between January 31 and February 5, 1994. A majority of the 1,025 respondents indicated that they did not feel that they received good value for the taxes paid to governments, that they perceived the tax system to be unfair to average Canadians, and that governments squandered a lot of the money received from taxes. Most believed that tax evasion had grown over the past five years, and that non-compliance would be less of a problem if tax rates were lower. Interestingly, however, most of the respondents reported that tax evasion is socially unacceptable and that Revenue Canada should increase its efforts to catch cheaters. A national Financial Post/Compas poll of 820 Canadian adults on tax compliance was performed between May 21 and May 23, 1995. Over 40 percent admitted to having paid cash to avoid taxes; 20 percent admitted hiding income to avoid paying tax; and 14 percent admitted to having participated in smuggling of cigarettes or alcohol. A substantial majority (77 percent) indicated that they had become more determined to avoid taxes than before. When asked why they wanted to cheat on their taxes, most indicated it was due to their dissatisfaction with government. Although these survey findings do not allow one to quantify the extent of non-compliance, they do suggest that compliance is perceived to be a large and growing problem in the 1990s.

In the spirit of the IRS-commissioned surveys to learn about informal suppliers in the U.S., Fortin, Fréchette and Noreau (1987) performed a survey of 2,134 adults in Quebec City in 1986. The survey inquired about expenditures in the underground sector as well as employment in jobs for which income is reported (regular sector jobs) and is not reported (underground sector jobs) on tax returns. Some statistics from this survey are reported in Lemieux, Fortin and Fréchette (1994). In all, 8.5 percent of respondents reported working in the underground economy, and the average income was only \$2,006. Reported employment in this sector is concentrated among those individuals with low regular sector earnings. An extreme example is the welfare recipients

in the sample, for whom the reported participation rate in underground employment amounted to 32.4 percent. Two-thirds of all underground jobs were in the construction and services sectors, including repairs. It is likely that income from underground employment was understated on the survey. For example, a comparison of reported underground income with reported underground expenditures shows that the latter exceeds the former by 27 percent. Nonetheless, it appears that the underground employment in Quebec City in 1986 was largely a part-time, low-income occupation.

5. Conclusion

The Canadian underground economy has received a significant amount of attention in recent years by the popular press, academics and policy-makers alike. It is widely held that the underground economy is a large and growing phenomenon in Canada. Analysts point to the GST, high levels of unemployment, public disillusionment with government, and high overall tax rates as primary factors fuelling the underground sector. As this paper has demonstrated, however, there is precious little direct evidence on either the overall size or trend in unrecorded economic activity. Moreover, although surveys, anecdotal evidence, and some indirect empirical studies seem to indicate that a growing share of economic transactions has become clandestine since the introduction of the GST in 1991, the existence and magnitude of any such change is uncertain. Regardless of whether there has been a significant growth in under-reporting, however, even conservative estimates suggest that tax non-compliance in Canada, as in most countries, is an important phenomenon that merits careful monitoring and analysis.

Studies based on indirect methods of estimation provide little insight into the nature and causes of non-compliance with the tax laws. Available evidence from enforcement activities indicates that the sources of non-compliance differ across classes of taxpayers according to the same basic patterns that have been observed in the United States. To the extent that individuals who receive a high share of their income from wages and salaries are non-compliant, it is mostly through excessive claims of credits and deductions. In all likelihood, a major share of all tax non-compliance is attributable to businesses. For both incorporated and unincorporated small businesses, much of the observed non-compliance from audits is in the form of unreported net income. In contrast, most observed non-compliance for larger corporations pertains to aggressive interpretations of the tax laws rather than income understatements.

Whatever the true extent of tax non-compliance, it is important to recognize that a substantial portion of uncollected revenue is not economically recoverable. Nor should recovery be attempted up to the point where the marginal resource cost of collection is equal to the marginal tax revenue recovered. At this point, the last dollar collected would yield zero net revenue but would exhaust a dollar of real resources. Therefore, the objective should not be to eradicate non-compliance entirely, but rather to maintain it at a tolerable level. Recent surveys indicate that many taxpayers perceive that non-compliance has grown to be too large in recent years and needs to be reduced. Whether such growth has been real or imaginary is not certain, but in any case, perceptions play a potentially important role in shaping future behaviour. In this regard, Revenue Canada's recent efforts to enhance and publicize its enforcement efforts seem consistent with the perceived need to keep compliance in check.

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Technical Committee on Business Taxation

The Technical Committee was established by the Minister of Finance, at the time of the March 1996 federal budget, to consider ways of:

- improving the business tax system to promote job creation and economic growth,
- simplifying the taxation of businesses to facilitate compliance and administration, and
- enhancing fairness to ensure that all businesses share the cost of providing government services.

The report of the Technical Committee was released in April 1998, with public consultations to follow the release of the report.

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The Technical Committee commissioned a number of studies from outside experts to provide analysis of many of the issues being considered as part of its mandate. These studies were released as working papers to make the analysis available for information and comment. The papers received only limited evaluation; views expressed are those of the authors and do not necessarily reflect the views of the Technical Committee.

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