

# **The Underground Economy**

## **Minimizing the Size of Government**

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This chapter discusses several aspects of work that has been undertaken by the author, over the past three years, to measure the extent of the “hidden economy” (HE) in New Zealand; to explore some of its determinants, and its responsiveness to fiscal instruments; and to investigate the size of the associated “tax gap” in that country. The work on which I draw has been discussed in more detail, and in somewhat more technical terms, in Giles 1997a, 1997b, 1997c, 1997d, 1997e, 1998, for example, and in Caragata and Giles 1996 and Giles and Caragata 1996. This work, which was commissioned by the New Zealand Inland Revenue Department, formed part of a much broader research program into many aspects of taxation policy. The principal findings of that research are reported in Caragata 1998b.

In this paper, we outline the results of some extensive econometric modeling that has been undertaken to establish a time-series of the size of New Zealand’s hidden economy from 1968 to 1994. The derivation of these data has facilitated a good deal of associated research and here we will be drawing on those findings to comment, in particular, on the relationship between the hidden economy and taxation policy, in terms both of the overall tax burden and also of the nature of the “tax mix” between, for example, direct and indirect taxes and so on. Our research in this area has revealed a clear and statistically significant link between

high taxes and the size of the underground economy. Moreover, we have been able to establish the extent to which reductions in the tax burden, and changes to its “mix,” can lower illicit activity in the economy. Interestingly, and very importantly, this in turn enables us to establish an “optimal” aggregate tax rate, if the objective is to maximize the impact on the HE. Many of the broad lessons that emerge from this research have applicability in the Canadian context, and more specific work of this type with Canadian data is currently being undertaken by the author and colleagues.

The plan of the rest of the paper is as follows. Section 1 provides some brief summary information about general international trends in the size of the HE. These trends are drawn from a variety of empirical studies on the subject. More specific evidence about the size and nature of the HE, and about the associated tax gap in New Zealand is discussed in section 2. Section 3 discusses some of the key features of the tax-responsiveness of the HE that emerged from our research for New Zealand; and the section 4 explores a few very tentative lessons that can be drawn for the Canadian economy from this evidence.

### **The international face of the hidden economy**

Considerable empirical research has been undertaken in a very wide range of countries, and employing various techniques, in an attempt to obtain measures of the magnitude of the underground economy. These measures generally provide somewhat varied evidence. For example, Frey and Weck-Hanneman (1984) report that for 17 countries from the Organisation for Economic Cooperation and Development (OECD) in 1978, the size of the HE (as a percentage of GNP) varied from 4.1 percent for Japan, 8.0 percent for the United Kingdom, 8.3 percent for the United States, to 13.2 percent in the case of Sweden. Canada was assessed at the sample mean of 8.8 percent, a figure that should be compared with the 5 percent to 7 percent of GDP that Mirus and Smith (1994) estimated for Canada in 1976, and the 15 percent that they estimated for 1990. Spiro (1993) estimated the Canadian underground economy at between 8 percent and 11 percent of GDP in 1993, and other Canadian (and international) evidence may be found in the various papers in Lippert and Walker (1997). By way of summarizing the various empirical studies for Canada, Mirus and Smith conclude that “a number of studies suggest significant growth and an order of magnitude of 12 to 15 percent of GDP for Canada’s underground economy when we include illegal activities but exclude barter-based transactions which our definition says should be counted” (1997: 8).

Evidence from the United States in 1970 yields a range, for the ratio of the HE to GDP, from 2.6 percent (Tanzi 1983) to 11 percent

(Schneider and Pommerehne 1985), while other studies summarized by Aigner *et al.* (1988) report American figures in 1978 that range from 4 percent (Park 1979) to 33 percent (Feige 1982) of GNP. In contrast, Bhattacharyya (1990) estimates the HE for the United Kingdom to be 3.8 percent of GNP in 1960, peaking at 11.1 percent in 1976, and averaging about 8 percent in 1984; while a British Inland Revenue analysis reported by Chote (1995) suggests that the HE may be 6 percent to 8 percent of GDP. Schneider (1997) provides some recent comparative information for a wide range of countries, some of which is summarized in figure 1, together with the earlier (and comparable) results of Frey and Weck-Hannemann (1984).

There are also several surveys of the literature on measuring the Hidden Economy, including those of Blades (1982), Boeschoten and Fase (1984), Frey and Pommerehne (1982, 1984), Gaertner and Wenig (1985), Kirchgassner (1984) and Weck (1983). These studies can be grouped loosely in the following way.

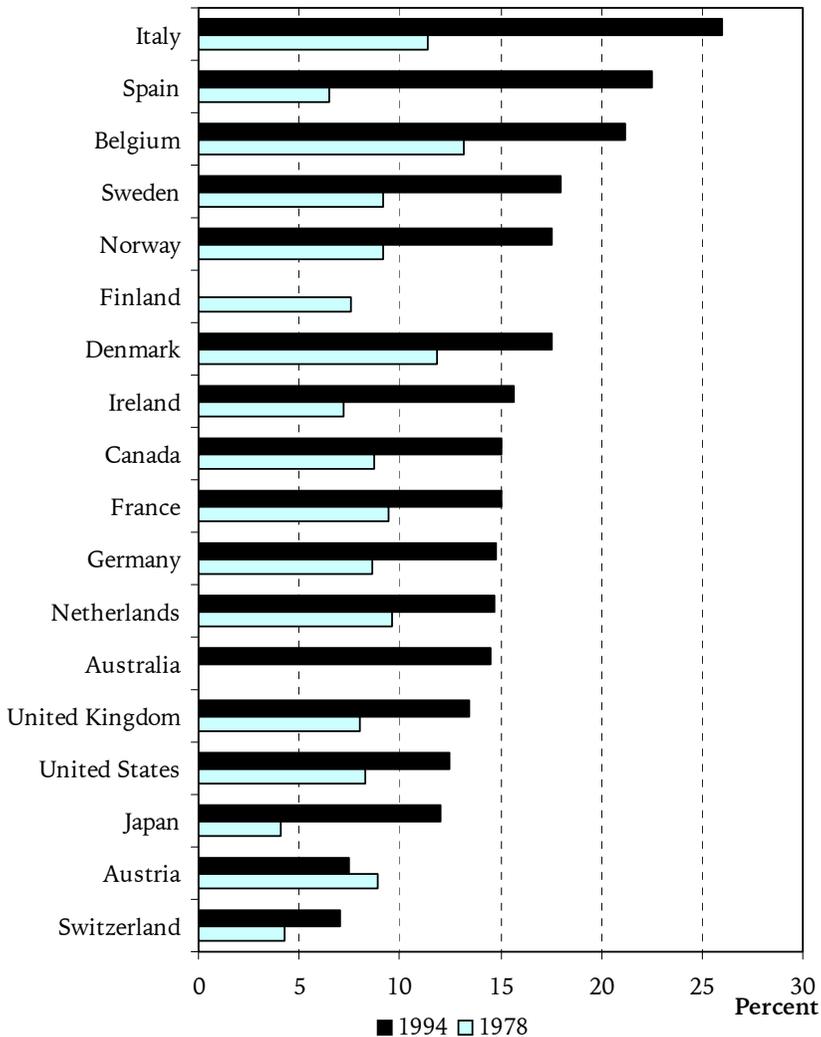
(1) *Tax Evasion*: It may be possible to use surveys relating to taxation compliance or tax-audit data to obtain estimates of underground activity (e.g. Isachsen *et al.* 1982; Morgensen 1985; Giles 1997e). Though this approach generally under-estimates the size of the HE, it does provide a profile of the underground labour force.

(2) *National Income and Expenditure*: A positive “initial discrepancy” between the expenditure and income estimates of GNP may reflect hidden activity (e.g. Macafee 1980; Park 1979). However, this approach is rather crude as such a discrepancy can be just the cumulation of various measurement errors.

(3) *Labour Force Participation Rates*: Contini (1981), Fuà (1976) and others have estimated the size of the HE from changes in the labour force participation rate. A decline in this rate over time or a low rate relative to those in comparable economies may reflect a movement of the workforce from the measured economy into hidden activities. One weakness of this approach is that many participants in the HE also work in the measured economy, so an *under-estimation* of unrecorded output is likely. Tedds, in her structural modeling of the Canadian HE (1998), takes account of multiple job-holdings.

(4) *Currency Demand*: Changes in the size of the HE can be judged from movements in the demand for currency, *i.e.* notes and coins in circulation (see, e.g., Tanzi 1980 and Spiro 1993). The “transactions approach” (e.g. Feige 1979) infers the size of overall economic activity from the total quantity of money. The difference between this inferred activity and observed economic activity measures the extent of the HE. There are

Figure 1: Size of the hidden economy as percent of GDP



Source: Frey and Weck-Hannemann 1984; Schneider 1997.

weaknesses with this approach too, including the need for accurate measures of the total volume of transactions and an assumption of a constant transactions ratio. Other currency-demand approaches to measuring the HE include adding tax rate variables to the demand equations (*e.g.* Cagan 1958 for the United States; Macechish 1962 for Canada) or allowing for differential velocities of circulation in the measured and hidden sectors (*e.g.* Bhattacharyya 1990 for the United Kingdom).

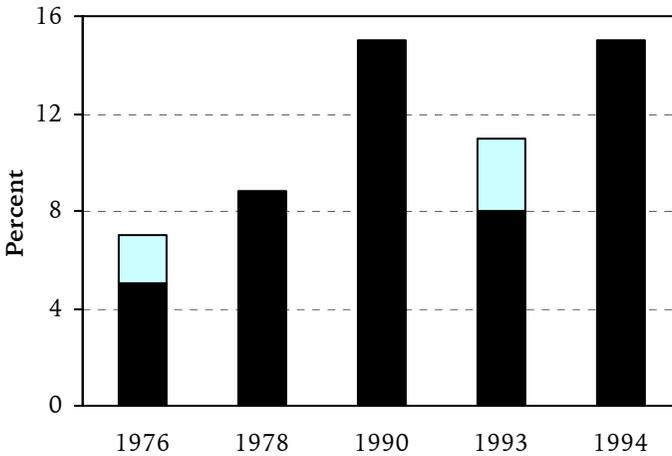
(5) *Latent Variable Models*: The approaches above focus on just *one* cause of underground economic activity and one indicator. Frey and Weck-Hannemann (1984) and Aigner *et al.* (1988) use “latent variable” structural modeling to measure the size of the Hidden Economy. The (unobservable) latent variable here is the extent of underground activity, perhaps expressed as a percentage of measured real GDP. The MIMIC (Multiple Indicators, Multiple Causes) model of Zellner (1970), Goldberger (1972), Jöreskog and Goldberger (1975), and Jöreskog and Sörbom (1993) allows for *several* “indicator” variables and *several* “causal” variables in forming structural relationships to “explain” the latent variable(s). This approach using the latent variable/MIMIC model is the basis for our own analysis of the HE in New Zealand, the full technical details of which are given by Giles 1997a.

Given the variety of estimation methods that have been used to measure the size of the HE, it is not surprising that the results show wide variations across countries and over time. However, when we concentrate on one or two of the more comprehensive methods, and fair comparisons are made with comparable data across different countries for a specific time-period, some interesting patterns emerge. As can be seen in figure 1, the average HE in countries belonging to the OECD seems to be about 15 percent of GDP; The HE in Canada seems to be of typical size, at least on the basis of the evidence to date. Further, *in percentage terms*, the size of the HE has grown over past 20 years. Schneider’s (1997) figures suggest that it has tripled since the 1960s. Figure 2 illustrates the variation among measures of the size of the Canadian HE, depending on the method and data used.

Why has *relative size* of the HE apparently grown over time in virtually every country where such studies have been undertaken? (Clearly, there are several answers to this question and a useful discussion may be found in Caragata 1998a: 71–76.) One fact is plain: in almost all of these countries the overall tax burden as measured in terms of the *effective tax rate* (the ratio of tax revenue to GDP, say) has grown. This is very clear when one inspects the OECD’s data constructed on a comparable basis. (The latest year for which this comparison can be made is currently 1994.) Figure 3 illustrates this point for Canada and New Zealand, which both had very similar effective tax rates in 1994 even though, as described below, their *statutory tax rate* systems are vastly different. Canada’s effective tax rate was 36.1 percent (an increase of 15.3 percent over the period shown); New Zealand’s was 37.0 percent (an increase of 35.0 percent); and the OECD average was 38.4 percent (an increase of 30.2 percent).

In some cases, the tax system has also grown more complex, making it more difficult for some tax-payers to comply. In New Zealand,

Figure 2: Canadian hidden economy as percent of GDP

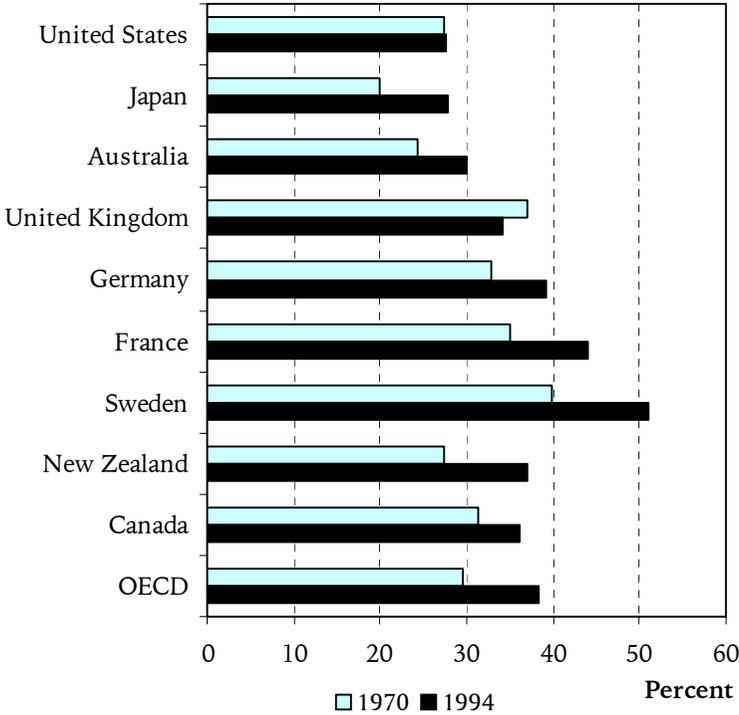


Source: Various authors. Note: Stacked bars denote a range.

however, just the opposite is true. Some of the tax-related highlights of the fiscal reforms in that country included the following:

- (1) *October 1986*: Introduction of the GST at a rate of 10 percent, with no exceptions, and written into the marked prices of retail goods. Simultaneously, wholesale taxes (which had been up to 20 percent) were abolished; the five-step (20 percent to 60 percent, plus a 10 percent surcharge) personal statutory tax scale was simplified to a three-step scale: 15 percent, 30 percent, 48 percent.
- (2) *1987 Budget*: A single, flat, personal statutory tax rate was proposed but not implemented.
- (3) *1988 Budget*: The company tax rate was reduced from 45 percent to 28 percent, and the personal tax scale was simplified to two steps, with marginal rates of 24 percent and 33 percent.
- (4) *1989 Budget*: The land tax rate was reduced from 2 percent to 1 percent, the GST rate was raised to 12.5 percent from 1 July 1989, and the company tax was raised to 33 percent from 1 April 1989.
- (5) *1990 Budget*: Excise taxes on automobiles and land taxes were abolished, and the GST threshold was raised from NZ\$24,000 to NZ\$30,000.
- (6) *1991 Budget*: There were various major international tax and company tax reforms.

Figure 3: Ratio of total tax to GDP (including local taxes)



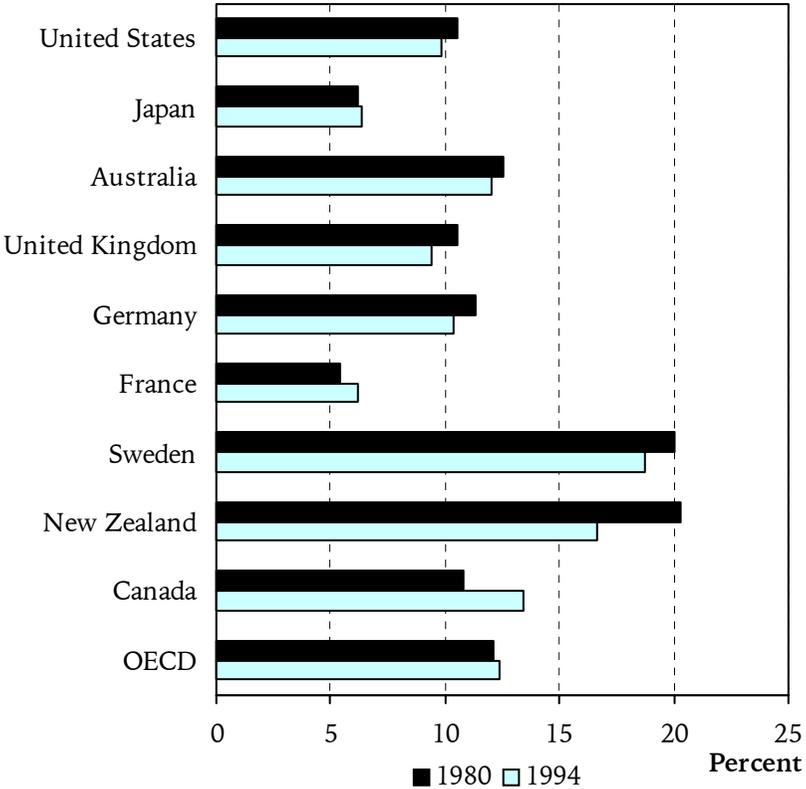
Source: Caragata 1998b.

(7) *1996 Budget*: Reductions were made to the personal income tax rates, making them 21.5 percent on the first NZ\$34,200 and 33 percent on income above that.

(8) *1997 Budget*: From 1 July 1998, personal income taxes are to be reduced to 19.5 percent on the first NZ\$38,000, and 33 percent on income above that.

Another important factor affecting the size of the HE appears to be the tax-mix. As can be seen in figure 4, the ratio of revenue from *personal* income taxes to GDP has changed in different ways in different countries between 1980 and 1994. In Canada, it increased by 24.1 percent to reach 13.4 percent in the mid-1990s. In New Zealand, by contrast, this ratio *fell* by 18.2 percent to a value of 16.6 percent in 1994. Some of the reasons for this will be made clear below. Overall, for OECD countries, the effective personal income tax rate was 12.4 percent in

Figure 4: Ratio of personal tax to GDP

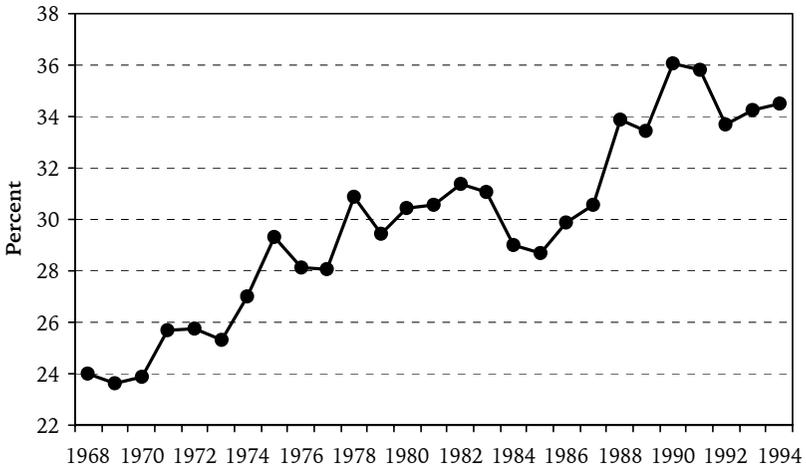


Source: Caragata 1998b.

1994, up just 2.5 percent since 1980. The case of New Zealand is interesting, especially given the economic reforms in that country since early 1984. Figures 5 and 6, which exclude taxes imposed by local authorities provide a useful overview (if these taxes are *included*, then the tax burden in New Zealand is at its highest point in 100 years). We see that there has been a decline in personal taxes since the 1980s, and an increase in indirect taxes since the mid-1970s.

Greater regulation of labour and product markets is also a factor that is generally regarded as driving the HE, though again this influence has been on the decline in New Zealand (though not significantly so in Canada) since the mid 1980s. On the other hand, the growing trends in the international labour market towards more self-employment and more multiple (part-time) jobs together with the growing rates of

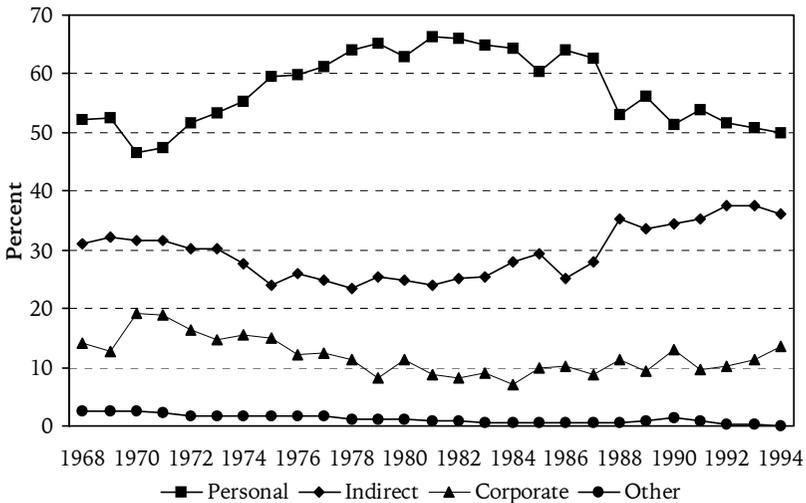
Figure 5: Ratio of tax to GDP in New Zealand



Source: Giles and Caragata 1996.

bankruptcy and of fraud and related criminal activities that have been documented for many countries are consistent with an expanding informal sector in the economy.

Figure 6: Shares of total tax in New Zealand



Source: Caragata and Giles 1996.

### **New Zealand's hidden economy and tax gap**

Since 1995 we have been developing econometric models of the aggregate size of the HE in New Zealand and the changes in such activity since the late 1960s. To do this, we have developed some new modeling techniques, including combining the estimation of a currency-demand equation that allows for both hidden and measured activity in a novel way, with the estimation of a MIMIC model.

This work comprises the first empirical investigation of the HE in that country and is more comprehensive than most similar studies for other countries. In particular, it employs novel data for regulatory effects and detailed taxation data. There appears to be no other research into this problem that combines both of the above types of models and none that takes explicit account of the non-stationarity of the time-series data in an appropriate manner. More recently, we have also corroborated our macro-level time-series estimates by analyzing cross-sectional data based on the tax-audit records for individual firms (see Giles 1997f). The central part of our modeling involves the estimation of a structural MIMIC model in which the HE is a latent variable. By using a range of measurable indicator variables and causal variables (see table 1), we are able to generate a predicted annual time-path for the HE from 1968 to 1994.

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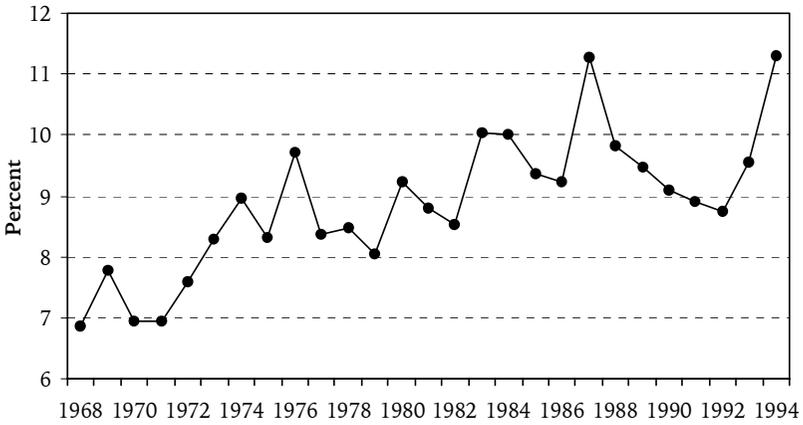
**Table 1: Variables used in hidden-economy model**

Indicators	Causes
Real GDP growth	Average and marginal tax rates; GST and self-employed tax
Ratio of currency to money supply	Unemployment rate; inflation rate; real disposable income
Male participation in labour force	Size of public sector; indices of economic regulation

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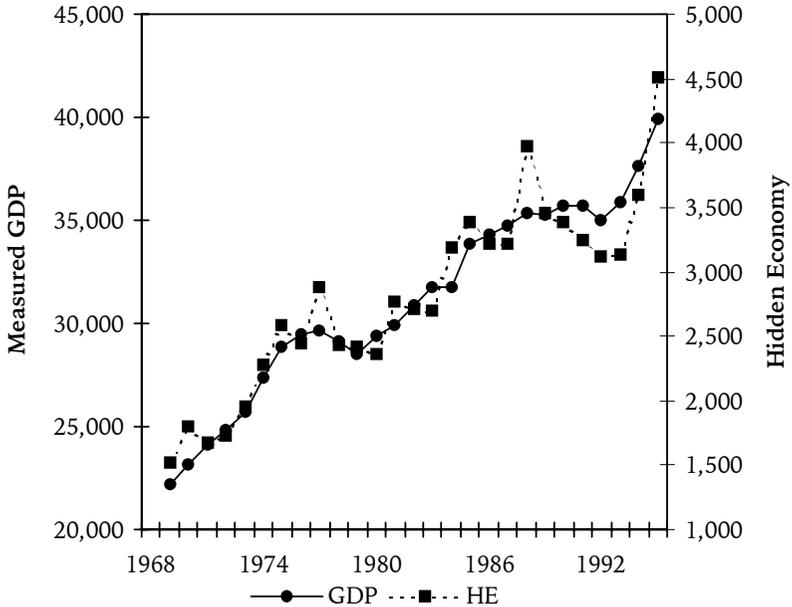
The details of this technique, of the results, and of the associated diagnostic testing of the model are reported in Giles 1997a, and the estimated HE time-series appears in figure 7. As it has in a wide range of countries (figure 1), the HE in New Zealand has been growing over time relative to GDP, ranging from 6.8 percent in 1968 to 11.3 percent in 1994, and averaging 8.8 percent over the period shown. As figure 8 illustrates, hidden output also appears to be more volatile than measured

Figure 7: New Zealand's hidden economy as percent of GDP



Source: Giles 1997a.

Figure 8: Measured and hidden GDP in New Zealand (in millions of real 1982/83 dollars)

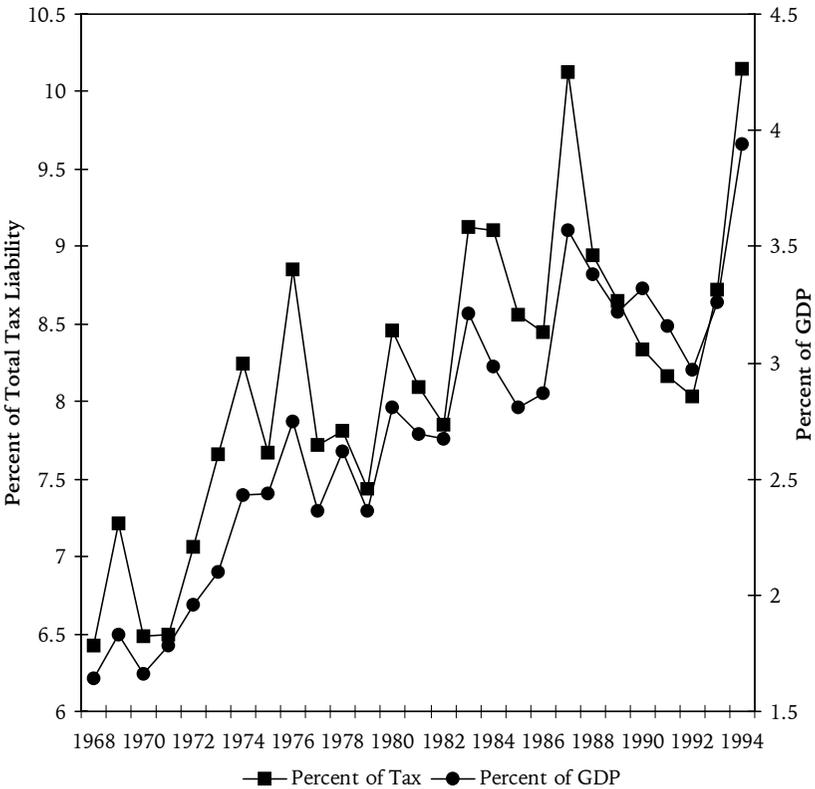


Source: Giles 1997a.

GDP. Giles (1997b) has established that there is a significant (Granger-) causal effect *from* measured GDP *to* the HE but not *vice versa*. The cycles in both of these series are shown by Giles to be relatively symmetric (1997c, 1998), and Giles has also shown that tax-related prosecutions can have a significant effect on the HE (1997d).

We can compute the size of the tax gap (*i.e.* the proportion of *potential* tax revenue that is foregone as a result of hidden activity) as:  $\text{tax gap} = (\text{tax revenue} \times (\text{HE}/\text{GDP}))$  and the results of this for New Zealand are shown in figure 9. We see that the tax gap rose from 6.4 percent to 10.2 percent of total tax liability between 1968 to 1994; that is, it rose from 1.6 percent to 4.0 percent of GDP, or from NZ\$0.1 billion to NZ\$3.2 billion in nominal terms. By way of comparison, Inter-

Figure 9: The tax gap in New Zealand



Source: Giles 1997a.

nal Revenue Service (1996) data for the United States suggests tax gaps of 19 percent (1985), 18 percent (1988), and 17 percent (1992) of total tax liability for individual tax-payers. The figure of 10.2 percent for New Zealand in 1994 is supported by the tax-audit figures for firms analyzed by Giles (1997e), which suggest a tax gap of the order of 10.8 percent for these economic units during the period from 1993 to 1995.

A little casual empiricism for the Canadian situation is also interesting here. Suppose we were to take 15 percent of GDP as the consensus of the research discussed in section 1 for the size of the HE in 1994. The ration of tax to GDP was 36.1 percent in that year, which implies a tax gap of about 5.4 percent of GDP. Nominal GDP was CDN\$654.8 billion in 1994 and total tax revenue was CDN\$236.4 billion; *this would imply a tax gap of CDN\$35.5 billion, or 13.1 percent of total tax liability.*

### **The responsiveness of the hidden economy to taxes**

In section 2, we noted some important patterns and trends in both the aggregate tax burden and the tax mix in New Zealand and other countries in recent years. Our own work (much of which is summarized in Caragata 1998a and 1998b) and that of several other authors from other countries supports the view that the chief causes of underground activity and tax-evasion include high and rising tax burdens, inflation, rising real disposable incomes, and declines in ethical standards. The link between the tax burden and the relative size of the HE in New Zealand has been explored by means of extensive simulations by Giles and Caragata (1996). Their results show that there is clear positive causality *from* Tax Revenue/GDP *to* HE/GDP and that, on average over their sample, just over one-half of the HE is “hard-core”—*i.e.* unresponsive to changes in taxation policy. Even in the limit when Tax Revenue/GDP = 0, the size of the HE is still 4.7 percent of GDP.

They find that the split between hard-core and soft-core hidden economic activity varies over the business cycle: hard-core tax evasion increases, relatively, during cyclical troughs. For example, they estimated 65 percent of evasion to be hard core in 1968 but only 39 percent in 1994. In the latter case, this meant that the hard core evasion amounted to 5.1 percent of GDP and implied a tax loss of NZ\$1.2 billion. By way of support, the micro-evidence from the tax-audit records analyzed by Giles (1997e) indicates an extrapolated figure for a hard-core HE equivalent to 5 percent of GDP. The other NZ\$2 billion of the tax gap in 1994 was, therefore, apparently tax-sensitive. Giles and Caragata (1996) also show that successive reductions in the effective tax rate will reduce the ratio HE/GDP, though not uniformly.

The elasticity between these two ratios increases with the tax burden, a unit elasticity apparently arising at an effective tax rate of 47 percent. Table 2, part (a), provides some details for the average responses over the period from 1969 to 1994.

More specifically, in 1994 a 10 percent (*not* a 10 percentage-point) cut in the effective tax rate implies a 7.6 percent cut in the HE/GDP ratio. So, it is estimated that reducing the tax burden from 34.5 percent to 31.1 percent of GDP in New Zealand that year would have reduced the HE ratio from 11.3 percent to 10.4 percent of measured GDP. Recalling figure 6, it is also interesting to ask what would be the corresponding effects of changes in the tax mix? This is addressed (with or without changes to the overall tax burden) in further simulation work reported by Caragata and Giles (1996). They show that an increase in indirect taxes relative to direct taxes reduces the size of the HE/GDP ratio. Again, some illustrative average figures are given in table 2, part (b). There, the overall tax burden has been held constant by interchanging the shares of personal and indirect taxes, as shown in figure 6, year by year. Comparing tax burden and tax-mix effects, Caragata and Giles show that reductions in the former can have more impact than even quite substantial changes in the tax-mix. For instance, on the basis of the 1994 figures, a 10 percent uniform reduction in the tax burden is predicted to have the same effect as the rather dramatic policy change of interchanging the personal and indirect tax proportions of total tax. Perhaps the most striking implications of these simulations are that the impact of tax changes on the HE starts to decelerate at an effective tax rate of around 21 percent of GDP; and that combining tax cuts with a change towards relatively more indirect taxes enhances the reduction of the (HE/GDP) ratio.

Table 2: Simulated values for percent (HE/GDP) (average, 1969–1994)

“Actual” %	Percent reductions in ratio tax/GDP					
	0	20	40	60	80	100
(a) No Change in Tax Mix						
8.96	8.96	7.87	6.91	6.06	5.32	4.67
(b) Personal and Indirect Tax Rates Interchanged						
8.96	7.96	7.16	6.43	5.78	5.19	4.67

### **Some lessons for the Canadian situation**

Although there is no definitive way to measure the size of the HE, we are now developing more sophisticated and reliable procedures for doing so, and the modeling that underlies the preceding discussion of underground activity in New Zealand is now being applied with Canadian data by the author and others (Tedds 1998). The tentative results to date clearly support the international evidence that the relative size of the HE has been growing over the past two or three decades. It is also clear from this evidence that the extent of the tax burden is a major driving force for the HE, and that the nature of the tax-mix also matters.

As far as the actual magnitude of the HE is concerned, the evidence for Canada is varied. Tax compliance in Canada, however, seems to be around the OECD average, suggesting underground activity of the order of about 15 percent of GDP in recent years. Of course, this is only a convenient way of stating this measure for comparative purposes—it does *not* imply that the official figures for Canada's GDP should be adjusted upwards by 15 percent to compensate for the HE, because many of the associated activities fall outside the definition of GDP. However, on the basis of this figure of 15 percent, there may be a tax gap of approximately CDN\$35 billion in Canada.

Judging by the evidence from New Zealand, and using the response rates calculated by Giles and Caragata (1996), reducing the Canadian effective tax rate from 36.1 percent to 30 percent (which, interestingly, is that of Australia) would probably reduce the HE ratio from about 15 percent of GDP to about 13 percent. Ignoring the stimulation to economic growth, and other dynamic effects (which undoubtedly are significant, but are as yet unexplored), the tax gap would then fall from 5.4 percent of GDP to 3.9 percent of GDP; or from CDN\$35.5 billion to about CDN\$25.5 billion. If the role of government could be reduced even further, so that the Canadian effective tax rate were brought down to 21 percent—the optimal rate calculated for New Zealand by Caragata and Giles (1996)—the HE ratio might fall to 10 percent of GDP and the tax gap could fall to 2.1 percent of GDP or CDN\$13.8 billion.

These figures are tentative, of course, but work that is currently in progress will enable us to provide more definitive measures shortly. In the meantime, the detailed empirical work with the New Zealand data provides us with some very important messages regarding the connection between the size of government, high effective tax rates, and the magnitude of the informal economy. Regardless of their precise numerical details, these are lessons that no policy-maker can afford to ignore.

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