

**The Underground Economy :
Minimizing the Size of Government**

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1. Introduction:

This paper 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" (hereafter, the "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 by Giles (1997a, 1997b, 1997c, 1997d, 1997e, 1997f), for example, and by 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 by Caragata (1998b).

In this paper we outline the results of some extensive econometric modelling that has been undertaken to establish a time-series of the size of the New Zealand HE 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 taxation policy and the effects taxes - in terms of both the overall tax burden and also the nature of the "tax mix", as between direct and indirect taxes, *etc.*. As we will see, 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 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 2 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 3. Section 4 discusses some of the key features of the tax-responsiveness of the HE that emerged from our research for New Zealand; and the final section explores a few very tentative lessons that can be drawn for the Canadian economy from this evidence.

2. The International Face of the Hidden Economy:

A considerable amount of 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 seventeen O.E.C.D. countries in 1978, the size of the HE (as a percentage of GNP) varied from 4.1% for Japan, 8.0% for the UK, 8.3% for the USA, to 13.2% in the case of Sweden. Canada was assessed at the sample mean of 8.8%, a figure that should be compared with the 5% to 7% of GDP that Mirus and Smith (1994) estimated for Canada in 1976, and the 15% that they estimated for 1990. Spiro (1993) estimated the Canadian underground economy at between 8% and 11% 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 summarising the various empirical studies for Canada, Mirus and Smith (1997, p.8) 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."

Evidence for the U.S.A. in 1970 yields a range, for the ratio of the HE to GDP, from 2.6% (Tanzi (1983)) to 11% (Schneider and Pommerehne (1985)), while other studies summarised by Aigner *et al.* (1988) report U.S. figures in 1978 which range from 4% (Park (1979)) to 33% (Feige (1982)) of GNP. In contrast, Bhattacharyya (1990) estimates the HE for the U.K. to be 3.8% of GNP in 1960, peaking at 11.1% in 1976, and averaging about 8% in 1984; while a British Inland Revenue analysis reported by Chote (1995) suggests that the HE may be of the 6% to 8% of GDP. Schneider (1997) provides some recent comparative information for a wide range of countries, some of which is

summarised 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 :

Tax Evasion

It may be possible (*e.g.*, Isachsen *et al.* (1982), Morgensen (1985), Giles (1997f)) to use surveys relating to taxation compliance, or tax-audit data to obtain estimates of underground activity. This approach generally under-estimates the size of the HE, but it does profile of the underground labour force.

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.

Labour Force Participation Rates

Contini (1981), Fuà (1976) and others have estimated the size of the HE from changes in labour force participation rates. A decline in this rate over time, or a low rate relative to those in other 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. Work in progress by Tedds (1998) takes account of multiple job-holdings in her structural modelling of the Canadian HE.

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) - *e.g.*, see Tanzi (1980), and Spiro (1993). The "transactions approach" (*e.g.*, Feige (1979)) takes the quantity of money, and from this 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 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 USA, and Macecish (1962) for Canada), or allowing for differential velocities of circulation in the measured and hidden sectors (*e.g.*, Bhattacharyya (1990) for the U.K.).

Latent Variable Models

The above approaches 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 modelling 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 latent variable/MIMIC model approach 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 HE seems to be about 15% of GDP, on average, in O.E.C.D. countries. Canada seems to be quite typical in terms of this type of activity, 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 1960's. Figure 2 illustrates the variation among measures of the size of the Canadian HE, depending on the method and data used. It is interesting to ask, "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, pp. 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 one inspects the O.E.C.D., 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 will be detailed below, their *statutory tax rate* systems are vastly different). Canada's rate was 36.1% (a change of 15.3% over the period shown); New Zealand's was 37.0% (an increase of 35.0%); and the O.E.C.D. average was 38.4% (up 30.2%).

In some cases, the tax system has also grown more complex, making it more difficult for some taxpayers to comply. In the New Zealand context, however, just the opposite is true. Some of the tax-related highlights of the fiscal reforms in that country included the following:

October 1986 : Introduction of the GST at a rate of 10%, with *no exceptions*, and written into the marked prices of retail goods. *Simultaneously*, wholesale taxes (which had been up to 20%) were abolished; the five-step (20% to 60%, plus a 10% surcharge) personal statutory tax scale was simplified to a three-step scale : 15%, 30%, 48%.

1987 Budget : A single flat personal statutory tax rate was proposed, but not implemented.

1988 Budget : The company tax rate was reduced from 45% to 28%, and the personal tax scale was simplified to two steps, with marginal rates of 24% and 33%.

1989 Budget : The land tax rate was reduced from 2% to 1%, the GST rate was raised to 12.5% from 1 July 1989, and the company tax was raised to 33% from 1 April 1989.

1990 Budget : Excise taxes on automobiles and land taxes were abolished, and the GST threshold was raised from N.Z.\$24,000 to N.Z.\$30,000.

1991 Budget : There were various major international tax and company tax reforms.

1996 Budget : Reductions were made to the personal income tax rates, making them 21.5% to N.Z.\$34,200 and 33% above that.

1997 Budget : From 1 July 1998, personal income taxes are to be reduced to 19.5% on the first N.Z.\$38,000, and 33% 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 *personal* income tax revenue to GDP has changed in different ways in different countries between 1980 and 1994. In Canada it increased by 24.1% to reach 13.4% in the mid 1990's. In New Zealand, by contrast, this ratio *fell* by 18.2%, to a value of 16.6% in 1994. Some of the reasons for this will be made clear below. Overall, for O.E.C.D. countries, the effective personal income tax rate was 12.4% in 1994, up just 2.5% since 1980. The New Zealand case is quite interesting, especially given the economic reforms in that country since early 1984. Figures 5 and 6, which *exclude* local authority taxes provide a useful overview. (If local authority taxes are *included*, then the N.Z. tax burden is at a 100-year high.) We see that there has been a decline in personal taxes since the 1980's, and an increase in indirect taxes since the mid-1970's.

Greater regulation of labour and product markets is also a factor which 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 1980's. On the other hand, the growing international labour market trends towards more self-employment and more multiple (part-time) job holding, together with the growing rates of 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. With this background in mind, we now consider the nature of the HE in New Zealand and some of the associated implications for taxation policy and the size of Government.

3. The New Zealand 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 1960's. To do this we have developed some new modelling 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 other such studies for other countries. There appears to be no other such research which combines both of these 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-section data based on the tax-audit records for individual firms, but a discussion of this (see Giles (1997f)) is beyond the scope of the present paper. The central part of our modelling 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", as summarized in Table 1, we are able to generate a predicted annual time-path for the HE from 1968 to 1994.

Table 1
Variables Used in Hidden Economy Model

<i>Indicators</i>	<i>Causes</i>
Real GDP Growth	Average & Marginal Tax Rates; GST & Self-Employed Tax
Currency/Money Supply Ratio	Unemployment Rate; Inflation Rate; Real Disposable Income
Male Labour Force Participation	Size of Public Sector; Indices of Economic Regulation

The details of this technique, of the results, and of the associated diagnostic testing of the model are reported by Giles (1997a), and the estimated HE time-series appears in Figure 7. Consistent with the discussion associated with Figure 1 above, we see here that the HE in New Zealand has been growing over time relative to GDP, ranging from 6.8% of that base in 1968, to 11.3% in 1994, and averaging 8.8% over the period shown. As Figure 8 illustrates, hidden output also appears to be more volatile than measured 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 (1997c, 1997d) to be relatively symmetric, and Giles (1997e) has shown that tax-related prosecutions can have a significant effect on the HE.

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% to 10.2% of total tax liability between 1968 to 1994. That is it rose from 1.6% to 4.0% of GDP, or from N.Z.\$0.1Billion. to N.Z.\$3.2Billion in nominal terms. By way of comparison, Internal Revenue Service (1996) data for the USA suggests tax-gaps of 19%, 18%, and 17% of total tax liability, in 1985, 1988, and 1992 for individual tax-payers. The 10.2% figure for New Zealand in 1994 is supported by the tax-audit figures for firms analyzed by Giles (1997f) - these suggest a tax-gap of the order of 10.8% for these economic units during 1993-1995.

A little casual empiricism for the Canadian situation is also interesting here. Suppose, from the discussion of other authors' research in Section 1 above, we were to take a consensus figure of 15% of GDP in 1994 for the size of the HE. The Tax/GDP ratio was 36.1% in that year, which implies a tax-gap of about 5.4% of GDP. Nominal GDP was C\$654.8Billion. in 1994, with total tax revenue at C\$236.4Billion, *so, this would imply a tax-gap of C\$35.5 Billion, or 13.1% of total tax liability.*

4. The Tax-Responsiveness of the Hidden Economy:

In Section 2 above 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. The increases in the relative size of the HE and effective tax rate in New Zealand are depicted together in Figure 10. Our own work (much of which is summarised in Caragata (1998a, 1998b), and that of several other authors internationally, 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 half of the HE is "hard-core", being unresponsive to changes in taxation policy. Even in the limit when (Tax Revenue/GDP) = 0, the size of the HE is still 4.7% of GDP.

They find that the split between "hard core" and "soft core" hidden activity varies over the business cycle - "hard core" tax evasion increases, relatively, during cyclical troughs. For example, they estimated 65% of evasion to be "hard core" in 1968, but only 39% in 1994. In the latter case, this meant that the "hard core" evasion amounted to 5.1% of GDP and implied a tax loss of N.Z.\$1.2 Billion. (By way of support, the micro-evidence from the tax-audit records analyzed by Giles (1996f) indicates a "hard-core" figure equivalent to 5% of GDP when grossed up.) The other N.Z.\$2Billion 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 (HE/GDP) ratio, but 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%. part (a) Table 2 provides some details for the average responses over 1969-1994.

More specifically, and to illustrate further, in 1994 a 10% (*not* a 10 percentage-point) cut in the effective tax rate implies a 7.6% cut in HE ratio. So, it is estimated that reducing the tax burden from 34.5% to 31.1% of GDP in New Zealand that year would have reduced the HE ratio from 11.3% to 10.4% 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 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% 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.

Table 2
Simulated Values for % (HE/GDP)
(Average, 1969 - 1994)

	% Reduction in (Tax/GDP)					
"Actual" (%)	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 Indirect Tax Rates Interchanged						
8.96	7.96	7.16	6.43	5.78	5.19	4.67

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% of GDP; and that combining tax cuts with a change towards relatively more indirect taxes enhances the reduction of the (HE/GDP) ratio.*

5. 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 modelling that underlies the above discussion of underground activity in New Zealand is now being applied with Canadian data by the author and others (*e.g.*, Tedds (1998)). The tentative results to date clearly support the international evidence (including that for Canada, by other authors), 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 rather varied. However, at best, Canada seems to be around the O.E.C.D. average with respect to tax compliance, suggesting underground activity of the order of about 15% of GDP in recent years. Of course, this is just a convenient way of stating this measure for comparative purposes - it does *not* imply that the official GDP figures should be adjusted upwards by such an amount to compensate, because many of the associated activities fall outside the definition of GDP. However, on the basis of this 15% figure, *there may be a Tax-Gap of approximately C\$35 Billion in Canada.*

Judging by the New Zealand evidence, and using the response rates calculated by Giles and Caragata (1996), *reducing the Canadian effective tax rate from 36.1% to 30% (which, interestingly, is that of Australia) this would probably reduce the HE ratio from about 15% of GDP to about 13% of GDP.* 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% of GDP to 3.9%*

of GDP; or from C\$35.5Billion to about C\$25.5Billion. If the role of government could be reduced even further, so that the Canadian effective rate were brought down to 21% (the "optimal" rate calculated for New Zealand by Caragata and Giles (1996)), the HE ratio might fall to 10% of GDP, and the Tax-Gap could fall to 2.1% of GDP, or C\$13.8Billion.

These figures are only suggestive, 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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