

Measuring the Size of the Hidden Economy in Trinidad & Tobago, 1973-1999

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ABSTRACT

In this paper, an attempt is made to measure the hidden economy of Trinidad & Tobago using annual time series data covering the period 1970-1999, within the Structural Cointegrating VAR (SCVAR) framework. Using a Tanzi-type currency demand approach as a starting point, a multiple equation SCVAR model is estimated that contains two long-run relationships linking the demand for currency with other variables. The model is evaluated on the basis of its persistence profiles, its impulse responses and other statistical criteria. It is solved using a Gauss-Siedel algorithm and establishes that the size of the hidden economy rose from a low of about 14% of measured GDP in the early 1970s to a high of 36% in 1981, and is currently about 20% of measured GDP, with no marked tendency to get larger in the near future. Hidden economic activity is also found to be highly positively correlated with activity in the regular economy.

KEYWORDS: Caribbean, Trinidad & Tobago, Hidden Economy, Structural Cointegrating VAR Models.

JEL CLASSIFICATION NUMBERS: C51, C52, E26, E60, O17, O54.

1. Introduction

In this paper, an attempt is made to measure the size of the hidden economy in Trinidad & Tobago using annual time series data covering the period 1970-1999. This is done within the Structural Cointegrating VAR (SCVAR) framework, applied to a demand for currency function. The paper is the first in an ongoing research project aimed at the identification and measurement of the hidden economy in certain Caribbean countries. In fact it is intended that the specific case studied in this paper, that of Trinidad & Tobago, serve as a template for future work on other countries of the Caribbean.

Economists have long had an interest in the size of the hidden economy and, since Cagan's (1958) paper, voluminous studies¹ about the size of the hidden economy have been carried out for countries throughout the world. Gradually, interest has extended to the Caribbean area. See in particular Faal (2003), Bennett (1995), Witter and Kirton (1990) and Thomas (1989). To date, however, here has been no attempt to measure the size of the hidden economy of Trinidad & Tobago, arguably the most prosperous country in the Caribbean region and one where many conditions have existed, and continue to exist, to ensure that hidden economic activity is widespread. Two studies on the Trinidad and Tobago economy, Rampersad (1987) and Lloyd-Evans and Potter (2002), yielded information on structural and other characteristics of the informal sector, but no attempt was made in either to measure the size of the hidden economy.

¹ See Schneider and Enste (2000) for a fairly comprehensive survey of the literature.

What possible motivation can there be for determining the size of the hidden economy in Caribbean countries like Trinidad & Tobago? Several general reasons are given in the literature for conducting research in this area and perhaps the most widely cited, which is applicable to the Trinidad & Tobago case, is the potential, in the absence of information about the size of the hidden economy, for erroneous policy decisions based on misleading statistical indicators. Indeed, economic policy measures may be of a wrong magnitude or even in a wrong direction if they are based on such indicators of the state of the economy. For example, the official unemployment rate may be overstated if some of the officially unemployed are working in the hidden economy. Similarly, the growth rate of real income may be understated if the hidden economy is expanding more quickly than the “measured” economy, or the rate of inflation may be overstated. Policy mistakes based on erroneous figures are particularly costly for small developing countries like Trinidad and Tobago where resources are very limited. Determining the size of the hidden economy in Trinidad & Tobago and, indeed, in other countries of the Caribbean, is a worthy enterprise for this reason alone.

There are many approaches to measuring the size of the hidden economy, perhaps as many as there are definitions of the concept. See Schneider and Enste (2000). A novel feature of this paper is that an estimate of the hidden economy of Trinidad and Tobago is obtained using the Structural Cointegrating VAR approach. Indeed, this paper represents the very first attempt to apply the SCVAR method to measure the size of the hidden economy. SCVAR modeling is based on cointegration analysis, and a major advantage of cointegration analysis, generally, is that it incorporates information associated with both the long-run and short-run behaviour of economic

agents. The older studies, like those of Tanzi, did not take advantage of this and, as a consequence, may have lost valuable information needed for estimating the size of the hidden economy.

A particularly attractive feature of the SCVAR approach, as opposed to standard cointegration or VAR analysis, is that it allows for the estimation of theory-consistent long-run relationships between the variables in the system. The short-run dynamics are freely estimated within a VAR framework. The model established may be evaluated on the basis of its generalized impulse responses as well as on the properties of its persistence profiles, another kind of impulse response that traces out the response of error correction terms to a one-time shock in the vector of disturbances, and may be interpreted as a measure of the speed of convergence toward equilibrium. See Pesaran and Shin (1996), (1998), (2002) and Kilian (1999). These generalized impulse responses and the persistence profiles are also extremely useful in evaluating the impact of policy measures.

Using Tanzi's (1980, 1982) currency demand approach as a starting point, we estimate, using Eviews 5.0, a multiple equation SCVAR model containing two long-run relationships linking the demand for currency with other variables and evaluate this model on the basis of its persistence profiles, its impulse responses and other statistical criteria. We solve this model using a Gauss-Siedel algorithm and determine that the size of the hidden economy rose from a low of about 14% of measured GDP in the early 1970s to a high of 36% in 1981, and is currently about 20% of measured GDP, with no marked tendency to get larger in the near future.

The rest of the paper proceeds as follows. In the following section, we define what we mean by the term “hidden economy” and present some reasons for the existence and persistence of the hidden economy in Trinidad & Tobago. In Section 3, we briefly review some empirical work done on the hidden economy in the English-speaking Caribbean to date and in Section 4 we briefly discuss the currency demand model that will form the basis of the SCVAR model. In section 5, we discuss the fundamental features of SCVAR modeling. Section 6 is the central piece of the paper where we set up the SCVAR model, estimate and evaluate it. In section 7, we use this model to determine the size of production in the hidden economy over the period 1973-1999. In section 8 we draw some policy lessons and in section 9 we conclude the paper.

2. The hidden economy in Trinidad & Tobago: definition, existence and persistence

The first obstacle in an exercise like this one is the definition of what constitutes the hidden economy as well as an agreement about the appropriate terminology to be employed. Like Faal (2003), we use the term “hidden economy” to refer to all “unreported income which has contributed to value added according to the *System of National Accounts* (1993)”, but which is not included in the official GDP measure published in the National Income Accounts of Trinidad & Tobago, published by the Central Statistical Office of that country. In so doing, we divide the total economy into its *hidden* and *measured*, or *regular*, components.

Several authors use the term “hidden economy” to describe the phenomenon discussed in this paper. These include the recent works of Giles (1999a, 1999b) and

Gadea and Serrano-Sanz (2002). However, there are many other concepts appearing in the literature that are related, and sometimes equivalent, to what we will call in this paper the hidden economy. These include terms like “shadow economy”, employed by Helberger and Knepel (1988), “black economy”, employed by Pissarides and Weber (1989), “underground economy”, employed by Faal (2003), Giles et al. (2002) and Hill and Kabir (2000), and many other terms. Our definition incorporates activity carried out in the so-called “informal economy”, or “informal sector” of the economy, a concept which is widely used even in the Caribbean by statistical agencies, non economists, or economists with special interests (like the labour market), to describe economic activity that employs a handful of workers who earn low incomes, use rudimentary equipment, and work outside the framework of laws and regulations. The informal economy is perhaps better defined as the marginal (or even marginalised) economy and it has long been of interest to Sociologists and Labour Economists, if only for the effect that activity in this sector has on employment and well-being. Examples of Caribbean studies of the informal economy include the work on the Trinidad & Tobago economy by Rampersad (1987) and Lloyd-Evans and Potter (2002), and on sub-sectors of the Jamaican economy by Smikle and Taylor (1977) and LeFranc et al. (1989). In many of the countries of the Caribbean, especially the smaller ones of the Eastern Caribbean, the distinction between the hidden and the informal economies might be blurred in practice².

Several reasons have been advanced for the existence and persistence of hidden economic activity worldwide. See Schneider and Enste (2000), (2003) for a fairly

² See Gërxhani (2003) for a very useful survey of studies done on the informal economy as well as for an appreciation of the blurred lines between the concepts of “hidden economy” and “informal economy” even in the developed countries.

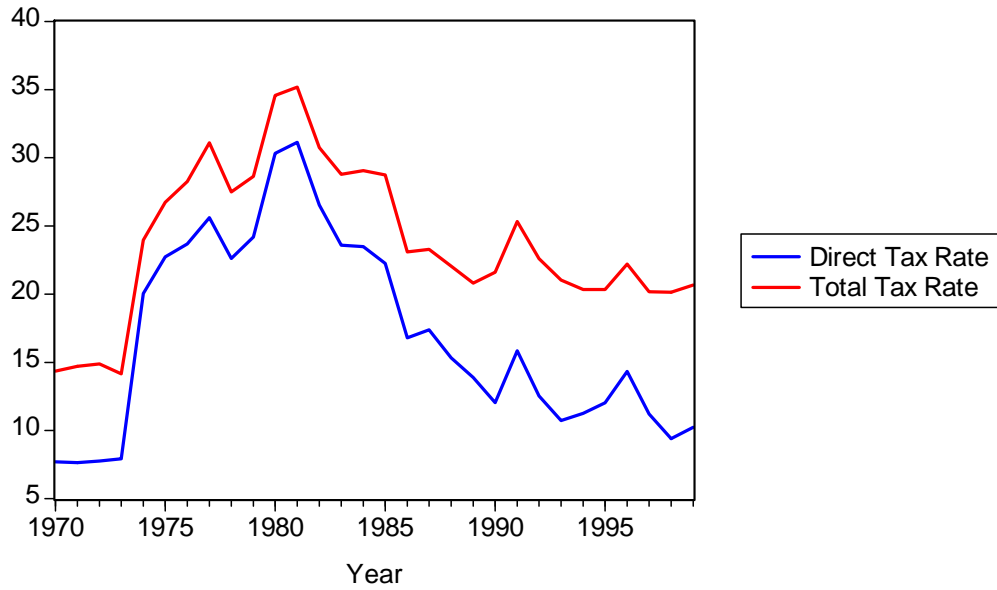
comprehensive review and analysis of such reasons. There is no doubt that many of the major reasons advanced are valid for the Trinidad & Tobago case. Here we consider the following:

- Increases in the tax burden;
- Intensity of government regulations;
- Perception of corruption;
- Discontent with quality of public services;
- Degree of ethnic fragmentation;
- Tax morale.

2.1 Increases in the Tax Burden Imposed on the Official Economy

The increase in the size of the hidden economy has been interpreted principally as a reaction to the overburdening of firms and individuals by the apparatus of state, principally through taxes. Most studies indeed show that the increase in the tax contribution burden is one of the main causes for the increase of the hidden economy. See for instance Schneider and Enste (2000), Cebula (1997), Johnson et al. (1998). Figure 1 below shows the time path of the evolution of the Direct and Total Tax burden (measured as a percentage of GDP) over the period 1970-1999, and if this hypothesis is true, then the size of the hidden economy in Trinidad & Tobago should reflect this pattern.

Figure 1
Evolution of Direct and Total Tax Rates in Trinidad & Tobago, 1970-1999



According to the hypothesis, individuals attempting to avoid paying taxes would turn to the hidden economy, which would lead to a substantial loss in tax revenues. Even if there should be an easing of the burden, the hidden economy may still persist. As Spiro (1993, p. 255) points out, “once this habit is developed, it is unlikely that it will be abandoned”, so that participants in the hidden economy are not likely to return to the regulated economy, even in the long run.

At present there is no quantitative evidence on the existence of tax evasion in Trinidad and Tobago but there is a considerable amount of anecdotal evidence. Trinidad & Tobago has had its fair share of high taxes for most of the period covered by the study. The Corporation tax rate stood at 45% until it was reduced in the 1990s following the introduction of a 15% Value Added Tax (VAT), when it fell to 35%. The marginal tax rate for individuals was even higher as Table 1 clearly shows:

Table 1
Marginal income tax rates in Trinidad & Tobago 1968-1999

Period	Income range	Marginal Income Tax Rates
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1968-1977	6,001-19,000 19,001-60,000 Over 60,000	30-45% 50-60% 70%
1978-1988	10,001-25,000 25,001-60,000 Over 60,000	30-40% 45-60% 70%
1990-1999	20,001-40,000 Over 40,000	30-35% 35-40%

The marginal tax rate for individuals was in the 1970s and 1980s as high as 70%, and even after the VAT was introduced in 1990 the highest rate varied between 35-40%. Details of the current taxation system in Trinidad & Tobago is outlined in Robinson-Walters (2003). A summary of the system is shown in Appendix 2 to this paper.

2.2 Intensity of Government Regulations

An increase in the intensity of regulations³ tends to limit the freedom of choice for individuals engaged in the official economy. Work by Johnson et al. (1997) predicts that countries with more general regulation of their economies tend to have a higher share of the hidden economy in the total GDP. Johnson et al. (1998) found that a one-point increase in the Heritage Foundation's regulation index, measured on a scale going from 0 to 10, is associated with an 8.1 percentage point increase in the hidden economy. The value of this index for Trinidad and Tobago has remained steadily high over the years (averaging about 6.5) notwithstanding the "liberalization" of the 1990s and after. Those who publish the index have noted that "regulations and bureaucratic red tape are burdensome" in Trinidad and Tobago.

An interesting and recent regulation, involving the regulation of minimum wages, was introduced in Trinidad and Tobago in 1998. An econometric investigation by Strobl and Walsh (2001) done after the implementation of this legislation showed that, while

³ This is usually measured by the number of laws and regulations, such as licenses requirements, product market regulations and employment protection legislation.

the wages of some individuals increased, other workers lost their jobs. As shown by Enste (2003) and others⁴, an increase in unemployment can cause the hidden economy to increase.

Perhaps the most burdensome regulations imposed on the Trinidad & Tobago economy over the period of the study were those associated with the foreign exchange and import regimes. Until 1993, fairly rigid foreign exchange controls were applied. It is almost impossible to “do business” in countries like Trinidad & Tobago without ready access to foreign exchange as even the most basic commodities, especially inputs into the production process, must be imported. And these imports must be purchased using hard currency. Foreign exchange, however, was relatively easily available on the black market at prices above the official fixed rate of exchange. Many firms and individuals took advantage of this state of affairs, through unofficial channels of course. A similar situation existed in other Caribbean countries. See Thomas (1989) for details about the Guyana case. As for the import regime, the national development programme was premised mainly on a strategy of “import substitution”, which involved high import duties and “negative lists” in an attempt to foster the growth of local industry. Locally produced goods were consequently overpriced and of dubious quality, resulting in a demand for the foreign alternatives, readily available on the black market. Faal (2003) describes a similar situation for Guyana.

2.3 Perception of corruption

Corruption plays a significant role in the choice of a business to belong to the regular

⁴ For example, Lemieux et al. (1994) gave a detailed explanation of underground labour supply using

or to turn to the hidden economy. However, a review of the literature shows that the link between the two is ambiguous, since there is still no agreement as to whether corruption and hidden activity are complements or substitutes. There is some empirical evidence which suggests that there is a significant positive relationship between corruption and hidden activity. See Johnson et al, (1998) and Friedman et al. (2000). This issue may be a very important determinant of the size of the hidden economy in Trinidad and Tobago, since there is the view that all politicians in Trinidad & Tobago are corrupt and that governments are all self-serving. Such a view is not helped when former Ministers of government, including a former Prime Minister, are either facing charges of being investigated for corrupt activity. One was even charged with murder, the alleged motive of which was the protection of ill gotten gains. According to Transparency International's⁵ Corruption Perceptions Index, this country fell from a score⁶ of 5.3 in 2001 to 4.6 in 2003. Johnson et al (1998) found that every one-point decrease in this index resulted in an increase in the hidden economy ranging from 3.5% to 5.1 %.

2.4 Discontent with quality of Public Services

Research on tax evasion shows that tax compliance depends on the perception of taxpayers regarding the adequacy of the public goods that they receive. See Spicer and Lundstedt (1976), Burgess and Stern (1993), Andreoni et al. (1998) and Slemrod and Yitzhaki (2002) among others. Therefore, if they think that there is some imbalance between the taxes they are paying and the amount and quality of public goods they receive then they will take any available opportunity to evade taxes. In

micro data from a survey conducted in Canada.

⁵ An international agency collecting data on worldwide corruption.

⁶ A 10 equals an entirely clean country while 0 equals a country where business transactions are

Trinidad & Tobago, there is the widespread view that the public services provided are less than adequate given the huge sums of money involved in their provision. The public hospitals, most public schools and many other public institutions, although financed by taxes and provided largely free of charge, are spurned by the country's large middle class who seek such services from privately run institutions. Even government ministers are known to send their children to private schools and to seek medical attention at private hospitals.

2.5 Degree of ethnic fragmentation

Lassen (2003) points out that ethnic polarization engenders mistrust which discourages tax compliance and that, if one group seems to be benefiting more from a particular public good, then the other groups are less likely to be willing to contribute to the maintenance of this good (see also Alesina et al. (1999)). Lassen's study also illustrates that the more ethnic divisions a society has, the larger the hidden economy. Trinidad & Tobago is divided along ethnic lines, and this division is reflected in voting patterns. See Ryan (1972), (1999). The two major parties are seen as representatives of the two major ethnic groupings (Indian and African), and there is suspicion and mistrust of the one group whenever the party of the other group is in power.

2.6 Tax Morale

Tax morale can be seen as the inner motivation to pay taxes. Researchers have claimed that tax morale can be used to explain the high level of tax compliance they have observed in certain countries. See, for example, Alm et al. (1992), (1999) and

entirely dominated by kickbacks, extortion etc.

Pommerehne et al. (1994). There are many variables that shape tax morale and the estimation of the level of tax morale for any particular country may be measured using instruments such as surveys⁷.

While there is a lack of empirical evidence on the level of tax morale in Trinidad and Tobago, there is anecdotal evidence to indicate that it is low. Certain socio-cultural conditions exist that make for a low tax morale in Trinidad & Tobago, which may have contributed to the development of hidden economic activity even in the absence of a perceived oppressive tax and regulatory system. In many instances in Trinidad and Tobago, there appears to be overt support for participants in the informal sector, for example, the abundance of private vehicles operating for hire in Trinidad and Tobago. Low tax morale could stem from factors such as the tax burden, lack of honesty or civic conscience, corruption, benefits from public spending and fiscal knowledge. There is also the “knowledge” that it is easy to evade taxes with impunity and there is no obvious witch-hunt of tax offenders. Torgler (2001) observed a significant negative correlation between tax morale and the size of the hidden economy.

3. Empirical Measures of the size of the Hidden Economy in the English-Speaking Caribbean

Published work on the size of the hidden economy in the English-speaking Caribbean exists only for Guyana and Jamaica. Thomas (1989) estimated Guyana’s underground economy by, first, analyzing the relationship between monetary and

⁷ Surveys can provide a good source of information about tax morale since they include many socio-economic, demographic and attitudinal variables.

income variables during the period 1964-1986. Then, using a crude trend analysis, he estimated the hidden economy in Guyana to be anywhere in size between 26% and 99% of the official economy over the period 1982-1986.

Witter and Kirton (1990) attempted to estimate the size of the hidden economy in Jamaica using a variant of Gutmann's (1977) currency ratio model. They obtained estimates varying from 8% to 64% of GDP. Using a labour market method similar to that used by Contini (1981), they estimated the size to be between 14% and 34% of GDP.

Bennett (1995) also applies Gutmann's currency ratio model to time series data covering the period 1977 to 1989 to obtain estimates of the hidden economies of Guyana and Jamaica. He estimated the size of the "underground sector" in Guyana to range from 22.7% to 54.4% of the size of the regular economy, and that of Jamaica to range from 26.1% to 78.1% of the regular economy.

Faal (2003) also examines the underground economy in Guyana with the primary objective of confirming and improving the estimates of earlier studies. Faal, however, steps out of the conventional mode and uses an error correction model based on Tanzi's currency demand method to obtain underground estimates for the period 1964 to 2000. He estimates that in the 1970s and 1980s the size of the hidden economy in Guyana was anywhere between 40% to 76% of the regular economy. Today, despite the "liberalization" of the economy in the 1990s, he estimates it to be as high as 50% of the regular economy, which is still higher than it was in the 1970s, probably a consequence of Spiro's (1993) habit-forming effect.

All these studies confirm the existence of a vibrant hidden economy whose size varies considerably.

4. Model of Currency Demand

Our point of departure is the following basic currency demand equation, which is similar to the original proposed by Tanzi (1980, 1982):

$$C = f(T, R, Y, \pi) \quad (1)$$

In this function:

- C is the total currency/cash holdings circulating within the economy as a whole (regular and hidden components);
- T is a tax variable;
- R is an opportunity cost variable for holding money;
- Y is a scale variable;
- π is the rate of inflation.

Recent studies, like that of Faal (2003), Hill and Kabir (2000) and Gadea and Serrano-Sanz (2002) introduce a “financial Innovations” variable, which is well grounded in theory and supported by the data. The basic argument is that financial innovations, such as credit cards and ATM machines, have affected money demand through their effect on the transactions cost of obtaining currency. Faal and Hill and Kabir proxy the financial innovations variables as the sum of the number of ATMs and the number of branches of financial institutions. Unfortunately, we could not obtain a series for this or any other appropriate variable, given the absence of data on innovative financial instruments like ATMs and credit cards.

A fundamental assumption of the currency demand approach is that agents undertake

activity in the hidden economy to avoid increasing taxes and prefer instead to make cash transactions when taxes rise. Currency demand will fall as the opportunity cost increases as well as when inflation increases. In an economy like that of Trinidad & Tobago, the inflation rate is in many respects another opportunity cost of holding money, given that real assets may be an alternative to holding money, in the absence of organized financial markets. Currency demand will of course increase as the scale variable increases.

The size of the hidden economy may be calculated in two steps. Firstly, an estimate is made of the amount of currency used for hidden economic transactions. This is obtained as the difference in the current level of currency balances and the level when the direct and indirect tax burden (and government regulations) is at its lowest value. Secondly, the size of the hidden economy is computed by assuming that the income velocity for currency used in the hidden economy is the same as that used in the official, formal economy.

5. Econometric methodology

In many empirical studies aimed at measuring the size of the underground economy based on equation (1), the demand for currency function is formulated as a single equation econometric model and estimated by Ordinary Least Squares. See Feige (1989). Today, however, such estimation may be carried out within the cointegration framework and, in particular, using an error-correction model. Otherwise, estimation of the currency demand equation will be spurious in the sense of Granger and Newbold (1974) if some or all of the variables entering the equation are $I(1)$ and not cointegrated. Cointegration theory teaches us furthermore that, if the variables are

cointegrated, there may be as many as four cointegrating relationships linking the five variables, of which the single Tanzi-type equation usually estimated is but at best only one. Following the results of the Granger Representation theorem (Engle and Granger (1987)), the cointegrating (long-run) relationships should be embedded within the framework of a vector error correction model, when it is then called a Vector Error Correction Model (VECM).

Recent work on measuring the hidden economy has employed the cointegration framework. See, for instance, the work of Kabir and Hill (2000) using Canadian data, Faal (2003) using Guyanese data, and that of Gadea and Serrano-Sanz (2002) using Spanish data. None of these, however, take advantage of the possibility that, in an n -variable model, there may exist up to as many as $(n-1)$ cointegrating vectors. They all restrict consideration to only one such vector even when, as was the case with the Kabir-Hill and Gadea-Serrano-Sanz models, there was evidence of more than one cointegrating vector.

The SCVAR approach is a special application of the cointegration approach and, in this section, we propose a SCVAR model based on the five variables shown in equation (1). SCVAR models were introduced into the literature by Garratt et al. (2000, 2003). Other useful methodological references are Pesaran (1997), Pesaran and Smith (1998), Pesaran et al. (2000) and Pesaran and Shin (1998, 2002). A major attraction of this approach is that it allows for the estimation of theory-consistent long-run relationships between the variables in the system. The short-run dynamics are freely estimated within a VAR/VECM framework. The properties of the system are evaluated on the basis of Persistence Profiles and Generalised Impulse Response

Functions, as well as other statistical criteria.

SCVAR modeling, using the five variables identified in equation (1), begins with the specification of a standard form VAR like:

$$\mathbf{y}_t = \boldsymbol{\mu}_0 + \sum_{j=1}^p \boldsymbol{\Phi}_j \mathbf{y}_{t-j} + \mathbf{u}_t, t = 1, 2, \dots, T \quad (2)$$

where

- ♦ \mathbf{y}_t is a (5×1) vector of variables entering equation (1)
- ♦ $\boldsymbol{\Phi}_j, j = 1, 2, \dots, p$ are 5×5 matrices of fixed coefficients.
- ♦ $\boldsymbol{\mu}_0$ is the (5×1) constant term vector
- ♦ t is the time subscript
- ♦ \mathbf{u}_t is the (5×1) error vector of independently, identically distributed random variables with mean zero and covariance matrix $\boldsymbol{\Omega}$.

If the variables in the \mathbf{y} vector are I(1) and cointegrated (as we will argue them to be in this paper) equation (2) may be re-written as:

$$\Delta \mathbf{y}_t = \boldsymbol{\mu}_0 + \boldsymbol{\alpha} \boldsymbol{\beta}' \mathbf{y}_{t-1} + \sum_{j=1}^{p-1} \boldsymbol{\Pi}_j \Delta \mathbf{y}_{t-j} + \mathbf{u}_t \quad (3)$$

where $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are (5×r) matrices (r<5) of full column rank and $\boldsymbol{\beta}' \mathbf{y}_{t-1}$ gives the r linear combinations of \mathbf{y} that are cointegrated. The r linear combinations are the error correction terms in the SCVAR model.

SCVAR modelling may be further carried out in the following 5 steps:

1. A priori specification of the key long run (equilibrium) relationships within the system, $\boldsymbol{\beta}' \mathbf{y}_t$. In the typical case, these relations will embody overidentifying restrictions. Let the number of such restrictions be equal to q.
2. The data are then used to determine the number of cointegrating relations

within the data and to establish in particular if this is equal to the number of relations specified a priori (r).

3. Assuming that the cointegrating rank is indeed equal to r , an exactly identified version of the equilibrium relationships (r restrictions on each equation, i.e. r^2 restrictions in all, $r^2 < q$) is then estimated.
4. The overidentified form of the model, which was specified a priori and containing a further $(q-r^2)$ restrictions, is estimated and the validity of the extra restrictions tested using a Likelihood Ratio Statistic, which, under the null, is distributed as a χ^2 with $(q-r^2)$ degrees of freedom.
5. The relationships verified in step 4 are then imbedded in an otherwise unrestricted vector error correction (VECM) model like (3) and the short-run coefficients estimated.

Traditional VAR modeling is limited to impulse response analysis and does not seek to derive underlying behavioural equations in the structure. The strategy of the SCVAR approach is quite different in that it allows the short run dynamics to be data determined but at the same time has a coherent long-run equilibrium. A detailed comparison of the SCVAR approach with other approaches to econometric modeling (large scale structural econometric models, unrestricted and structural VARs and dynamic stochastic general equilibrium models) may be found in Garratt et al. (2000).

6. Construction, estimation and evaluation of the SCVAR model

The empirical counterparts of the variables in equation (1) used in this paper are:

$$\ln \frac{C_t}{P_t}, \ln \left(1 + \frac{T_t}{Y_t}\right), \ln(1 + R_t), \ln \frac{Y_t}{P_t} \text{ and } \pi_t$$

where

- \ln denotes the natural logarithm;
- C_t is nominal currency balances held in the entire economy;
- P_t is the implicit GDP deflator;
- $\frac{C_t}{P_t}$ real currency balances held within the economy as a whole;
- T_t is total taxes collected;
- Y_t is GDP measured in current prices;
- $\frac{Y_t}{P_t}$ is real GDP, the chosen scale variable;
- $\frac{T_t}{Y_t}$ is the tax rate;
- R is the interest rate paid on savings deposits;
- π_t is the inflation rate, measured as the rate of growth in P_t .

Annual data on these variables were collected for the period 1970-1999. Data sources are given in an appendix to this paper.

6.1 Testing for Unit roots

A preliminary step in the SCVAR approach, as in all cointegration analysis, is the determination of the order of integration of each of the variables in the system. In Table 2 below, we display the results obtained using the classic Dickey-Fuller (ADF) tests, as well the alternative procedure proposed by Kwiatkowski et al. (KPSS) (1992). In levels, the tests are conducted with both a constant term and a linear trend while in first differences they are conducted only with constant term since we assume that differencing will remove whatever trend might exist in the data. The lag length for the ADF tests was chosen on the basis of the SBC criterion, and the Bartlett kernel estimation method, with Newey-West bandwidth, was chosen for the KPSS procedure.

Table 2**Unit Root Tests**

Variable	Test Equation	ADF (C, LT)	ADF (C, LT) p-value ^a	ADF (C)	ADF (C) p-value ^a	KPSS (C, LT)	KPSS (C)
$\ln \frac{C_t}{P_t}$	Level 1 st Diff	-1.9878	0.5824	-1.6027 -3.5096	0.4685 0.0152	0.1271*	0.1365 0.1124
$\ln \left(1 + \frac{T_t}{Y_t}\right)$	Level 1 st Diff	-2.0438	0.5539	-1.9702 -3.8178	0.2975 0.0076	0.1497**	0.1534 0.3056
$\ln(1 + R_t)$	Level 1 st Diff	-3.0477	0.1373	-2.2512 -5.8763	0.1937 0.0000	0.1128	0.4359* 0.1981
$\ln \frac{Y_t}{P_t}$	Level 1 st Diff	-2.0934	0.5270	-1.6972 -2.0535	0.4216 0.2638	0.1164	0.2979
π_t		-4.1086	0.0162	-2.8326 -6.7118	0.0666 0.0000	0.0976	0.5084** 0.1619

ADF (C, LT) Augmented Dickey-Fuller test with constant term and linear trend.

ADF (C) Augmented Dickey-Fuller test with constant term.

KPSS (C, LT) KPSS test with constant term and linear trend.

KPSS (C) KPSS test with constant term.

* KPSS test significant at 10% level.

** KPSS test significant at 5% level.

a - MacKinnon (1996) one-sided p-values for ADF tests.

There is some ambiguity in the tests results shown in Table 2. There are, in particular, some obvious differences in the results based on the ADF and KPSS testing procedures. The ADF tests pronounce clearly in favour of the existence of exactly one unit root in the case of the currency, tax and interest rate variables. In the case of the inflation variable, the results are more ambiguous. When both the constant term and linear trend terms are used, the series appears to be stationary, but when only the constant term is included, the null of a unit root is not rejected at about the 7% level of significance, while the null of two unit roots is clearly rejected. The KPSS procedure favours the existence of a unit root for the currency and tax variables when both the constant and linear trend terms are included, but does not reject the null of stationarity if only the constant term is used. It favours a unit root for the interest rate and inflation variables when only the constant term is included in the test equation but does not reject the null of stationarity if both the constant and linear trend terms are included.

The ambiguity that results from testing the income variable is the most interesting of all. The ADF test does not reject the null of two unit roots, while the KPSS test does not reject the null of stationarity in the case of both test equations, although the value of the test statistic, when the two terms are included (0.116), is very close to the 10% critical value of 0.119.

Overall, there seems to be some evidence – stronger in some cases than in others - for the existence of one unit root in each of the variables being considered. We will henceforth assume that all five variables admit exactly one unit root.

6.2 Specifying the long run relations in the model

The SCVAR method requires a priori specification of possible long run relations among the variables. Well established economic theory points us in the direction of (at least) two possible long-run relations linking the 5 variables. The first is a classic demand for money function:

$$\ln \frac{C_t}{P_t} = \beta_{01} + \beta_{11} \ln (1 + R_t) + \beta_{21} \ln \frac{Y_t}{P_t} + \varepsilon_{1t} \quad (4)$$

In this case it is a demand for real balances, where currency (real) demanded is a function of real income and the interest rate. The expected signs of the coefficients are $\beta_{11} < 0$, and $\beta_{21} > 0$. Equation (4) may also include the rate of inflation either in addition to, or as an alternative to the other “opportunity cost” variable, the rate of interest.

The second relation is based on the literature that deals with the money-income causal nexus. See Friedman and Schwarz (1963) and Sims (1972). In this framework, income (output) responds to changes in the money supply. This response is likely to be tempered by changes in the tax rate as well as in the rate of inflation. The

proposed long-run relation is:

$$\ln \frac{Y_t}{P_t} = \beta_{02} + \beta_{12} \frac{C_t}{P_t} + \beta_{22} \ln \left(1 + \frac{T_t}{Y_t} \right) + \beta_{32} \pi_t + \varepsilon_{2t} \quad (5)$$

The expected signs here are $\beta_{12} > 0$, $\beta_{22} < 0$ and $\beta_{32} > 0$. Real output (income) will respond positively to increases in the monetary balances and to increasing inflation but will respond negatively to an increase in taxes.

The error terms, ε_{1t} and ε_{2t} , are normally and independently distributed stationary random variables (with mean zero and constant variance). When viewed as linear combinations of the variables appearing in equations (4) and (5), these error terms define the error correction terms of our SCVAR model.

Other studies employing the cointegration framework, like Hill and Kabir (2000) and Faal (2003), consider the possibility of only one cointegrating vector such as:

$$\ln \frac{C_t}{P_t} = \beta_0 + \beta_1 \ln \left(1 + \frac{T_t}{Y_t} \right) + \beta_2 \ln (1 + R_t) + \beta_3 \ln \frac{Y_t}{P_t} + \beta_4 \pi_t + \varepsilon_t \quad (6)$$

This is similar in spirit to the original Tanzi model. In this case, the expected coefficient signs are $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 > 0$ and $\beta_4 < 0$. Hill and Kabir formally test for the value of the cointegrating rank and determine that there are two cointegrating vectors. They however still opt to consider only one following the advice of Hamilton (1994) that, in such a case, we need only consider the vector corresponding to the highest eigenvalue. Faal does not test for the cointegrating rank and chooses instead to use an a priori formulation like (6), which he incorporates into an ARDL framework. In this paper, we will consider the case of estimating only the one cointegrating vector⁸ and

⁸ This, of course, will be the only valid procedure even within our own framework if the cointegrating

compare the results obtained for the alternative model with 2 cointegrating vectors.

6.3 Specifying the underlying unrestricted VAR

In order to cast the 5 variables into a form like equation (2), we must first determine an appropriate lag length. A natural constraint in this exercise is the short data series that we possess: 29 annual data points. For every lag introduced, we lose 1 of these data points and 5 degrees of freedom, so that in a two-lag model we will be using 27 observations to estimate 11 coefficients (this includes the constant term), leaving only 16 degrees of freedom. The addition of another lag reduces the degrees of freedom to 10 and consequent loss in the efficiency of the estimators. For this reason, we limit consideration of appropriate lag length to a maximum of two lags (which, after all, implies an adjustment process of two years in the case of annual data, which is quite a long time).

Table 3 below gives the results of the selection process based on some very well known criteria. See Enders (2004), p. 281-3. For a more elaborate treatment of the lag selection process, see Ivanov and Kilian (2000).

Table 3
Lag selection criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	209.58	NC	1.80e-13	-15.15	-14.91	-15.08
1	309.94	156.12	7.05e-16	-20.74	-19.30*	-20.31
2	346.47	43.29*	3.72e-16*	-21.59*	-18.95	-20.81*

* indicates lag order selected by the criterion

Log L: Log of the likelihood function

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

NC means not calculated

rank is found to be equal to 1.

All the criteria select a VAR(2) specification except the Schwarz information criterion, which selects a VAR(1). We retain the VAR(2) model for the rest of the analysis. We will, however, test for the sensitivity of the cointegrating rank to the choice of the VAR lag length by considering the VAR(1) and VAR(2) cases.

6.4 Estimating the long-run relations

The VAR(2) model is used as the vehicle for determining the cointegration rank of the variables and, subsequently, to verify and estimate the coefficients of the two long-run relations (4) and (5). We restrict the intercept in the VAR to belong to the cointegration space. The summary results of the Johansen tests for cointegration using the VAR(2) and VAR(1) models are shown, respectively, in Tables 4(a) and 4(b) below:

Table 4(a)

Tests for Cointegration Rank, VAR(2) model

r=	0	1	2	3	4
Eigenvalue	0.8199	0.6721	0.5505	0.3635	0.1553
Trace Statistic	114.7	68.45	38.35	16.76	4.557
95% Quantile	76.97	54.08	35.19	20.26	9.165
p-value*	0.0000	0.0016	0.0221	0.1419	0.3354
Max Eig Statistic	46.29	30.11	21.59	12.20	4.557
95% Quantile	34.81	28.59	22.30	15.89	9.165
p-value*	0.0014	0.0317	0.0626	0.1747	0.3354

Table 4(b)

Tests for Cointegration Rank, VAR(1) model

r=	0	1	2	3	4
Eigenvalue	0.8274	0.6760	0.6662	0.1649	0.0011
Trace Statistic	105.3	57.87	27.45	4.898	0.0309
95% Quantile	69.82	47.86	29.80	15.49	3.841
p-value*	0.0000	0.0044	0.0911	0.8195	0.8604
Max Eig Statistic	30.43	30.43	22.55	4.867	0.0309
95% Quantile	27.58	27.58	21.13	14.26	3.841
p-value*	0.0007	0.0210	0.0314	0.7585	0.8604

* MacKinnon et al. (1999) p-values

At the 5% level of significance, the trace statistic identifies 3 cointegrating vectors in the case of the VAR(2) and only two in the case of the VAR(1) model. Using the Maximum Eigenvalue statistic identifies reverses the order of these results. In all cases, there is convincing evidence that there is more than one cointegrating vector. Our a priori reasoning suggested that there were only two such vectors and the evidence does not reject this hypothesis outright. We therefore accept the existence of exactly two cointegrating vectors. Restrictions consistent with those implied by equations (4) and (5) were imposed on the cointegrating vectors and the following results obtained:

$$\ln \frac{C_t}{P_t} = -22.34 - 56.15 \ln(1 + R_t) + 3.274 \ln \frac{Y_t}{P_t} + \hat{\varepsilon}_{1t} \quad (8.90) \quad (10.9)$$

$$\ln \frac{Y_t}{P_t} = 5.737 + 0.7572 \ln \frac{C_t}{P_t} - 4.020 \ln \left(1 + \frac{T_t}{Y_t}\right) + 0.2757 \pi_t + \hat{\varepsilon}_{2t} \quad (5.535) \quad (5.359) \quad (0.8546)$$

T-ratios (asymptotic) are shown in parantheses.

The χ^2 statistic for testing the overidentifying restrictions is calculated as 0.8622, with a p-value of 0.41, and it therefore does not reject the hypothesis that the imposed restrictions are correct. All variables carry the correct sign and all but one – the inflation rate variable - are highly significant. It was decided to remove the inflation rate from the long-run specification, leaving it then to play a role only in the short run adjustment of the model. The results obtained after re-estimation are:

$$\ln \frac{C_t}{P_t} = -22.39 - 55.82 \ln(1 + R_t) + 3.278 \ln \frac{Y_t}{P_t} + \hat{\varepsilon}_{1t} \quad (4')$$

$$(8.87) \quad (11.0)$$

$$\ln \frac{Y_t}{P_t} = 6.073 + 0.6869 \ln \frac{C_t}{P_t} - 4.381 \ln \left(1 + \frac{T_t}{Y_t}\right) + \hat{\varepsilon}_{2t} \quad (5')$$

(5.535) (5.359)

The χ^2 statistic of 0.9082, with a markedly improved p-value of 0.64, does not reject the hypothesis that the imposed restrictions are correct. All variables carry the correct sign and are all highly significant. The two long run relations are properly identified and properly estimated.

We repeated this exercise using equation (6) as the only cointegrating vector, which is similar in spirit to the work of Hill and Kabir. The final estimated equation was obtained as

$$\ln \frac{C_t}{P_t} = -8.4090 + 4.989 \ln \left(1 + \frac{T_t}{Y_t}\right) + 3.274 \ln \frac{Y_t}{P_t} + \hat{\varepsilon}_{1t} \quad (6')$$

(5.12) (5.15)

Notice that the two opportunity cost variables have been omitted. They were both insignificant in a preliminary estimation and were consequently eliminated. The χ^2 statistic for testing the overidentifying restrictions is calculated as 1.9783, with a p-value of 0.372, and it therefore does not reject the hypothesis that the imposed restrictions are correct. All variables carry the correct sign and are all highly significant.

6.5 Estimation and evaluation of the SCVAR model

The estimated long run equations (4') and (5') are now embedded into an associated Vector Error Correction Model (VECM), as is required by (2) above, and the short run coefficients are then freely estimated. This estimated VECM constitutes our

SCVAR model. The results of this exercise are shown in Table 5 below. These include the estimated coefficient values, their corresponding t-statistics, and the value of \bar{R}^2 for each short-run equation. Below the table we display the p-values associated with four multivariate testing procedures for serial correlation (the portmanteau and LM tests), normality (multivariate Jarque-Bera test) and heteroscedasticity (multivariate white test).

Table 5
SCVAR Model

Equation	$\Delta \ln \frac{C_t}{P_t}$	$\Delta \ln \left(1 + \frac{T_t}{Y_t}\right)$	$\Delta \ln (1 + R_t)$	$\Delta \ln \frac{Y_t}{P_t}$	$\Delta \ln \pi_t$
$\hat{\varepsilon}_{1,t-1}$	-0.1036 [0.7265]	-0.0244 [0.7681]	-0.0203 [3.1789]	-0.0870 [1.5274]	-0.0032 [0.0624]
$\hat{\varepsilon}_{2,t-1}$	0.2969 [2.3415]	-0.0742 [2.6864]	-0.0201 [3.5204]	-0.0565 [1.1170]	-0.3616 [7.8334]
$\Delta \ln \frac{C_{t-1}}{P_{t-1}}$	0.0440 [0.1542]	-0.0267 [0.4290]	-0.0168 [1.3135]	-0.0528 [0.4628]	-0.0208 [0.1999]
$\Delta \ln \left(1 + \frac{T_{t-1}}{Y_{t-1}}\right)$	0.2097 [0.1887]	0.0938 [0.3877]	-0.0886 [1.7765]	0.4532 [1.0217]	-1.8754 [4.6362]
$\Delta \ln (1 + R_{t-1})$	0.1465 [0.0369]	1.2177 [1.4080]	0.2755 [1.5456]	2.1198 [1.3366]	9.5830 [6.6259]
$\Delta \ln \frac{Y_{t-1}}{P_{t-1}}$	0.2450 [0.3261]	0.0005 [0.0029]	-0.0250 [0.7416]	0.2844 [0.9482]	0.3973 [1.4527]
$\Delta \ln \pi_{t-1}$	-0.0715 [0.2380]	0.0274 [0.4185]	-0.0004 [0.0315]	-0.0031 [0.0262]	-0.6208 [5.6774]
\bar{R}^2	0.382	0.181	0.518	0.382	0.861

The error correction terms $\hat{\varepsilon}_{1,t-1}$ and $\hat{\varepsilon}_{2,t-1}$ are derived from equations (4') and (5') respectively.

Multivariate Ljung-Box Q statistic, lag 12: p-value=0.993

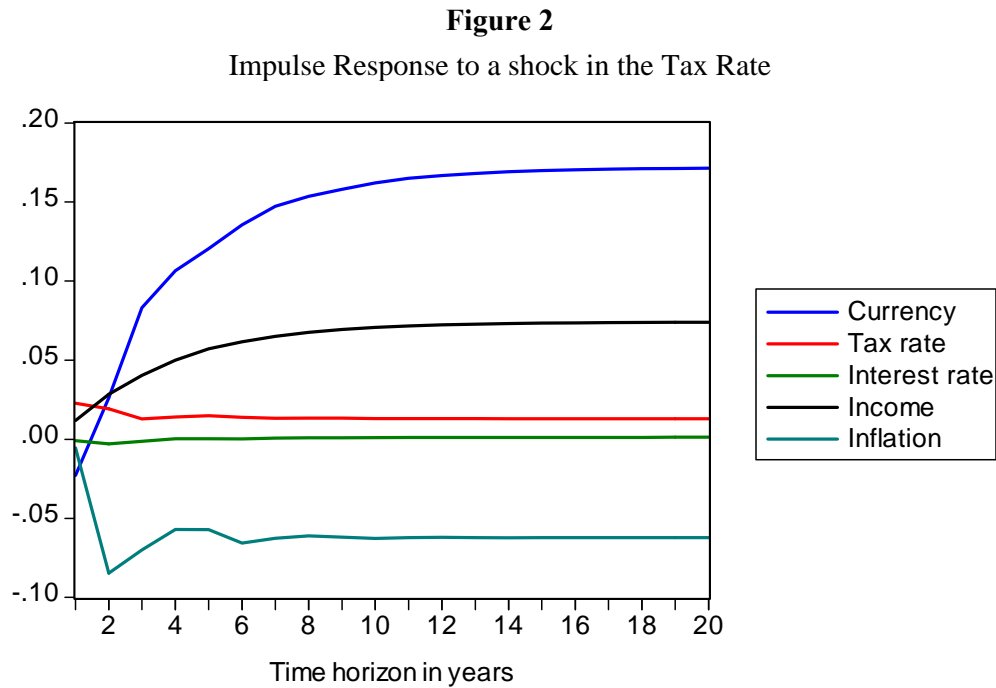
Multivariate LM test for serial correlation, lag 12: p-value = 0.491

Multivariate Jarque-Bera test for normality: p-value = 0.241

Multivariate White test for heteroscedasticity: p-value = 0.043

The diagnostic statistics indicate that the model residuals are normally distributed and untainted by serial correlation. There is, however, some evidence of heteroscedasticity at about the 4% significance level. At least one of the two long-run relations (the error correction terms) is significant in all five equations and the income relation is significant in four out of the five. Both are significant in one case.

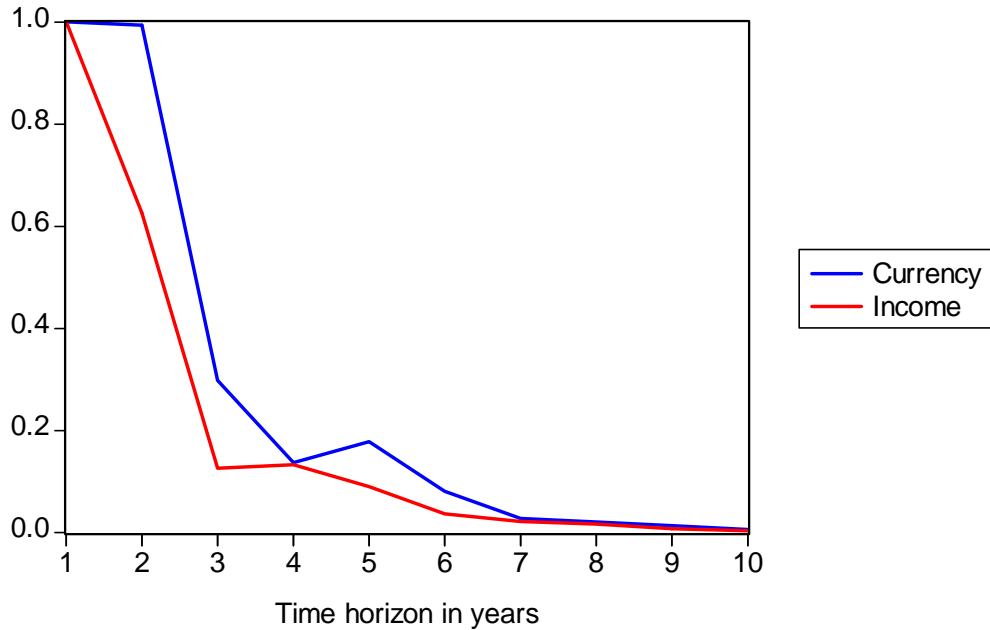
The generalized impulse responses of the five variables to a shock to the tax rate innovation are shown in Figure 2 below:



The stability of the model is evident from the fact that all variables return quickly to a new equilibrium level following the tax shock. The responses of the various variables to the shock also follow a predictable pattern. The tax rate itself settles down to a higher equilibrium level, resulting in a corresponding increase in currency demand, which settles down quite quickly to a higher equilibrium level. Income also rises, in keeping with the predictions of the money-income causality hypothesis.

The Persistence Profiles of the two cointegrating vectors following a system-wide shock are shown in Figure 3 below

Figure 3
Persistence Profiles following a system-wide shock



Garratt et al. (2000) define a half-life measure, which describes the horizon over which the profile falls to 0.5. Given that the profile starts at 1 and falls to zero, this gives a simple indication of the speed of adjustment of a profile and makes it easy to compare the response rate of the different profiles. Both relations return rapidly to equilibrium following a shock, and the half-life is less just a little more than two years in both cases, providing further evidence of the stability, and consequent “goodness-of-fit”, of the model.

We repeated the entire exercise using equation (6') as the only long run relation and the results were very similar to those reported above. We do not present the results of this alternative SCVAR model here.

7. Calculating the size of the Hidden Economy

In this study, in addition to employing the more sophisticated SCVAR framework which is a multiple equation system with embedded pre-identified long-run relations, we go one step further and solve the system as a whole using the Gauss-Seidel

algorithm of Eviews 5.0. This procedure is often carried out within the framework of structural econometric models and we use it to calculate the series of “illegal money” over the period covered by the data. The SCVAR model is first solved to obtain values for the total amount of cash circulating in the economy as a whole over the period 1973-1999. Denote this series as C_t , $t=1973, 1974, \dots, 1999$. In a second step, the total tax is set equal to zero, to mimic a situation where there will be no incentive to participate in the hidden economy. Solving the model, with taxation equal to zero, yields therefore the value of “legal” or “regular” currency. Denote this solution C_{Rt} , $t= 1973, 1974, \dots, 2000$.

Assuming that the velocity of “illegal” money is the same as that of legal money, an estimate of the hidden economy is obtained by multiplying illegal money by the velocity of money. The velocity of money is obtained by dividing nominal income by legal money:

$$V_t = \frac{Y_t P_t}{C_{Rt}}, t = 1973, 1974, \dots, 1999$$

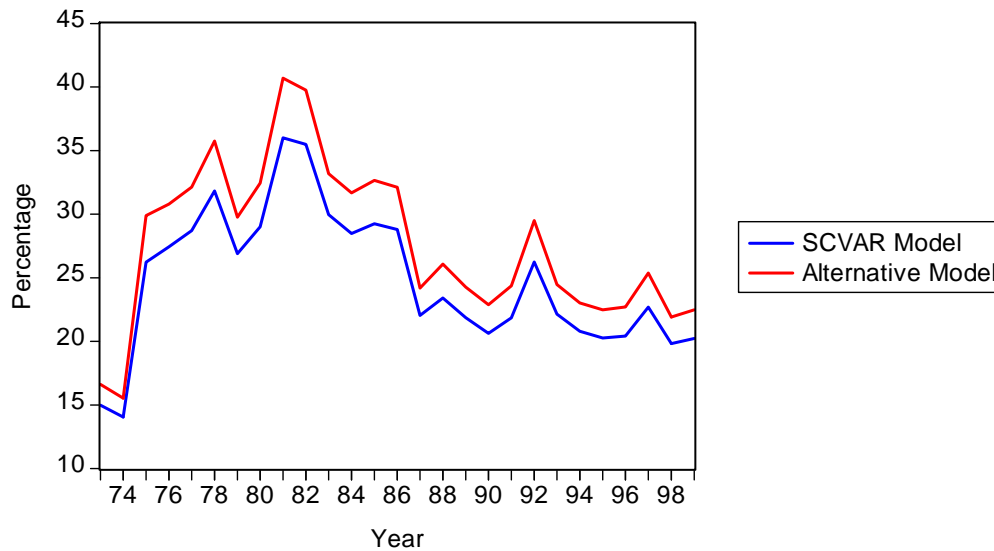
The estimate of the amount of income (nominal) attributable to hidden economy activity is then calculated as:

$$Y_{Ht} = (C_t - C_{Rt}) * V_t, t = 1973, 1974, \dots, 1999$$

We repeated this exercise using the SCVAR based on long-run relation (6'). Figure 4 below shows the time path of the estimated size of the hidden economy of Trinidad &

Tobago, as a percentage of measured GDP, over the period 1973 to 1999, obtained using both our SCVAR and the alternative model.

Figure 4
Evolution of Relative Size of the Hidden Economy of Trinidad & Tobago 1973-1999
(% of Measured GDP)

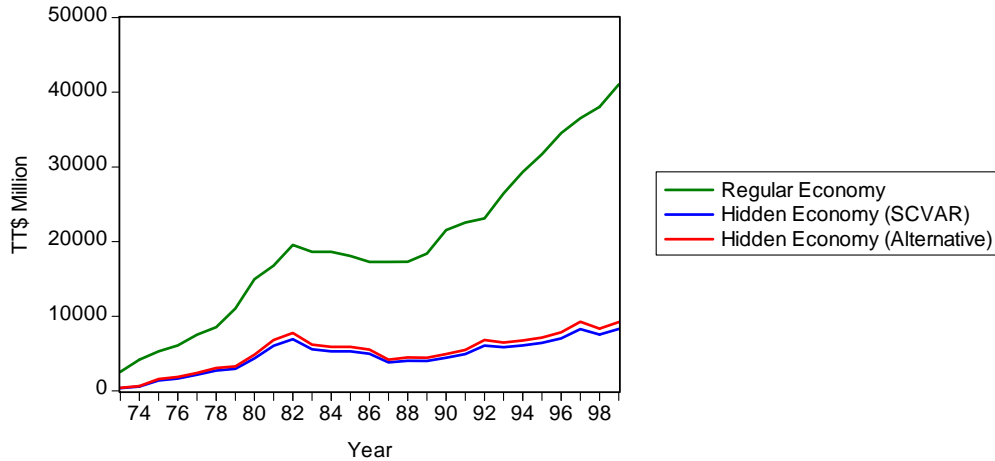


The alternative model yields slightly larger estimates of the hidden economy than the SCVAR model, but both models show the same pattern, and both are highly correlated with the size of the regular economy (the coefficient of correlation is close to 1 in both cases). Using the alternative model, the hidden economy has an average size of close to 27% of measured GDP over the period and varied in size from 15% to 41%. Using the alternative model, the hidden economy has an average size of about 25% of the GDP of Trinidad and Tobago over the period, and varied in size between 14% and 36%. In both cases, it rose steadily during the period of the oil boom and was at its highest in 1981-2, just before oil prices started to tumble. During this period of boom, the Trinidad & Tobago economy was awash with foreign exchange, yet very strict foreign exchange and import regulations applied, making the currency and other black markets attractive propositions. Income tax rates, as they applied to

corporations and individuals, attained its highest during this period. There was ample motive and opportunity to undertake hidden economic activity in this period.

As oil prices declined, economic activity as a whole slowed down considerably, and hidden economic activity was no exception. The motive for participation in the hidden economy remained (high taxes and strict regulations) but the opportunities disappeared (declining levels of income). With an end to the recession of the eighties, the decline of the hidden economy slowed and even picked back up in the early 1990s. Its continued growth was perhaps forestalled by the removal of foreign exchange and import restrictions, and the free floating of the Trinidad & Tobago dollar, in 1993. Since that time, the size of the hidden economy seems to have settled down to about 20% of the size of the regular economy, and there seems no obvious tendency for this trend to alter. If anything, with ever increasing liberalization of the economy, the size of the hidden economy might decline. Figure 5 below, which shows the actual time path of GDP in both the regular and the hidden economies, seems to suggest that the gap between the two may get even larger (in favour of the regular economy).

Figure 5
Evolution of Regular and Hidden Economies, 1973-1999



It is interesting to compare the size of the Trinidad and Tobago hidden economy with that of Guyana and of Jamaica. There are some similarities between the three countries. They all have a similar history of British colonialism. During the 1970s and 1980s, the governments of all countries embarked on an ambitious nationalization campaign resulting in widespread state ownership of the “commanding heights of the economy”, and all governments imposed very restrictive foreign exchange and import regimes. All countries are rich in mineral resources, Trinidad & Tobago in oil, the other two in bauxite. There is a major non economic similarity between Trinidad & Tobago and Guyana: the two former colonies welcomed large amounts of Indian indentured labour in the 19th and 20th centuries, resulting in racial tensions between the newer arrivals and the descendants of African slaves⁹.

The Trinidad and Tobago hidden economy is, not surprisingly, much smaller and much less variable in size than that of Guyana and Jamaica. This is so notwithstanding the similarities discussed above. The main reason is the fortunes of the economies during the latter half of the 20th century. The price of oil has held up much better than the price of bauxite, and so the regular economy of Trinidad &

Tobago has been in a much better shape than that of Guyana and Jamaica. In fact, during the 1980s, there was a mass exodus of human resources and capital from Guyana as a consequence of serious economic hardships, and an almost total breakdown of official systems. In Jamaica, there was almost a total breakdown in the late 1970s following the collapse of “democratic socialism” and a bloody election campaign in which at least 1000 people were murdered.

Both the hidden and regular economies of Trinidad & Tobago are influenced by the fortunes of the petroleum sector. As oil prices rise, the demand for goods and services, including factor services, rises much faster than the regular economy could satisfy them. This presents entrepreneurial opportunities to those willing to become active in the hidden economy. It may also be true that, precisely at this time, the government is less minded about the loss of revenue due to the existence of a growing hidden economy since its main source of revenue, the petroleum sector, is providing it with more than 80% of its needs. The opposite happens as the price of oil falls: the regular and hidden economies respond to the same stimuli as the entrepreneurial opportunities become more and more difficult to transform into dollars and cents, given the shrinking fortunes of the oil sector.

8. Policy lessons

Many studies of the hidden economy, such as Hill and Kabir (2000), address the question of the loss of governmental revenues consequent to the existence of a vibrant hidden economy. They then propose policy measures aimed at “regularizing” the hidden activity.

Such policy proposals are based on the implicit assumption that the hidden economy

⁹ This tension is much more serious in Guyana where racial riots, opposing the two groups, have erupted in the past.

competes for the resources of the regular economy. When this is not the case, and the two seem to move together (as appears to be the case here), then it is possible that the hidden economy may be a source of joy to the public purse. As consumers, participants in the hidden economy pay all kinds of indirect taxes (Land and Building Taxes, Road Taxes, VAT and so on) and, because of income earned, look less to the government for handouts. Perhaps if participants were forced to take part in the regular economy, they may prefer to opt out or, at best, will be considerably less productive. This may result in a drain on the public purse.

It would seem then that it is not always a good idea to force the hidden economy out of existence. This would have spelt disaster for a country like Guyana where close to 100% of the needs of Guyanese were being supplied by the hidden economy. Policies aimed at regulating hidden economic activity must first ensure that such hidden activity is not a complement to regular activity, and the indications are that they definitely are. Rather than force compliance, it might be more worthwhile to remove the incentives for hidden economic activity, such as the high tax burden, the unnecessary regulations, the corrupt political activity. Then the hidden economy may be integrated, if not seamlessly, without great aggravation, into the regular economy.

9. Conclusion

In this paper, we used the SCVAR method to measure the size of the hidden economy in Trinidad & Tobago. We established that the size of the hidden economy rose from a low of about 14% of measured GDP in the early 1970s to a high of 36% in 1981, and is currently about 20% of measured GDP, with no marked tendency to get larger in the near future. It is clear that a vibrant and sizeable hidden economy exists in

Trinidad & Tobago, which, for purposes of economic policy at least, cannot be ignored. For economic policy measures to be truly effective, however, we need more information than just the size of the hidden economy: we need to know more about its structure, its content and, very importantly, the nature of the link, or “transmission mechanism”, between the hidden and regular economies. Policy measures which seek, without further information, to punish participation in the hidden economy, may be seen as killing a goose laying golden eggs, if it can indeed be established that there is complementarity between the two economies. This will require further investigation, the cost of which can surely be justified given the size of the phenomenon.

Unfortunately, the indirect methods, such as the SCVAR method employed in this paper, cannot provide such details. More costly methods, such as the voluntary survey method, may be used. This approach is relatively new but has been implemented successfully in some countries, like Norway. It is reasonable to assume that this method is likely to meet with some success in the Caribbean since a lot of the so-called hidden activity is carried out overtly, and the participants may even enjoy public support for reasons given in section 2. The sample survey method has the advantage of being able to provide detailed information on the structure of the hidden economy (especially on the composition and size of the work force in the hidden economy), the characteristics of employment and the quality of work performed. Future research must go in this direction.

Future research must also involve the other countries of the Caribbean, especially those of the smaller islands of the Eastern Caribbean, and more especially because of

the proposed CARICOM Single Market and Economy, projected to come into being in 2005. One of the planks of the CSME is the free movement of labour, which is very likely to have an impact on hidden economic activity throughout the region. The case of Trinidad & Tobago will serve as a template and as a springboard to an investigation of the hidden economy in the wider Caribbean region.

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Appendix I

The data used, and the source of the data, are as follows:

- C is cash in active circulation, TT\$ million. *Source: Quarterly Statistical Digest of the Central Bank of Trinidad & Tobago;*
- T is the overall tax burden (direct taxes plus indirect taxes), TT\$ million. *Source: National Income Accounts of Trinidad & Tobago published by the Central Statistical Office of Trinidad & Tobago;*
- R is the measured as $(r/100)$ where r is the rate on savings deposits expressed in percentage form. *Source: Quarterly Statistical Digest of the Central Bank of Trinidad & Tobago;*
- Y is Gross Domestic Product at market prices, TT\$ million. *Source: National Income Accounts of Trinidad & Tobago published by the Central Statistical Office of Trinidad & Tobago.*
- P is the implicit GDP deflator, 1985=1. *Source: Calculated from data obtained from the National Income Accounts of Trinidad & Tobago published by the Central Statistical Office of Trinidad & Tobago*

Appendix II

DESCRIPTION OF THE TRINIDAD AND TOBAGO TAX SYSTEM as at October 31, 2003

Principal Tax	Description/Tax Base	Rates	Deductions and Main Exemptions
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<p><u>DIRECT TAXES</u></p> <p>a) INCOME TAXES</p> <p>CORPORATE</p> <p>These are artificial persons registered under the Companies Act or created by an Act of Parliament. They include Companies incorporated outside of Trinidad and Tobago which have registered under Part V Division 2 of the said Act.</p>	<p>Income from sources derived in or accruing in Trinidad and Tobago or elsewhere and whether received in Trinidad and Tobago or not in respect of gains and profits from: farming, fishing, operation of mines or other natural resources, trade or business, professions, vocations or management charges, royalties, rents, interest, discounts and annual payments, fees, commissions, distributions, short term capital gains.</p>	<p>The corporation tax rate is 30%.</p> <p><i>Companies engaged in liquefaction of natural gas, manufacture of petrochemicals and transmission and distribution of natural gas and wholesale marketing and distribution of petroleum products – 35%</i></p> <p>Petroleum profits tax is levied at 50%</p> <p>Capital gains on acquisitions and disposals of an asset within 12 months are taxed as part of income at the individual's marginal rate or the corporate tax rate of 35%.</p>	<p>All expenses wholly and exclusively incurred in the production of the income are allowed except where specifically disallowed.</p>
<p>Business Levy</p>	<p>Payments of corporation tax are set off against the business levy liability of the corporation in the following year when returns are filed.</p>	<p>The business levy is 0.2% of the gross income of the company. Final liability is offset by corporation tax payable at year end.</p>	<p>The individual tax payer is entitled to a tax credit against his business levy liability for a year of income of any payment made in respect of his income tax liability for that year up to a maximum of his business levy liability.</p>
<p>Green Fund Levy</p>	<p>A quarterly tax on gross revenue</p>	<p>Tax rate 0.1%.</p>	

Unemployment Levy	A tax on the profits of companies subject to the Petroleum Taxes Act. Petroleum operations are classified into three (3) types of business for tax purposes: Exploration and production operations, refining operations and marketing operations	Tax rate 5%	
Withholding Taxes Corporations	Major expenses not allowed are domestic and private expenses, capital expenses and certain payments to non-residents unless withholding taxes have been accounted for and paid over to the Board of Inland Revenue	Dividends to Companies – 15% (10% to a parent company) Royalties to companies – 20% Interest to companies – 20% Interest to banks – 20% Profits realised by foreign corporations not reinvested – 10%	Some of the existing treaties provide rates of up to 30%. The lower statutory 20% rates will be applied in such instances.

<p>INDIVIDUAL</p>	<p>Income from sources derived in or accruing in Trinidad and Tobago or elsewhere and whether received in Trinidad and Tobago or not in farming, fishing, operation of mines or other exploitation of other natural resources, trade or business, professions, vocations or managerial charges, employment, rents, royalties, interests, discounts, annual payments, fees, commissions, distributions, short term capital gains.</p>	<p>For every dollar on the first \$50,000 of the chargeable income – 25 cents</p> <p>For every dollar thereafter of the chargeable income – 30 cents</p>	<p>All expenses wholly and exclusively incurred in the production of income are allowed. Where the source of the income is employment income the only expenses allowed are travelling necessarily incurred in the performance of the duties and trade union dues.</p> <p>Main exemptions are: income from scholarship or bursary, dividends from resident companies (except preference), income of a resident where the total income does not exceed \$25,000 for a year of income, pensions under the National Insurance Act, severance payments due to redundancy retirement severance benefits and certain other payments in termination of office or employment are exempt to a maximum of \$300,000.</p>
			<p>An individual may claim up to \$18,000 in the aggregate as deductions in respect of mortgage interest/bridging finance payments and tertiary education expenses for himself or children. He/she may claim up to \$12,000 in the aggregate as deductions in respect of pensions and/or deferred annuities and National Insurance contributions. Interest on loans to purchase investments (there are exceptions) are deductible expenses in ascertaining the taxable income.</p>

Withholding Taxes Individuals		Dividends to individuals – 15% Royalties to individuals – 20% Interest to individuals – 20%	Does not apply to salary and emoluments
Land and Building Taxes	Based on the assessed values of property.	Undeveloped land - \$20.00 per acre Buildings – 7.5% on estimated rental value	
<u>INDIRECT TAXES</u> a) Value Added Tax (VAT)	A tax on the value of imports and the value of supplies of goods and services. Businesses earning a gross income of \$200,000 per annum and over are required to be registered	Rate of 15%	Exemptions on certain goods apply
b) Stamp Duty	Levied on instruments of all types (e.g. deeds, mortgages, leases etc)	Rates vary depending on instrument starting from \$25.00	Residential transfers are exempt up to \$315,000. On the next \$100,000 rate is 5%
c) Motor Vehicles Taxes		Rates are calculated by reference to class or description of motor vehicle and engine size	
d) Customs Duties	Levied on imported goods according to classification in Schedules to the relevant legislation.	Rates based on the c.i.f. value of the goods at the time of import	Exemptions on certain goods apply

Source: Robinson-Walters (2003)

