

Evidence of a Post-GST Increase in the Underground Economy

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PRÉCIS

L'expérience dans d'autres pays laisse supposer que l'évasion à l'égard des taxes à la valeur ajoutée est un problème sérieux au niveau des détaillants. Il y a une probabilité, qu'à la limite, le passage de la taxe fédérale sur les ventes des fabricants à assiette restreinte, à la taxe sur les produits et services (TPS), dont l'assiette est élargie, ait fait augmenter les incitatifs et les occasions d'évasion fiscale. Cette étude comporte une analyse de la croissance des soldes liquides détenus par le public, à titre d'indicateur du volume de transactions, et conclut qu'il y a eu une augmentation substantielle de l'économie souterraine depuis l'entrée en vigueur de la TPS. La sous-déclaration de revenus signifie que non seulement des recettes de TPS sont perdues, mais aussi celles tirées des impôts sur le revenu et des taxes de ventes provinciales. Les résultats empiriques laissent supposer que le mouvement vers l'activité souterraine a entraîné des pertes de recettes fiscales approximatives de 2,3 milliards de dollars à tous les échelons gouvernementaux en 1992.

ABSTRACT

Experience in other countries suggests that evasion of value-added taxes is a significant problem at the retail level. There is a likelihood that, at the margin, switching from the narrow-based federal manufacturers' sales tax to the broad-based goods and services tax (GST) may have increased the incentives and opportunities for tax evasion. This study analyzes the growth in cash balances held by the public, as an indicator of transaction volumes, and finds that there has been a substantial increase in the underground economy since the introduction of the GST. The underreporting of income means that not only GST revenue is lost, but also the associated income tax and provincial sales tax. The empirical results imply that the shift toward underground activity caused tax revenue losses of roughly \$2.3 billion to all levels of government in 1992.

INTRODUCTION

The underground economy is a broad term that covers a wide variety of economic transactions that are not reported to government agencies. It has been an intriguing area of study for economists, where the challenge is to

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try to measure economic activities that individuals have a considerable vested interest in keeping hidden. The largest part of the underground economy probably consists of individuals evading taxes in activities that are otherwise legal, rather than activities that are inherently illegal, such as selling narcotics.

The imposition of the goods and services tax (GST)¹ in Canada at the beginning of 1991 represents an interesting opportunity to measure changes in the growth of the underground economy. As will be described below, analysis of the behaviour of cash balances since the advent of the GST provides an avenue for estimating changes in the size of the underground economy. The results indicate that there has, in all likelihood, been a substantial increase in unreported economic activity, coinciding exactly with the introduction of the GST.

DOES THE GST INCREASE THE LIKELIHOOD OF TAX EVASION?

Prior to introducing the GST, the federal government argued that this tax might reduce the scope for tax evasion, because it is applied successively at different stages of processing. Each business is supposed to pay GST on all the inputs that it purchases. The GST it has paid on its inputs is credited against the GST it collects from its own customers. Presumably, any major corporation buying inputs or services from a smaller business would insist that it be given receipts for the GST paid on inputs. Therefore, where a business was previously operating without being registered at all for tax purposes, the government will reap some extra revenue from it. However, the quantitative significance of this may not be very large. Any above-ground enterprise would already have demanded invoices from its suppliers for the purpose of income tax documentation. Therefore, it is not obvious that the addition of a GST would markedly increase the degree of reporting.

Conversely, one can think of many areas where the incentive for evasion has been increased by the existence of the GST. This includes home repair operations, where the seller's direct labour is a large proportion of the value added. The anecdotal evidence overwhelmingly suggests that the GST has increased the degree of cheating.² Making the GST an explicit tax may, in this respect, have been a mistake. Before the GST was introduced, Irene Ip of the C.D. Howe Institute pointed out, "If a tax is hidden, people don't understand it's been paid. The risk is that the GST will push the tolerance of Canadians, already annoyed with high taxes, to the point where they will avoid it in large numbers."³

¹ Part IX of the Excise Tax Act, RSC 1985, c. E-15, as amended.

² For example, "GST Adding to 'Underground Economy,' Critics Say," *The Toronto Star*, August 19, 1991.

³ Quoted by Don Hogarth, "Tax Could Boost Underground Economy," *The Financial Post*, May 7, 1990.

It has been claimed that the incentive to cheat is reduced by the fact that the service provider cannot claim the input tax credit on materials (such as building supplies) on which he has paid GST. However, in practice, most businesses are not so foolhardy as to attempt to evade all taxes. They choose some fraction of their sales that they do not report. They then claim their whole input tax credit against the portion of their sales that they do report, and so they do not lose any input tax credits through GST evasion. Of course, service providers of this type have always had a large incentive to underreport their sales in order to evade income taxes. The existence of the GST gives their customers an additional incentive to pay cash and be a party to the tax evasion.

The GST may have particularly exacerbated cheating by small retailers. The combination of the GST with the pre-existing provincial sales tax creates a highly visible tax with a value of 15 percent or more in most provinces. The GST has been a highly publicized focus of consumer resentment, and many consumers will gladly seek a retailer who will offer to sell an item tax-free in a cash transaction.

There is a subtle way in which the GST has increased the opportunity for retailers to evade taxes. Previously, a retailer of radios paid the federal manufacturers' sales tax (MST) on each radio when he bought it wholesale. In general, these items are obtained from large, factory-run operations with many employees, and this was a tax that the retailer could not avoid. Now the retailer pays the GST on each radio he buys from the manufacturer, and one might suppose that there is no difference. However, if he buys 100 radios wholesale and reports the GST on only 95 of those that he sold, he can claim the input tax credit for all 100 against the GST that he charges on the 95. In the same way, the whole GST paid on all his other inputs, such as rent, utilities, etc., can be credited against the proportion of sales that is reported.

A study of value-added taxation (VAT) by Alan Tait of the International Monetary Fund emphasized the prevalence of evasion at the retail level:

Understating sales is the most usual way to evade VAT. . . .

[T]axpayers may be picked for audit if their reported sales as a ratio to purchased inputs is lower than average over a period of years; but where shops carry many different lines, when trading practices are changing and lines stocked alter, and when shops carry on business in different localities, such checks are imprecise, and more sophisticated methods of detection may be called for.⁴

If a retailer carries underreporting activity to an extreme, he will probably be caught by an audit. However, as Tait suggests, there is normally a fairly wide variance in the ratio of value added to sales among different businesses. A retailer who underreports sales by a mere 5 to 10 percent is

⁴ Alan A. Tait, *Value Added Tax: International Practice and Problems* (Washington, DC: International Monetary Fund, 1988), 310-11.

unlikely to arouse suspicion in a simple computer audit. Cumulated across the economy, this "small" evasion represents a huge loss of tax revenue.

In the case of retail merchants, the deductibility of the input tax credit creates an increased incentive to cheat. Tax evasion is most prevalent in businesses that are small enough that the owner or a member of his or her family can do the bookkeeping. This scale of operation is much more common among retailers than among manufacturers and wholesalers. The presumption is that, by replacing a tax collected entirely by manufacturers and wholesalers with one collected partly at the retail level, the federal government has increased the scope for tax evasion.

This point has been noted by Graham Bannock, an expert on the VAT in the United Kingdom:

A retailer who sells to a customer at a tax inclusive price and does not record the fact will still be better off by the amount of output tax due, even if he still pays input taxes. . . .

[B]ecause collection of the tax is multi-stage, then only part of the proceeds of the tax is lost if it is evaded at any point in the system . . . but the corollary is that there are many more points in the economy at which scope for fraud exists.⁵

Experience from Europe suggests significant rates of evasion, even in such relatively law-abiding countries as Belgium and the Netherlands.⁶

As pointed out previously by Ruggeri and Van Wart, the ongoing administrative costs faced by the economy are markedly higher under the GST than under the MST it replaced.⁷ The costs of ensuring compliance, from the point of view of the government, are larger by a whole order of magnitude. Revenue Canada could ensure substantial compliance with the MST by auditing only 75,000 medium-sized to large businesses. The task is enormously greater with 1.5 million tax filers under the GST, and the return from auditing a small business is low.

EMPIRICAL MEASUREMENT OF THE UNDERGROUND ECONOMY

There are various methods for attempting to measure the size of the underground economy, all of them fraught with problems. Some studies involve direct attempts to measure unreported economic activity, using extrapolations from the results of special intensive audits of random samples of taxpayers. Of course, tax evaders are aware of the risk of audits, and they

⁵ Graham Bannock, *VAT and Small Business: European Experience and Implications for North America* (Willowdale, Ont.: Canadian Federation of Independent Business, 1986), 49.

⁶ Sijbren Cnossen, "The Netherlands," in Henry J. Aaron, ed., *The Value-Added Tax: Lessons from Europe* (Washington, DC: Brookings Institution, 1981), 43-59, at 52-53.

⁷ G.C. Ruggeri and D. Van Wart, "Overoptimism and the GST: A Critical Comment on the Hamilton and Kuo General Equilibrium Analysis" (1992), vol. 40, no. 1 *Canadian Tax Journal* 148-61.

often succeed in hiding their activities so well that they cannot be uncovered by even the most intensive audit.

One of the most basic tactics used by tax evaders is reliance on cash transactions, rather than cheques or credit cards, in order to prevent the existence of an audit trail. Measurement of monetary aggregates is, as economic data go, among the most accurate. Therefore, analysis by economists attempting to estimate the magnitude of the underground economy often focuses on investigating the relationship between cash balances and other economic indicators.

Monetary indicators have been used in past attempts to estimate the overall size of the underground economy. Mirus and Smith estimated the size of the underground economy in Canada to be roughly 10 percent of reported gross domestic product (GDP) in the early 1980s.⁸ Several different estimates exist for the United States, varying over an implausibly wide range. Long-term movements in monetary ratios are dominated by major institutional changes (such as credit cards, new types of chequing accounts, electronic transfers, etc.). Therefore, attempts to estimate the absolute size of the underground economy are subject to a very large margin of error.

The Recent Unusual Growth of Cash Balances

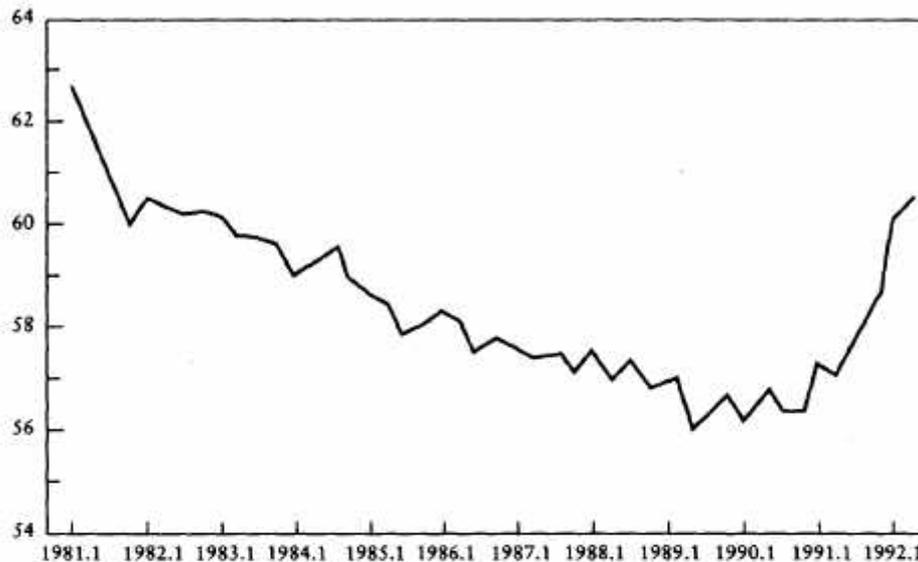
Fortunately, in examining the impact of the GST, it is not necessary to contend with the thorny problems of measuring the absolute size of the underground economy. We are looking for a change occurring in the underground economy over a short time interval, during which no significant structural change in the financial system is likely to be a major factor impinging on the observed data. In this instance, it appears likely that the simplest indicator, the ratio of cash balances (held outside banks) to reported expenditure, should give a useful indication of changes in the size of the underground economy associated with the introduction of the GST.

This is a particularly good indicator, because the stock of cash held by the public is known with a high degree of accuracy by the Bank of Canada. Moreover, the amount of cash held is entirely at the discretion of the individual consumers and businesses—who decide week to week and day to day how much of their paycheques to withdraw in the form of cash and how much cash to hold in their cash registers. In a country like Canada, with solid financial institutions, virtually nobody (outside the underground economy) would hold cash for anything other than short-term transaction needs. Therefore, short-term changes in cash balances are likely to be a very timely and sensitive indicator of changes in the volume of transactions.

However, as noted, the demand for cash balances also undergoes substantial structural changes owing to innovations in financial institutions.

⁸ Rolf Mirus and Roger S. Smith, "Canada's Underground Economy," in Edgar L. Feige, ed., *The Underground Economies: Tax Evasion and Information Distortion* (Cambridge, Eng.: Cambridge University Press, 1989), 267-80. This volume contains several articles discussing methodological issues related to measuring the underground economy.

Figure 1 Cash Balances as a Percentage of Monthly Consumer Expenditure, 1981-1992



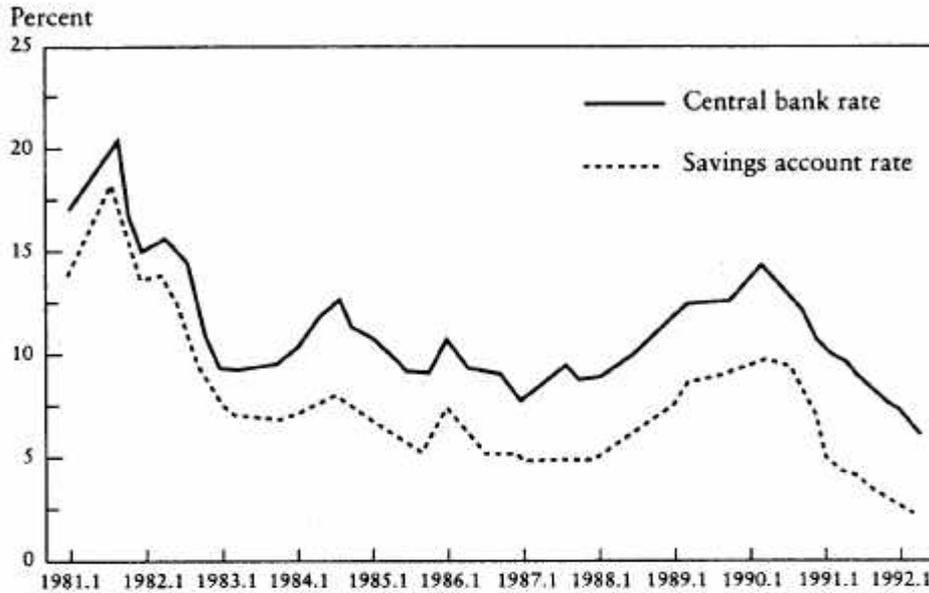
Source: Statistics Canada, CANSIM series B1604 and D20113, quarterly data.

The ratio of cash balances to total expenditure has been on a long-term declining trend ever since the 1950s. A great variety of financial and technological innovations have made it possible for consumers and businesses to economize on their holdings of non-interest-earning cash. The rate of decline was particularly large in the 1970s as the spread of credit cards reduced the need for cash balances, and in the early 1980s at the advent of interest-bearing chequing accounts. Since 1981, the downward trend has continued at a relatively modest pace. The most noteworthy technological innovation affecting cash balances during this period was probably the widespread introduction of automatic teller banking machines.⁹ All of a sudden, beginning in the first quarter of 1991, this smooth downward trend was dramatically broken, and the ratio of cash to reported consumer expenditures rose sharply (see figure 1).

Someone observing figure 1 might object that there has been considerable irregularity in the cash-to-expenditure ratio before, such as the large drop in the 1981-82 period. However, historically, rapid declines in this ratio have been a common occurrence, owing to major financial innovations. Large increases in the ratio, by contrast, are quite rare. Therefore, it

⁹ Data from the Canadian Bankers' Association indicate that the number of these machines increased from 669 in early 1982 to 8,600 in October 1990. There was substantial further growth in the two years after the introduction of the GST, to about 11,000 in late 1992. The availability of these machines reduces the amount that people need to withdraw at any one time, since they know that they can get more cash any time of the day if they run short.

Figure 2 Canadian Interest Rates, 1981–1992



should be emphasized that *the rate of increase in the ratio of cash to reported expenditure in the year following the introduction of the GST is the highest in the whole period for which data on this variable exist, which goes back to 1953.*

This appears to be *prima facie* evidence of underreporting of expenditure, resulting from the GST. However, interpretation is never that simple. One of the other events occurring in the past few years is a trend of declining interest rates. Lower interest rates mean that the amount of interest forgone when larger cash balances are held is relatively smaller. Therefore, a decline in interest rates, other things being equal, tends to increase the ratio of cash balances to transactions.

The decline in interest rates occurring since 1990 is not unprecedented, and indeed it is smaller than the one that occurred in the post-1982 period (see figure 2). In spite of a large decline in interest rates, there was only a very slight increase in cash balances in 1984. Therefore, one would not expect the interest rate decline to account for a large proportion of the increase in cash balances that occurred after 1991. However, to separate out the effects of the change in interest rates, an econometric relationship was estimated between cash balances, expenditure, and interest rates. The details of the estimation, using a variety of alternative specifications of the demand for currency equation, are described in the appendix to this article.

Other Indicators

Some other indicators generally support the view that there was an increase in the underground economy in 1991. These are briefly discussed below.

1) *Home renovation and repair expenditure.* This is, of course, an area where it is often assumed that there is substantial unreported economic activity. Statistics Canada recently reported a 10 percent decline in home repair and renovation expenditure in 1991.¹⁰ By contrast, reported data on total consumer durables expenditure, and the furniture and appliances category, showed both declining about 5 percent; total new housing expenditure declined 6.8 percent. Of course, it is not impossible for renovation expenditure to fall more than these other categories, but it is unusual.

2) *Retail sales tax collections.* Ontario's retail sales tax collections have recently been even lower than what one would expect on the basis of reported retail sales. The discrepancy is not necessarily outside the bounds of normal variance, but it too is consistent with the hypothesis of increased underground activity. Statistics Canada's estimate of retail sales is based on intensive reporting by large retailers (large chains, department stores, supermarkets). The figure for smaller retailers is extrapolated from the large stores' sales and from random sampling of small stores. If more of the latter have "gone underground," the sales they report to the Ministry of Revenue will be less than the sales implicit in Statistics Canada's retail sales data.

3) *Other financial variables.* It has been suggested that the increase in cash balances may be due to some other changes in consumers' financial practices. However, looking at the data on chequable deposits held in banks (M1 less cash outside banks), one observes a 4.3 percent increase between December 1990 and June 1992, which is almost the same as the reported growth in consumer expenditure. This tends to support the econometric analysis, which suggests that the increase in cash holding cannot be explained by reductions in bank balances. It might also be argued that negative publicity about high interest rates on credit cards led to an increased preference for cash. However, the data do not indicate any mass exodus from credit cards, since balances outstanding in the fourth quarter of 1991 were higher than in the fourth quarter of 1990. Indeed, credit card balances grew slightly faster in that year than did overall consumer loans.¹¹

4) *Cross-border shopping.* It is probable that there was an increase in undeclared cross-border shopping during this period. Some US merchants in border towns have a policy of accepting Canadian currency, and this might account for some of the increased cash balances. However, it is doubtful that this is quantitatively significant. The US merchants who accept Canadian currency are not (on that account) doing anything illegal. They would therefore have no incentive to hoard Canadian currency and would quickly exchange it for US dollars. Of course, undeclared cross-border shopping by Canadians is itself a form of tax evasion, and one of the factors that makes shopping in the United States appear attractive to Canadians is avoidance of the GST. Higher Canadian tobacco taxes have

¹⁰ *Statistics Canada Daily*, October 29, 1992. To be published in *Homeowner Repair and Renovation Expenditure in Canada*, catalogue no. 62-201.

¹¹ Statistics Canada, CANSIM series B340 versus CANSIM series B339.

probably also caused a considerable amount of smuggling of this commodity. However, these taxes have been considerably higher in Canada than in the United States for several years prior to 1991, and this factor is unlikely to be a major contributor to the sudden increase in the cash-to-expenditures ratio in 1991.

CONCLUSIONS

The weight of evidence is consistent with the view that there was an increase in the underground economy in 1991 owing to the GST. In particular, the increase in cash balances relative to reported expenditures was extraordinarily large. There does not appear to be any viable explanation of this observation other than the conclusion that the underground economy has grown.

The introduction of the GST occurred in the midst of a recession, and the GST has probably exacerbated that recession in a variety of ways. The Bank of Canada appears to have raised interest rates in advance of the GST's introduction, in order to slow down the economy and head off its inflationary impact.¹² The fact that the GST was introduced during a recession has probably increased the temptation for individuals, suffering economic hardship, to turn to tax evasion in order to partly offset the recession's impact on them. Unfortunately, once this habit is developed, it is unlikely that it will be abandoned merely because economic growth resumes. Any increase in the underground economy represents a decline in respect for legal modes of behaviour and a weakening of the social contract among Canadians.

The results of the econometric estimation, detailed in the appendix, suggest that Statistics Canada's official figure for 1992 total consumer expenditure will understate the true level of expenditure by roughly \$5.7 billion, or 1.4 percent. A \$5.7 billion addition to aggregate Canadian GDP would represent a 0.8 percent increase.¹³ The University of Toronto's FOCUS model¹⁴ indicates that the total of taxes collected by all levels of government

¹² The growth in the underground economy, in turn, means that monetary policy is even tighter than it might appear. Since the underground economy needs more cash for its transactions, less is available for use as reserves by the banking system. The ratio of monetary base to GDP is the largest short-term determinant of real interest rates, far outweighing the effects of government deficits. See Peter S. Spiro, *Real Interest Rates and Investment and Borrowing Strategy* (New York: Quorum Books, 1989), especially 74-78 and 162-63.

¹³ A substantial proportion of consumer expenditure is on imported goods; consequently, at first glance, one might expect the effect on GDP to be less than \$5.7 billion. However, apart from smuggled items, imports will already have been captured in the balance of payments accounts and been deducted from GDP. Most commodities enter Canada legally and "go underground" in order to avoid taxation of the retail markup component. Smuggling, in the form of cross-border shopping, has probably grown substantially, but these purchases are not made using Canadian dollars and therefore are not reflected by the cash-to-expenditure ratio.

¹⁴ FOCUS: *Forecasting and User Simulation Model* (Toronto: University of Toronto, Institute for Policy Analysis) (looseleaf).

rises about 41 cents for each dollar of GDP. Therefore, the additional underreporting of income resulting from the GST would have cost all governments in Canada a total of about \$2.3 billion in 1992. This loss of tax revenue exacerbates serious deficits that have occurred at all levels of government owing to the recession.

One cannot pretend that there is a great deal of precision in any estimate of the underground economy. The actual increase in the underground economy could be either larger or smaller than the number estimated in this article. One can never definitively prove that there has been an increase in the underground economy, or that it was due to a specific tax change such as the GST. However, pragmatic public policy has to be based on probabilities rather than certainties. The preponderance of the evidence suggests that the federal government was overoptimistic when it predicted that introduction of the GST would actually reduce tax evasion. This does not by itself mean that the GST is an inherently bad tax, but it does mean that the costs of enforcing and administering it may be higher than anticipated. The main implication of this study is that the federal government needs to consider additional steps to ensure effective administration of the GST, which may include a considerable increase in auditing efforts and other measures to increase compliance.

APPENDIX: ECONOMETRIC ESTIMATION OF THE CURRENCY DEMAND EQUATION

The volume of cash balances held is a function of the volume of transactions in the economy and of the interest rate. Since there is no optimal measure of the volume of transactions, GDP and various of its subcomponents were tried. It turned out, not surprisingly, that the strongest correlation is between cash balances and consumer expenditure, rather than between cash balances and total GDP.¹⁵ US studies of the demand for cash balances has also found that consumer expenditure or retail trade is the best explanatory variable.¹⁶

Numerous alternative formulations of the demand equation were tried, including non-linear specifications, and all of them supported the finding that there has been an unexpectedly large increase in the cash-to-expendi-

¹⁵ A measure of consumer expenditure that excluded categories (such as car purchases and rent) that rarely involve cash transactions was also constructed. The improvement in correlation that was achieved with it was very slight; therefore, it appeared preferable to use the broader measure, which would be more familiar. It should be noted, in passing, that the ratio of cash to retail sales increased even more sharply than the ratio of cash to total consumer expenditure. This may be taken as giving a clue to the main area of increase in underground activities.

¹⁶ See Michael Dotsey, "The Demand for Currency in the United States" (February 1988), 20 *Journal of Money, Credit, and Banking* 23-39; and M. Ladenson and G. Mäkinen, "The Currency Ratios 1920-80" (1992), vol. 20, no. 4 *Atlantic Economic Journal* 1-8. The latter article is particularly interesting, because the authors include the tax rate as an explanatory variable (on the hypothesis that a higher tax rate induces more evasion and thus a greater demand for currency) and find it to be one of the most significant variables.

ture ratio. Two representative specifications are summarized in the table below. One explains total cash balances by total expenditure, and the second explains per capita real cash balances by per capita real expenditure. The latter is the theoretically preferred formulation, since the widely accepted inventory model by Baumol suggests that individuals benefit from economies of scale to reduce their cash-to-expenditure ratio as the real value of their weekly expenditures rises.

Details of the Estimated Equations

The cash and expenditure variables were converted to the form of quarter-to-quarter percentage changes to reduce the likelihood of spurious correlations. A time trend also was tried, to attempt to capture the effect of trends in financial innovation, but it proved to be insignificant, probably because these innovations took place in major bursts rather than at a steady rate. The interest rate variable used was the central bank rate, which proved to be more highly significant than the savings account deposit rate—perhaps because business holders of cash have money market rates as their opportunity cost. Some theoretical models imply that the change in the interest rate also is important, and this was tried, but it turned out to be statistically insignificant.

A third-order distributed lag, for six quarters, worked best on the expenditure variable, and a second-order distributed lag over three quarters was used for the interest rate variable. In order to eliminate simultaneity bias, it is generally preferable to use only lagged values for the right-hand side variables. In practice, the results were relatively little changed by whether the current quarter's value was included or excluded. In the 1980 to 1990 subperiod, the fit was improved by using only lagged values, and this is what was done to obtain the coefficients shown below. For the longer 1970 to 1990 sample, the fit was slightly better when the current quarter's value was included; therefore, that specification was used for those equations.

Table 1 summarizes the results of four regression equations (t-statistics are in parentheses). The proportion of the variation explained is quite high, in view of the fact that the dependent variable is in the form of a quarter-to-quarter percentage change. The regressions were estimated up to the fourth quarter of 1990, just before the GST was introduced. They were then used to make an out-of-sample forecast for 1992:2. In all cases, they implied that, given the reported rate of expenditure growth, the stock of cash outstanding was higher than expected: by \$378 million for equation 1; by only \$193 million for equation 2; by \$1,348 million for equation 3; and by \$1,240 million for equation 4.

This gives us quite a wide range to choose from, underlining the fact that it is hard to come up with a high-precision estimate of the size of the underground economy. The relatively conservative figure from equation 1 is perhaps the most reliable. This specification had the best regression statistics, and it also had the lowest out-of-sample forecast error for the 1989-90 period. It could be argued that these equations always do have a

Table 1 Regression Equations Explaining Growth of Cash Balances

Regression	Constant	Expenditure variable	Interest rate	Corrected R ²	Durbin-Watson
1970:1 to 1990:4, total currency	2.17 (8.2)	0.57 (7.63)	-0.15 (-8.3)	0.72	1.81
1980:1 to 1990:4, total currency	1.92 (5.92)	0.48 (2.52)	-0.11 (-3.37)	0.54	2.32
1970:1 to 1990:4, real per capita currency	0.88 (2.46)	0.79 (3.74)	-0.12 (-3.79)	0.58	1.71
1980:1 to 1990:4, real per capita currency	1.48 (1.63)	0.62 (1.59)	-0.15 (-2.21)	0.56	1.88

Source: Statistics Canada, CANSIM series: cash outside banks: B1604; bank rate: B14079; personal income: D20113. Real values were calculated using the personal consumption deflator, D20557. Per capita figures were calculated using the total labour force, D767606.

substantial margin of error, and the underprediction for the 1991-92 period could just be a random forecast error. This cannot be ruled out, of course, but a Chow test did indicate a structural break at 1991:1. Moreover, a large number of equations were estimated which all underpredict the quantity of cash for this period. This makes it highly doubtful that the equation's error is just an ordinary forecast error.

Calculating the Implied Amount of Underground Activity

We still have to make an assumption about the velocity of cash balances in the underground economy, which is no doubt less than it is in the reported economy. In the latter, cash turned over about 21 times per year (consumer expenditure divided by cash outstanding) in 1990. In 1960, before the advent of cash-conserving innovations, this velocity was about 15. If we assume the latter number as the velocity of cash in the underground economy today, the underprediction of the cash balance by equation 1 implies that expenditure in mid-1992 was actually \$5.7 billion, or 1.4 percent, higher than reported by the official data. Although the relation estimated here uses consumer expenditure on the right-hand side, one cannot necessarily presume that the unreported expenditure falls under Statistics Canada's definition of consumer expenditure. It could, for example, be home renovation expenditure, which is defined in the housing construction category. As noted in the body of the article, reported home renovation expenditure has declined sharply. Therefore, including it as an explanatory variable would have made the model's overprediction even larger.