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MEASURING THE SIZE OF IRELAND'S BLACK ECONOMY

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1. INTRODUCTION

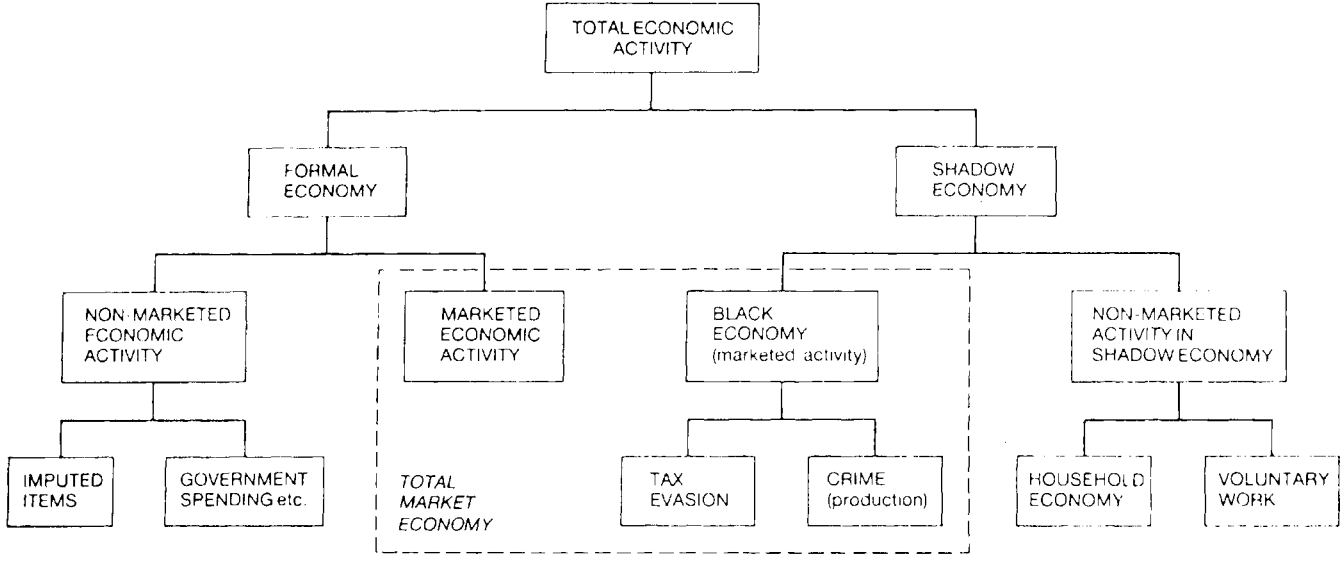
Official estimates of national income are widely used in economic analysis, particularly in monitoring trends in national output and living standards over time and also in comparing relative income levels across countries. The adequacy of these estimates as a measure of economic welfare has long been questioned because they, by definition, exclude items such as household production, the costs of pollution etc. Another school of criticism, however, argues that these estimates are seriously flawed because they exclude a significant portion of activity which should be included but which is hidden from the authorities for various reasons, mainly tax evasion. In its extreme form (e.g. Feige 1979) it is claimed that this 'black economy' is so extensive and that its growth in the 1970s and 1980s has been so significant that official estimates of GNP are no longer a reliable basis for formulating policy. In this view, for example, the phenomenon of weak output growth during the stagflation in the 1970s was a statistical illusion due to the massive shift from the official to the black economy.

In this paper we try to assess the extent to which official estimates of national income in Ireland are affected by black economy activities. The first section begins by defining what we mean by the term 'black economy' drawing from discussions in international literature. This is followed by a brief overview of the methods used to construct Ireland's national accounts with a view to assessing the possible impact of black economy activity on official estimates of GNP. The third section reviews the techniques which are available to estimate the scale of the black economy. The following sections present the results of applying these techniques to the Irish case.

2. DEFINITION OF 'BLACK ECONOMY'

The concept of the black economy which is examined in this paper is the one put forward by Smith (1986) and which is illustrated in Chart 1. *Total Economic*

Chart 1 The Shadow Economy, the Formal Economy and the Black Economy



A – Activities that should, in principle, be measured in GDP, but are not because they are hidden.
B – Activities excluded from GDP by convention.

Source: Smith (1986)

Activity comprises all production of goods and services whether sold in markets or not. The formal economy is that portion of total economic activity which appears in official estimates of national income. This includes recorded market activity and non-market activity such as public administration and various imputations (e.g. rent on owner-occupied housing).

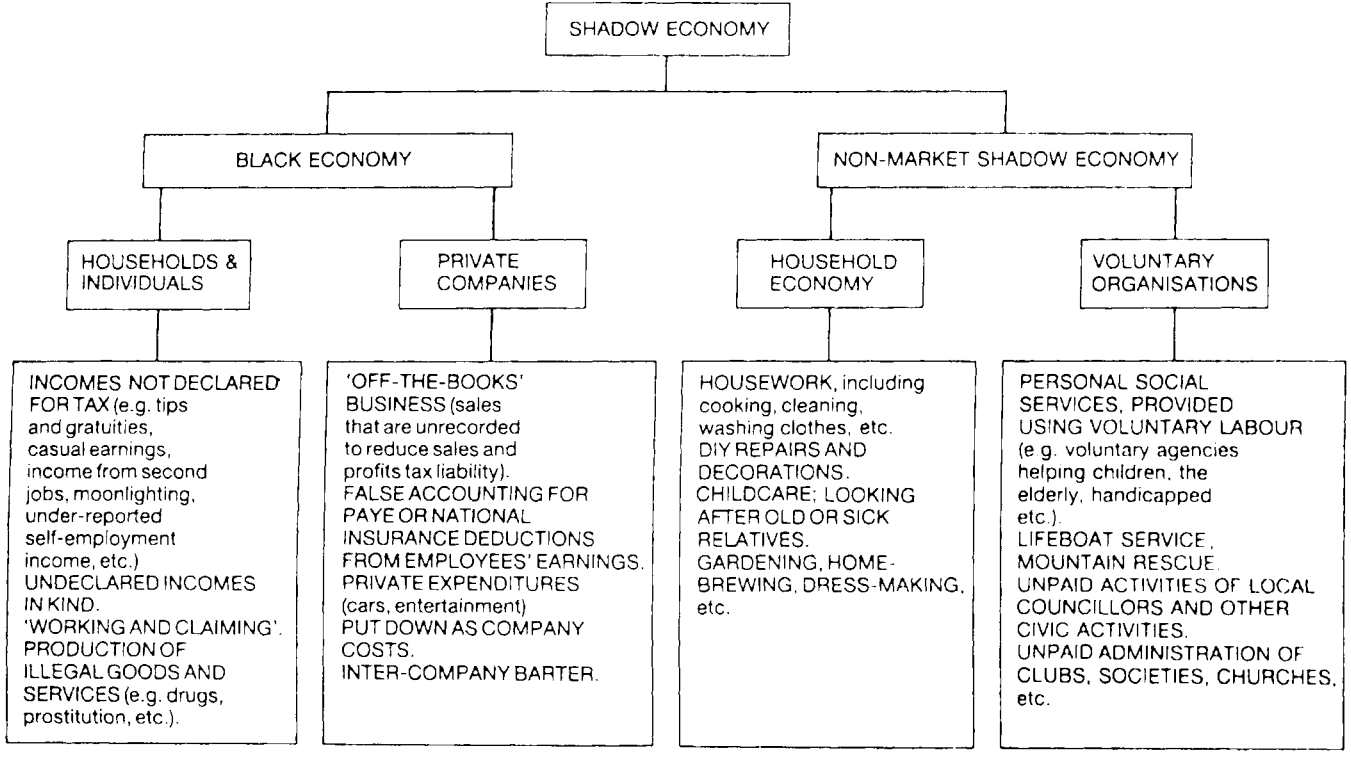
The *shadow economy* - as defined by Smith - comprises that part of total economic activity which is excluded from the official measurement process. Some items are excluded for conceptual reasons. For example, home production, DIY and gardening etc. are excluded from the national accounts by definition, since the national accounts are not intended to measure these activities. Other components are excluded because of the desire of participants to conceal their activities (e.g. crime or tax evasion). These latter items should be recorded as part of national income in the national accounts on the basis of national accounting conventions but are excluded from official estimates because they remain hidden from the authorities. This component of the shadow economy is defined by Smith as the *black economy* and is the focus of this study. The sort of activities which typically occur in this sector are presented in Chart 2.

It is worth noting that although, in theory, the black economy will not be recorded in the official estimates, in practice, official statisticians may make adjustments to their estimates to take account of black economy activity. Secondly, while the desire to minimise, or if very successful, eliminate, tax liabilities is the main motive behind most black economy activity, it is important to note the distinctions which exist between tax evaded income and black economy activity as defined here. This is presented below:

	Economic Income (National a/c. conventions - Formal and Black Economy)
minus	Lawful Exemptions (e.g. Personal, VHI, Mortgage relief)
plus	Taxable income not included in economic income (e.g. capital gains)
equals	**True Taxable Income (defined by tax law)**
minus	Black Economy Income
minus	Unlawfully Claimed Exemptions
minus	Other undeclared taxable income (e.g. undeclared capital gains)
equals	**Observed Taxable Income**

It is clear that the gap between 'true' taxable income, according to tax law, and the base on which tax is actually paid is not equal to our definition of the black economy. For example, the gap includes items not in the black economy: if someone claims an allowance to which they are not entitled this is part of evaded

Chart 2 Typical Activities in the Shadow and Black Economies



Source Smith (1986)

income even though it is reported to the authorities and therefore not part of the black economy in our sense of the term. Similarly, some components of tax evaded income such as undeclared capital gains are not part of black economy income, on our definition, since capital gains are generally not considered as income on the basis of national accounts conventions. Nonetheless, despite these conceptual differences, it seems likely that the level of black economy income is closely connected with tax evaded income.

3. THE IRISH NATIONAL ACCOUNTS AND THE BLACK ECONOMY

At the core of the Irish national accounts system are the estimates of National Income derived by aggregating the incomes of different categories of citizens i.e. the income table. Published estimates of the expenditure components of GNP are constrained to equal the estimate of GNP obtained from the income table - a result achieved by allowing consumer expenditure to act as a residual which equates the two sets of accounts. Therefore this section focuses on the issue of how the components which make up National Income are derived and the implication of the estimation procedures for the size of the black economy. Table 1 provides a more detailed exposition of the income table for the year 1985.

Table 1 Net National Product at Factor Cost, 1985

Category	£million
Income from Agriculture, Forestry and Fishing	**1401.5**
1. Income from self-employment and other trading income	1265.3
Remuneration of Employees:	
2. Wages and salaries	121.5
3. Employers contribution to social insurance	14.7
Non-Agricultural Income	**13664.8**
Profits, professional earnings, interest, dividends and income from lands and buildings:	
4. Trading Profits of companies (before tax)	2797.7
6. Other trading profits, professional earnings etc.	955.8
7. Adjustment for stock appreciation	99.4
8. Rent of Dwellings (actual and imputed)	341.0
9. Rent element in land annuities	6.2
Remuneration of Employees	
10. Wages and salaries	8836.6
11. Employers' contribution to social insurance adjustment	628.1
12. Adjustment for financial services	-817.2
Net Domestic Product at Factor Cost	**14249.1**
Net Factor income from the rest of the world	-1965.7
Net National Product at Factor Cost	**12283.4**
= National Income	

Agricultural Income is not based on incomes reported by farmers to the Revenue Commissioners. Instead, an indirect production based estimation technique is used. On the basis of information on production and prices of various crops and livestock, and on the value of inputs, an estimate of value-added is derived (Gross Agricultural Product). From this other expenses are deducted to derive an estimate of farmers' income which, when combined with estimated wages paid to farm labourers, gives Agricultural Income. This estimate, since it does not rely on data supplied to the Revenue Commissioners, is unlikely to be significantly affected by black economy activities.

Estimates of non-agricultural wages and salaries are derived from estimates of employment and average earnings derived from various surveys, such as the annual Labour Force Survey. Again, since this data does not rely on information supplied by taxpayers to the Revenue Commissioners, it is unlikely to be substantially affected by black economy activity. However, to the extent that black economy activities such as 'nixers' may not be fully accounted for, there may be some understatement of the extent of income in this category. Reliable data on employers' social insurance contributions are, of course, readily available from official sources.

Aggregate corporate profits are estimated by the CSO on the basis of accounts submitted by companies to the Revenue Commissioners. Some adjustments are made to this data to bring it into line with national accounts conventions (hence the adjustment for stock appreciation and for financial services). Given that this item is derived from returns submitted to the Revenue Commissioners, it is possible that it is underestimated due to income understatement. However, the extent of understatement should be limited by the fact that the distribution of profits is skewed towards larger companies which are closely monitored by the Revenue Commissioners and by the fact that tax evasion in corporate settings would typically require the collusion of a number of people - company employees, accountants etc. - which increases the riskiness of evasion.

Other trading profits, professional earnings etc. comprises the estimated earnings of unincorporated bodies, partnerships and the self-employed. This data is derived from returns made to the Revenue Commissioners. It is clear, from international evidence, which will be discussed below, that the main impact of black economy activity will be to underestimate this element of national income. For example, in the UK 84 per cent of the official estimate of the black economy is attributed to under-reporting of self-employment income.

The Irish CSO is not unaware of the problems posed for national income estimates by black economy activity. In fact, published national accounts incorporate some adjustment for this factor. The published figure for company profits incorporates an upward adjustment to allow for the under-reporting of profits on the part of small and medium-sized firms to the Revenue Commissioners. The published figure for

income of the self-employed incorporates two black economy adjustments. The first relates to the problem of undercoverage (i.e. the fact that some self-employed do not submit returns to the Revenue Commissioners) and is derived from a comparison of the number of self-employed estimated on the basis of statistical surveys such as the Census of Population, with the number of returns submitted to the Revenue Commissioners. A further upward adjustment is carried out to correct for under-reporting of income by those self-employed who do submit returns. Taken together, the adjustments to corporate profits and self-employment income amount to almost 2.5 per cent of GNP. This compares with a corresponding estimate of 1.5 per cent of GNP in the UK.

The above review of the procedures employed in estimating Ireland's national income suggests that to the extent that black economy activities result in an underestimation of national income, they are likely to have their main impact on estimated self-employment income and, to a lesser extent, corporate profits and undeclared wage income. While the CSO is aware of this problem, and has made a sizeable adjustment in preparing the official estimates, it remains to be seen whether this adjustment is sufficient.

4. HOW TO MEASURE THE BLACK ECONOMY

By definition, one of the main objectives of participants in the black economy is to conceal their activities from the authorities. It is hardly surprising, therefore, that estimation of the extent of the black economy poses a formidable challenge. Nonetheless, a range of techniques to derive estimates has been developed over the years. This section provides an outline of the various methods which can be employed.

According to Frey and Pommerhene (1984) there are five basic approaches to estimating the extent of the black economy.

- The first approach is based on voluntary surveys and samples. Basically, this involves surveying a sample of the population to determine the extent of the involvement in black economy activity. This approach has been applied in Norway and Italy for example. One obvious difficulty is the reluctance of black economy participants to take part in such surveys. This sample selection bias implies that the results of these surveys are likely to underestimate the extent of the black economy. Other problems include the difficulty in estimating the black economy returns to capital inputs and the influence of the phrasing of the questions on estimates of the size of the black economy. We are not aware of any surveys for Ireland which cover black economy activity, and therefore this approach will not be considered further.

- The second approach is based on tax auditing and other compliance methods. This relies on data generated in the enforcement of tax laws and in efforts by the tax authorities to uncover hidden income either through understatement or non-filing of returns. A number of difficulties beset this approach. Firstly, using tax compliance data is equivalent to using a sample of the population. However, since the selection of taxpayers for tax audit is not random, in general, but based on properties of submitted returns which indicate a likelihood of evasion, the sample is not a random sample of the population. This factor is likely to bias compliance-based estimates of the black economy upwards. Secondly, estimates based on tax audits reflect that portion of black economy income which the authorities succeeded in discovering. This is likely to be only a fraction of hidden income. For example, evidence for the US suggests that tax audits only uncover about a quarter of the income of taxpayers selected for audit. In this regard, use of tax compliance data may be not unlike using the number of convictions secured by the police as a measure of the level of crime.

- The third approach is based on discrepancies between income and expenditure. In national accounting the income measure of GNP should be equal to the expenditure measure of GNP. Thus, if an independent estimate of the expenditure side of the national accounts is available, the gap between the expenditure measure and the income measure can be used as an indicator of the extent of the black economy (McAfee, 1980). However, since national accounts statisticians will be anxious to minimise this discrepancy, the initial discrepancy, or first estimate, rather than the published discrepancy should be employed for this purpose. If all the components of the expenditure side were measured without error, then this approach would indeed yield a good estimate of the scale of the black economy. However, unfortunately, this is not the case and the discrepancy, therefore, reflects all omissions and errors everywhere in the accounts as well as black economy activity. A related approach is pursued by Pissarides and Weber (1988) who use micro data from household budget surveys to estimate the extent of income understatement by the self-employed. This involves measuring the inconsistencies, using econometric Engel functions, between what people spend and what they report as income.

- The fourth approach, and perhaps the most popular, is the monetary approach. There are various techniques under this heading, but almost all in some way rely on the idea that, in order to conceal black economy income, currency is the main transactions medium. Thus by deriving estimates of excess currency holdings and tracking the evolution of this variable over time it is possible to estimate the trends in black economic activity. Combined with some estimate of the base period level of the black economy, these approaches can provide estimates of the scale of the black economy. The main exponents of the various monetary approaches include Gutmann (1977), Feige (1979) and Tanzi (1983). Monetary approaches suffer from a number of difficulties, not least of which is

the fact that demand for currency reflects a number of factors other than the extent of the black economy.

- The fifth approach developed by Frey and Weck (1984) is based on an econometric analysis on the relationship between determinants of the black economy e.g. tax rates, tax morality, etc. and indicators of its size such as participation rates, hours worked etc. The technique enables the authors to estimate an unobserved hidden economy variable for a number of economies, including Ireland. The authors estimate that the Irish black economy accounted for 7¼ per cent of GNP in 1978. The methodology has, however, been subjected to strong criticism (Helburger and Knepel, 1988), and will not be considered further here.

Estimates of the size of the black economy (as a percentage of GNP) in the US, UK, Germany and Sweden using the above methods are presented in Table 2.

Table 2 International Estimates of the Size of the Black Economy in 1976 (as a percentage of GNP)

Category	US	UK	Germany	Sweden
Tax auditing	6-8	6-8	5	2-6
National Income Discrepancy	4	2.5	5	4-7
Fixed currency ratio (Gutmann, 1977)	11	8	n.a.	10
Transactions method (Feige, 1979)	28	15	16-24	n.a.
Currency equation (Tanzi, 1983)	3.5-6	7	12	13

Source: Frey and Pommerhene (1982) and Feige (1979)

For the US, estimates range from a low of 4 per cent to a high of 28 per cent. For the UK the range is from 2.5 to 15 per cent; estimates varying from 5 to 12 per cent are reported for Germany while Swedish estimates range from 2-6 to 13 per cent. It is clear from this table that there is considerable international variation in estimates of the extent of the black economy. It is also very evident that different techniques yield strikingly different estimates. In general, estimates based on tax auditing and national accounts discrepancies give rise to significantly lower estimates than monetary based estimates. Within the monetary approach, the fixed currency ratio method and Feige's transaction method generally give rise to higher estimates than Tanzi's currency equation approach.

5. TAX COMPLIANCE DATA AND IRELAND'S BLACK ECONOMY

The main example of this approach is the US Inland Revenue Service (1979). In this study data from audits of taxpayers combined with estimates of the number of non-filers was used to derive estimates of 'hidden income'. In principle, a similar approach could be applied to Ireland and data generated by audits of the self-employed and corporate tax returns could be used to estimate the extent of the black economy. At present, however, a number of difficulties arise with this approach in the Irish context which will be discussed later.

The system of self assessment for the self-employed was introduced in 1988 and was extended to corporation tax in 1989. In this system, taxpayers are required to submit returns of income and tax due each year. In the majority of cases, the return is accepted by the Revenue Commissioners. However, in a small but growing percentage of cases, some returns are selected for in-depth audit. Where agreement with the taxpayer on the degree of underpayment is not reached, the case is referred to the Investigation Branch for further investigation and possible legal action.

In 1990, for example, 1,125 audits were initiated (equivalent to about half a per cent of the number of returns submitted). In the first nine months of 1991 this was increased to 1,674. The selection of returns for audit is not based on random selection but on an assessment by an inspector of whether evasion is likely based on such features of the return as: unduly low profit rates, late return/payment, introduction of cash into the business, unusual features in the accounts etc. The 694 cases closed by the audit teams in 1990 yielded £6.8 million, or £10,000 per case (a figure which has risen to over £11,600 in the first nine months of 1991). This compares with an average tax payment per self-employed person (including farmers) of £1,140 in 1990. The comparable payment per PAYE employee was just over £2,000.

On the surface, these data appear to indicate a significant degree of income understatement by the self-employed. However, the Revenue Commissioners caution that, because of the non-random nature of the audit selection procedure, 'the yield (from audits) cannot be taken as a reliable indicator of the general level of compliance among self-employed taxpayers in general'.

6. NATIONAL ACCOUNTS DISCREPANCIES AND IRELAND'S BLACK ECONOMY

In principle, GNP measured using the income method should be identically equal to GNP as measured by the expenditure method. In practice, however, national accountants find that this identity rarely holds due to various errors and omissions. In the usual case, GNP measured by the expenditure method exceeds the income-based measure. McAfee (1980) argues that the discrepancy between the income and

expenditure method can be used as an indicator of the size of the black economy. The argument here is that since the income method relies heavily on data supplied to tax collection authorities, it will naturally underestimate true income because of tax evasion. However, an independent estimate of GNP using estimated expenditures should not suffer from the same problem, since this is derived from trade data, commodity flow accounts and surveys and should not be distorted by tax evasion. In these circumstances, the expenditure estimate should provide a check on the income estimate and the gap between the two can serve as an indicator of the hidden economy.

In the Irish case published national accounts do not provide an independent estimate of the expenditure on GNP. This arises because our published accounts are constrained to satisfy the national accounts identities. Thus the expenditure estimate is forced to equal the income estimate. This is achieved by allowing personal consumer expenditure to act as the residual which equates the income and expenditure measures of GNP. Clearly, this data is not useful for our purposes.

However, the CSO does indeed derive an independent expenditure based estimate of GNP which is not published because gaps in the data sources mean that some of the elements are inevitably poorly based. This estimate of GNP consistently exceeds the income based estimate, of late by about 3 per cent. On the basis of the reasoning employed by McAfee, this strongly suggests that the adjustments for the black economy incorporated into the national accounts do not go far enough and that the black economy could be more significant than allowed for in the official GNP estimates by an amount equivalent to 3 per cent of GNP. Taken together, the official estimate for underreporting and non-reporting of self-employment income referred to above (2½ per cent of GNP) and the national accounts discrepancy (3 per cent of GNP) are consistent with the existence of a black economy amounting to over 5 per cent of GNP.

The discrepancies in the national accounts point to a significant scale of the black economy in Ireland. There are, however, a number of limitations to this approach which must be borne in mind. The main problem is that the gap between the income and expenditure methods is a pure residual and, by definition, includes all errors and omissions elsewhere in the accounts. Thus this item may not be a reliable indicator of the black economy.

7. MONETARY ESTIMATES OF IRELAND'S BLACK ECONOMY

Monetary based estimates of the size of the black economy are based on the idea that, in order to ensure concealment of income from the tax authorities, participants have strong incentives to conduct their transactions in currency rather than through financial institutions. A number of approaches for estimation of the size of the black economy using monetary indicators have been developed. These indicators include:

1. Currency holdings per capita and as % of GNP
2. Average size of currency denominations
3. Trends in the Currency/Current Account ratio
4. Estimated number of transactions performed by currency and current accounts
5. Residuals in currency demand equations
6. Simulations of the effect of tax on currency demand

7.1 Currency holdings per capita and as % of GNP

The 'incredible, indeed suspiciously large holdings of currency (Gutmann, 1977) has led some economists to view the levels of currency held by the public as evidence of a significant black economy. Examination of currency holdings in Ireland in an international context does not, however, suggest that Ireland suffers from an exceptionally large black economy as Table 3 reveals. In 1992, currency holdings by the public per head amounted to 561 ECU; among the lowest of the countries considered. On the basis of currency as a per cent of GDP, again the data in no sense indicate 'excessive' holdings of currency in Ireland. To the extent, therefore, that currency holdings tell us anything about the size of the black economy, this data does not suggest that Ireland has an abnormally high black economy. Indeed, econometric analysis of the data contained in Table 3 suggests that currency holdings in Ireland are less than would be expected given the level of economic development.

Of course, such international comparisons of currency holdings are fraught with difficulties and the levels of currency per head reflect a host of historical, institutional and economic factors. In these circumstances, use of the level of currency per head or as a percentage of GNP tells us little about the extent of the black economy.

7.2 Average size of currency denominations

The average size of notes in circulation has also been suggested as an indicator of the level and trend of the black economy. For example, increases in the share of large notes in the total currency outstanding could be taken as an indicator of growth in the black economy. In Table 4, data prepared by Boyle (1982) are presented along with updated estimates for 1990 and 1992. From this data it is evident that the average denomination of notes held by the public has doubled since 1980. Prima facie, this provides some evidence of growth in the black economy over the 1980s.

Table 3 Currency held by the public, 1990

Country	Per Head (ECU)	% of GDP
Belgium	991	6.5
Denmark	932	4.6
Germany	1175	6.2
Greece	537	10.5
Spain	894	9.0
France	653	3.9
IRELAND	**561**	**5.9**
Italy	775	5.2
Luxembourg	938	5.4
Netherlands	1060	7.2
Portugal	348	7.3
United Kingdom	374	2.8
USA	733	4.3
Canada	546	3.2
Japan	1631	8.7
Switzerland	2696	10.2
Average	**928**	**6.3**

Source: Basic Statistics of the Community, Eurostat, 1992.

Table 4 Percentage distribution of note issue and average value of notes outstanding

Year	£1	£5	£10	£20	£50	£100	Average Size (£)	Index 1960=100	CPI 1960=100
1960	63	22	12	3	0.1	0.1	3.68	100	100
1965	60	24	13	3	0.1	0.1	3.85	105	123
1971	55	28	13	3	0.1	0.1	4.00	109	173
1975	46	32	18	4	0.2	0.2	4.96	135	297
1980	38	20	35	7	0.5	0.2	6.55	178	573
1990	19	14	23	41	0.3	-	12.80	348	1202
1992	15	14	21	47	0.3	-	14.00	381	1279

However, the evidence is not overwhelming since growth in average denomination size may simply reflect attempts by people to minimise transaction costs as well as the influence of supply side factors on composition of notes (e.g. the introduction of the £1 coin). Of course, inflation also has an impact on note size. As the data in Table 4 shows, prices also doubled over the 1980s. Hence the increase in average note size cannot be considered excessive.

7.3 Estimates based on trends in the Currency/Current Account Ratio

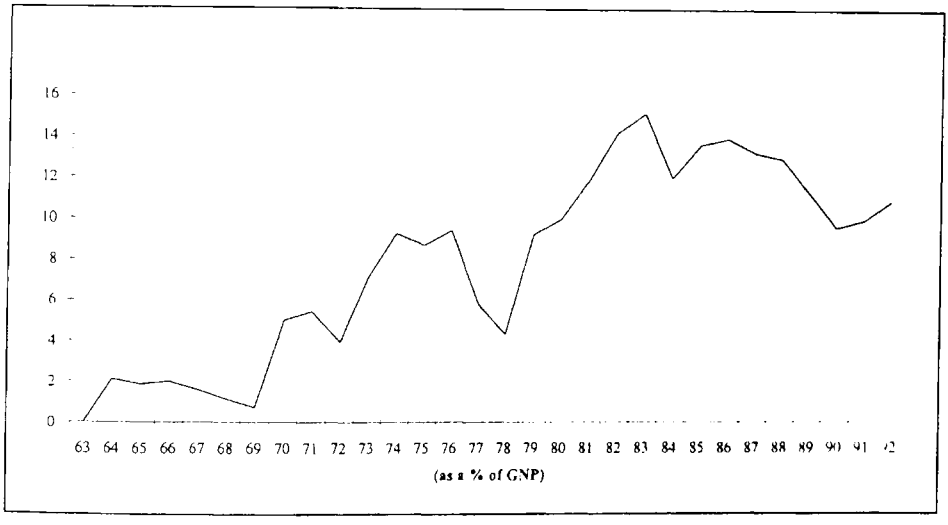
The main exponent of this approach is Gutmann (1977). The idea here is that changes in the share of the black economy in GNP will, for tax evasion purposes, result in greater use of currency relative to current accounts. Hence movements in this ratio will track trends in the share of the black economy. By choosing some base date level for the black economy, its absolute share can be determined for different years. To illustrate this approach, consider the following:

The ratio of currency to current accounts - and, therefore the share of currency in the M1 money aggregate - is assumed to be constant in the absence of a black economy. Hence, assuming a zero black economy in some base year, we obtain an estimate of the "equilibrium" currency ratio. The gap between this estimate and the actual gives us a measure of "excess" currency holdings which when multiplied by M1 velocity gives an estimate of the size of the black economy.

Details of these calculations for Ireland for the period 1960 to 1990 are presented in Chart 3a and in Table 5[1]. These calculations assume a black economy of zero in 1963, the year when the currency M1 ratio reached its lowest level. From relatively low levels in the 1960s, this measure of the black economy crept up through the 1970s and early 1980s reaching an estimated peak of 15 per cent of GNP in 1983 before falling back gradually to 11 per cent in 1992.

While this method may throw some light on trends in the black economy, it suffers from serious limitations. The first problem is the need to assume some benchmark figure (such as zero in 1963 in our case) for the level of the black economy. Clearly estimates of the extent of the black economy are highly sensitive to this choice. Secondly, moving from a measure of "excess currency" to black economy income involves multiplication by actual M1 velocity. This assumes that the velocity of circulation is the same in the formal and black economies, which may not be justified. (Note that this problem applies equally to the other monetary methods examined below). Thirdly, and perhaps most important, movements in the currency-money ratio may reflect factors other than changes in the size of the black economy.

Chart 3a: Size of Black Economy - Gutmann Method



7.4 Feige's Transaction Method

The idea underlying this approach is to estimate the value of all transactions performed by currency and current accounts and to compare this with the trend in GNP. A divergence between the two indicates a rise in the black economy. In order to apply this method, it is necessary to know:

(a) the turnover of current accounts;

(b) the stock of currency;

(c) the average life of currency; and

(d) the number of transactions performed by a unit of currency over its lifetime.

Boyle (1982) attempted to employ this method but lack of data on (d) above resulted in an approach which was highly unsatisfactory. Typically, some assumption has to be made about (d) which undermines the usefulness of the whole approach. Moreover, when used abroad, this method has yielded implausibly high estimates of the size of the black economy, (for example, application of this method in US data for 1979 implies a black economy equivalent to 60 per cent of recorded GNP). Given these difficulties, it was decided not to proceed with this approach.

7.5 Residuals in currency demand equations

Some adjustment for the problems of the currency ratio technique can be achieved by a method used by Boyle (1982), which provided his main estimate of the extent of the black economy in Ireland. In this approach, a currency demand equation is specified and estimated over some period of the available data. If it is assumed that during the sample estimation period, there was little or no significant black economy, the *out-of-sample residuals*, multiplied by the velocity of circulation, can provide an estimate of the black economy in the years beyond the estimation period. In implementing this approach, a currency demand equation, depending on the level of observed GNP and interest rates was estimated over the period 1960-1974 and out-of-sample projections were made for the period 1975 to 1992. Details of the estimated equation can be found in Box 1. The estimates of the black economy derived from this approach are also presented in Table 5 and Chart 3b.

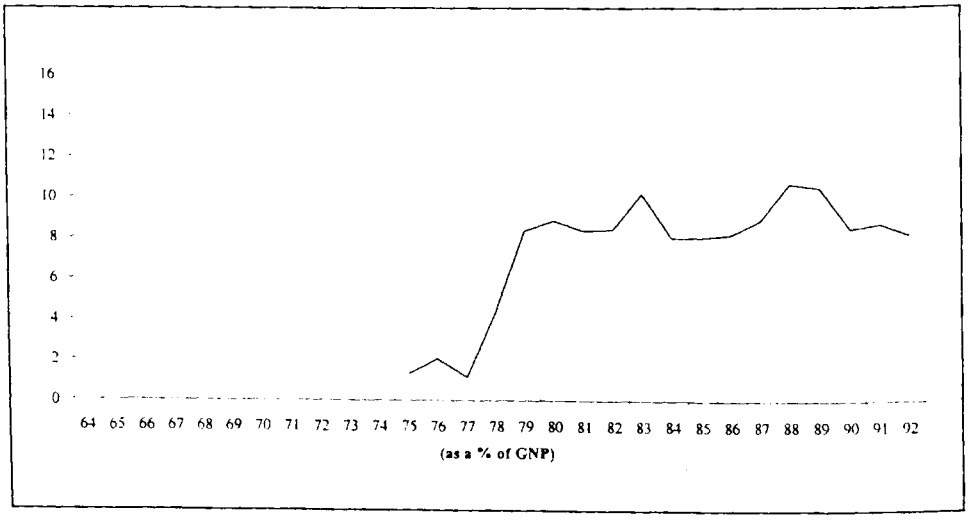
Box 1: Currency Demand Equation

The estimated equation referred to in the text is

$$\ln(C) = -0.34 + 0.73 \ln(GNPV) - 0.003\, r$$
$$(1.5) \quad (19.9) \quad (0.4)$$
$$R^2 \ 0.99 \quad DW \ 1.1$$

where C, GNPV and r are currency holdings, the value of GNP and the long bond yields, respectively; t-ratios are in parentheses below the estimated coefficients.

Chart 3b: Size of the Black Economy - Boyle Method



The estimates mirror those produced by the fixed currency ratio method outlined earlier. Of course, the estimated level of the black economy implied by this approach is significantly below the results obtained for the fixed currency approach, because of the assumption of a zero black economy in the period 1960-1974 (in contrast to the assumption of a zero black economy in 1963 in the previous approach). However, trends in both estimates are similar. The present approach suggests that the level of the black economy climbed to a peak of 10 per cent of GNP in 1983 before falling back to 8 per cent by 1992.

This approach represents some improvement on the fixed currency ratio method - apart from the extreme benchmark assumption - in the sense that it attempts to correct for factors which might alter the demand for currency, namely income and interest rates. However, it still suffers from the problem that all of the out-of-sample forecast error of the currency demand equation is attributed to movements in the level of the black economy - a highly questionable assumption. A priori, one might have expected factors such as financial innovation to reduce the public's demand for currency below what would have otherwise been the case. That this did not happen and, in fact, actual currency holdings were higher than the projections of a traditional currency demand equation, suggests that some growth in the scale of black economy activity since the mid 1970s has occurred. While this is suggestive, nonetheless, it would again be unreliable to place too much reliance on these estimates given the limitations of the underlying methodology.

7.6 Tax simulations in a currency demand model

One of the main limitations of the currency methods outlined previously is the assumption that either all (in the case of the fixed ratio method) or a significant residual part (in the case of the Boyle method) of the movement in monetary indicators of interest is attributable to black economy activity. This is defended on the basis that the changes in currency holdings will reflect, to a large extent, movements in black economy activities driven by a desire to evade taxation. An alternative, and arguably superior, approach is to model the effect of taxation on currency demand directly. This approach enables one to determine how much of the change in the public's currency holdings are attributable to changes in taxation, and, therefore, to tax evasion and the black economy. By multiplying this estimate of 'excess' currency holdings by an appropriate measure of income velocity, it is possible to derive an estimate of black economy income. This approach was developed by Tanzi (1983).

An equation explaining the currency/M1 ratio as a function of observed income, interest rates and the tax rates (defined as the ratio of central Government tax revenue to GNP) was estimated for the period 1960 to 1992. Details of the equation are presented in Box 2.

Box 2: Currency Equation - Tanzi Approach

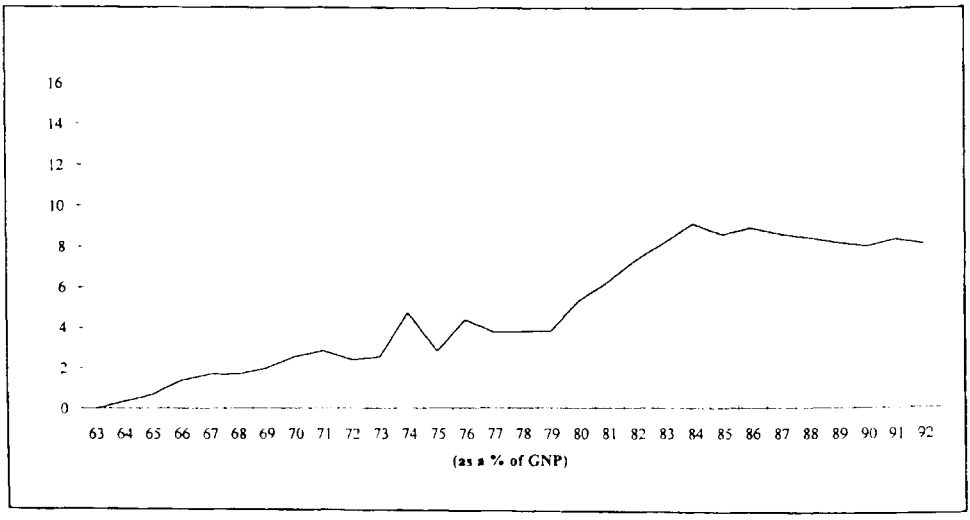
The following equation was estimated with annual data over the sample period 1960-1992:

$$\ln(C/M1) = -1.36 + 0.01 \ln(GNPV) - 0.009r - 0.01\ taxr$$
$$(18.4) \qquad (0.4) \qquad (4.1) \qquad (2.7)$$
$$R^2\ 0.8 \qquad DW\ 1.33$$

where C/M1, GNPVAL, r and taxrate are, respectively, the ratio of currency to the sum of currency plus demand deposits, the value of GNP, the yield on long gilts and the ratio of Central Government tax revenue to GNP. The tax variable is adjusted for the effects of the Tax Amnesty in 1988.

The fitted values of the equation were calculated using the actual values of the tax variable. The model was then simulated setting the tax rate its level in 1963. This amounts to assuming that the black economy was zero in 1963 and, therefore, ensures consistency with the fixed-ratio method employed above. The difference between these two sets of projections provides an estimate of 'tax-induced' currency holdings. Multiplying this by actual M1 velocity yields estimates of the size of the black economy for each year 1960 to 1990. Again, the results of this procedure are presented in Table 5 and Chart 3c.

Chart 3c: Size of the Black Economy - Tanzi Method



The trend in this measure is broadly similar to the estimates obtained from the two previous methods with the estimated black economy rising to a peak of 9 per cent of GNP in 1984 and then falling back somewhat to 8 per cent in 1992.

While theoretically sound, this method involves a number of practical difficulties. In particular, the reliability of the estimates obtained depends crucially on the correct specification and robustness of the currency demand model from which they are derived. In this context, we encounter practical difficulties. For example, relatively minor changes in the model's specification result in substantial variations in the size, sign and significance of the key tax rate parameter. In these circumstances, considerable doubt must attach to our black economy estimates derived using this method. Nonetheless, trends in our estimate which by definition mirror changes in the average tax rate, should, a priori, provide a useful guide to trends in the black economy.

Table 5 Estimates of the size of the Black Economy using Monetary Techniques

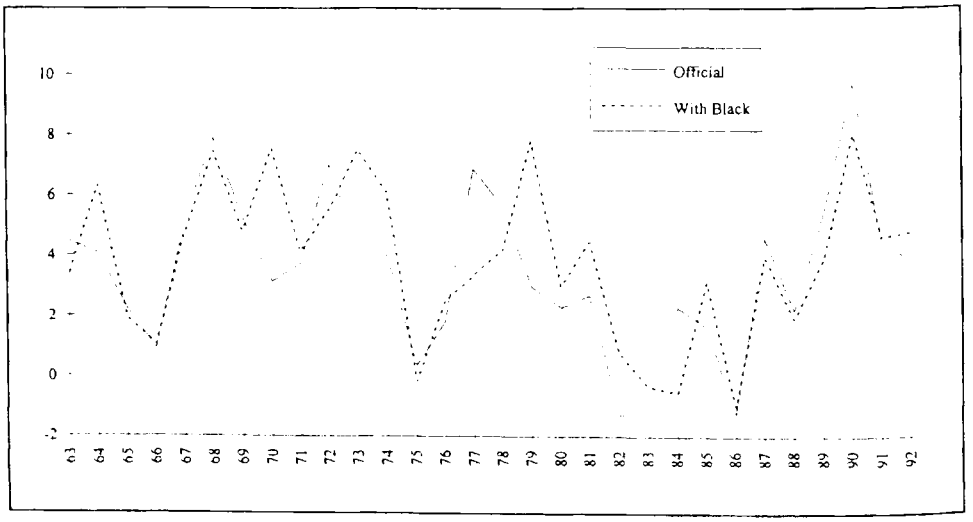
Year	Gutmann	Boyle	Tanzi	Year	Gutmann	Boyle	Tanzi
1963	0.0	n/a	0.0	**1978**	4.3	4.3	3.8
1964	2.1	n/a	0.4	**1979**	9.2	8.4	3.8
1965	1.9	n/a	0.7	**1980**	10.0	8.9	5.3
1966	2.0	n/a	1.4	**1981**	11.8	8.4	6.2
1967	1.6	n/a	1.7	**1982**	14.2	8.5	7.3
1968	1.2	n/a	1.7	**1983**	15.1	10.2	8.1
1969	0.7	n/a	2.0	**1984**	12.0	8.0	9.1
1970	5.0	n/a	2.6	**1985**	13.6	8.1	8.5
1971	5.4	n/a	2.8	**1986**	13.9	8.2	8.8
1972	3.9	n/a	2.4	**1987**	13.2	8.9	8.5
1973	7.1	n/a	2.5	**1988**	12.9	10.7	8.4
1974	9.3	n/a	4.7	**1989**	11.2	10.5	8.1
1975	8.7	1.3	2.8	**1990**	9.5	8.5	7.9
1976	9.4	2.1	4.4	**1991**	9.9	8.7	8.2
1977	5.8	1.2	3.8	**1992**	10.8	8.2	8.0

8. ECONOMIC GROWTH AND THE BLACK ECONOMY

Up to now the discussion of the impact of the black economy has centred on the effect on the *level* of GNP. An equally important issue is its impact on the *growth rate* of GNP. Does the inclusion or exclusion of black economy estimates markedly affect our conclusion about the growth of the economy? Is Feige's claim about the stagflation of the 1970s being a statistical illusion justified?
The answer to these questions depends, of course, on which estimate of the black economy is used. Generally the more volatile the estimate of the black economy, the greater will be the difference in the GNP growth rates. By way of a sensitivity analysis, we compute a series of GNP growth rates including our most volatile estimate of the black economy - which is the estimate based on the fixed currency ratio discussed above - and compare it with the official estimates of GNP growth. The results of this exercise are presented in Chart 4.

It is clear from this graph, although the two series diverge from time to time, that the broad trend in both is similar. Similarly, the average growth rate for the whole period is very similar (3.5 on the basis of official estimates as against 3.8 including our measure of the black economy).

Chart 4: Effect of Black Economy on GNP Growth



Overall, the analysis suggests that adjustment for black economy activity is not likely to result in significant changes in official growth rates. These results provide some justification for the advice of the CSO, proffered annually in the National Income and Expenditure publication, that greater reliance should be placed on year-to-year changes rather that actual levels of national accounts variables.

9. CONCLUSION

This paper has presented the results of applying a range of techniques for estimating the size of the black economy for Irish data. As is evident from the results obtained, no definitive and precise conclusions can be drawn from this exercise, since different approaches appear to yield strikingly different conclusions. Moreover, from a methodological point of view, it is evident that all of the available techniques for estimating the magnitude of the black economy suffer from significant limitations. Against this background, the conclusions from this exercise must be viewed as highly tentative.

The available evidence indicates the existence of a significant black economy in Ireland. National accounts discrepancies together with official adjustments to allow for unrecorded incomes are consistent with the existence of a black economy amounting to around 5 to 6 per cent of GNP in 1992 while estimates based on various monetary based approaches suggest a range of 8 to 10 per cent of GNP for the same year. It is noteworthy that the various monetary indicators suggest that the share of the black economy rose significantly from the 1960s to the mid-1980s in line with an increase in the tax burden before falling somewhat in the remainder of the decade.

While black economy activity may result in some underestimation in the level of GNP, there is little to suggest that its growth rate has been markedly affected. Thus Feige's claim that the size and growth of the black economy invalidates the use of official GNP growth rates for analysis and policy purposes does not seem relevant in the Irish case.

Footnote

1. Data on currency holdings and currency accounts of the private sector are taken from the IMF International Financial Statistics Yearbook, 1993

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DISCUSSION

Michael Lucey: I am very pleased to be given the opportunity of proposing the vote of thanks to Gabriel Fagan's interesting and well written paper. Being a national accountant, I obviously have a special interest in any efforts made to estimate the scale of the black economy in Ireland. Although the black economy is generally considered to be significant, surprisingly little independent research work has been done to try to quantify it. I'm glad, therefore, that this paper highlights the problems involved and provides estimates for Ireland comparable to those available in other countries. I'm also pleased to note that the author concludes that the relative size of the black economy appears to remain fairly stable from year to year. This is critical for the quality of statistics because significant year to year variations would not alone affect growth rates but would also call into question the reliability of other key indicators.

At the outset, Gabriel takes time to clarify the scope of the black economy that he intends measuring. This is very important since the terms used to describe unrecorded economic activity are often overlapping and confusing. In fact, because of this confusion, official statisticians have in the past couple of years been working to standardise terminology in this area. In this respect, I can mention in passing that conventions recently adopted differ slightly from those used in this paper. For instance, the term black economy as now used by the international statistical agencies, excludes activities that are illegal in the context of the civil code. Therefore, it is more restrictive than the definition in this paper. The wider concept which includes illegal activities is described as the underground or hidden economy. However, irrespective of the terminology differences it is quite clear what is being measured in this paper. Basically, the question asked is 'how much higher would the value of GNP be if all income arising from relevant productive activities was correctly included'?

Section 5 of the paper contains some interesting results of tax audits. The Revenue Commissioners understandably concentrate their audits on the more suspicious tax declarations so that the results cannot be used to give a true estimate of the black economy. Nevertheless, the results could be useful in establishing upper limits and in identifying activities and units most likely to be involved in such activity. It would therefore be useful to have some additional detail of the audit results. For instance, does the average yield of £10,000 in 1990 include liabilities accrued over a period of years? Does it include fines and interest penalties for late payment of taxes? It would be useful if the yield could be annualised and compared with the income amounts declared prior to audit.

Section 6 of the paper deals with the National Accounts and the gap between the Income and Expenditure based measures of GNP. This is the area that I'm most familiar with and it is probably useful to summarise some of the estimation methods

used by the CSO to measure the GNP. As described in the paper, the income estimates in the National Accounts are designed to capture, at least some, hidden economic activity. Estimates of wages and salaries are grossed up to Labour Force Survey employment control totals. Profits which are based on tax returns are adjusted upwards to allow for under-reporting. In the case of the self-employed, a significant adjustment is also made to compensate for non-reporting or the non-filing of tax returns. This latter adjustment is based on a comparison of the number of tax cases filed with the Revenue Commissioners and the number of self-employed reported in the Labour Force Survey. The comparison is undertaken at NACE sector level and, although crude, it does show significant gaps in those industries where black economy activity is considered to be most prevalent.

In 1988 some of the adjustments in sectors such as Building and Construction and the Distributive Trades were in excess of +50 per cent and could well be too high! A possible explanation is that the Labour Force Survey has been capturing an increasing number of self-employed persons who do not get into the tax system either because their earnings are too low or because their businesses operate only for a very short period of time. When the results of the enhanced 1992 Labour Force Survey becomes available it may be possible to shed further light on these matters.

While the adjustments made to the raw data significantly increase the income based estimate of GNP, the adjusted total is still well below our independently derived expenditure based estimate. Does this gap imply that there are still large amounts of black economy income not captured in the statistical system? Until the existing compilation methods are refined further it would be premature to draw such a conclusion.

The components of the income account and their relative importance are shown in Table 1 of Gabriel's paper. The breakdown of the expenditure account in 1992 was as follows:

Expenditure on Gross National Product at current market prices, 1992

Category	£million
Personal Expenditure	17,106
Net Government Expenditure	4,773
Capital Formation	4,616
Exports	18,673
Imports	-15,721
Net Factor Outflow	-3,518
Gross National Product	26,290

As explained in the paper, the gap between the separate income and expenditure measures of GNP is a residual. Therefore, it is affected also by errors or shortcomings in the components of the expenditure account. Some of these errors will be unrelated to the black economy.

Indeed, the most significant reduction in the income and expenditure gap in recent years came about as a result of the large upward revisions, earlier this year, to the level of service imports. These imports, which are largely purchases of multinationals, were already fully discounted and excluded from the tax based estimates of corporate profits. Therefore, the income based GNP was unaffected by the revisions and the increased imports meant that the gap between the two sides of the Accounts was narrowed considerably.

While revisions of this magnitude are not expected again, there are aspects of the National Accounts compilations that still need improvement. One should, therefore, wait until the existing gap can be further analysed. To this end, annual Input/Output tables are being developed which will be used to study the remaining discrepancies at a detailed sectoral level.

Moving to Section 7, we find that the estimates based on the demand for currency are higher than the tax audit or income/expenditure gap results. Of course, some hidden or unreported transactions that require currency may not be part of the official GNP estimate. Examples are illegal activities (in theory part of GNP but no one captures them) and transactions in existing goods such as second hand cars. Perhaps it is more difficult to understand why the different methods can give such conflicting results as are apparent in Table 2 of the paper. The USA, for instance, which appears to have a fairly low black economy when measured by the National Income discrepancy method fares much worse than the other countries under the fixed rates approach and the transactions method. However, using the Tanzi equation its black economy is smallest of the four countries listed. The answer may well lie in the base years used for the different methods since the absolute size of all the currency demand results appear to be very sensitive to the benchmark year selected for the calculations.

Given the variability of the estimates in Table 2, it is gratifying that the estimates for Ireland presented in Table 5 are so close together especially in recent years. Looking at the results, I was a little surprised at the apparent decline in the level of the black economy during the 1980s. During this period the self-employed sector, where black economy activities are concentrated, increased in relative importance. When farmers are excluded, the numbers of self-employed in the Labour Force Survey increased by 30 per cent between 1983 and 1990 and went from being 6.5 per cent of those at work in 1983 to over 8 per cent in 1990. Of course, even if the number of participants in the black economy increased over this period, it is still conceivable that their aggregate income could have declined as a proportion of overall GNP. At

the same time, it is perhaps worth considering whether the currency demand results could be significantly affected by factors not related to the black economy such as the widescale introduction of credit cards in the late 1980s.

Section 8 of the paper looks at the potential error in growth rates resulting from black economy activities. From a National Accountants viewpoint the results are somewhat consoling. Indeed the long term impact looks small and far less important than the consistent differences between our output and expenditure based growth measures. Looking at Chart 4, the relationship between the two series is very consistent except for the year 1970 which appears to be an outlier. Incidentally, the consistency of the growth measures will also be examined within the framework of the annual Input-Output tables mentioned earlier.

Returning again to the different methods used to estimate the size of the black economy, one other interesting exercise that can be undertaken is a comparison of the actual VAT yield in a year with the theoretical VAT yield based on the transactions recorded in the National Accounts. Using the very detailed information in the National Accounts, it is possible to identify those transactions that are liable to non-deductible VAT. For the most part, these are purchases of taxable goods and services by households, government and non-registered or exempt businesses. By applying the appropriate tax rates to the value of these transactions it is possible to derive an estimate of the theoretical VAT yield that should accrue to the Revenue Commissioners. A comparison with the actual VAT yield, adjusted for timing differences, gives the following results:

Theoretical VAT as a percentage of actual yield

Year	Percentage
1988	1.047
1989	1.091
1990	1.084

While the relationships between VAT yields and the levels of value added are complex, the above result for 1990 suggests that the amount of potentially taxable income not recorded in the VAT system is about 4 per cent of GNP. An element of this may be legitimately excluded, however, under the various threshold arrangements operated in the VAT system.

As part of EC budget calculations, similar comparisons are compiled for other Member States but these are not published. However, the available information suggests that differences for some southern European countries are much higher. This may suggest that the VAT collection systems in those countries are not well developed. In fact, such concerns were responsible in part for the revisions made in the EC Own Resources system in 1988. A new 4th resource was introduced which is directly levied on the value of Member States' GNPs. Also, the traditional VAT resource was amended, so that, for most countries, the budget contribution payable under the 3rd resource is now also determined by the size of GNP.

To ensure that these new Own Resources mechanisms were fair and equitable, a GNP Directive (89/103) was introduced governing the compilation of Member States' GNP estimates. Considerable work is being done, at present, to ensure that Member States GNP estimates are equally comprehensive and reliable. A recent Commission Decision has specified a number of projects to be undertaken for the purpose of improving the coverage of the black economy. These involve comparisons of National Accounting employment estimates with data from demographic sources, examinations of the scope and scale of benefits in kind and investigations of the potential of tax audits for providing information on the black economy in Member States.

The only one of the above projects not referred to already tonight is the impact of benefit in kind payments on GNP levels. These benefits could be substantial and may not be adequately captured in either the income or expenditure based GNP estimates. In the National Accounts, the scope of benefits in kind is very wide. As well as the traditional benefits, such as the private use of business cars, low interest rate loans, etc., the National Accounting concept also includes items such as the value of car parking facilities at work, the benefit of subsidised canteens, certain elements of travel and subsistence repayments, etc.

This work is now in hand and will obviously take time to complete. In the meantime, Gabriel's paper has shed some additional light on the scope and potential scale of the black economy in Ireland.

Once again on my own behalf and on behalf of the members of the Society I thank Gabriel Fagan for his paper and I now propose the formal vote of thanks.

Seán Moriarty: It gives me great pleasure to second the vote of thanks to Dr. Gabriel Fagan and to compliment him on his most interesting and thought provoking paper.

It is fair to say that his presentation is of particular interest to the Revenue who are niche consumers of anything written about the black economy.

I would agree with Dr. Fagan, from our experience, that the level of the black economy is extremely difficult to measure and it is interesting that this paper suggests that there is no consensus internationally as to measurement methods.

I was also interested in his analysis of the criteria and adjustments considered in calculating national income. I would agree that there is likely to be significant degree of accuracy in aggregate corporate profits returned to the Revenue Commissioners. This is because in the major companies planning for tax minimisation such as tax avoidance schemes etc. has no implications for the pre-tax profit figure. Black economy activity in owner-controlled companies takes much the same form as that which is generated by individuals to the extent that funds are diverted for the benefit of the proprietors. It is sometimes difficult to determine where the missing profits belong in these circumstances. Are they actually unrecorded corporate profits or simply additional personal earnings of the proprietors? Black economy activities are always ultimately intended to benefit individuals rather than companies. It is possibly arguable that earnings diverted from owner-controlled companies by the proprietors are personal rather than corporate income.

Again our experience coincides with Dr. Fagan's assumption that a substantial segment of the black economy is driven by fear of detection. It is probably not an exaggeration to sat that a certain core of the people involved in the black economy activity appear to regard these earnings as real reward of enterprise. In any event it appears to be sustained by people with both imagination and creativity with some of the sheltering of transactions becoming more sophisticated. Funds are channelled out of businesses in ways ranging from straightforward diversion of cash for goods, to transfers of goods at undervalue, to collusion between purchasers and sellers and even to barter arrangements.

The diverted funds appear to be partly used for consumption and partly for capital accumulation in a variety of ways ranging from disguised savings at home and abroad to undervaluation of property, stocks etc. There is also some evidence of such earnings being recycled in an extended black economy where they are paid in the form of unrecorded additional remuneration to employees etc.

It will be interesting to observe over the next few years whether in an increasingly cashless society the volume of currency in circulation will continue to provide a reliable indicator of movements in the level of the black economy. To the extent that some people are prepared to live with the risk of detection personal savings are also a potential destination for black economy earnings. In measuring GNP via the expenditure method it would appear that personal savings are one the residuals. The extent to which funds generated in the black economy find their way into personal savings can therefore be important but is, of course, difficult to evaluate where these savings cannot be independently computed.

Dr. Fagan is correct in his assumption that Revenue auditing cannot be relied upon to give realistic indicators of the extent of the black economy because of the fact that cases are not selected for audit on any kind of random basis which might allow statistical conclusions to be drawn. Any test program which might produce reasonably reliable results would need to take account of very many variables particularly sectoral variations.

The necessity to bias audit towards the areas of greatest risk will result in most audit cases being selected because of indicators from analysis or intelligence that certain issues may need verification. Cases selected at random are however likely to play some part in audit strategies in the future and experiments in other countries in this area will be monitored. Whatever happens Revenue is likely to remain the agency with the most day to day contact with the shadowy figures who inhabit the black economy and it seems likely that, in the longer term, we may be able to make some contribution to the debate on its measurement.

It does however seem that the growing influence of Revenue compliance programs is beginning to narrow the options available to people tempted to operate in the black economy and that this will be one pressure likely to reduce, to some degree, its significance in the future.

Dr. Fagan's paper takes the debate on the situation in Ireland a considerable distance forward. It is indeed a comprehensive analysis of a complex problem which is never far from the public debate in this country. I would once again like to thank him for his very valuable contribution.

Reply by Gabriel Fagan: I would like to thank both Mick Lucey and Seán Moriarty for their kind comments on my paper. Most of the commentary takes the form of providing additional information relevant to the measurement of the size of the black economy. Given the difficulties involved in this field, additional information is always helpful and, in this respect, the information provided in both commentaries is especially valuable. In particular, the envisaged improvements in the national accounts compilation procedures, outlined in Mr. Lucey's comments, should help to greatly improve the quality of the estimate based on national accounts discrepancies, while the prospect of random selection for tax auditing could mean that, in the future, a reliable tax-based estimate of the size of the black economy may be available. These developments offer the prospect of deriving more accurate estimates of the size of the black economy, although, for reasons outlined earlier, such estimates will always have a high margin of uncertainty - an occupational hazard in the field of black economy measurement.