

THE UNDERGROUND ECONOMY, THE DEMAND FOR CURRENCY
APPROACH AND THE ANALYSIS OF DISCREPANCIES:
SOME RECENT EUROPEAN EXPERIENCE

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Recent estimates of the size of the “underground economy” have used the so-called “demand for currency approach.” One of the assumptions made by these studies is that official statistics do not take into account the underground economy when estimating GDP. After setting some definitions, the paper presents a brief critical review of the method and results obtained for the European Union using this approach. It points out that the different concepts of unreported and unrecorded activities are incorrectly considered to be equivalent. The third section, after a review of the method of estimating the underground economy using the discrepancy approach, presents the new results of the authors which give an indication of the amount of the unreported activities already included in official national accounts statistics in the EU. The results of the discrepancy approach disprove the widespread belief that official statistics only include officially recorded transactions and reinforce the critical view on the results obtained with the currency-demand approach.

INTRODUCTION

In recent years there has been a return of interest in the particular topic known as the *underground economy* and particularly in estimates of the underground economy obtained by the so-called *demand for currency approach*. These studies have become a current subject of discussion in the European press. Figures are usually presented as percentages of official statistical GDP with the explicit or implicit assumption that the amounts involved should be added to the official estimate in order to get the “true” level of GDP. The implications that follow are quite far-reaching and are not confined to fiscal evasion and policies to combat fiscal evasion. In addition to being one of the most important economic indicators, GDP/GNP is also used in the EU for budget purposes and own-resources contributions by Member States and is one of the parameters defined by the stability pact. Public deficit to GDP ratios would for instance be grossly over-estimated by statistics, and the wider implications are that economic and monetary policies would be based on largely biased figures.

Among the most recent and quoted studies on the underground economy in Europe, one finds various works by Schneider. Updated calculations are now presented in Schneider and Enste (2000), together with a review of several methods used for estimating the underground economy. Schneider adopts a variant of the *monetary approach* to the measurement of the underground economy

Note: Any views expressed by the authors are not necessarily those of the European Commission.

that is based on a demand for currency equation and argues that the figures obtained represent what should be added to the official estimates. He uses the following definition of what he calls the *shadow economy*: “All economic activities that contribute to value added and should be included in national income in terms of national accounting conventions, but are presently *not* registered by national measurement agencies.”¹

Another study that has received attention and is sometimes quoted in conjunction with Schneider’s estimates is ORSEU (1995). This study however adopts a different method, based on the analysis of discrepancies, which also implies another definition of the underground economy. In contrast with the monetary methods, this method has the essential characteristic of taking official statistical figures as an accurate picture of economic reality. It then tries to estimate the size of the *underground* economy by comparing the actual receipts from taxes (or other compulsory payments such as social contributions) with the receipts that would have accrued to the State if the taxable base had been that implied by national accounts statistics. The estimated underground economy thus represents in this case a part of the total level of economic activity recorded by statistics but not reported to the tax agencies. It is therefore important, when comparing the various figures that are published, to have in mind these differences of definitions, because the results may have very different meanings.

In this paper, the first section introduces and discusses these problems of definition. In section 2, we briefly review the method and results obtained for EU Member States by the recent studies based on the currency-demand approach that have been quoted above. We do not aim for a complete review of the literature on the monetary methods, of which the demand for currency model constitutes only a particular variant.² Section 3 first reviews the discrepancy approach to the assessment of the underground economy. Next, it presents some new results obtained in Europe with this approach which give an indication of the amount of the underground economy contained in official national accounts statistics. The concluding section summarizes the main points and tries to draw some of their implications.

1. THE UNDERGROUND ECONOMY IN THE SYSTEM OF NATIONAL ACCOUNTS

Many authors have studied phenomena of undeclared and informal economic activities from various different points of view. Thomas (1992, p. 125) presents a table listing no less than fifteen different names that have been used in the literature. The various concepts analyzed are likewise far from being uniform. It is often the case that definitions diverge and overlap in intricate ways. Quite independently from questions of names, and with reference to developed countries, one can however say that the main distinction is between illegal economic activities, on the one hand, and economic activities which are legal, but are conducted in violation of fiscal or social security laws, on the other hand. Following the terminology adopted in the System of National Accounts 1993 (SNA93), one

¹See Schneider (1986, p. 643), italic in the original.

²See Feige (1989).

can call the former *illegal activities* and the latter *underground activities* (see 6.29–6.36). According to the SNA93, both are in principle included within the production boundary considered by national accounts.³

Another distinction is that between *observed* and *unobserved* economic activities. The income generated in the latter can be called, following Feige (1989), *unrecorded* income, as distinguished from the income *unreported* to fiscal authorities that is generated in the underground economy in the sense defined above.⁴ Reference is made in this case to the capability of national accounts of collecting information about the economic activities that fall within the boundary that has been defined. The statistical problem is to reduce—and ideally, to eliminate—the area of economic activity that is unobserved. This corresponds to the problem of getting an exhaustive set of estimates, as defined by Decision 94/168/EC: “Estimates are exhaustive when they cover not only production, primary income and expenditure which are *directly observed* in statistical surveys, but include production, primary income and expenditure which are *not directly observed*.”

With respect to the relationship between *unreported* and *unrecorded* activities, it should be noted that the former are not necessarily part of the latter, although it can be difficult—when using indirect methods—to distinguish how much of the total statistical estimate corresponds to the underground economy. According to the SNA93, “Because certain kinds of producers try to conceal their activities from public authorities, it does not follow that they are not included in national accounts in practice. Many countries have had considerable success in compiling estimates of production, which cover the underground economy as well as the ordinary economy. (. . .) Because the underground economy may account for a significant part of the total economy of some countries, it is particularly important to try to make estimates of total production which include it, even if it cannot always be separately identified as such” (6.36).

Therefore, it appears that the system of official statistics gives in principle full consideration to the indirect observation of the underground economy (or unreported activities). Over time, national accountants have developed a great variety of indirect methods that are used in combination, within a consistent framework of accounting constraints, to try to get estimates for economic phenomena that tend to escape direct measurement. Whether these methods have been successful in recording underground activities remains of course an empirical matter, to which we will return in section 3 below. The next section instead contains a brief review of the results produced with the currency-demand approach quoted in the introduction.

³Instead, according to Decision 94/168/EC on *exhaustiveness*, only underground activities are included within the field of study for the GNP Fourth Resource. See Hayes and Lozano (1998) for a detailed presentation of the work done in this area.

⁴Tanzi (1999, p. 344) remarks that “not so many students of the underground economy have shown awareness of the fact that there are two definitions and, thus, two measures of the underground economy: one being national production or income that is missed by statistical offices when they calculate the value of the national product; the other is revenue not reported to, and not discovered by the tax authorities produced in underground activities. The first measure of underground activities implies that the country is richer than the official statistics show. The second implies that the government receives less revenue than it should.”

2. SOME RECENT RESULTS FROM THE CURRENCY-DEMAND APPROACH IN EUROPE

The demand for currency approach has been introduced by Tanzi (1980) in a study for the United States, and has been later adopted in Europe, with some variations, by Klovland (1984) and Schneider among other authors. The method consists, first, in fitting an equation for the demand of currency, which is modeled as a function of various factors. Among these factors, the main distinction is between those that are derived from standard economic modeling and those linked to tax evasion. In the latter case, the hypothesis made is that agents need higher currency holding for their unreported transactions.

Schneider has used different variants of the following equation:

$$(1) \quad \ln \left(\frac{cur_t}{p_t} \right) = a_0 + a_1 \ln \left(\frac{cur_{t-i}}{p_{t-i}} \right) + a_2 \ln (VT_{t-i}) \\ + a_3 \ln (IR_{t-i}) + a_4 \ln (TR_{t-i}) + \varepsilon_t \quad (i = 0, 1, 2)$$

where *cur* is the per capita stock of currency in circulation and *p* the GDP deflator.

The *legal* factors included in equation (1) are *VT* and *IR*, with the following meanings. *VT* is the level of transactions, with a positive expected sign in the regression. Schneider has used several variables to proxy *VT* in different applications: real per capita GDP, the share of private consumption on GDP, real consumption per capita. *IR* is the interest rate on some short-term financial instrument having a negative expected sign in the regression. The *illegal* factors that can lead to currency holding are instead represented by *TR*, which is a measure of the tax pressure expressed by some average rate of taxation. As stated above, the idea is that the higher the tax pressure, the more people will try to evade taxes. And to do so, they will need to hold more currency for transactions.

Once equation (1) has been fitted, the expected value for currency holdings can be first calculated for a sequence of periods. Secondly, expected currency holdings can be recalculated from the same equation in which the actual time series for *TR* has been substituted with a constant minimum level of tax rate. This second series for currency will be lower than the first one throughout, provided the coefficient of *TR* is positive. The difference between the two is taken to represent the *extra* currency held in each period as a result of the presence of the underground economy. The stock of extra currency is finally converted into *extra* GDP applying the ratio: GDP/(M1—extra currency), which reflects the hypothesis that GDP does not record transactions unreported to the tax office. The results obtained with this method are summarized in Table 1, which is taken from Schneider and Enste (2000).

The table shows that, according to the authors, GDP would be underestimated in all the thirteen EU Member States considered. All countries except Austria have percentages well above 10 percent, and five countries are beyond 20 percent. The percentages are growing in all Member States during the period 1989–97. Moreover, Schneider and Enste point out that these results might be in turn underestimated because the currency demand approach can of course only take account of underground exchanges transacted in cash. We will consider the

TABLE 1
 SIZE OF THE SHADOW ECONOMY (IN PERCENTAGE OF GDP)
 USING THE CURRENCY DEMAND APPROACH

Country	Average 1994–95	Average 1996–97
Austria	7.0	8.6
Belgium	21.5	22.2
Denmark	17.8	18.2
France	14.5	14.8
Germany	13.5	14.8
United Kingdom	12.5	13.0
Greece	29.6	30.1
Ireland	15.4	16.0
Italy	26.0	27.2
Netherlands	13.7	13.8
Portugal	22.1	22.8
Spain	22.4	23.0
Sweden	18.6	19.5

Source: Schneider and Enste (2000).

implications of these results in depth in the final section, when a comparison with those of the discrepancy approach will be possible. In concluding this part, it can be added that skepticism about the results obtained with the currency demand approach has already been expressed in the literature.⁵ Despite the authors' claim that all conventional possible factors that can influence the demand for currency are taken into account in the estimated equation,⁶ one can still doubt whether this is really so, and above all, whether the elimination of the tax variable from the equation really gives as a result the demand of currency for underground transactions.

More importantly, there is the fact that the method adopted is apt to give indications of the amount of tax evasion (or unreported income), rather than of the exhaustiveness of statistics (unrecorded income). This mis-match between the definition of underground economy used by the authors and the method used to estimate it has also been pointed out by Tanzi, who first introduced this method of estimation: "It should be obvious that the estimation of the underground economy so derived is different from the one that implies a downward bias in the measurement of GNP" (1999, p. 345). Indeed, the two results would coincide only if statistics were calculated from fiscal sources, and did not as a consequence record transactions not reported to the tax office. As seen above, this is in fact the hypothesis made in the work described in this section. But this hypothesis is discredited on empirical grounds by the results of the discrepancy approaches that we examine below.

3. THE DISCREPANCY APPROACH

The idea at the base of the methods of estimating the underground economy we call the "discrepancy approach" is that it is possible to detect, at least partially,

⁵See for instance Feige (1989), Thomas (1992, 1999).

⁶See Schneider and Enste (2000), section 6.2.4. Feige has instead pointed out that GDP or final consumption are proxies of dubious reliability for the volume of transactions. Moreover, in the case of currencies like the US dollar and the German mark the effect of stocks held abroad is likely to be substantial and should be taken into account (see Feige, 1997).

the underground economy using the difference between two alternative and independent measurements of the same economic variable (e.g. income, VAT receipts, etc.). This is possible because one of these variables is calculated by national accountants while the second comes from tax data. Therefore the discrepancy between the two can be imputed, after all necessary reconciliation, to activities that are not declared to fiscal authorities but are included in the national accounts. The aims of the various studies that have used this approach are different and it is difficult to directly compare their results. The method can be applied to different tax bases (income tax, value added tax, social contributions, etc.) and the results derived refer to the given tax base, rather than to economic concepts like GDP. Nevertheless, the common and most interesting feature of this approach is that, through the analysis of the discrepancy, it demonstrates that a part of the underground economy (quantified below) is already taken into account by national accounts, thus disproving the often made assumption that official statistics take no account of the underground economy.

In fact, at least in the EU, since the late 1980s most of the statistical offices were already taking into account, by various methods, some underground economy in their statistics.⁷ At present, thanks to the joint effort of Eurostat and of all national statistical offices in the framework of the EU *exhaustiveness* decision,⁸ the set of statistical sources and methods used to record economic activity has been further improved in all Member States.⁹ Although national accounts are partially based on fiscal records, they also draw on a large number of other sources that are cross-checked within a consistent accounting framework. This also provides a solid base for the indirect observation of economic phenomena that are not easily directly observable, but makes it difficult to quantify the size of the total adjustment made to have an exhaustive coverage of the economy. Hence the usefulness of the discrepancy approach, which helps quantifying *ex post* the degree of adjustment by comparing final national accounts estimates with pure fiscal data.

We will first review some previous contributions by Macafee (1980) for Great Britain, Park (1998) for the United States and Van Der Laan and De Vaard (1985) for the Netherlands. Then in section 3.2 we will present the results obtained by recent studies undertaken by the European Court of Auditors and by Eurostat in relation to Value Added Tax fraud in the EU.

3.1. *Comparison of Estimated Income Starting from National Accounts Data With the Income Fiscally Declared*

In an early contribution, Macafee started from the observation that, in the United Kingdom, measurements of the GDP according to the income approach

⁷For instance, the French national accountants carry out three types of explicit corrections: raising for fraud and tax avoidance; raising for fraud on the VAT “without purchaser’s agreement”; and raising for “moonlighting.” The whole of the corrections leads to a 4.3 percent raising of GDP. For further details on France see Willard (1989). For the Italian case see Siesto (1987) and subsequent publications by the Italian statistical office.

⁸Commission Decision of 22 February 1994, 94/168/EC, Euratom: on measures to be taken for the implementation of Council Directive 89/130/EEC, Euratom on the harmonization of the compilation of gross national product at market prices. *Official Journal*, L077, p. 0051–0058.

⁹See Hayes and Lozano (1998).

and the expenditure approach were almost completely independent. In addition, the author considered that the GDP expenditure approach, mainly estimated starting from household surveys, is less affected by the underground economy because households do not hide their expenditure from investigators (except for certain goods such as alcohol, tobacco and gambling), whereas the income estimated starting from tax data is certainly underestimated because of tax evasion. In order to refine the analysis of this difference, Macafee eliminated the temporal shifts and the other differences and arrived at the residual error (RE) that he considered as an indicator of concealed income and therefore of most of the underground economy. The remainder of the underground economy, which includes the incomes and the expenditure that is taken into account neither in the expenditure approach nor in the income approach is not integrated by this calculation. According to the estimate of the author, the size of the residual underground economy varied, between 1960 and 1978, from less than 1 percent to 4 percent of the GDP.

The Bureau of Economic Analysis (BEA) of the United States is regularly evaluating the amount of the difference between income fiscally declared to the Internal Revenue Service and income derived from national accounts. A reconciliation of concepts and definition is carried out on national accounts figures to derive an alternative measure of the Adjusted Gross Income defined by the tax law. The difference between BEA and IRS figures, called the Adjusted Gross Income (AGI) gap, is mainly considered as income earned but not reported for tax purposes and is therefore an indicator of the underground economy.¹⁰

Park (1998) estimated the AGI gap for the period 1947–96. The results of this study are shown in Figure 1.

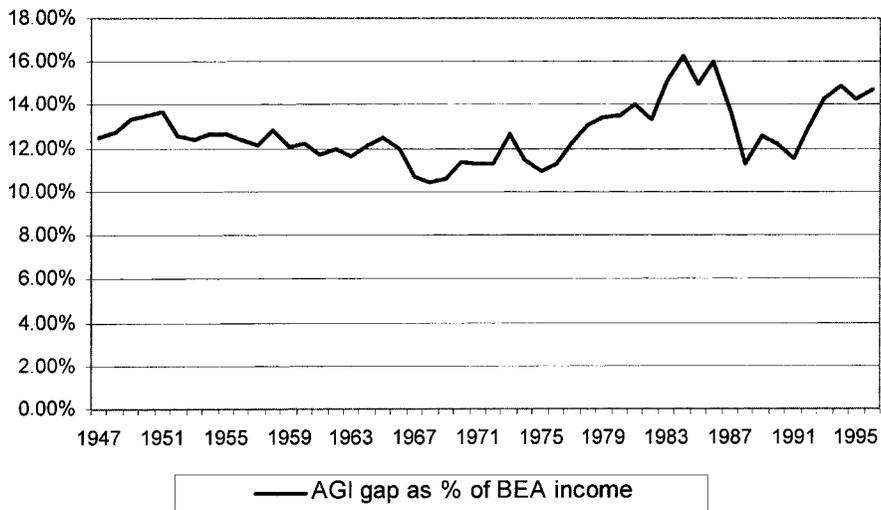


Figure 1. Adjusted Gross Income Gap in the USA (as a percentage of the BEA estimated income 1947–96)

¹⁰See in particular Park (1998, p. 16), “Overall, BEA believes that the explicit and implicit adjustments for misreporting account for a major part of the AGI gap.”

One interesting result of Park's estimate is that, in the long period under analysis, unreported income has increased at an average annual rate of 7.6 percent, compared with an average growth rate of 7.3 percent of personal income. In other words, unreported income, as a proportion of personal income, remained quite stable around 13 percent over a 50-year period.

In the Netherlands, Van Der Laan and De Vaard made a similar comparison in 1985 between income statistics and the national accounts, which is based on premises similar to the ones of Park. In fact, also in the Netherlands more than 80 percent of national accounts are based on non-fiscal data, while income statistics are mainly based on fiscal data. Therefore, an analysis of the difference between these statistics is considered to be an indicator of the size of underground economy already included in national accounts. The result of this study is that some 5.5 percent of total income was already included in NA in addition to that reported to fiscal agencies, as shown in Table 2. For further details on the Dutch experience, the reader is referred to Kazemier (1993).

TABLE 2
PRIMARY INCOME OF HOUSEHOLDS, ACCORDING TO THE NATIONAL ACCOUNTS AND THE INCOME STATISTICS IN THE NETHERLANDS

	1977	1979	1981	1983	1985
Income statistics (adjusted)	192.2	223.9	246.0	264.6	283.8
National accounts (NA)	203.0	235.3	258.2	282.9	301.6
Difference as % of the NA	5.3%	4.8%	4.7%	6.5%	5.9%

3.2. Comparison of the Theoretical and Effective Yield of Value Added Tax

In the framework of the work concerning VAT fraud, Eurostat (1997) and the European Court of Auditors have estimated the difference between the theoretical and actual VAT receipts.¹¹ The method adopted has as a starting point the calculation of the VAT which would be paid if all the taxpayers paid the tax according to the transactions recorded in national accounts (*theoretical VAT*). The calculation of the theoretical VAT is carried out annually, starting from the data of national accounts, by all the Member States within the framework of the calculation of the VAT own resource base which they pay to the Community budget. Having calculated the theoretical VAT, one can find the difference between this theoretical VAT and the actual receipts of the VAT. Dividing then the missing receipts by the weighted average rate of VAT, one finally arrives at the undeclared VAT base.

It should be pointed out that these studies did not have as initial aim the evaluation of the underground economy, but rather the estimate of VAT fraud. It seems, however, that the VAT fraud can serve as a good indicator of the part of underground economy included in national accounts, because of the rather general field of application of VAT to transactions in goods and services. Nevertheless, it should be pointed out, first, that the theoretical VAT base represents on average between 55 percent and 70 percent of GDP, depending on the Member

¹¹A similar approach has been used by the study of ORSEU (1995) that has been quoted at the beginning.

TABLE 3
UNDECLARED VAT BASE IN 1995 AS A
PERCENTAGE OF THE THEORETICAL
VAT BASE

Austria	11.70%
Belgium	20.60%
Denmark	5.70%
Finland	11.10%
France	7.40%
Germany	6.50%
Greece	28.10%
Ireland	7.40%
Italy	32.90%
Luxembourg	2.60%
Netherlands	2.90%
Portugal	13.80%
Spain	28.60%
Sweden	4.70%
UK	19.10%

State. Second, the value added taxed by VAT does not coincide either with taxable income or with statistical value added, the main differences from the latter being the full deductibility for VAT of investment purchases and the existence of activities that are exempted from VAT.¹²

The results obtained from the comparison between theoretical VAT and VAT receipts, are shown in Table 3, which contains the undeclared VAT base for the year 1995 (expressed as a percentage of the theoretical VAT base). This is represented graphically in Figure 2.

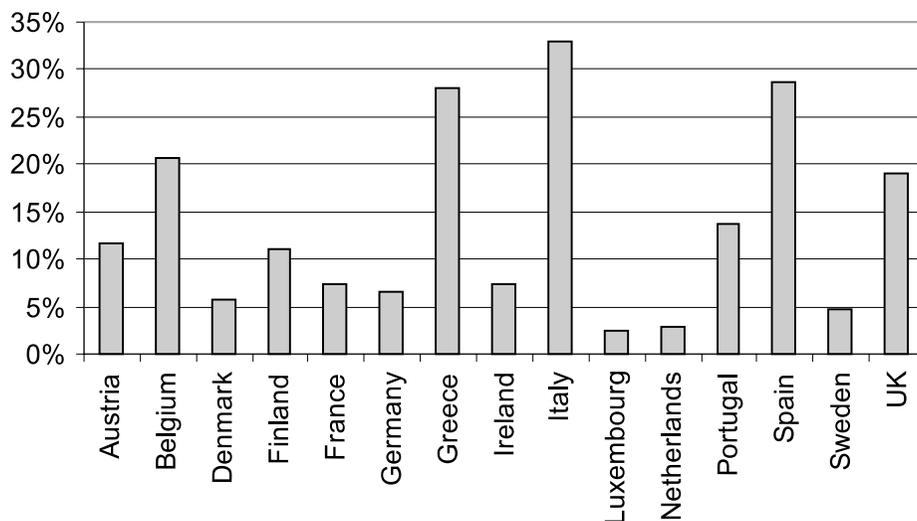


Figure 2. Undeclared VAT Base in 1995 as a Percentage of the Theoretical VAT Base

¹²Exempted activities are however taxed at a previous stage, i.e. when exempt producers pay VAT on their purchases of inputs that they cannot deduct later on.

4. CONCLUSIONS

As mentioned above, the results obtained with the discrepancy approach indicate to what extent the underground economy, in the sense of activities unreported to the tax authorities, is already included in official statistics and disprove the widespread belief that official statistics only include officially recorded transactions.

Another implication is that in Schneider's version of the currency-demand approach, the incorrect identification of *unreported* and *unrecorded* activities also leads to results expressed as percentages of GDP, overlooking the fact that statistical GDP does not express any actual tax base. The reference to a clearly defined tax base is instead, according to the present authors, a point of strength of the method based on discrepancies. Some authors have already commented that the results obtained with the currency demand approach would suggest an extraordinarily high level of irregular activities. In respect of this, one may also, in conclusion, observe that the figures involved are in fact even higher than they *prima facie* appear, when they are compared to those components of statistical value added that could possibly be underestimated because of the difficulties involved in recording the underground economy.

To illustrate this point, one can again take 1995 as an example. In 1995, EU GDP was equal to 6581 billion ECU. Of this total, imputed components (i.e. imputed rents of owner-occupiers and government capital consumption, which cannot have anything to do with any estimate produced with a monetary method) represented 6.8 percent. Second, there is an important component of value added that cannot be either under-recorded or evaded, namely compensation of general government employees, another 11.5 percent of GDP at the EU level in 1995.¹³ So the 16.5 percent (or 1085 billion ECU) of *shadow* additional GDP calculated by Schneider and Enste¹⁴ should already be read as representing about 20.2 percent of the part of value added that remains after these deductions (that is to say, 81.7 percent of GDP, or 5375 billion ECU). This calculation of the part of value added that can, in a general sense, be related to cash transactions and evasion has been thus far quite conservative. It suffices to think of cases such as water and energy supply, other utilities, air and railways transport, or such as firms that sell goods and services to the government, to see that another large part of private value added can have little to do with the cash-transactions mechanism analyzed by the currency-demand approach.

Even without considering these elements, it remains to say that taxes and contributions (excluding the part paid by government employees) in turn amounted in 1995 to about 2630 billion ECU, thus leaving a net value added of 2745 billion ECU. This rough calculation would therefore lead to the conclusion that underground additional value added, as estimated in Schneider and Enste represented in 1995 nearly 40 percent of legal value added net of taxes and contributions, and exclusive of the GDP components that have been deducted in the first place.

¹³Data for GDP and its components are taken from Eurostat online database NewCronos.

¹⁴16.5 percent is the average that can be calculated for the EU as a whole (see Table 1, column "average 1996–97") using Member States GDP as weights. Luxembourg and Finland are not included, but they represented only 1.7 percent of EU GDP.

The result would of course be higher for those countries characterized by higher than average ratios. More importantly, the different scale of the government sector in the various countries would alter the results contained in Table 1 in fairly different ways. For example, in terms of private value added gross of taxes and contributions, countries such as Sweden (25.7 percent) and Denmark (24.4 percent) would become very close to Spain (27.6 percent) and Portugal (29.3 percent). If taxes and contributions are deducted from the reference base, Scandinavian countries reach percentages close to 70 percent, whereas Spain and Portugal stand around 50 percent. These are additional elements that reinforce the skeptical view of the results of the currency demand approach that already exists in part of the literature on the underground economy.

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