A joint Initiative of Ludwig-Maximilians-Universität and Ifo Institute for Economic Research

Working Papers

MEASUREMENT OF VALUE ADDED TAX EVASION IN SELECTED EU COUNTRIES ON THE BASIS OF NATIONAL ACCOUNTS DATA

Chang Woon Nam
Rüdiger Parsche
Barbara Schaden

CESifo Working Paper No. 431

March 2001

CESifo

Center for Economic Studies & Ifo Institute for Economic Research
Poschingerstr. 5, 81679 Munich, Germany

Tel.: +49 (89) 9224-1410
Fax: +49 (89) 9224-1409
e-mail: office@CESifo.de

CESifo *Working Paper No. 431*
March 2001

MEASUREMENT OF VALUE ADDED TAX EVASION IN SELECTED EU COUNTRIES ON THE BASIS OF NATIONAL ACCOUNTS DATA

Abstract

The size of tax evasion and fraud appears to be increasing steadily in the EU. To a certain extent, the completion of Single Market has further encouraged firms' and households' evasive behaviour in paying value added taxes in the EU Member States, whereas such efforts have traditionally been most pronounced in the field of corporate and personal income taxation. This study primarily deals with the quantification of the VAT evasion and fraud in the EU. On the basis of the national accounts data, it suggests a novel way of estimating the annual amount of hypothetical VAT revenues for the individual EU countries. The relation between the calculated hypothetical and the (current) collected revenues in a fiscal year largely determines the extent of VAT evasion and fraud of a country, when the time-lag problem between the creation of tax liability and the VAT collection in cash terms can be adjusted.

JEL Classification: F02, K42, O17, H25, H26, H87

Chang Woon Nam
Ifo Institute for Economic Research
Poschinger Str. 5
81679 Munich
Germany
e-mail: nam@ifo.de

Rüdiger Parsche
Ifo Institute for Economic Research
Poschinger Str. 5
81679 Munich
Germany
e-mail: parsche@ifo.de

Barbara Schaden
Ifo Institute for Economic Research
Poschinger Str. 5
81679 Munich
Germany
e-mail: schaden@ifo.de

Introduction

Although there are controversies existing about the definition of tax evasion and the shadow economy, their size seems to be growing steadily in the EU and in other OECD countries (Schneider and Enste, 2000; Schneider, 2000b; OECD, 1997). In particular, the burden of direct and indirect taxation, the complexity of the entire tax and social transfer system as well as the intensity of government regulation have been empirically identified as the major causes of encouraging such illegal or hidden economic activities. To a certain extent, the recent implementation of the Single Market appears to have increasingly stimulated firms' and households' evading behaviour of paying value added taxes in the EU Member States, while the tax evasion and fraud has traditionally been most serious in the field of corporate and personal income taxation.[1] In other words, the abolition of the border controls for intra-EU trade accompanied by the less well-established administrative co-operations of the (rather problematic) nation-specific EDP (electronic data processing) control systems has probably provided further opportunities to easily realise their VAT evasion efforts in the EU (Parsche, Steinherr and Waller, 1996).[2]

---

[1] In OECD countries general consumption taxes, especially value added tax (VAT), belong to the fastest growing revenue sources together with contributions to finance social security. The former tax item produced ca. 18% of total tax revenues in 1998, compared with only 12% in the mid-1960s (OECD, 1999).

[2] VAT control is still a national question in the EU. Yet, the Commission is highly interested in effective taxation and control in all Member States, for VAT contributes to the EU budget. Today, the need for audits under the transitional VAT system is much greater than before 1993, when cross-border transactions were scrutinised by border controls. However, insufficient financial resources are presently provided by the individual countries for this purpose. In addition, EU Member States have kept their own (nation-specific) VAT control methodology in spite of the creation of the internal market. Furthermore, some countries and regions are unwilling to improve the tax control, for this could reduce competitive advantages of indigenous firms against those foreign companies with higher tax compliance. Nowadays the tasks regarding the administration and control on VAT matters are increasingly transferred to local and regional authorities. Emphasising the so-called subsidiarity principle, this development can be positively interpreted as a necessary measure to enhance the control efficiency, since the local authorities have better information about local taxpayers. On the other hand,

Different types of empirical methods have been recently adopted to measure the size of tax evasion and informal economy, which range from a direct survey to a sophisticated, dynamic econometric model. All these methods have advantages and shortcomings at the same time (Schneider, 2000a and 2000b; Schneider and Enste, 2000; Lippert and Walker, 1997; Feige, 1989). According to Schneider (2000a) and Thomas (1992), these approaches can be largely differentiated into three:

- micro approaches based on surveys (e.g. about income declared for tax purposes) among taxpayers and tax auditing (Isachsen, Klovland and Strom, 1982; Mogensen, Kvist, Körmendi and Pedersen, 1995),
- macroeconomic approaches calculating the discrepancies between income and expenditure statistics (MacAfee, 1980; Del Boca, 1981) as well as between the official (i.e. registered) and actual labour force (Contini, 1981); the monetary approach based on the Fisher quantity equation (Feige, 1979; 1996); the popular currency demand method measuring the correlation between the currency demand and the tax pressure (Tanzi, 1982); and the physical input method observing relations between (official and unofficial) GDP and electricity consumption (Kaufmann and Kaliberda, 1996; Johnson, Kaufmann and Schleifer, 1997; Lacko, 1998), and
- (dynamic) multiple-indicators and multiple-causes econometric models which consider various macroeconomic determinants for creating a shadow economy (i.e. the burden of taxation and regulation, tax morality, etc.) and attempt to explain their effects in the development of production, labour and money markets simultaneously (Aigner, Schneider and Ghosh, 1988; Schneider, 2000a; Frey and Weck-Hannemann, 1984).

Unlike the larger share of conventional empirical analyses which emphasise the predominance of direct taxation and measure the total size of tax evasion for the entire domestic economy of a country, this study primarily deals with the narrow aspect of tax evasion in the specific area of EU value added taxation. On the basis of the national accounts data, it suggests a novel way of estimating the annual amount of hypothetical VAT revenues of the individual EU countries, which are assumed to be the maximum

---

such an assignment could more easily lead to permitting tax evasion and fraud on the local level (Europäische Kommission, 1995, 1997 and 2000).

level of VAT revenues the country can ideally collect in a fiscal year. When the mismatch in timing between the creation of tax liability and the VAT collection in cash terms can be adjusted, the relation between the hypothetical and the (current) collected revenues indicates the tax collection performance of a country, from which the extent of VAT evasion and fraud (as well as suspension of tax claims caused by bankruptcies) can also be derived for the country.

Method of Calculating VAT Evasion Based on National Accounts Data

As mentioned above, the extent of the VAT evasion and fraud in the individual EU countries is largely determined by the difference between the hypothetical and the collected VAT revenues in a given fiscal year. The latter can be easily obtained from the official statistics, while the former should be estimated for comparison purposes. For the calculation of the hypothetical VAT revenues of a country, national accounts data and input-output tables published by the national statistical office, annual reports of various state-owned companies and other relevant statistics are adopted as the VAT base.[3] In particular, the statistics and data on private consumption, intermediate consumption and investment of central and local governments apparently play the most important role for the assessment, together with those on business performance of banks and insurance companies which are not entitled to deduct input VAT.

In other words,

---

[3] To a certain extent shadow activities are currently included in the national accounts of the individual EU countries. Yet, the methods for correcting official statistics for this purpose still vary from one country to another. The European System of Accounts (ESA) of 1995 prescribes to adopt all possible approaches to quantify (implicit and explicit) additions so that illegal and hidden economic activities can be exhaustively included in GDP. Even if this goal were achieved, the exact share of shadow activities would not seem to be easily identified. In general, national statistical offices can hardly provide detailed information on the part of GDP attributed to these shadow activities. Only some sector-specific, explicit additions are relatively well captured in the relevant statistics and can be separated rather easily.

$$(1) \qquad \textit{Tax collection performance ratio} = \frac{\textit{Collected VAT revenues}}{\textit{Calculated hypothetical VAT revenues}} .$$

Hence,

$$(2) \qquad \textit{Ratio of VAT evasion} = 1 - \textit{Tax collection performance ratio} .$$

In the quantification of hypothetical VAT revenues, for example, the component 'private consumption' of the national accounts data is differentiated into taxable and non-taxable (or tax-exempted) categories. As indicated in the national VAT law, the normal and the reduced rates are then allocated systematically corresponding to the individual items of private consumption, from which one can calculate the hypothetical VAT revenues for this area. Yet, it should be borne in mind that the national accounts data on private consumption are generally expressed in gross terms, which means that these values already contain the VAT amounts. As a consequence, the so-called gross VAT rates are used for the calculation purpose instead of the net tax rates.

The gross VAT rate is defined as

$$(3) \qquad \textit{Gross VAT rate} = \frac{\textit{Net VAT rate}}{1 + \textit{Net VAT rate}} .$$

In the case that a consumption position cannot be entirely assigned to a VAT rate but encompasses a number of sub-items which are subject to varied tax rates, a weighted gross rate is implied. The weighting scale for the total position is usually derived from the different shares of the sub-items in this consumption category.

Table 1 Value added tax rates in the EU Member States

	(Net) VAT rates in 1996 #	
	Normal rate in %	**Reduced rate in % ***
Austria	20	10
Belgium	21	6 and 12
Denmark	25	–
Finland	22	6, 12 and 17 ***
France	20.6	5.5 and 7
Germany	15 **	7
Greece	18	4 and 8
Ireland	21	12.5
Italy	20	4 and 10
Luxembourg	15	3, 6 and 12
Netherlands	17.5	6
Portugal	17	5 and 12
Spain	16	4 and 7
Sweden	25	6 and 12
United Kingdom	17.5	–

In this study the quantification is carried out for the years 1994, 1995 and 1996. For this reason, the 1996 VAT rates are indicated here.

* In general the reduced rates are imposed on the consumption of agricultural products, foodstuffs, books, and certain medical and pharmaceutical products and equipment as well as paintings and antiques. Exports are subject to the zero rate.

** Since 1 April 1999 16%

*** Since 1 January 1998 only two reduced rates: 8% and 17%

Source: Mennel and Förster (1999), Steuern in Europa, Amerika und Asien, Herne/Berlin.

Analogously one can also measure the input VAT burden of governments, banks and insurance companies, private non-profit organisations as well as those activities and

industries like private lessons, renting houses and apartments, market-oriented health services, postal services, lottery, etc. which are, due to the tax-free (or exempt) sales of goods and services, not subject to the input tax deduction in most cases. Special tax regimes like the flat rate taxation for farmers, the taxation of margins for travel agencies, and the SME-specific rule cause some additional efforts in collecting and elaborating relevant statistics, for these firms are also allowed to opt for the normal taxation. Furthermore, it should be additionally taken into account that in many countries the input tax deduction is (fully or partially) limited also for taxable private firms when purchasing certain services and durable (investment) goods like cars and corresponding expenditures for maintenance and repair work as well as gasoline.

Some quantification difficulties may arise when the territorial scope of the VAT law does not tally with the territorial reporting area covered by the national accounts (see the case of Åland Island with the mainland of Finland). The same applies when the VAT law provides for tax rates that differ by region (see the case of Corsica in France). In both cases, a precise quantification is possible only if corresponding regional statistics are available. An additional measuring problem can emerge when certain items are recorded in the national accounts which are not connected with purchases of relevance for VAT purposes (e.g. imputed rents for house or apartment owners or additions for shadow economy), and in particular when these items are not indicated separately but incorporated into other items, with the result that a recalculation is hardly possible.

A more serious problem for the quantification of VAT evasion based on national accounts data is caused by the discrepancy between the tax revenues on an origin basis (i.e. the creation of tax liability) and the collected cash revenues in a given period of time. The latter differs from the former owing mainly to the factors like payment periods, back payments and deferred payments. In other words, the calculation of hypothetical revenues for a fiscal year is made on the basis of current national accounts data, which delivers, therefore, the sum of VAT revenues on an origin basis for the same year. In practice, however, the VAT imposed on households consumption (and on the investment and intermediate consumption of governments, financial institutions, private non-profit organisations, etc.) made at the end of December of the preceding year, for example, can only be effectively (i.e. in cash terms) transferred by firms to tax authori-

ties in January of the current year. At present this type of formal VAT collecting process usually takes approximately a month (see e.g. the case in Germany). As a consequence, a significant share of tax revenues actually originated from the purchases of goods and services in December of the preceding year is (in cash terms) collected later and recorded as the revenues of January of the current fiscal year. For the adjustment of such a time-lag problem the January revenue value of the individual years is thus particularly relevant. Since the monthly amounts of collected tax revenues are hardly available for the investigated EU Member States, a tenth of the preceding year's revenues on an origin basis is simply allocated for all countries (except Spain) as the part of the corresponding type of VAT revenues for the current fiscal year.[4] Furthermore, an additional deduction of 1% of revenues on an origin base of a fiscal year is made in the quantification to adequately consider the significance of suspending tax claims caused by bankruptcy and other types of tax waiving of the same year.[5]

Major Findings of the Empirical Analyses on VAT Collection Performance and VAT Evasion in the EU

Table 2 and 3 summarise the tax collection performance ratio and the VAT evasion ratio for the selected EU Member States in the period 1994-1996. For France, Italy and the UK the corresponding values for the years between 1991 and 1993 are adopted for the comparative purposes (Parsche, Steinherr and Waller, 1996). Among those investigated nations, Italy, Spain, Greece and Belgium had the highest VAT evasion and fraud rates

---

[4] Spain is an exception. Regardless of reduced or normal rates, this country increased its VAT rate by 1% in 1995. Due to the three month tax payment period, the collected VAT revenues in 1995 contain the first quarter the revenues from the lower taxes (3%, 6% and 15%) and the rest from the higher ones (4%, 7% and 16%). The corresponding time-lag adjustment is made on the basis of this fact.

[5] Such types of statistical adjustment and deductions can be done more accurately by national statistical offices on the basis of nation-specific method and period of tax payment, seasonal fluctuation of consumption and tax income as well as insight information on bankruptcies and other sorts of tax waiving.

in the observed years which are derived from the lowest tax collection performance figures. By contrast, tax evasion appears to be less serious in the Netherlands, Denmark and the UK, which have recently enjoyed tax collection performance values of around 95% in the same period of time. By and large, these empirical findings correspond well to the major outcomes of the previous studies by Schneider and Enste (2000) and Schneider (2000b) which measure the size of shadow economy (as a percentage of official GDP) in advanced economies based on the so-called currency demand approach.

Furthermore, while the ratio of VAT evasion and fraud more or less stagnated on a high level in Italy and Greece, the same ratio tended to slightly decrease in the low tax evasion countries like Denmark and the Netherlands between 1994 and 1996. Germany suffered from a rapid growth of VAT evasion in the three subsequent years after the introduction of Single Market in 1993.[6] A positive correlation between the extent of tax evasion and the level of tax rates is less distinct in the investigated years (see the low evasion ratio of Denmark with the high normal rate of 25% and the vice versa for Spain with 16%).[7]

---

[6] If this trend has maintained in Germany, the annual sum of tax evasion and fraud is anticipated to have recently reached higher than 20 billion DM in the area of value added taxation.

[7] To a certain extent, this empirical finding conflicts with the general argument for broadening the tax base and lowering tax rates to reduce the economic incentive to go underground. Other popular measures aimed at reducing the size of tax evasion and fraud are (a) simplifying the administration of various taxes, (b) considering tough enforcement, (c) increasing international co-operation for sharing tax information and (d) building a better information base for tax evasion with resources of statistical office, ministries of finance and tax authorities, etc.

Table 2 Tax collection performance ratio in the selected EU Member States for 1994-1996 (in %)

	1994 (1991)	1995 (1992)	1996 (1993)	Average
Belgium	82.0	80.1	79.9	80.7
Denmark	95.5	95.7	96.2	95.8
France *	91.9	91.5	90.2	91.2
Germany	98.3	94.8	92.5	95.2
Greece	80.2	79.5	79.7	79.8
Italy *	66.8	64.5	65.1	65.5
Netherlands	96.2	98.3	98.4	97.6
Portugal	86.1	87.0	84.4	85.8
Spain	80.8	75.4	76.0	77.4
United Kingdom *	99.6	95.6	93.5	96.2

* For the countries France, Italy and the United Kingdom, annual hypothetical VAT revenues were calculated by Parsche, Steinherr and Waller (1996) for the period 1991-1993. Their calculation was based on the old national statistical system prior to the introduction of the European System of Accounts (ESA) in 1995, in which these countries compiled and classified economic data according to their own rules and definitions. Compared to the cases in France and Italy, the size of shadow economy was less sufficiently considered and included in the UK when calculating the country's national accounts data for the years between 1991 and 1993.

Sources: National accounts and tax revenue statistics of the investigated countries; Eurostat (1997), National Accounts ESA 1980-1995, Luxembourg/Brussels; Calculations of the Ifo Institute for Economic Research, Munich.

Table 3 Ratio of tax evasion in the selected EU Member States for 1994-1996 (in %)

	1994 (1991)	1995 (1992)	1996 (1993)	Average
Belgium	18.0	19.9	20.1	19.3
Denmark	4.5	4.3	3.8	4.2
France *	8.1	8.5	9.8	8.8
Germany	1.6	5.2	7.5	4.8
Greece	19.8	20.5	20.3	20.2
Italy *	33.2	35.5	34.9	34.5
Netherlands	3.8	1.7	1.6	2.4
Portugal	13.9	13.0	15.6	14.2
Spain	19.2	24.6	24.0	22.6
United Kingdom *	0.4	4.4	6.5	3.8

* See Table 2.

Sources: National accounts and tax revenue statistics of the investigated countries; Eurostat (1997), National Accounts ESA 1980-1995, Luxembourg/Brussels; Calculations of the Ifo Institute for Economic Research, Munich.

Conclusion

In recent years VAT has remained as one of the major revenue sources in the EU. This study introduces a new method of measuring the tax evasion and fraud in the specific area of VAT. Its extent is basically determined by the comparison of the size of calculated hypothetical revenues to that of the collected cash revenues in a fiscal year. In addition the time-lag problem between the creation of tax liability and the VAT collection in cash terms is adjusted in a systematic way.

In the field of value added taxation in the EU, countries like Italy, Spain, Greece and Belgium particularly suffered from the serious tax evasion and fraud in the investigated period between 1994 and 1996.[8] By contrast, the average tax collection performance ratio reached fortunately over 95% in the Netherlands and Denmark. Germany had the fastest growth of VAT evasion after the introduction of Single Market in 1993. A positive correlation between the tax evasion and the level of VAT tax rates was less significant in the EU. In general, co-operative efforts and harmonised measures for the tax control and enforcement as well as the establishment of a better information base for tax evasion appear to be required in the EU in order to enhance the VAT collection performance in the individual countries.

To be sure this type of quantification depends very strongly on the quality of national accounts data, input-output tables and other relevant official statistics as well as VAT revenue data available for the individual countries. Improvement of their quality and availability is still necessary in the context of the EU-wide co-operative network among national statistical offices and tax authorities. Such statistical upgrading will make not only the measuring process more convenient but also the outcomes more accurate.

A systematic, long-term oriented analysis is required to deliver the more comprehensive view on the general trend of VAT evasion in the EU and its change caused by the introduction of the Single Market in 1993, which cannot be done without the elaboration of relevant data for the years prior to this event. Such future empirical research will also provide opportunities to examine the impact of a number of national VAT reforms and/or the EU-wide tax harmonisation efforts on the size of tax collection performance and VAT evasion and fraud in the EU Member States.

References

Aigner, D., F. Schneider and D. Gosh (1988), Me and My Shadow: Estimating the Size of the US Hidden Economy from Time Series Data, in: Barnett, E., R. Berndt and H.

[8] For Italy between 1991 and 1993.

White (Eds.), *Dynamic Econometric Modelling*, Cambridge (Mass.): Cambridge University Press, 224-243.

Contini, B. (1981), Labour Market Segmentation and the Development of the Parallel Economy — The Italian Experience, *Oxford Economic Papers*, Vol. 33, No. 4, 401-412.

Del Boca, D. (1981), Parallel Economy and Allocation of Time, *Micros (Quarterly Journal of Microeconomics)*, Vol. 4, No. 2, 27-57.

Europäische Kommission (1995), *Verfahren der Mitgliedstaaten zur Erhebung und Kontrolle der Mehrwertsteuer, Zweiter Bericht nach Verordnung (EWG, Euratom) No. 1553/89, Art. 12*, Brussels and Luxembourg: Amt für Amtliche Veröffentlichungen der EU.

———— (1997), *Verfahren der Mitgliedstaaten zur Erhebung und Kontrolle der Mehrwertsteuer, Dritter Bericht der Kommission, Artikel 12 der Verordnung (EWG, Euratom) No. 1553/89, KOM(96) 681 endgültig vom 8.1.1997*, Brussels.

———— (2000), *Dritter Bericht gemäß Artikel 14 über die Anwendung der Verordnung (EWG) No. 218/92 des Rates vom 27. Januar 1992 über die Zusammenarbeit der Verwaltungsbehörden auf dem Gebiet der indirekten Besteuerung (MwSt.) und Vierter Bericht gemäß Artikel 12 der Verordnung (EWG, Euratom) No. 1553/89 über Verfahren zur Erhebung und Kontrolle der MwSt., KOM(2000) 28 endgültig vom 28.1.2000*, Brussels.

Eurostat (1997), *National Accounts ESA 1980-1995*, Luxembourg and Brussels.

Feige, E.L. (Ed. 1989), *The Underground Economies. Tax Evasion and Information Distortion*, Cambridge et al.: Cambridge University Press.

———— (1996), Overseas Holdings of U.S. Currency and the Underground Economy, in: Pozo, S. (Ed.), *Exploring the Underground Economy*, Kalamazoo: Michigan, 5-62.

Frey, B. S. and H. Weck-Hannemann (1984), The Hidden Economy as an "Unobserved" Variable, *European Economic Review*, Vol. 26, No. 1, 33-53.

Isachsen, A.J., J. Klovland and S. Strom (1982), The Hidden Economy in Norway, in: Tanzi, V. (Ed.), *The Underground Economy in the United States and Abroad*, Heath: Lexington, 209-231.

Johnson, S., D. Kaufmann and A. Shleifer (1997), *The Unofficial Economy in Transition*, Brookings Papers on Economic Activity, Fall, Washington DC.

Kaufmann, D. and A. Kaliberda (1996), *Integrating the Unofficial Economy into the Dynamics of Post Socialist Economies: A Framework of Analyses and Evidence*, The World Bank Policy Research Working Paper No. 1691, Washington DC.

Lacko, M. (1998), The Hidden Economies of Visegrad Countries in International Comparison: A Household Electricity Approach, in: Halpern, L and Ch. Wyplosz (Eds.), *Hungary: Towards a Market Economy*, Cambridge (Mass.): Cambridge University Press, 128-152.

Lippert, O. and M. Walker (Eds. 1997), *The Underground Economy. Global Evidence of Its Size and Impact*, Vancouver: The Fraser Institute.

MacAfee, K. (1980), A Glimpse of Hidden Economy in the National Accounts, *Economic Trends*, No. 136, 81-87.

Mennel, A and A. Förster (1999), Steuern in Europa, Amerika und Asien, Herne/Berlin: NWB Verlag.

Mogensen, G., H.K. Kvist, E. Körmendi and S. Pedersen (1995), *The Shadow Economy in Denmark 1994: Measurement and Results*, The Rockwool Foundation Research Unit Study, No. 3, Copenhagen.

OECD (1997), *Framework for the Measurement of Unrecorded Economic Activities in Transition Economies*, OECD Working Paper No. 93.

———— (1999), *Revenue Statistics 1965/1998: 1999 Edition*, Paris.

Parsche, R., M. Steinherr and S. Waller (1996), *Ursprungslandprinzip und Clearing bei der Mehrwertsteuer – ein makroökonomischer Ansatz*, ifo Studien zur Finanzpolitik, No. 61, Munich.

Schneider, F. (2000a), *Illegal Activities, But Still Value Added Ones (?): Size, Causes and Measurement of the Shadow Economies All over the World*, CESifo Working Paper, No. 305.

———— (2000b), *The Increase of the Size of the Shadow Economy of 18 OECD Countries: Some Preliminary Explanations*, CESifo Working Paper, No. 306.

Schneider, F. and D. Enste (2000), Shadow Economies: Size, Causes, and Consequences, *The Journal of Economic Literature*, Vol. 38, No. 1, 77-114.

Tanzi, V. (1982), A Second (and More Sceptical) Look at the Underground Economy in the United States, in: Tanzi, V. (Ed.), *The Underground Economy in the United States and Abroad*, Heath: Lexington, 38-56.

Thomas, J.J. (1992), *Informal Economic Activity*, LSE Handbooks in Economics, London: Harvester Wheatsheaf.