FISCAL AND REGULATORY CAUSES OF THE SHADOW ECONOMIES IN TRANSITION COUNTRIES: THE CASE OF UKRAINE

Iryna Mel'ota, Ulrich Thießen, Tetyana Vakhnenko

Institute of Economic Research and Policy Consulting (IER)

melota@ier.kiev.ua

Phone: (+38044) 228 6358, 228 6343

Fax: (+38044) 228 6336

Address: Reytarska str. 8/5-a, kyiv 01034

Abstract

A model of Ukrainian shadow economy money demand is estimated that includes new regulatory burden, tax complexity, and soft-budget constraint variables. This model is analysed to determine the causes and dynamics of the Ukrainian shadow economy and to assess the effectiveness of state measures undertaken to reduce its size. We find the direct tax burden including social security contributions, the regulatory burden on enterprises, the complexity of the tax system, and soft-budget constraints for enterprises to be important causes for unofficial activity. We conclude that the lowering of the social security burden, the introduction of a presumptive tax for small and medium-sized businesses, and some hardening of budget constraints for enterprises are the main explanatory factors for the presumed decline of the shadow economy in recent months. We also conclude that the government could do more to reduce the shadow economy, foremost by lowering the effective regulatory burden on enterprises, but also by reducing the complexity of the tax system and the personal income tax burden, and by hardening further the budget-constraints for enterprises.

1 Introduction

The analysis of the causes of the shadow economy's demand for money in advanced industrial countries is complicated by relatively little variation in policy variables. Ukraine provides a natural experiment for estimating a shadow economy money-demand model because it has experimented with a number of tax, social security and regulatory regimes over a short period of time, unlike more stable countries where explanatory variables tend to change slowly over long periods of time. This paper studies the causes of Ukraine's shadow economy money demand and analyses the dynamics of the shadow economy. Unlike other estimates, based on electricity consumption, surveys (Gregory and Mel'ota, 2001) and estimated household expenditures, a money demand model - extended to include transition-specific causes of unofficial economic activity - can provide answers not only to the evolution of its size but also to the effects of particular policies. One of the key causes for the unofficial activity considered in our model is the complexity of the tax system. Schneider and Neck (1993) have argued that its effect is unambiguously negative because rising complexity provides more opportunities to avoid taxes legally. By contrast, we argue that tax complexity affects the Ukrainian shadow economy differently because of institutional differences compared to industrialised countries.

The paper is structured as follows: Section 2 presents our estimates of a currency demand model and evaluates policy simulations. Section 3 compares these results with those obtained by using electricity consumption, and discusses methodological reasons for differences in the results. Section 4 summarises the policy implications.

2 A currency demand for money model to estimate the shadow economy

a) Methods and background

There is a substantial literature dating back to Guttmann (1977), Feige (1979) and Tanzi (1983) that uses the demand for money to estimate the size and dynamics of the shadow economy. This methodology assumes that there exists an 'official' demand for money in the official economy and a 'shadow' demand for money in the underground economy. Guttmann and Feige assumed monetary ratios (either currency (C) to demand deposits (D), or M2 times velocity of transactions to GNP) that, except for the effect of the shadow economy, would have remained constant over time. Since the assumption of fixed official velocity is open to criticism, Tanzi (1983) improved on this original approach through the use of an estimated demand for currency equation, where currency holdings (for official and unofficial purposes) relative to money (defined as M2) is the dependent variable. In his equation, official currency demand depends upon the traditional money demand determinants such as real income and real interest rate, the latter as a measure of the opportunity cost of holding money, and the ratio of wages and salaries to national income. Tanzi captures unofficial currency demand by introducing tax variables; hence, his model captures only those underground activities that are the result of taxes. Tanzi obtained lower (and perhaps more reasonable) estimates of the US shadow economy than Guttmann and Feige.

Subsequent authors included additional variables, such as tax complexity or regulatory burden that were presumed to cause persons and businesses to operate in the shadow (e.g. Schneider and Neck 1993, Shabsigh 1995, Hill and Kabir 1996). Schneider and Enste (2000) provide a useful survey of this methodology for a large number of developed and developing countries. This paper applies such a conventional model that incorporates both tax and other variables to Ukrainian quarterly data for the period 1993-2000. The literature (Wagner 1976, Clotfelder, 1983, Schneider and Neck, 1993) provides some guidance on the measurement of complexity and regulatory burden variables. One of the contributions of this paper is the rather painstaking measurement of quarterly variables capturing Ukraine's tax complexity and regulatory burden.

We are not aware of a study of any transition country that uses the currency demand method, a gap that should be closed because the monetary approach is the only method allowing causes and policy effects to be examined.

Ukraine is presumed to have a relatively large shadow economy and, when the first estimates of its size were published (see, for example, Kaufmann and Kaliberda, 1996), the government became very concerned and adopted measures in an attempt to reduce its size:

The State's first efforts were directed at the tax burden since it had been identified as the most important problem for enterprises irrespective of their size (Management Systems International et al. 2000). In 1995 the 'income' tax for enterprises was replaced by a moderate corporate profit tax (30% rate and relatively generous depreciation allowances). Taxes and levies on exports were abolished.[1] The top marginal personal income tax rate was reduced starting from very high rates in 1993 and 1994 to 50% in late 1994 and further to 40% in the fall of 1995. Social security contributions were lowered in steps during 1997-1999 from 52 percent to around 40 percent of the gross wage. An attempt to reduce the regulatory burden on enterprises was made in 1998 by way of orders to state agencies to co-ordinate and reduce their inspections of enterprises. Also during this year a moderate and optional presumptive tax on small and medium sized businesses was introduced. In addition, the State sought to inhibit non-monetary forms of payment, such as barter operations and inter-enterprise arrears, which facilitated unofficial transactions. Moreover, the State attempted to 'harden' budget constraints for enterprises by reducing the share of subsidies in GDP on the expenditure side of the budget during the latter half of the 1990s (although the quantitatively more important subsidies to enterprises in the form of tax exemptions as a share of GDP remained relatively stable). Additional measures were taken in early 2000 to increase transparency and to forbid non-monetary transactions in the important energy sector.

In sum, Ukraine carried out an extensive series of anti-shadow-economy measures between the mid-1990s and the present. These policy changes permit us to estimate a shadow demand for money that takes advantage of the considerable variation in policy variables during this period. Methodological notes and graphs of these variables are presented in the appendix.

[1] Transitory export taxes on livestock, oilseeds and a few other goods were, however, introduced in the late 1990s. These are examples of many minor and some more substantial setbacks to a consistent reform strategy that occurred in almost every policy area making an objective assessment of the reform progress difficult.

b) Model description

We follow the demand for currency specifications, which have been used in estimations of the shadow economy for developed and developing countries (e.g. Tanzi 1983, Klovland 1984, Schneider and Neck 1993, Shabsigh 1995, Hill and Kabir 1996). Specifically, our dependent variable (CM2) is the ratio of domestic currency holdings (CUR) to M2. This ratio is assumed to be determined by the level of income (proxied by real consumption per capita, CRPC), the real rate of return on deposits (IRD), a dummy variable to capture the influence of the introduction of the presumptive tax for small and medium sized businesses in 1998 (DPRET), and a series of measures of causes of shadow economic activity discussed above. The latter are the direct tax burden (DT) and the indirect tax burden (INDT), each measured by a variety of explicit and implicit tax rates, the social security burden (SSC), also measured by explicit and implicit contribution rates, the effective regulatory burden (REG) and the inverse of the complexity of the tax system (REV), following the complexity measure suggested by Wagner (1979), Clotfelter (1983) and Schneider and Neck (1993). Although the conceptual meaning of these variables may be clear, there are no uniform standards or methods of measurement. The authors devoted a considerable effort to the measurement of the variables REG and REV as explained in the appendix that is available to interested readers.

During transition, the use of non-monetary forms of payment and of foreign currency (especially US-Dollars) has been relatively widespread. We introduce inter-enterprise arrears as a proxy for non-monetary forms of payment in our estimated equations. There are two ways to do this: either non-monetary payments are added to the dependent variable or they are included as an additional explanatory variable. When we added the non-monetary payment proxy to the dependent variable (by adding the increase of nominal inter-enterprise arrears to both domestic currency and M2), we obtained considerably less statistically significant results. When we included real overdue inter-enterprise arrears (IEAOVR) as an additional independent variable, we obtained a significant negative coefficient and an increased R^2, suggesting that domestic currency and inter-enterprise arrears are substitutes. This finding does not indicate whether arrears serve merely as a control variable in the money-demand function or as a cause of unofficial economic activity. In other words, the relationship between the 'missing' currency (due to use of inter-enterprise arrears) and unofficial transactions remains unclear. In the one extreme case, inter-enterprise arrears, which replace currency, may finance official transactions. In this case IEAOVR is merely a control variable. In the other extreme, inter-enterprise arrears replace currency demanded for unofficial transactions, and its coefficient would capture the shadow economy due to inter-enterprise arrears. Assuming further that arrears are largely attributable to soft budget constraints, this variable captures the effect of soft-budget constraints on the shadow economy. In our models and simulations we explore both extreme cases.

The lack of data on foreign currency prevents us from dealing with this issue, although we attempted some experiments.[2]

To summarise, our model is:

$$CM2_t = a_0 + a_1 CRPC_t + a_2 IRD_t + a_3 DT_{t\,i} + a_4 INDT_{t\,i} + a_5 SSC_{t\,i} + a_6 REG_t + a_7 REV_t + a_8 IEAOVR_t + a_9 DPRET_t + e_t \qquad (1)$$

where i represents the different definitions of the tax and social security variables (Table 1) and e is an error term.

[2] We experimented by using three enlarged definitions of the currency-M2 ratio. In the first one we included foreign currency deposits only, which are known and which could be a proxy for circulating foreign currency, although they themselves can scarcely be used for unofficial transactions. In the second, we included foreign currency deposits and a proxy for circulating foreign currency, which was constructed from the statistics on 'net purchases of US-Dollars' (see appendix C). In the third, we included the proxy for circulating foreign currency only. However, estimations with all of these enlarged definitions of the currency-M2 ratio yielded insignificant results and even perversely changed the signs of traditional explanatory variables (interest rate and real consumption). This remained true when varying the estimation period. Hence, a definition of money based on domestic currency and deposits is superior to any enlargement. However, excluding foreign currency from the estimations means that the shadow economy financed through the use of circulating foreign currency needs to be estimated separately (appendix C).

Table 1

Definitions of variables used in estimating currency demand

Variable	Definition
CM2	Domestic currency/M2 ratio
CRPC	Real consumption per capita
IRD	Weighted real interest rate on deposits
IDEP	Weighted nominal deposit interest rate
DT_1	Personal income tax revenues/ GDP
DT_2	Corporate tax revenues/ GDP
DT_3	Personal plus corporate tax revenues/ GDP
DT_4	Personal income tax revenues/ monetary income (excluding pensions)
DT_5	Personal income tax revenues plus corporate tax revenues plus social security contributions/ GDP
DT_6	Top marginal personal income tax rate
DT_7	Simple average of lowest and highest marginal personal income tax rate
DT_8	Average marginal personal income tax rate (DT_7) plus statutory corporate tax rate
DT_9	DT_7 plus DT_3
DT_{10}	DT_7 plus DT_5
DT_{11}	DT_7 plus DT_4
DT_{12}	DT_7 plus the ratio of personal income tax revenues and social security contributions to monetary income (excluding pensions)
$INDT_1$	VAT revenues/ GDP
$INDT_2$	VAT plus excise tax revenues/ GDP
SSC_1	Social security contributions/ GDP
SSC_2	Social security contributions/ wage income
SSC_3	Social security contributions/ monetary income (excluding pensions)
SSC_4	Social security contribution rate
REG	Proxy for the regulatory burden for enterprises, see appendix A
REV	Proxy for the inverse of the complexity of the tax system, see appendix B
IEAOVR	Real overdue inter-enterprise arrears

Note: Sources of data are provided in the appendix

Before performing our estimations we tested the stationarity properties of the variables. When transformed into natural logarithms they appear to be stationary and therefore we base our simulations on the log-linear form.[3]

The expected signs of the independent variables are as follows: With a rising level of income, the currency-M2 ratio (CM2) should decline because of increased demand for deposits. Hence, a negative sign for real per capita consumption (CRPC) is expected. Since a higher real interest rate on deposits increases the opportunity cost of holding currency, it should lead to a decrease in CM2 (a negative sign of IRD). The direct and indirect tax, social security, and effective regulatory burden (DT, INDT, SSC, REG, respectively) are all assumed to be causes of unofficial activity and should therefore have positive signs.

A key variable in our study is tax complexity, as measured by the indices proposed by Wagner (1979), Clotfelter (1983) and Schneider and Neck (1993), (appendix B). As noted above, increasing complexity of the tax system may influence unofficial activity in either direction in a transition economy with unstable institutions. Schneider and Neck (1993) estimated a model for Austria that concludes that household labour supply in the official economy increases with the number of tax exemptions, suggesting that increasing complexity of the tax system dampens unofficial activity. Thus, a tax reform, which broadens the tax base and reduces the number of taxes and tax holidays, may contribute to more shadow economy activity. Clotfelter (1983), to the contrary, has argued briefly that simplification of the tax system facilitates income reporting for taxpayers, increases tax compliance and the willingness to operate officially, thus dampening unofficial activity.

[3] For the unlikely case that the variables used are nevertheless non-stationary we tested our equations for co-integration. The augmented Engle-Granger test rejected the hypothesis for our equations to be co-integrating regressions (shown at the bottom of Table 2). We also estimated the equations using first differences of natural logarithms. We obtained considerably less significant results. But when in these differenced equations the dependent variable was replaced by the difference of the logarithm of nominal currency holdings, and the CRPC variable by the difference of the logarithm of nominal GDP (as a scale variable), we obtained similarly significant results as in our equation used for the simulation. The additional estimation results are available from the authors.

In this paper, we argue that tax complexity's effect can be influenced by the specific institutions of a country. In countries like Ukraine, with uncertain rules and arbitrary official behaviour, simplification may have a positive influence on the welfare of a representative economic agent: Efforts and costs to legally avoid taxes are saved, which could be sizeable if the tax rules and exemptions change frequently and if taxpayers cannot be sure whether a legitimate tax exemption claimed would be accepted by arbitrary officials. The degree of perceived fairness of the tax system could increase with simplicity because the taxpayer may consider that other agents are now paying 'fair' taxes. If complexity of the tax system increases, the tax administration has more room for arbitrary actions. Hence, the taxpayer gains from simplification may well over-compensate the welfare loss incurred when tax exemptions are reduced. The effect of complexity of the tax system on the Ukrainian shadow economy is thus an empirical issue and the expected sign of REV is indeterminate.

The introduction of the presumptive tax for small businesses (DPRET) should lower the incentives for unofficial activity and should yield a negative sign.

Finally, the influence of non-monetary forms of payment and soft budget constraints (proxied by real overdue inter-enterprise arrears) is indeterminate, because the estimated sign is dependent upon whether enterprises are using arrears as a substitute mainly for currency (the sign would be negative) or mainly for deposits (the sign would be positive) or equally for both (the coefficient would be insignificant).

c) Results

Table 2 presents four sets of estimated equations for our dependent variable CM2. The coefficients of the independent variables have the theoretically expected signs and are, in most cases, significant at conventional levels. We obtained mixed results for the real interest rate and ended up using the nominal rate for reasons explained in the footnote 10.[4]

The ex-post forecasting power of all four equations is excellent as indicated by the RMSE and Theil's inequality coefficient (Table 2). In fact, surprisingly, the ex-post forecasting quality of the equations is better than that of money demand equations for the industrial country of Austria (Schneider and Neck 1993, p. 356) even though we did not include a lagged dependent variable.

Table 2

Ukraine: Estimated domestic currency demand functions (Quarterly data, 1993 first quarter, 2000 third quarter; t-statistics in parentheses below estimated coefficients)

Equation:	*(1)*	*(2)*	*(3)*	*(4)*
Dependent variable:	*ln (CM2)*	*ln (CM2)*	*ln (CM2)*	*ln (CM2)*
Independent variables:				
Constant	-3.98	-4.22	-4.38	-4.18
	(-6.57)***	(-5.64)***	(5.86)***	(-4.69)***
IRDEP	-0.003			
(Real interest rate)	(-1.33)			
ln (IDEP)		-0.06	-0.12	-0.11
(Nominal interest rate)		(-1.05)	(-1.72)*	(-1.32)
ln (CONSRPC)	-0.42	-0.39	-0.46	-0.49
(Real per capita consumption)	(-3.26)***	(-2.35)**	(-2.76)***	(-2.77)**
ln (DT4+1)	8.68			
(Personal income tax burden)	(3.48)***			
ln (DT5+1)				
(Burden of personal income tax + corporate tax +		1.39		
social security contributions)		(2.39)**		
ln (DT10+1)				
(Burden of PIT, CPT and SSC + average			0.91	
marginal PIT rate)			(2.36)**	
ln (DT11+1)				
(Personal income tax burden + average marginal				0.97
PIT rate)				(2.12)**

[4] Ex-post definitions of the real interest rate, such as deflating the nominal rate by inflation indices, may not measure correctly the relevant ex-ante real interest rate. Given this difficulty, we experimented using the nominal interest rate, which was somewhat more significant than the real rate (although still insignificant by conventional standards). This may indicate that, perhaps due to money illusion on the part of economic agents, the nominal rate is a better measure of the relevant expected real interest rate than ex-post measures of it. On theoretical reasoning the insignificant interest rate was included in the regression because the opportunity cost of holding currency should be considered. In addition, the inclusion raised the explained portion of the variation in ln CM2 and improved the forecasting power of the equations.

ln (REG+1)	3.17	3.93	3.88	3.78
(Effective regulatory burden)	(3.51)***	(3.53)***	(3.46)***	(2.71)**
ln (REV+1)*(-1)	3.44	2.60	2.12	2.72
(Complexity of the tax system)	(2.53)**	(1.77)*	(1.45)	(1.81)*
ln (IEAOVR+1)	-0.88	-1.12	-1.24	-1.35
(Real overdue inter-enterprise arrears)	(-1.99)*	(-1.75)*	(-1.95)*	(-2.19)**
DPRET	-0.13	-0.051	-0.077	-0.090
(Presumptive tax dummy)	(-3.14)***	(-1.20)	(-1.85)*	(-2.28)**
Test Statistics				
Number of Observations	31	31	31	31
Correction for auto-correlation of the residuals	no	no	no	yes
Adjusted R^2	0.9519	0.9415	0.9412	0.9136
F-statistic	85.74	69.93	69.58	39.34
D.W.	2.29	2.08	2.11	2.01
AEG-Test for co-integration	-2.63 (3 lags)	-2.45 (3 lags)	-2.73 (4 lags)	-2.71 (4 lags)
Ex-post forecast 1993-2000:				
RMSE (root mean squared error)	0.0612	0.0675	0.0676	0.0713
Theil's inequality coefficient	0.0365	0.0403	0.0404	0.0448
Tests for structural breaks:				
Dummy 1994, Q4	-0.082	-0.034	-0.200	-0.300
	(-0.96)	(-0.36)	(-1.74)*	(-2.15)**
Dummy 1998, Q4	0.016	-0.022	-0.019	-0.03
	(0.21)	(-0.26)	(-0.22)	(-0.38)
Dummy 2000, Q1	-0.077	0.089	0.097	-0.156
	(-1.25)	(1.91)*	(2.43)**	(-2.64)**

Note: *denotes significance at the 10% level, ** denotes significance at the 5% level, * denotes significance at the 1% level**

Source: Authors' calculations

Of the many tax variables that were tested in the regressions (DT_1-DT_{12}, $INDT_1$-$INDT_2$) we found the implicit personal and corporate income tax burden (DT_1-DT_5, DT_9-DT_{12}) always highly significant. By contrast, the indirect tax variables ($INDT_1$-$INDT_2$) were never significant and even had at times negative signs. This insignificance is consistent with studies for industrialised countries and could suggest that the VAT (despite its relatively high level of 20%) and excise taxes are not major causes of unofficial activity.

The statutory and marginal tax rates (DT_6-DT_8) and the social security contribution rates (SSC_1-SSC_4) were also not significant at conventional levels. Social security contributions as a share of GDP (SSC_1) were significant only in equations, which use first differences. When the social security burden is added to the personal and corporate income tax burden, this composite variable is always highly significant (DT_5, DT_{10}, DT_{12}). Our proxy for the regulatory burden (REG) has the expected positive sign and is always highly significant. Our proxy for the complexity of the tax system (REV*(-1))[5] is always positive, although not always significant. The positive sign indicates that rising complexity increases shadow economic activity, which is the contrary to the finding for Austria by Schneider and Neck (1993). This suggests that tax complexity, be it the number of taxes, the considerable room for interpretation of tax laws on the part of the tax administration, or the number and extent of tax exemptions, all contribute to unofficial activity in Ukraine.

The estimated negative sign of real inter-enterprise arrears shows that arrears result in less currency being demanded relative to deposits. In other words, arrears substitute for currency, but they may finance either official or unofficial transactions. One could argue that the measured substitution of inter-enterprise arrears for currency rather than for deposits indicates that there is some truth to the hypothesis that arrears are related to unofficial transactions. Otherwise why would enterprises not also substitute arrears for deposits?

Among the qualifications to these estimations is the concern that the currency demand function may not be stable, for instance due to changing inflationary expectations. We therefore tested for structural breaks using a simple dummy technique. The Chow test cannot be applied because the number of observations is too small relative to the number of regressors. We tested three dates for potential breaks, namely the last quarter of 1994, when a new reform-minded government came to power, the last quarter of 1998, which is the quarter that followed the currency crisis of August/September 1998, and the first quarter of 2000, when there was another important change of government. The results are reported at the bottom of Table 2.

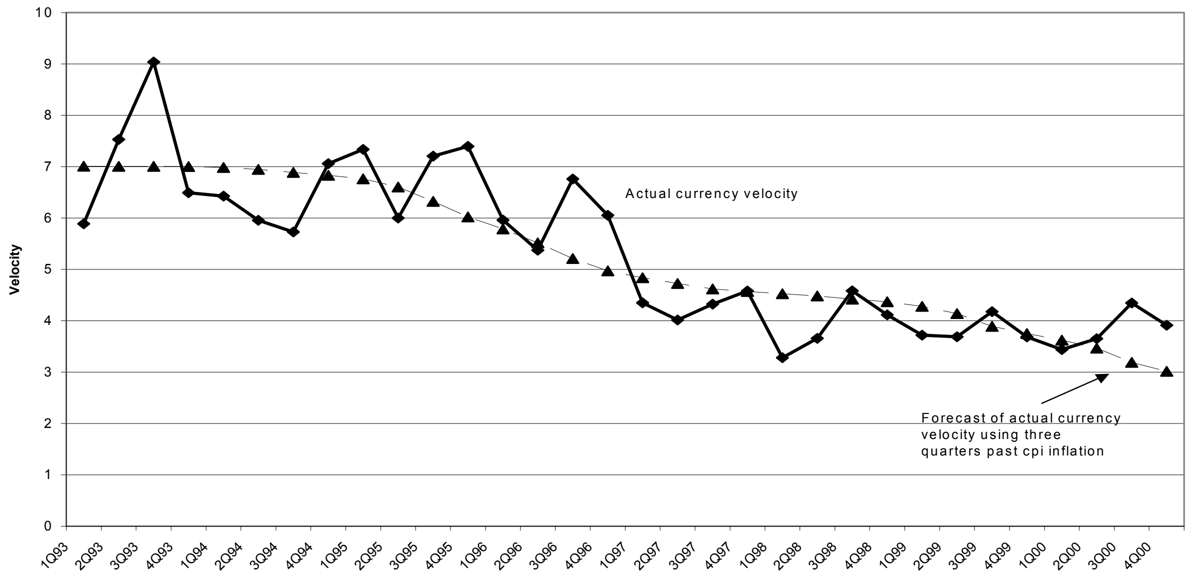
5 Following the literature, the complexity variable REV attains values between 0 and 1 and measures the inverse of complexity, appendix B. Multiplying it by –1 yields a (negative) variable that measures complexity.

d) Trends and simulations

The estimated equations in Table 2 are used to derive estimates of trends in the shadow economy as follows: First the forecasted values of nominal domestic currency holdings are calculated. Then the equations are solved again, setting all independent variables that represent causes of unofficial activity to zero while keeping the estimated coefficients of the remaining explanatory variables unchanged. This yields an estimate of hypothetical currency holdings for the case of no shadow economy. Deducting this amount of currency holdings from those holdings forecast in step one yields an estimate of the amount of currency used for unofficial transactions ('unofficial currency'). Due to the uncertainty about whether inter-enterprise arrears are associated with unofficial transactions, we have two estimated unofficial currency holdings. Combining them with a velocity assumption yields an unofficial GDP.

Graph 1

Ukraine: Velocity of domestic currency 1993-2000



Given both the lack of knowledge about the velocity of currency in the shadow economy and the sensitivity of the estimated shadow economy levels to velocity, much discussion in the literature focuses on the velocity assumptions. Since we are interested in the impact of policies on the evolution of the shadow economy, we do not need to estimate actual shadow economy levels but only an index of these levels. In this case the assumed *level* of velocity is not relevant, merely the evolution of velocity, its trend, is important. We chose to use *actual currency* velocity because it is well behaved in the sense that it can be largely explained by past inflation as shown by ex-post forecasts (Graph 1). We also argue that it is reasonable to assume the 'unofficial' currency velocity to behave in a similar fashion. The use of other velocities such as 'legal M1' (defined as actual M1 minus estimated illegal currency holdings) or a stable velocity does not change the estimated shadow economy index from 1996 onwards. For the period 1993-1995, the estimated shadow economy index would rise faster when using either a stable or the 'legal M1' velocity instead of the actual currency velocity.

The second column of Table 3 provides an index of the shadow economy for the two scenarios concerning inter-enterprise arrears (panel A and B). We present an index of the shadow economy's share in official GDP and not its estimated levels, because we are interested in the effects of changes of economic policies and can avoid assumptions about the level of shadow economy velocity, since only the velocity trend is needed.

Table 3
Evolution of the shadow economy (Estimates based on equation 2 of Table 2 and using the actual velocity of domestic currency shown in Graph 1)

Year	Index of the Shadow Eco-nomy share of GDP	Simulation 1: Tax burden at the average level of 1993-94 (prior to reforms) and no presump-tive tax	Simulation 2: No introduction of presump-tive tax for small and medium sized enterprises	Simulation 3: Regulatory burden constant at the level of 1993	Simulation 4: Complexity of the tax system constant at the level of 1993	Simulation 5: Regulatory burden and complexity of the tax system at the level of 1993	Simulation 6: Real overdue inter-enterprise arrears at the level of 1993	Simulation 7: Avoidance of policy mistakes (Regulatory burden, complexity of the tax system, and inter-enterprise arrears at the level of 1993)
Panel A: Assuming inter-enterprise arrears are associated with unofficial economic activity								
1993	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1994	1.06	1.06	1.06	0.86	0.99	0.79	1.06	0.80
1995	1.24	1.32	1.24	0.82	0.98	0.64	1.23	0.64
1996	1.45	1.55	1.45	0.84	1.09	0.62	1.42	0.59
1997	1.59	1.68	1.59	0.85	1.20	0.63	1.55	0.59
1998	1.55	1.69	1.55	0.85	1.10	0.59	1.52	0.55
1999	1.37	1.66	1.52	0.72	1.03	0.53	1.33	0.50
2000	1.48	1.86	1.64	0.73	1.09	0.53	1.44	0.49
Panel B: Assuming inter-enterprise arrears are not associated with unofficial economic activity								
1993	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1994	1.12	1.12	1.12	0.91	1.04	0.83	1.10	0.81
1995	1.25	1.34	1.25	0.83	0.97	0.63	1.28	0.65
1996	1.36	1.46	1.36	0.78	0.97	0.55	1.49	0.60
1997	1.41	1.50	1.41	0.75	1.00	0.52	1.63	0.59
1998	1.38	1.51	1.38	0.74	0.91	0.48	1.60	0.55
1999	1.21	1.50	1.36	0.63	0.85	0.43	1.38	0.49
2000	1.31	1.70	1.47	0.64	0.90	0.43	1.48	0.48

Source: Authors' calculations

The estimates in the second column suggest that the shadow economy's share reached a peak in 1997. Between 1997 and 1999 it declined considerably but rose again during 2000.

The impact of various factors on the shadow economy is demonstrated by simulations (columns 3 to 9, Table 3). They show how the shadow economy would have evolved had particular policies been different while leaving the other variables unchanged. Simulation 1 shows that without the implemented tax reforms, the shadow economy would have increased nearly continuously and reached a much higher level by 2000.

The presumptive tax for small and medium-sized businesses (simulation 2) is estimated to have reduced the shadow economy's total size during 1999 and 2000 by about 11 and 12 percent in panel A, and by 12 and 14 percent in panel B.[6] Apparently, the dampening effect of the presumptive tax on the shadow economy became stronger. This may be judged to be a very respectable success. The estimate is qualified by the fact that the dummy could also capture other effects.

By contrast, had it been possible to prevent the regulatory burden from rising, the shadow economy would have declined nearly continuously (simulation 3). Had the government not increased the complexity of the tax system, the shadow economy would have remained relatively stable at its initial level (simulation 4). Had both the regulatory burden and the complexity not increased over time, the shadow economy would have declined continuously (simulation 5). Had enterprise arrears not increased, the growth of the shadow economy would have been considerably dampened (simulation 6). Simulation 7 captures the effect of 'avoidance of policy mistakes': Had the regulatory burden and tax system complexity not increased and had the government even hardened budget constraints for enterprises and thus prevented the rise of their overdue arrears, the shadow economy would have been reduced by more than half in 2000.

The simulations also explain shadow economy dynamics. Growth of the shadow economy's share during 1993-97 was caused by three factors: increases of the regulatory burden, an increase of tax system's

[6] To obtain these percentages, the difference between the figures in columns 4 and 2 has to be divided by the figures of column 2.

complexity, and increased overdue inter-enterprise arrears. Factors that reduced it since then were: the reduced tax system complexity during 1998-99, the introduction of the presumptive tax, less overdue inter-enterprise arrears, and a continuation of the decrease of the tax burden, especially lower social security contributions. Despite the continued decreasing tax pressure, growing acceptance of the presumptive tax and lower real overdue inter-enterprise arrears, the shadow economy's decline appears to have been halted in 2000 due to increases in the regulatory burden and the tax system complexity. The results from 2000, which cover only one year, caution policy makers concerning the importance of consistent policies to reduce the size of the shadow economy.

Finally, the simulations reveal that the single most important contributor to unofficial activity is the regulatory burden, followed by tax system complexity, the tax burden and inter-enterprise arrears.

3 Comparison with estimates based on electricity consumption

Our results are based upon a 'shadow' money demand estimation combined with actual velocity. The approach most commonly used in estimating shadow economies in transition countries is based on comparisons of real GDP growth with electricity consumption (e.g. Dobozi and Pohl 1996, Kaufmann and Kaliberda 1996, Johnson et al. 1997, Lazko 2000).[7] We have performed such calculations using Ukraine's official data on total electricity consumption and real output growth, using two elasticity assumptions to yield two scenarios. In the first scenario we assume that elasticity equals .85 during the downturn (on the assumption that much energy is wasted when output declines) to obtain a lower bound estimate for the shadow economy. This assumption is equivalent to an elasticity of 1.18, the inverse of .85, during the economic upswing, which occurred since 2000. The second scenario uses a unitary elasticity. Consequently, Scenario 2 yields higher shadow economy estimates than Scenario 1.

Table 4 contrasts these scenarios with the results from our monetary approach scenarios. To facilitate the comparison both sets of indices are set to 100 in 1993, the first year of our data.

According to the electricity approach the shadow economy's share in GDP jumped in 1994, grew until 1996 and then fell off very rapidly. By contrast, the monetary approach shows a relatively smooth increase until 1997 and since then a moderately declining trend interrupted in 2000. Another major difference between these results is that according to the first electricity scenario (Scenario 1) (which reasonably argues that some energy is wasted during an economic downturn), the Ukrainian shadow economy was 3% lower in 2000 than in 1993 whereas according to the monetary approach it was 30-50% higher!

[7] All that is needed to estimate the shadow economy's evolution under this approach is the growth rate of electricity consumption, the growth rate of real official GDP, and an assumption about the elasticity of electricity consumption with respect to total GDP. The gap between estimated total output and official GDP can then be taken as an indicator of the size of the unofficial economy.

Table 4
Comparison of indices of the shadow economy

Year	Index of the shadow economy share in official GDP (1993=100)			
	Electricity consumption approach		Monetary approach	
	Scenario 1 Assuming an output elasticity of electricity consumption of .85 when output falls [a)]	Scenario 2 Assuming an output elasticity of electricity consumption of unity	Assuming inter-enterprise arrears are associated with unofficial economic activity	Assuming inter-enterprise arrears are not associated with unofficial economic activity
1993	100	100	100	100
1994	138	145	106	112
1995	154	166	124	125
1996	159	177	145	136
1997	152	173	159	141
1998	136	161	155	138
1999	125	152	137	121
2000	97	122	148	131

[a)] This is equivalent to an elasticity of 1.18 when the output increases
Source: Authors' calculations

We suggest that the money demand results are more reliable because they are based on an empirical model that yields good results, while the electricity model appears based on business cycle features. In the electricity approach, the decline of the shadow economy since 1995 is simply the result of the bottoming out of the recession, which is associated with some improvement in energy efficiency. But the improvement in energy efficiency could have been expected when considering the row of energy price shocks since the early 1990s, which hit especially industrial consumers but recently also private households. Soft budget constraints certainly dampened these effects but did not eliminate them. Also the substitution effects from one energy source to another one may have been minor, because over the longer term relative price changes among different types of energy were not pronounced and investment was relatively low, which would have been required to replace one energy type by another one. Dependent upon the time lag involved, this would mean that the true output elasticity of electricity consumption changed (increased) during the recession of the 1990s. This could have allowed electricity consumption to fall increasingly quicker than real output making it difficult to draw conclusions about the behavior of the shadow economy.

Moreover, only the monetary method can estimate the causes of the shadow economy and identify the impact of individual policies. Unlike the electricity method, policy conclusions can be drawn, and our results show that policy reversals can have immediate negative consequences.

4 Conclusions

Money demand estimations provide new evidence on the evolution and causes of Ukraine's shadow economy and on the effectiveness of policies implemented to dampen it. The implications of this study go beyond the case of Ukraine because it suggests that the effective regulatory burden and the tax system complexity are quantitatively as important or even more so than the tax and social security burdens. In addition, the idea of a simplified taxation system for small businesses should be seriously considered as a means to reduce the shadow economy. Perhaps, one cannot make generalisations based on a transition country undergoing substantial change, but the study suggests that any country has to worry as much or more about its regulatory burden and complexity issues as about its tax rates.

The estimations concur with previous estimates that the Ukraine's shadow economy has been attenuating in recent years. But our results suggest that this turnaround happened during 1998-1999 at least one year later than the electricity approach suggests. Moreover, growth and decline in the shadow economy have been much more modest than suggested by the electricity model. Most importantly, our approach provides particular policy reasons for the decline: The factors that contributed to the reduction of the shadow economy's share since its peak in 1997 have been the decrease of the tax burden, especially lower social security contributions and the introduction of the presumptive tax, reduced tax system complexity (until 1998), and a decline in real overdue inter-enterprise arrears (suggesting a hardening of budget constraints). The regulatory burden appears to be the prime cause. Despite efforts to reduce it, we do not find much evidence of success.

Based on these findings, policies that could contribute to reduce Ukraine's shadow economy would be first and foremost, a serious reduction in the effective regulatory burden. However, setting up a central agency responsible for deregulation may be of little use as long as other government organs are not seriously co-ordinating their regulatory plans and actions with this agency.

Secondly, tax reforms should be implemented that simplify the tax system - including a reduction of the number of taxes and exemptions - and that reduce in particular the personal income tax burden.

Thirdly, social security contributions should not be increased again.

Fourthly, given that indirect taxes appear not to be a significant explanatory factor, it could be argued that the VAT rate could be set relatively high. Considering also that income earned in the shadow economy tends to be spent on official markets where VAT is paid, and that the VAT is a tax on consumption and not on savings and investment, maintaining a relatively high VAT rate could be a reasonable way of taxing some unofficial income without being a major cause for it. However, we do not want to overlook that high indirect taxes can be strong incentives for unofficial activity, especially in the services sector and with regard to goods that can be smuggled easily and are subject to high excise taxes. Therefore, our view that the VAT rate could be relatively high is conditioned by the paramount goal of moderate taxation at all levels.

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6 Appendices

The following appendices explain the proxies used for the regulatory burden, the tax system complexity, and estimates of the shadow economy financed through use of foreign currency. Subparagraph D) lists the sources of the data.

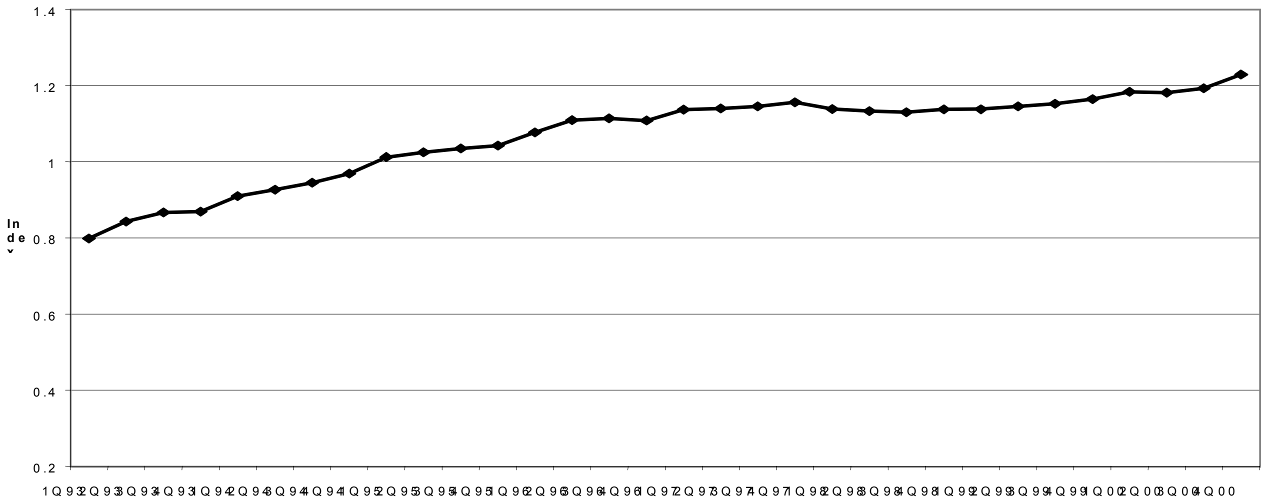
A) Proxy for the effective regulatory burden

As emphasised in Johnson et al. (1998) when discussing the regulatory burden as a cause for unofficial activity, what should be considered is not only the quality and extent of formal regulations and rules per se, but rather the effective regulatory burden. The latter includes the extent of discretion on the part of the authorities in interpreting and implementing regulations. Considering this argument and the considerable freedom for authorities in Ukraine to interpret rules (an example is the freedom on the part of the state tax administration to interpret tax rules) there may be deviations between the evolution of the regulatory burden in a narrow sense and that of the effective regulatory burden. It is the latter that we would like to measure. Since we cannot examine the effective regulatory burden in detail, we constructed a crude proxy for it. We use the number of those government employees in the central and local governments who may be most relevant in determining the degree of effective regulation, the so-called 'state managers' and we divide this number by the population. 'State managers' are defined as all employees in ministries (including regional branches of ministries), state committees (including regional branches), local administrations (oblasts, rayons, villages), and members of the so-called 'supervisory organs of economic management of state enterprises'. Other empirical studies on the shadow economy use the stock of all existing and enforced laws concerning federal, state, and local regulatory activities as a proxy for the intensity of regulations (see, for instance, Schneider and Neck 1993). This measure seems no less crude than ours. For Ukraine this indicator would continuously increase due to the presidential decrees, most of which have the power of law and which very rarely repeal former ones. Graph 2 shows that our proxy (REG) decreased only once, namely during 1998 and since then rose again. Is this consistent with the available micro-evidence on the evolution of the regulatory burden?

For the year 1995, when deregulatory reforms were implemented, our proxy continues to increase, albeit relatively little. This increase may point to a weakness of this proxy; although it could be that the reforms simply dampened the growth of the effective regulatory burden. Available enterprise surveys covering the period since 1995 indicate that particularly during 1998, the year when the government took additional steps to reduce the regulatory burden, improvements in registration procedures occurred and financial inspections decreased somewhat (IFC 1999, 2001a). This is the year for which our proxy shows a decline. Enterprise surveys covering the period 1998-2000 (Management Systems International et al. 2000, IFC 1999, 2001a, 2001b) do not provide evidence for the decrease of the regulatory burden to have continued after 1998. Some indicators even point to an increase in this burden since 1999. For instance, the average duration of inspections by state agencies increased in 1999 as compared to 1998 and the average nominal costs of these inspections rose by considerably more than the corresponding inflation rate. There are even voices arguing that particularly regional efforts to strengthen control over enterprises increased during recent years and that in some oblasts these efforts resulted in an increase of state employees that work on matters such as enterprise administration. In sum, enterprise surveys show that contrary to the intentions and efforts of all governments since 1994, the effective regulatory burden did not decline, a fact that corroborates our proxy.

Graph 2

Ukraine: Proxy for the effective regulatory burden on enterprises 1993-2000[1)]



[1)] Percentage share of 'state managers' in population, see appendix A

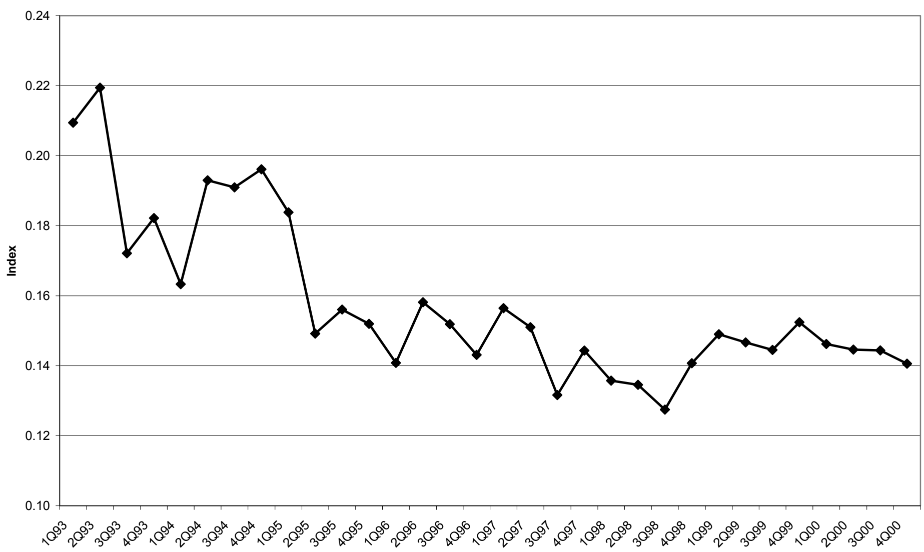
B) Proxy for the complexity of the tax system

Following the methodology used in other studies on the shadow economy (Wagner 1976, Clotfelter 1983, Schneider and Neck 1993) the variable 'inverse of the complexity of the tax system' (REV) was constructed using the Herfindahl-Hirschman concentration measure:

$$REV = \sum_{i=1}^{n} \left(\mathrm{Re}\, v_{it}\right)^2$$

where Rev_{it} equals the i-th government revenue share of the total revenue amount for all n revenue items in a year t. Revenues from privatisation and capital transactions of the government are excluded. REV equals 1 if there is only one tax and thus the tax system is very simple. With increasing complexity the value of REV decreases.

Graph 3



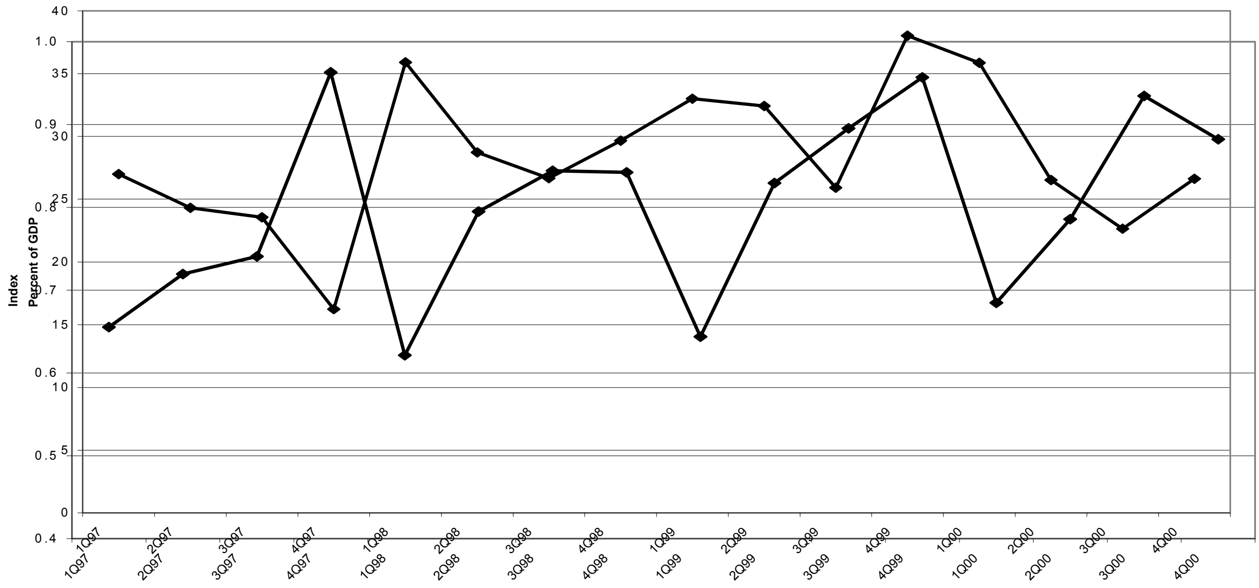
Ukraine: Proxy for the complexity of the tax system 1993-2000[1)]

[1)] The lower the index value, the more complex the tax system. See appendix B for the derivation of the index.

Graph 3 shows that there has been a declining trend of REV during 1993-1997, i.e. increasing complexity, and since then REV has increased slightly. Tax exemptions could not be considered in this measure because they have been calculated by the State Tax Administration only since the beginning of 1997. Graph 4 shows these tax exemptions as a share of GDP.

Graph 4

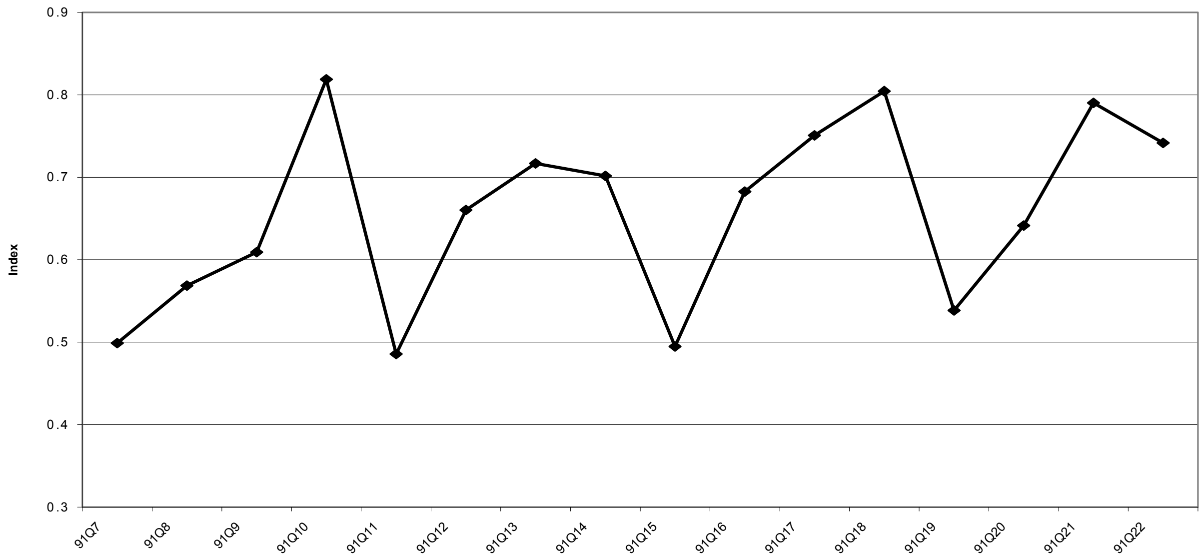
Ukraine: Tax exemptions as a share of GDP 1997-2000



Over this period their trend remained roughly horizontal. For the period since 1997 we calculated a concentration measure for tax exemptions in an analogue manner to REV (Graph 5).

Graph 5

Ukraine: Sum of squared tax exemption shares in total tax exemptions 1997-2000



It too appears to fluctuate around some medium value. We added it to REV in order to obtain a comprehensive measure for the complexity of the tax system (Graph 6).

Graph 6

Ukraine: Composite proxy for the complexity of the tax system 1997-2000

For the period since 1997 the trend of both elements of the comprehensive indicator of the tax system's complexity remained roughly horizontal. However, regarding the period 1993 through 1997 there is a trend decline of REV (Graph 3), or in other words, the complexity of the tax system as judged on the basis of the revenue element of the comprehensive indicator, increased during this period. If we would have an indication as to how tax exemptions evolved during 1993-1996, we could construct an index of overall complexity of the tax system for the whole period under consideration. We did not find evidence of significant differences in tax exemption policies regarding the two periods 1993-96 and 1997-2000. Under the assumption that there have not been significant changes in tax exemption policies during these two periods and given the approximately horizontal trend during 1997-2000 of the tax exemption element of the comprehensive indicator, one may simply concentrate on the revenue element (REV) of the comprehensive indicator as a good approximation of the evolution of the overall complexity of the tax system. In our money demand estimations for the period 1993-2000 we therefore use the revenue share indicator (REV) as the proxy for the complexity of the tax system.

C) Proxy for the amount of circulating foreign currency and estimates of the shadow economy financed through use of foreign currency

Newspaper reports in 1998 put the amount of circulating US-Dollars at 5 to 10 billion, which would equal about 100-200 US-Dollars per capita. This could be a reasonable estimate. Assuming that the amount of circulating US-Dollars at the beginning of 1996 was 5 billion and that this figure changed over time as suggested by the statistic on 'net purchases of US-Dollars by households', one obtains a time series for circulating US-Dollars. However, the statistics on net purchases of US-Dollars begin only in 1995, thus we constructed the missing values for 1993-94 by assuming that the same net amount of foreign currency bought during 1995 was also bought during each of the years 1993-94 and divided the annual amount by four to obtain the quarterly amounts.

As explained in the text, an estimation of the currency demand functions that included this estimate of foreign currency holdings did not prove successful so that the shadow economy financed through use of these US-Dollar holdings needs to be estimated separately. More importantly for us, we need to find indicators for its evolution so as to check whether the US-Dollar financed shadow economy evolved similarly to the one we estimated, i.e. whether it has a trend decline since about 1998.

Owing to the relatively unstable banking system, that does not inspire confidentiality either, and due to the fact that there is no liquid domestic asset that yields a positive real return, a considerable part of foreign currency holdings may not circulate freely but is kept as relatively safe savings at home. Assuming that one quarter or even one half of these Dollar holdings may circulate for the purpose of financing unofficial transactions, and applying a velocity of 2 and 4, the resulting unofficial GDP would amount to 3.2-16 billion US-Dollars. This would roughly equal 10-50% of official GDP during 2000. To judge how this unofficial GDP changed during recent years one would need to make assumptions about both the evolution of the amount of circulating US-Dollars and its velocity.

If we use the net purchases of US-Dollars by households, which declined strongly since 1999, as an indicator for both variables, then the US-Dollar shadow economy declined since 1999. If we use the dollarisation ratio (ratio of foreign currency deposits to the sum of all deposits), which declined steadily until the currency crisis in the fall of 1998 and remained at a higher level and relatively stable since then, the US-Dollar shadow economy would have remained stable since 1999. Overall then this evidence does not suggest a trend increase of unofficial transactions financed through foreign currency during 1999-2000 and thus is not in conflict with the estimates presented in Table 3.

D) Sources of the data

The Ministry of Finance, Kiev, Ukraine provided social security contributions, social security contribution rates, tax rates, and all tax revenue data. The Ministry of Finance also provided the data on more than 40 quarterly government revenue items over the period 1993-2000 used to construct the REV index. Data on tax exemptions, available only for the period starting 1997, were provided by the State Tax Administration. The number of so-called 'state managers' used for constructing the proxy for the regulatory burden was provided by Ukraine's statistics committee (Dershkomstat). All other data were taken from Ukrainian-European Policy and Legal Advice Center, Ukrainian Economic Trends, Kiev, Ukraine, various issues. The data are available from the authors.