3. ESTIMATING HIDDEN ECONOMY AND HIDDEN MIGRATION: THE CASE OF ROMANIA[1]

Lucian-Liviu ALBU[*]
Raluca IORGULESCU[**]
Cristian STĂNICĂ[***]

Abstract

Economists have already established a relationship between tax rates and size of the hidden economy. The higher the level of taxation is, the greater the incentive to participate in hidden activity and escape taxes is. On the one hand, coming from generally accepted findings of the theory, we concentrate on evaluating the reasons for agents' involvement in hidden economy and estimating the size of this part of economy in the case of Romania. At the same time, there is evidence of an extended hidden migration together with an increase in the official migration data, usually from eastern EU members to western countries. In a sense, hidden migration could be in relation to proper hidden economy. On the other hand, using some indirect procedures, we try to estimate the size of hidden migration in Romania.

Keywords: informal income, inactive population, emigration potential, hidden migration

JEL Classification: C13, D10, F22, H31, J22, J61, O17

1. Introduction

Although, before 1990, during the communist regime, a so-called parallel economy (a kind of informal economy) functioning outside of the official economy was recognised,

[*] *The Institute for Economic Forecasting, Casa Academiei Romane, Calea 13 Septembrie, No. 13, Sector 5, Bucharest, Romania, Correspondig Member of the Romanian Academy, Phone/Fax: 0040-21-3188148; E-mail: ipe@ipe.ro , albul@ipe.ro .*

[**] *The Institute for Economic Forecasting, Casa Academiei Romane, Calea 13 Septembrie, No. 13, Sector 5, Bucharest, Romania, Phone/Fax: 0040-21-3188148.*

[***] *The Institute for Economic Forecasting, Casa Academiei Romane, Calea 13 Septembrie, No. 13, Sector 5, Bucharest, Romania, Phone/Fax: 0040-21-3188148, stanica_cris@yahoo.com .*

only in the transition period estimates of the size of the informal economy in Romania were made. Moreover, over the last years, under the expanding migration phenomenon, there has been an increasing preoccupation to estimate its invisible part to be added to the domestic hidden economy. In the first part of this paper, we present some estimates of the size of informal economy in Romania and, in the second one, based on available data and other published information, we try to build a schedule in order to obtain some estimates of hidden migration.

2. Estimating the size of the informal economy

As a method to estimate the size of informal economy for the last years we used one based on the correlation between the official registered average income per capita in households and the income obtained by their participation in informal activities. Based on some former research (see: Albu, Kim, and Duchene, 2002; Albu, 2004; Albu and Iacob, 2008), we demonstrated empirically that one of the most significant determinants of the participation in informal activities is the average income per person in household obtained in the formal sector. Moreover, the households' behaviour is sometimes fundamentally different between groups of population. The most synthetic expression of this idea could be as follows: along with their formal income growth, the households wish to obtain more and more informal income in absolute terms, but at the same time the share of informal income in the total income tends to decrease (sharply until a reasonable average level of formal income is obtained and slowly in the case of the richest households). Probably, the main reason why the rich people could be involved in the informal sector could be the attempt to avoid in a certain proportion the taxes, according to an optimising strategy as is the case of rational agents.

Data obtained from some special surveys organised in Romania (in September 1996 under the ACE-PHARE-R Project: "Informal Economy in Romania", 1996-1998; in July 2003 under the GDN Project: "Tax Evasion, Underground Economy and Fiscal Policies in Candidate Countries") enabled us to estimate the parameters for the correlation between income in households from the official sector and their participation in informal activities. Now, we present only the final results and the strategy we used in order to expand the estimation procedure from the households included in the survey to the entire population at the national level. Certain behavioural regimes were outlined in matter of potential implication in the informal sector. Thus, in the case of poor households (obtaining relative low income from their activity in the official sector) there is a large propensity to work also in the informal sector. On the other hand, in the case of rich households (obtaining relative large income from their work in the official sector), their propensity for informal jobs becomes smaller; however still remain the temptation for rich people to accept informal jobs in order to supplement their income or, perhaps, to avoid taxation. Despite the general decreasing tendency of the share of expected (desired) informal income along with the growth in the basic income of the household obtained in the official sector, in absolute terms the expected informal income has an increasing tendency.

In order to estimate the size of hidden income, we used the hypothesis of a hyperbolic-type function for $z\%(v)$ – the share of hidden (informal) income (depending

on the average level of income per person in household obtained in the official sector, v) in the total average income per person in household. Thus, to estimate the coefficients we selected as basic regression equation the following one:

$$z\% = a / (v + b) + (1 - a/b) + u \tag{1}$$

where: a, b are coefficients, and u is residual variance.

Then, using the estimated values of coefficients we can write, along with changes in the level of formal income, the expected trajectories, as follows (see for details, Albu, 2004):

$$ze\% = a / (v + b) + (1 - a/b) \tag{1'}$$
$$ze(v) = [(b - a) / a] \cdot v + (b^2 / a), \text{ with } ze(0) = (b^2/a) \tag{2}$$

In order to estimate the real level for informal income, according to the available data from surveys, we used two sub-samples, denoted by A and B. In the case of the sample A, the function of informal income share reflects indirectly the impact of changing the proportion of households operating in the informal sector (or equivalently, the impact of changing the probability for a household to be involved in the informal sector) along with the growth of the formal income per person in household. Consequently, it could be used directly to expand the estimation procedure to the national level. An impediment remains: the same distribution of the entire population by formal income is implicitly supposed as in the case of the sample A. On the other hand, within the sample A there is a sub-sample B comprising only the households obtaining informal income. In this case, to simply extrapolate the z%(v) function to the entire set of households is not a good solution (it is the case of the so-called hypothesis of a generalized informal economy). Thus, we have to amend the z%(v) function by multiplying it by the probability function computed by deciles of formal income. As a first step, we amended the last estimating equation by adding a supplementary equation concerning the probability for a person in a household to be involved in informal activity. It was estimated by regressing within the sample A the proportion of persons in household obtaining effectively informal income in the total number of deciles of formal income in which they are located (the total number of this special category of households is just the sub-sample B):

$$p = a \cdot d + b + u \tag{3}$$

and from this the equation (2) was rewritten as

$$zpe(v) = ze(v) \cdot pe(d) \tag{4}$$

where: d are deciles (d=1…10); pe(d)=ad+b is the estimating equation of the probability for a person in a household to be involved in informal economy, p; a and b are coefficients, and u is the residual variance in equation (3). The estimating procedure (4) is denoted by C. Moreover, we extended the three estimating procedures, A, B, and C, to the national level over the period 2000-2007. In order to conserve the estimated values of the coefficients in case of extending the model to the national level, all the data on income from the surveys were expressed in constant prices.

The conclusion was that over the 2000-2007 period the share of informal income decreased in Romania from 21.7-22.3% in the total income of households to 14.6-15%, as one may see below in Table 1. The estimated shares are comparable with those reported in other studies, but obtained by different methods (for instance, see

Schneider, 2003). Under the very improbable hypothesis of a generalised participation in informal activities (in the theoretical case, when all households are involved in informal activities, as in the case of the sub-sample B), the computed share decreased from 33.7% in 2000 to 24.8% in 2007. The main factor of this favourable dynamics of informal income was the growth in the official registered income (+78.9%, from about 104400 to 186700 lei/person/month, computed in 1995 currency and prices, as they are originated in the first survey used).

Table1

Average shares of informal income in the total income of households

Years	z%M	zp%M
2000	22.3	21.7
2001	21.2	20.6
2002	20.7	20.2
2003	19.6	19.3
2004	17.6	17.6
2005	17.2	17.3
2006	16.3	16.5
2007	14.6	15.0

Source*: Authors' own estimations.*

Interesting conclusions could be drawn by analyzing by deciles the dynamic process of involvement in the informal sector. Appendix 1 presents the three matrixes comprising the shares of informal income within the total income in the case of the deciles for each year of the 2000-2007 period, corresponding to the three estimating methods. Appendix 2 presents the contribution of deciles to the total informal income at the national level, also corresponding to the three methods.

Figures 1 and 2 show the estimated dynamics of the average share of informal income in total income at the national level, based on the two estimation procedures, A and C, over the 2000-2007 period (the year 2000 is denoted by 0 and 2007 by 7), and its relatively strong inverse correlation with the distribution of formal income grouped by deciles (deciles are denoted by i=1…10, and years by j=0…7). z%M represents the yearly average share of the informal income in the total income at the national level, resulted from the regression equation based on the procedure A (sample A) and zp%M from that based on the procedure C (applying the regression equation to sub-sample B amended by the probability function).
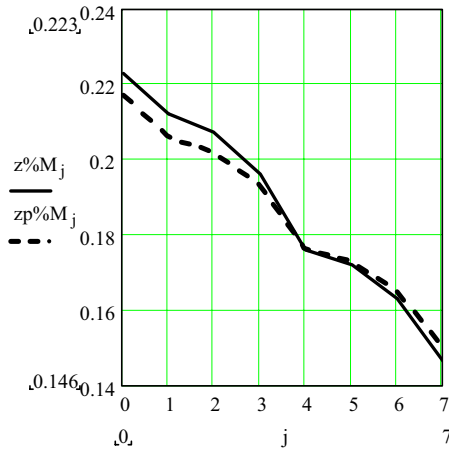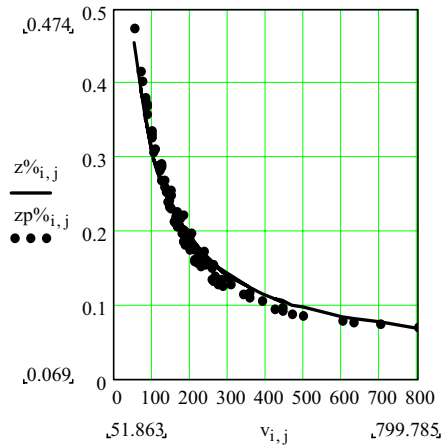
Figure 1

$z\%M_j$
$zp\%M_j$
$---$

0.24
0.223
0.22
0.2
0.18
0.16
0.146 0.14
0   1   2   3   4   5   6   7
0   j   7

Figure 2

$z\%_{i,j}$
$zp\%_{i,j}$
•••

0.474 0.5
0.4
0.3
0.2
0.1
0.069 0
0 100 200 300 400 500 600 700 800
51.863 $v_{i,j}$ 799.785

3. Estimating the size of hidden migration

Like all studies on migration, a relatively poor and inconsistent base of underlying data and information supports the presented analysis. As a rule, taking into account the natural dynamics of population and the data on migration, a determined relation should be between demographic statistics, including migration data, and labour force statistics. Unfortunately, the official statistics is operating only with the so-called final migration (international migration determined by the change of permanent residence). Thus, by channels of vital statistics and registered migration, from the total existing population to the total active population some discrepancies seem to occur. They could be interpreted just as "hidden" migration. Some reasons could be found in the definition of migration as it is considered by legislation. For instance, a person travelling abroad, initially declared as tourist (thus, for a period of less than 3 months), could renew many times his/her stay abroad or could remain indefinitely abroad trying to find a job there or working on official or black labour market. In case of his/her EU country, this person will continue to be included in the total number of population (also, in the active or inactive population).

In all countries, the problems with counting international migrants and measuring (workers') remittances are difficult. Official estimates contain very large errors in both overestimating and underestimating the actual stocks and flows. Such difficulties are exacerbated by the prevalence of undocumented migration and (in some cases of European Eastern countries) by the problem that many people who had lived permanently in one location suddenly were counted as "foreign-born" and, hence, as migrants when national boundaries were adjusted after the country splitting (Soviet Union, Yugoslavia, and Czechoslovakia). These impediments make it difficult to document migration, draw inferences on its impact, and prescribe policies to optimise the role of migration in enhancing growth and poverty reduction.

Based on official statistics, we estimated indirectly the potential number of economically active population of emigrants (EP), for the period 1998-2007, as shown in Table 2. The analysis of the registered data on labour force demonstrated in the last decade a dramatic decrease in the activity rate (from 70.8% in 1997 to 63.0% in 2007), which could be non-realistic (even in case of some methodological changes). International experience shows that large structural changes in labour force are questionable in such short a period (a decade being considered short from the historical viewpoint, because the structure of the demographic system has usually much inertia). In order to estimate a more realistic number of inactive labour force, we are interpreting data from the viewpoint of human behaviour and potential involvement of a person in an economic activity. Thus, although for official statistics the definition of economically active population includes only employed population and ILO unemployed, we extended the notion of active population to all persons having potential to work, but actually they are not included either in the employed group or in the unemployed group (this group of population could be interpreted as a "reserve army"). Some of them are living in the country or work in informal sector, but others are already working abroad without any registration in official statistics. Consequently, they continue to be included somewhat artificially in the category of non-economically active persons. They are inactive for the country of origin, but they could be active in the destination country.

The estimated number of inactive population we obtained by using two hypotheses: H1) maintaining for the entire period 1997-2007 the share of inactive population within the total number of persons aged between 15-64 at the same level as in 1997; and H2) applying the same procedure but in case of the extended population of 65 years and over.

Table2

Inactive population and emigration potential, 1998-2007

- thou. persons -

	Year	H1				H2			
		NAP1	NAP*	EP*	A/R*	NAP2	NAP**	EP**	A/R**
		Age 15-64				Age >14			
0	1997	4479				6698			
1	1998	4703	4473	**230**		6919	6710	**209**	
2	1999	4748	4472	**276**	46	6963	6725	**238**	30
3	2000	4790	4483	**307**	31	7054	6760	**294**	56
4	2001	4964	4488	**476**	169	7272	6791	**481**	186
5	2002	5443	4367	**1077**	600	7936	6641	**1295**	815
6	2003	5637	4378	**1259**	183	8186	6673	**1513**	218
7	2004	5529	4387	**1142**	-118	8216	6699	**1517**	4
8	2005	5662	4397	**1265**	123	8400	6728	**1672**	155
9	2006	5468	4398	**1069**	-196	8209	6728	**1482**	-191
10	2007	5568	4394	**1174**	104	8255	6727	**1528**	46

Notes: H1 and H2 are the two hypotheses considered; NAP1 and NAP2 – the officially reported number of non-economically active persons in case of population of age between 15-64 and in case of population of 65 years and over; NAP* and NAP** – the estimated level of NAP1 and

NAP2; EP* and EP** – the number of potential stock of emigrants; A/R* and A/R** – the number of added (+) or returned (-) emigrants to/from the stock.
Source: Romanian Statistical Yearbook 1998-2008 and authors' own estimations.

In official statistics, we can see a strange situation during the period 1997-2007: despite a significant decrease (-12.7%) in the total population between 15 and 64 years, the number of inactive persons in the same group of population registered an impressive growth (+24.3%). Similar trends are in case of all population of 15 years and over: an insignificant increase (+0.4%) in the total population of 15 years and over, but an impressive growth (+23.2%) of inactive persons in the same group of population.

Moreover, using the two hypotheses, we estimated the potential stock of emigrants, EP, which was between 1.2 and 1.5 million persons in 2007. The result is close to the data estimated for Romania by the Migration and Remittances Team, Development Prospects Group, Word Bank – 1,244,052 persons in 2005 (Ratha and Xu, 2008). In a study (by Non-Members Economies and International Migration Division, Directorate for Employment, Labour and Social Affairs, OECD) on recent trends in international migration into OECD countries (Liebig, 2008), the contribution of Romania to the immigration flows was estimated at 89,000 persons in 2000 and at 205,000 persons in 2006 (data that could be comparable, in average, with our estimations in Table2).

4. Conclusions

Informal economy and hidden migration escape official data, further altering the output of estimation models. Based on data from certain special organised surveys and using a specific model, we estimated that over the period 2000-2007 the share of informal income in the total income of households decreased in Romania from 21.7-22.3% to 14.6-15%. Moreover, we estimated that the potential stock of emigrants increased over the same period from 294-307 thousand persons to 1174-1528 thousand persons.

References

Albu, L.-L. (2004), *Estimating the Size of Underground Economy in Romania*, Tax Evasion, Underground Economy and Fiscal Policies in Candidate Countries (The Case of Romania), GDN Project, Prague, June.

Albu, L.-L. and Iacob, A. I. (2008), "*Problems in Estimating Tax Evasion and Hidden Economy*", The 3rd General AMaMeF Conference on Advances in Mathematical Finance, May 5-10, Pitesti.

Albu, L.-L., Kim, B.-Y., and Duchene, G. (2002), "An Attempt to Estimate the Size of Informal Economy Based on Household Behaviour Modelling", *Romanian Journal of Economic Forecasting*, 3(1):17-24.

Liebig, T. (2008), "*Recent trends of international migration into OECD countries and main challenges in the labour market*", International Seminar on European Migration: Comparative advantage versus cherry-picking

policies, Institute for Economic Forecasting - Bucharest and Association ROSES – Paris, June 13-15, Bucharest.

Mansoor, A. and Quillin, B. (Eds.) (2007), "*Migration and Remittances - Eastern Europe and the Former Soviet Union*", Europe and Central Asia Region 2006, The International Bank for Reconstruction and Development/The World Bank, Washington DC.

Ratha, D. and Xu, Z. (2008), "*Migration and Remittances Factbook*, Migration and Remittances Team, Development Prospects Group, Word Bank (www.worldbank.org/prospects/migrationandremittances).

Schneider, Friedrich, (2003), "The Size and Development of the Shadow Economies and Shadow Economy Labor Force of 22 Transition and 21 OECD Countries: What Do We Really Know?", In: Boyan, B. (Ed), *The Informal Economy in the EU Accession Countries. Size, Scope, Trends and Challenges to the Process of EU Enlargement*, Bertelsmann Foundation, World Bank, Center for the Study of Democracy, Vienna Institute for International Economic Studies, Sofia, Vienna.

***   National Institute of Statistics (1996-2007): Population, labour market, population income, expenditure and consumption, *Romanian Statistical Yearbook 1998-2008*, Bucharest.

Appendix 1

Shares of informal income in total income by deciles

H1 Estimations under the hypotheses of procedure A
(regression equation on sample A)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.454	0.380	0.393	0.354	0.345	0.351	0.344	0.309
D2	0.342	0.314	0.310	0.293	0.270	0.270	0.266	0.233
D3	0.299	0.279	0.271	0.258	0.236	0.240	0.235	0.204
D4	0.269	0.256	0.251	0.239	0.212	0.219	0.209	0.187
D5	0.246	0.238	0.234	0.222	0.203	0.199	0.191	0.168
D6	0.225	0.222	0.217	0.207	0.186	0.181	0.174	0.155
D7	0.203	0.204	0.199	0.190	0.169	0.165	0.157	0.140
D8	0.182	0.182	0.177	0.171	0.153	0.147	0.137	0.123
D9	0.156	0.158	0.150	0.145	0.128	0.123	0.116	0.104
D10	0.109	0.105	0.100	0.096	0.084	0.081	0.076	0.069
Average	**0.223**	**0.212**	**0.207**	**0.196**	**0.176**	**0.172**	**0.163**	**0.146**

H2 Estimations under the hypotheses of procedure C
(regression equation on sub-sample B amended by the regression
equation of probability sub-sample B in sample A)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.474	0.404	0.416	0.380	0.371	0.377	0.370	0.337
D2	0.358	0.331	0.328	0.312	0.290	0.291	0.287	0.256
D3	0.308	0.289	0.282	0.270	0.250	0.254	0.249	0.222
D4	0.270	0.259	0.254	0.243	0.219	0.226	0.217	0.198
D5	0.240	0.233	0.230	0.220	0.203	0.200	0.193	0.174
D6	0.213	0.210	0.206	0.197	0.181	0.176	0.171	0.155
D7	0.186	0.186	0.182	0.175	0.159	0.156	0.150	0.137
D8	0.161	0.160	0.157	0.152	0.139	0.135	0.128	0.118
D9	0.133	0.134	0.129	0.126	0.114	0.111	0.105	0.098
D10	0.095	0.092	0.089	0.087	0.079	0.077	0.074	0.070
Average	0.217	0.206	0.202	0.193	0.176	0.173	0.165	0.150

H3 Estimations under the hypothesis of procedure B
(a generalized informal economy based on the equation of regression
used in case of sub-sample B)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.571	0.501	0.513	0.475	0.466	0.472	0.464	0.429
D2	0.463	0.434	0.430	0.412	0.387	0.388	0.384	0.348
D3	0.418	0.397	0.389	0.374	0.350	0.356	0.349	0.316
D4	0.387	0.373	0.367	0.354	0.324	0.332	0.321	0.296
D5	0.362	0.353	0.349	0.336	0.314	0.309	0.301	0.275
D6	0.339	0.335	0.330	0.318	0.295	0.289	0.281	0.259
D7	0.314	0.315	0.309	0.299	0.275	0.271	0.261	0.242
D8	0.290	0.290	0.285	0.278	0.256	0.250	0.238	0.222
D9	0.260	0.262	0.254	0.247	0.227	0.221	0.212	0.199
D10	0.204	0.199	0.194	0.189	0.174	0.170	0.164	0.155
Average	0.337	0.324	0.318	0.306	0.283	0.279	0.268	0.248

Appendix 2

Shares of informal income in total income by years

H1 Estimations under the hypotheses of procedure A
(regression equation on sample A)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.137	0.128	0.126	0.122	0.128	0.126	0.123	0.122
D2	0.112	0.110	0.109	0.110	0.105	0.104	0.103	0.101
D3	0.105	0.100	0.100	0.099	0.099	0.098	0.098	0.096
D4	0.098	0.096	0.097	0.100	0.098	0.098	0.098	0.095
D5	0.096	0.096	0.100	0.098	0.098	0.098	0.096	0.095
D6	0.091	0.092	0.092	0.091	0.092	0.092	0.093	0.097
D7	0.093	0.092	0.094	0.092	0.092	0.093	0.097	0.098
D8	0.091	0.096	0.095	0.096	0.094	0.096	0.097	0.098
D9	0.089	0.095	0.094	0.097	0.097	0.098	0.097	0.098
D10	0.088	0.095	0.093	0.095	0.097	0.097	0.099	0.100
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

H2 Estimations under the hypotheses of procedure C
(regression equation on sub-sample B amended by the regression
equation of probability sub-sample B in sample A)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.154	0.146	0.143	0.139	0.143	0.140	0.136	0.133
D2	0.124	0.123	0.122	0.122	0.116	0.114	0.113	0.111
D3	0.113	0.109	0.109	0.107	0.107	0.105	0.104	0.103
D4	0.102	0.101	0.101	0.104	0.102	0.102	0.101	0.099
D5	0.096	0.096	0.100	0.098	0.098	0.098	0.096	0.095
D6	0.088	0.089	0.089	0.088	0.089	0.089	0.090	0.094
D7	0.086	0.085	0.087	0.085	0.085	0.086	0.090	0.091
D8	0.081	0.085	0.084	0.085	0.084	0.087	0.088	0.089
D9	0.077	0.081	0.081	0.084	0.085	0.086	0.086	0.088
D10	0.078	0.085	0.084	0.086	0.090	0.092	0.095	0.097
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

H3 Estimations under the hypothesis of procedure B
(a generalized informal economy based on the equation of regression
used in case of sub-sample B)

	2000	2001	2002	2003	2004	2005	2006	2007
D1	0.124	0.117	0.114	0.111	0.115	0.112	0.108	0.106
D2	0.105	0.103	0.102	0.102	0.097	0.095	0.094	0.092
D3	0.100	0.096	0.096	0.094	0.094	0.092	0.091	0.089
D4	0.095	0.093	0.094	0.096	0.094	0.093	0.093	0.090
D5	0.094	0.094	0.098	0.095	0.095	0.095	0.093	0.092
D6	0.091	0.092	0.091	0.090	0.091	0.091	0.092	0.096
D7	0.095	0.093	0.095	0.093	0.092	0.093	0.097	0.099
D8	0.095	0.099	0.098	0.098	0.097	0.100	0.101	0.102
D9	0.096	0.101	0.101	0.104	0.105	0.106	0.106	0.107
D10	0.105	0.113	0.112	0.115	0.120	0.121	0.126	0.128
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000