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- Abstract -

The actual global crisis seems to influence negatively the sustainable development in EU countries. At least partially the informal economy escapes from the official registered GDP and hidden migration from the official demographic statistics. This can affect in a significant way the measurement of sustainable development and consequently policies in this field. Coming from general accepted findings of the theory, we concentrate on evaluating the reasons of agents to be involved in hidden economy and estimating the size of this part of economy. Today, there are evidences of a tendency to extended hidden migration together with an increasing official migration usually from eastern EU members to western countries. In a sense, hidden migration could be in relation with informal economy. Using some indirect procedures, we try to estimate the size of hidden migration and its impact on the official side of economy and its potential growth in the future. The main application of the developed methodology is in case of Romania.

Key Words: informal income, inactive population, emigration potential, hidden migration

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1. Introduction

Although before 1990, during the communist regime, it was recognised a so-called parallel economy (a kind of informal economy) functioning outside of the official economy, only in transition period occurred estimates of size of the informal economy in Romania. Moreover, last years, under the extending migration phenomenon, there is 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, coming from 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 informal economy

As method to estimate the size of informal economy for 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 old research (see, Albu, 2004), 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 formal sector. Moreover, the households' behaviour is sometimes fundamentally different among groups of population. The most synthetic expression of this idea could be as follows: along with their formal income growth, the households tend to wish to obtain more and more informal income in absolute terms, but in the same time the share of informal income in the total income tends to decrease (sharply down until a reasonable average level of formal income is obtained and slowly down in the case of the richest households). Probably, the main reason why the rich people could be involved in the informal sector is provided by the attempt to avoid in a certain proportion the taxes, according to an optimising strategy as is the case of rationale agents.

Data obtained from some special surveys organised in Romania facilitated us to estimate the parameters for the correlation between income in households from official sector and their participation in informal activities. Now, we present only the final results and the strategy we used in order to extent estimation procedure from households' population in survey to the entire population at national level. Certain behavioural regimes were outlined in matter of potential implication in informal sector. Thus, in the case of poor households (obtaining relative low income from their activity in the official sector) there is a large availability 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 availability for informal jobs becomes smaller; however still remain the temptation for riche people to accept informal jobs in order to supplement their income or perhaps to avoid taxation. Despite of the general decreasing tendency of the share of expected (desired) informal income along with the growth of the basic income of 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 (function of 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:

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$$z\% = a / (v + b) + (1 - a/b) + u \qquad\qquad (1)$$

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):

$$ze\% = a / (v + b) + (1 - a/b) \qquad\qquad (1')$$

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

In order to estimate the real level for informal income, according to the available data from surveys, we used two samples, noted as 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 equivalent 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: it is implicitly supposed the same distribution of the entire population by formal income 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 total number of households existing in Romania is not a so 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 informal income in the total number of deciles of formal income in which they are located (the total number of this special category of household is just the sub-sample B):

$$p = a \cdot d + b + u \qquad\qquad (3)$$

and from which the equation (2) was rewritten as

$$zpe(v) = ze(v) \cdot pe(d) \qquad\qquad (4)$$

where d are deciles (d=1…10); pe(d)=ad+b is the estimating equation of the probability that 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 noted as C. Moreover, we extended the three estimating procedures, A, B, and C, to the national level over the period 2000-2009. In order to conserve the estimated values for coefficients in case of extending the model to the national level, all data on income from used surveys were expressed in constant prices.

The conclusion was that over the period 2000-2009 the share of informal income decreased in Romania from 21.7-22.3% in the total income of households to 12.6-13.5%, as we can see below in Table 1. Under the very improbable hypothesis of a generalised participation in informal activities (in theoretical case when all households are involved in informal activities as in case of the sub-sample B), the computed share decreased from 33.7% in 2000 to 22.5% in 2009. The main factor of this favourable dynamics of informal income was the growth of the official registered income (+216.8%, from about 104400 to 226300 Lei/person/month, computed in 1995 currency and prices, as they are originated in the first used survey).

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Table 1. 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
2008	12.9	13.7
2009	12.6	13.5

Interesting conclusions could be extracted in the case of analysing by deciles the dynamic process of involvement in the informal sector. In Appendix 1 are presented the three matrixes comprising the shares of informal income within the total income in the case of the deciles for each year of the period 2000-2009, corresponding to the three estimating methods. In Appendix 2 is presented the contribution of deciles to the total informal income at 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 period 2000-2009 (the year 2000 is denoted as 0 and 2009 as 9), and its relatively strong inverse correlation with the distribution of formal income grouped by deciles (deciles are noted as i=1…10, and years as j=0…9). z%M represents the yearly average share of the informal income in the total income at 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 on sub-sample B amended by the probability function).

Figure 1.

Figure 2.

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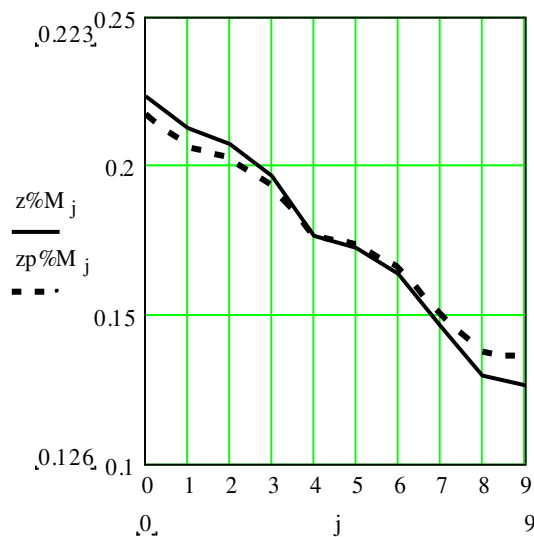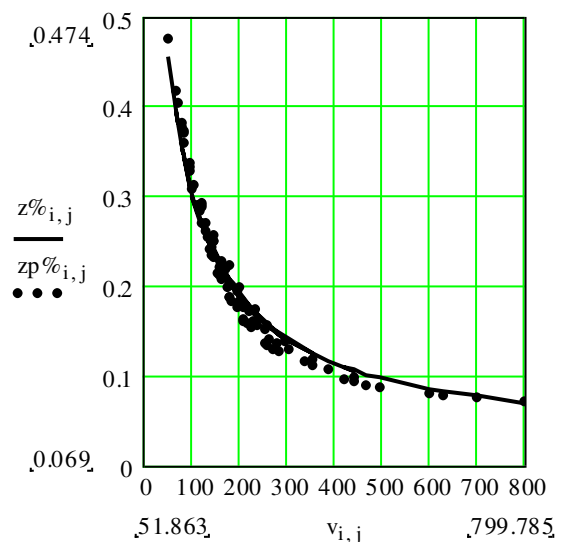
3. Estimating the size of hidden migration

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 natural dynamics of population and data on migration, between demographic statistics, including migration data, and labour force statistics should be a determined relation. Unfortunately, the official statistics is operating only with the so-called final migration (international migration determined by change of permanent residence). Thus, by channels of vital statistics and registered migration, from total existing population to the total active population could occur some discrepancies. They could be interpreted just as "hidden" migration. Some reason could be find 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 less than 3 months), could renew many times its stage 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 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 overstating and understating 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 splitting process (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 1998-2009, as it is shown in Table 2. The analysis of the registered data for labour force demonstrated last twelve years a dramatic decrease in the activity rate (from 70.8% in 1997 to 63.1% in 2009), 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 period (a decade being considered short from historic viewpoint, because the structure of demographic system has usually large inertia). In order to estimate a more realistic number of inactive labour force, we are interpreting data from a viewpoint of human behaviour and potential involvement of a person in 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 a potential to work but actually not included either in employed group or in unemployed group (this group of population could be interpreted as a "reserve army"). Some of them are living in country or work in informal sector, but others are already working abroad without any registration in the official statistics in their country of origin. Consequently, they continue to be included artificially in the category of economically non-active persons. They are inactive for the origin country, but they could be active in destination country.

Estimated number of inactive population we obtained by using two hypotheses: H1) maintaining for the entire period 1997-2009 the share of inactive population within the total number of persons of age between 15-64 years at the same level as in 1997; and H2) applying the same procedure but in case of the total number of population over 14 years.

Table 2. Inactive population and emigration potential, 1998-2009

- thou persons -

	Year	H1				H2			
		NAP1	NAP*	EP*	A/R*	NAP2	NAP**	EP**	A/R**
		Age 15-64				Age >14			
0	1997	4479	4479			6698	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**
11	2008	5580	4392	**1188**	**14**	8295	6724	**1571**	**44**
12	2009	5542	4386	**1157**	**-32**	8300	6718	**1582**	**11**

Notes: H1 and H2 are the two considered hypotheses; NAP1 and NAP2 – the officially reported number of economically non-active persons in case of population of age between 15-64 and in case of all population over 14 years respectively; 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 of emigrants abroad.

From official statistics, we can see a strange situation during the period 1997-2009: despite of a significant decreasing (-12.7%) of the total number of population between 15-64 years, the number of inactive persons in this group of population registered an impressive growth (+23.7%). Similar trends are in case of considering all population of 15 years and over: an insignificant increasing (+0.3%) of the total population in this group, but an impressive growth (+23.9%) 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 1.16-1.58 millions persons in 2009. 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 on recent trends of international migration into OECD countries (Liebig, 2008), the contribution of Romania to the immigration inflows 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 (the estimated average level was between 84,000 and 125,000 persons per year in the period 1999-2009).

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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	2008	2009
D1	0.454	0.380	0.393	0.354	0.345	0.351	0.344	0.309	0.281	0.271
D2	0.342	0.314	0.310	0.293	0.270	0.270	0.266	0.233	0.209	0.200
D3	0.299	0.279	0.271	0.258	0.236	0.240	0.235	0.204	0.180	0.172
D4	0.269	0.256	0.251	0.239	0.212	0.219	0.209	0.187	0.161	0.154
D5	0.246	0.238	0.234	0.222	0.203	0.199	0.191	0.168	0.147	0.140
D6	0.225	0.222	0.217	0.207	0.186	0.181	0.174	0.155	0.133	0.128
D7	0.203	0.204	0.199	0.190	0.169	0.165	0.157	0.140	0.121	0.117
D8	0.182	0.182	0.177	0.171	0.153	0.147	0.137	0.123	0.108	0.104
D9	0.156	0.158	0.150	0.145	0.128	0.123	0.116	0.104	0.092	0.090
D10	0.109	0.105	0.100	0.096	0.084	0.081	0.076	0.069	0.065	0.064
Average	**0.223**	**0.212**	**0.207**	**0.196**	**0.176**	**0.172**	**0.163**	**0.146**	**0.129**	**0.126**

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	2008	2009
D1	0.474	0.404	0.416	0.380	0.371	0.377	0.370	0.337	0.310	0.301
D2	0.358	0.331	0.328	0.312	0.290	0.291	0.287	0.256	0.234	0.226
D3	0.308	0.289	0.282	0.270	0.250	0.254	0.249	0.222	0.199	0.192
D4	0.270	0.259	0.254	0.243	0.219	0.226	0.217	0.198	0.176	0.170
D5	0.240	0.233	0.230	0.220	0.203	0.200	0.193	0.174	0.157	0.151
D6	0.213	0.210	0.206	0.197	0.181	0.176	0.171	0.155	0.138	0.134
D7	0.186	0.186	0.182	0.175	0.159	0.156	0.150	0.137	0.122	0.119
D8	0.161	0.160	0.157	0.152	0.139	0.135	0.128	0.118	0.106	0.104
D9	0.133	0.134	0.129	0.126	0.114	0.111	0.105	0.098	0.089	0.088
D10	0.095	0.092	0.089	0.087	0.079	0.077	0.074	0.070	0.067	0.067
Average	**0.217**	**0.206**	**0.202**	**0.193**	**0.176**	**0.173**	**0.165**	**0.150**	**0.137**	**0.135**

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	2008	2009
D1	0.571	0.501	0.513	0.475	0.466	0.472	0.464	0.429	0.399	0.389
D2	0.463	0.434	0.430	0.412	0.387	0.388	0.384	0.348	0.320	0.311
D3	0.418	0.397	0.389	0.374	0.350	0.356	0.349	0.316	0.288	0.278
D4	0.387	0.373	0.367	0.354	0.324	0.332	0.321	0.296	0.266	0.258
D5	0.362	0.353	0.349	0.336	0.314	0.309	0.301	0.275	0.250	0.242
D6	0.339	0.335	0.330	0.318	0.295	0.289	0.281	0.259	0.233	0.227
D7	0.314	0.315	0.309	0.299	0.275	0.271	0.261	0.242	0.219	0.214
D8	0.290	0.290	0.285	0.278	0.256	0.250	0.238	0.222	0.203	0.199
D9	0.260	0.262	0.254	0.247	0.227	0.221	0.212	0.199	0.183	0.181
D10	0.204	0.199	0.194	0.189	0.174	0.170	0.164	0.155	0.150	0.149
Average	**0.337**	**0.324**	**0.318**	**0.306**	**0.283**	**0.279**	**0.268**	**0.248**	**0.229**	**0.225**

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	2008	2009
D1	0.137	0.128	0.126	0.122	0.128	0.126	0.123	0.122	0.124	0.126
D2	0.112	0.110	0.109	0.110	0.105	0.104	0.103	0.101	0.102	0.109
D3	0.105	0.100	0.100	0.099	0.099	0.098	0.098	0.096	0.099	0.097
D4	0.098	0.096	0.097	0.100	0.098	0.098	0.098	0.095	0.096	0.096
D5	0.096	0.096	0.100	0.098	0.098	0.098	0.096	0.095	0.097	0.097
D6	0.091	0.092	0.092	0.091	0.092	0.092	0.093	0.097	0.095	0.094
D7	0.093	0.092	0.094	0.092	0.092	0.093	0.097	0.098	0.094	0.092
D8	0.091	0.096	0.095	0.096	0.094	0.096	0.097	0.098	0.093	0.092
D9	0.089	0.095	0.094	0.097	0.097	0.098	0.097	0.098	0.098	0.097
D10	0.088	0.095	0.092	0.095	0.097	0.097	0.099	0.100	0.102	0.100
Total	**1.000**	**1.000**	**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	2008	2009
D1	0.154	0.146	0.143	0.139	0.143	0.140	0.136	0.133	0.133	0.135
D2	0.124	0.123	0.121	0.122	0.116	0.114	0.113	0.111	0.110	0.117
D3	0.113	0.109	0.109	0.107	0.107	0.105	0.104	0.103	0.105	0.103
D4	0.102	0.101	0.101	0.104	0.102	0.102	0.101	0.099	0.100	0.100
D5	0.096	0.096	0.100	0.098	0.098	0.098	0.096	0.095	0.097	0.098
D6	0.088	0.089	0.089	0.088	0.089	0.089	0.090	0.094	0.093	0.091
D7	0.086	0.085	0.087	0.085	0.085	0.086	0.090	0.091	0.089	0.087
D8	0.081	0.085	0.084	0.085	0.084	0.087	0.088	0.089	0.085	0.085
D9	0.077	0.081	0.081	0.084	0.085	0.086	0.086	0.088	0.089	0.088
D10	0.078	0.085	0.083	0.086	0.090	0.092	0.095	0.097	0.099	0.096
Total	**1.000**	**1.000**	**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	2008	2009
D1	0.124	0.117	0.115	0.111	0.115	0.112	0.108	0.106	0.105	0.107
D2	0.105	0.103	0.102	0.102	0.097	0.095	0.094	0.092	0.092	0.098
D3	0.100	0.096	0.096	0.094	0.094	0.092	0.091	0.089	0.091	0.090
D4	0.095	0.093	0.094	0.096	0.094	0.093	0.093	0.090	0.091	0.091
D5	0.094	0.094	0.097	0.095	0.095	0.095	0.093	0.092	0.093	0.094
D6	0.091	0.092	0.092	0.090	0.091	0.091	0.092	0.096	0.095	0.093
D7	0.095	0.093	0.095	0.093	0.092	0.093	0.097	0.099	0.096	0.095
D8	0.095	0.099	0.098	0.098	0.097	0.100	0.101	0.102	0.098	0.097
D9	0.096	0.101	0.101	0.104	0.105	0.106	0.106	0.107	0.109	0.108
D10	0.105	0.113	0.111	0.115	0.120	0.121	0.126	0.128	0.130	0.127
Total	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**