

Unregistered international trade – economic phenomenon under different statistic approaches

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JEL classification: F10, F 17

Abstract:

We analyze unregistered international trade as a fragment of the parallel economy. On the basis of the unregistered trade through the Eastern border of Poland, we will present difficulties in defining the parallel economy and its elements as well as the ways of estimation of that trade with bringing into play the results in economic analysis and policy. We present possibility of judging unregistered trade volume by indirect information like e.g. passenger transport through the borders and number of offences and crimes connected to the trade of goods. We present conclusions of such analysis. We make it clear that such form of research does not perfectly reflect the real trade volume of cross-border trade and does not give full information about unregistered trade consequences and significances for Polish economy. It is also difficult to determine changes, which occurred in cross-border trade on the Eastern border after Poland joined European Union on 1 May 2004.

In the paper we analyze also three statistical approaches to the problem of measuring illegal trade with the East. The first approach is a questionnaire survey based on a random stratified sample of adult citizens of Poland. The second approach is a direct survey of bazaars in Poland. The third one is a study based on information from the Police Department about arrested illegal traffickers. As a basis of the estimation we state the amount of bunches of cigarettes illegally sold (bought).

Hereby, we analyze unregistered international trade as a fragment of the parallel economy. On the basis of the unregistered trade through the Eastern boarder of Poland, we will present difficulties in defining of parallel economy and its elements as well as the ways of estimation of that trade with bringing into play the results in economic analysis and policy. We present possibilities of use three statistical approaches to measure illegal trade with the East.

Nowadays, the scientific research of unregistered border trade is difficult in Poland. Poland doesn't have basic data of that trade, because polish statistical office, has not been collecting unregistered trade data since 1997. In our paper, we present possibility of judging unregistered trade volume by indirect information like e.g. passenger transport through the borders and number of offences and crimes connected to the trade of goods. We present conclusions of such analysis. We make it clear, that such a form of research does not perfectly reflect the real trade volume of cross-border trade and does not give full information about unregistered trade consequences and significances for Polish economy. It is also difficult to determine changes, what occurred in cross-border trade on the Eastern border after Poland joined European Union on 1 May 2004.

We stressed that such a analysis can be directly applied to analogous problems such as the amount of illegally sold (bought) vodka, compact records, computer programs or faked clothes. All three approaches carry different problems to be solved. In the case of questionnaire survey the question about losses and weights arises (stratification into social, geographic and age groups). In the case of the bazaar survey we need to consider stratification into weekends, Mondays and other week days. Also stratification into different seasons of the year should be taken into account. Apart from that the method of bazaar selection should be discussed (random or arbitrary). As far as the study based on information from the Police Department is considered we should decide what is the basis of the analysis. Should it be the amount of the confiscated cigarettes or the number of arrested traffickers? These and other questions are left to be answered

In terms of the passengers transport through the borders¹, comparing 2003 to 2004 year number of people passing Polish border increased by 24%. The significant rise was notified on the West border (54% increase in number of people comparing to the year 2003). Undoubtedly, the most important reason of that substantial increase of passengers transport on the West border in first part of 2004 was forthcoming Polish integration to

¹ Passengers transport data from: *Statistical compendium of Customs Service 2000-2005*, Ministry of Finance – Customs Service of Republic of Poland, 2005.

EU and elimination of the procedure of passport control on the border. Since May 1, 2004 Polish citizens may cross the EU border using their identity card and there is no registration of passengers transport through the border with Germany, Czech Republic and Slovakia. The smallest change in cross-border passengers flow took place on the East border (2%) and on the South border (1%) in 2004.

Table 1: Passengers transport through the Polish borders in 2000-2005 in million people

border	2000	2001	2002	2003	2004	2005
East border	32.04	30.85	28.68	26.81	27.36	30.42
South border	-	85.00	72.73	63.44	65.55	-
West border	89.75	60.58	50.99	50.84	78.51	-
Airports	4.75	4.86	4.89	5.13	6.81	9.51
total	281.81	185.15	160.33	148.75	180.42	-

Source: *Statistical compendium of Customs Service 2000-2005*, Ministry of Finance – Customs Service of Republic of Poland, 2005.

In the first quarter of the year 2005, passengers transport on the East border raised by 15% comparing to the first quarter of 2004 (from 5.54 mill to 6.35 mill people). Number of Polish citizens crossing the East border in the mentioned period, increased from 1.4 mill people to 2.6 mill people (by 85%), while number of foreigners decreased from 4.14 mill people to 3.75 mill people (by 9%). The fall in number of foreigners coming into the East border was affected by visa duty to the citizens of Belorussia, Ukraine and Russia, and an obligation of visa payment for Belorussians (significant increase in travel costs; prices of temporary resident visa: single visit - 6 USD, double visit - 10 USD, frequent visit - 30 USD plus additional payment for application in case of temporary work permit - 40 USD; see also table 2).

Analyzing bazaars (market places) situated in large cities and small towns along the East border, it can be stated, that unregistered trade has an important position in life of people from Eastern Poland. regions. Recurrently, the goods imported out the East border are sold by Russians, Belorussians, Ukrainians at prices much lower than in the retail trade stores. For example, one pack of cigarettes Marlboro costs from 4 to 4.5 zlotys on

bazaar, concurrently, it costs 6.9 zlotys at the retail store. The alcohol products case is similar. The difference in prices occurs the reason, why tobacco and alcohol products are the largest group of goods in unregistered trade. Their are sold on bazaars illegally. Number of offences and crimes connected to the smuggling of tobacco and alcohol products through the border may attest to the importance of these goods in unregistered trade.

Table 2: Passengers transport through particular border in 2002-2005 in million of people (considering land borders)

Border country	2002	2003	2004	2005
Russian Federation	3.94	3.13	3.55	3.87
Lituania	3.02	3.21	3.77	-
Belorussia	9.53	8.83	7.95	8.79
Ukraina	12.19	11.63	12.07	17.75
Slovakia	14.45	13.98	15.48	-
Czech Republic	58.28	49.45	50.06	-
Germany	50.99	50.85	78.51	-
total	152.41	141.10	171.42	

Source: *Statistical compendium of Customs Service 2000-2005*, Ministry of Finance – Customs Service of Republic of Poland, 2005.

Data about offences and crimes connected to the trade of goods are given by the Central Statistical Office (GUS) in the file with press releases and tables of statistical data, because GUS does not collect data in other way. In that paper, statistics are build on the basis of the information from Customs Service – institution dependent to Ministry of Finance.

Table 3: Offences and crimes connected to the trade of goods in 2001-2005

	Year					
	2001	2002	2003	2004	2005	2001-2005
Customs crimes in total	18 684	20 012	23 885	15 412	4 815	82 808
- in import	18 402	18 820	22 135	14 101	4 025	69 493
Customs offences in total	6 728	5 073	5 407	18 139	34 146	69 493
- in import	6 676	4 965	5 078	16 841	31 910	65 470
Currency crimes in total	79	38	10	8	32	167
- in import	0	3	0	1	1	5
Currency offences in total	12	5	3	1	2	23
- in import	2	1	3	0	2	8

Source: *Statistical compendium of Customs Service 2000-2005*, Ministry of Finance – Customs Service of Republic of Poland, 2005.

Number of customs offences increased more than five times in the period of 2001-2005. Customs offences take place usually in the case of smuggling of small amount of imported goods such as cigarettes and spirits. Although, the rise in notified customs offences is not a clear meaning occurrence. It can reflect increase in import of goods in cross-boarders trade, as well as improving in effectiveness of Customs Service.

Table 4: Customs offences and crimes in 2000-2005 – number of cases instituted

Rok	Import		Export	
	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)
2000	20 809	128.23	259	14.81
2001	23 859	153.19	389	14.84
2002	22 629	115.11	1 206	9.57
2003	27 214	122.22	1 751	12.27
2004	30 943	118.22	673	6.97
2005	35 938	83.00	435	4.56

Source: Central Statistical Office in „Przestępczość”, file of unpublished documents provided by Library of CSO and Statistical Bulletin of Customs Service published by Ministry of Finance, 2006.

Customs Service has taken up issues concerning excise taxes and tax inspection since September 1, 2003 and it has resulted in large amount of cases in terms of illegal import in 2003 and 2004. In 2004, it was notified, that number of customs offences and crimes in terms of import has raised by 12% comparing to the previous year. The largest increase was registered by Customs Chamber in Przemysl and the fall was recorded in Bialystok. That fact may suggest that imposed visa duty for Belorussians has highly limited number of their visits in Poland with an eye to trade. On the other hand, visa for Ukrainians is free of charge and their visits have not been restricted².

Unregistered trade volume with Belorussia has fallen down in the last years. That change appears in the statistical data from particular check-points, which are Customs Service Offices in Poland. There was notified 4% decrease of customs offences and crimes by the Customs Office in Bialystok, 3.9% fall (data from Biala Podlaska). There was a substantial increase in number of customs offences and crimes (by 74%) notified by Customs Office in Przemysl, which concerns to the border with Ukraine.

Table 4 A:
- **selection by the Customs Offices controlling trade mostly with Belorussia, Russia, Ukraine**

	Biała Podlaska		Białystok		Olsztyn		Przemysl	
	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)
2000	4517	38	1375	13	1650	5.7	2510	9.2
2001	5388	43.6	2281	28	1919	5.8	2364	6.6
2002	5850	41.5	3643	12	2602	9.4	2706	3.1
2003	7213	26.3	3304	b.d.	3465	7.2	2674	9.1
2004	7065	24	3233	8.7	3883	4.3	4651	7.1

Table 4 B:
- selection by type of goods* (in 2003-2004)

	Ethyl alcohol >80%		Cigarettes		CD and other data source		Men's shirts		Underwear - shirts		Fitness clothes	
	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)	N° of cases	Value of goods (mill zlotys)
2003	4500	11.7	15373 (15034)	44.49 (36)	118 (117)	4.6	13 (12)	0.65	35 (35)	0.07	1	0.13
2004	3600 (3400)	5.11 (3.46)	20644 (19162)	67.84 (60)	218 (194)	7.71	30 (24)	1.6	100 (97)	1.7	78 (74)	1.12
2005	2191	4.47	25048	41.88	208	6.15	-	-	-	-	54	0.28

(*) numbers in brackets relate to imported goods

Source: Central Statistical Office in „Przestępczość”, file of unpublished documents provided by Library of CSO and Statistical Bulletin of Customs Service published by Ministry of Finance, 2006.

Based on passengers transport data, we cannot measure that any more on the West and South border, because there is no passport control. As statistics shows, significant fall in passengers transport took place on Eastern border, mostly because of the administrative procedures and visa duties on the border, as it is EU border. Analyzing and the number of customs offences and crimes connected to the exchange of goods, we can conclude that volume of trade with Eastern neighbors decreased within last years. It happened mostly because of the administrative procedures and visa duties and luggage control of citizens of Belorussia, Ukraine, and Caliningrad District.

In research dealing with volume of unregistered trade, with East European countries in particular, it is necessary to use statistical methods. Planning the research which is meant to assess the scale of the trade we might use three basic but very different approaches. The first one is a questionnaire survey based on a random stratified sample. The second approach would be a direct study of Polish open air markets. Because of financial reasons it also had to be a sample survey not a complete enumeration. The third approach would be researching data obtained from the police about apprehended traffickers and their goods.

A questionnaire survey based on a random stratified sample of adult citizens of Poland would be one of most usual (from statistical point of view) but most expensive solutions at the same time. A survey frame could be PESEL Central Database (the database of national identification numbers; the PESEL number is mandatory for all permanent residents of Poland and for temporary residents living in Poland for over 2

months; it is used in Poland since 1979). In a questionnaire survey of adult citizens stratified sampling should be used, stratification should be done according to a voivodship (16 strata) and according to a dual town – country division within a voivodship (2 strata in each voivodship). Additionally age strata could be created. They shouldn't be numerous because too many strata could result in too small sample sizes within some strata. Also it might be useful to have strata according to income of respondents. Unlike other suggested stratifying variables information necessary to create them can't be obtained from available data. We may consider including additional question in a questionnaire referring to income of a person and to carry out stratification after drawing a sample, i.e. to conduct the so called poststratification. This solution will certainly cause that nonresponse will increase and may prove to be inefficient.

Questionnaires should be anonymous. It is advisable to use some incentives (one of them might be drawing prizes). Questionnaires could be distributed by post, carried out by phone or through personal interviews. The last option is most expensive but yields most accurate data. Assessing volume of e.g. illegal sale of cigarettes smuggled from countries east of Poland by means of a direct personal interview it would be necessary to use two stage sampling apart from stratified sampling. Survey frame would be different as well. Two stage sampling involves drawing certain number of so called first stage units (they can be statistical districts – units used by Central Statistical Office) and then from within these we shall draw certain number of second stage units which may be for example flats. Two stage sampling is usually conducted because of financial reasons. Using usual simple sampling or even stratified sampling sample units may be located too distant from each other and the survey would be too time and cost expensive to conduct. In case of questionnaires posted by mail or conducted by phone two stage sampling is not recommended. So as we see depending on the manner of data collection the sampling method and sampling frame could be different.

From statistical point of view two stage sampling increases variance of applied estimators and the random error is larger. However nonrandom error usually grows smaller because direct personal interview usually yields more accurate data. So we have to compromise on random errors, nonrandom errors and financial funds.

Formulating a proper question or questions enquiring about e.g. purchased illegal cigarettes should be left up to experts in the field. One should remember about precision and separation of issues touching individual answers. In all kinds of questionnaires one should expect a nonresponse problem. So even if the sample is initially proportionally

designed between strata we should use weights in the process of assessing unknown values because we can not expect such a sample would be proportional (representative) at the final stage of a survey.

In random stratified sampling dividing the country into 96 strata (16 voivodships, 2 town-country strata, 3 age strata) we have the following formulas for the mean and total value of the studied variable:

$$\hat{y} = \sum_{k=1}^{16} \sum_{j=1}^2 \sum_{i=1}^3 W_{ijk} \bar{y}_{S_{ijk}} \text{ - estimator of the population mean}$$

$$\hat{t} = \sum_{k=1}^{16} \sum_{j=1}^2 \sum_{i=1}^3 N_{ijk} \bar{y}_{S_{ijk}} \text{ - estimator of the population total,}$$

where

- W_{ijk} - weight for particular strata; $i=1,2,3$ refers to age strata, $j=1,2$ to town or country respectively and $k=1,2,\dots,16$ refers to a given voivodship
- $W_{ijk} = \frac{N_{ijk}}{N}$
- N_{ijk} – size of a subpopulation of adult citizens of Poland at age i , $i=1,2,3$ living respectively in a town or country $j = 1,2$, in a given voivodship $k=1,2,\dots,16$ (according to PESEL database)
- $N = \sum_{k=1}^{16} \sum_{j=1}^2 \sum_{i=1}^3 N_{ijk}$ size of a population of all adult citizens of Poland (according to PESEL database)
- $\bar{y}_{S_{ijk}}$ - sample means within given strata

In the case of random stratified sampling random error of the estimation can be assessed using formula:

$$\hat{\delta} = \frac{2 \cdot \sqrt{\sum_{k=1}^{16} \sum_{j=1}^2 \sum_{i=1}^3 W_{ijk}^2 s_{S_{ijk}}^2 \left(\frac{1}{n_{ijk}} - \frac{1}{N_{ijk}} \right)}}{\hat{y}} \cdot 100\% \text{ - percentage error}$$

where n_{ijk} - given sample sizes within strata, $s_{S_{ijk}}^2$ - sample variance within strata.

In the case of two stage sampling formulas are a little more complex; also in the case of large nonresponse formulas should be corrected [see e.g. Särndal, Swensson, Wretman: Model Assisted Survey Sampling, Springer-Verlag 1992].

Another approach to assessing the volume of unregistered trade with East European countries is a direct survey of open air markets. Target population here consists of all open air markets in Poland. To conduct a survey it is necessary to divide the population into two subpopulations. The first subpopulation would consist of open air markets of utmost strategic importance, regarding unregistered trade, like *Jarmark Europa* (Europa Open Air Market) in Warsaw or *Jurowiecka* open air market in Białystok. The second subpopulation would consist of regular open air markets of local importance.

In this case the total number of all regular open air markets in Poland is unknown and this is the first serious problem which arises here. The first step should be to assess this number. One can do this for example by dividing territory of Poland into voivodships and within each voivodship into relatively small geographical entities. From each voivodship we should draw some number of geographical entities, gather information about number of open air markets in selected entities and use appropriate estimator.

In optimally constructed survey in a subpopulation of strategic open air markets it is necessary to conduct complete enumeration, i.e. study all markets regarding the volume of goods sold illegally. In a subpopulation of local markets it would be advisable to conduct a multi stage sampling. The problem is that we do not have any sampling frame from which we could select a sample. That is why we should use geographical entities drawn earlier in order to assess the number of open air markets and only from this drawn at first stage geographical entities draw in the second stage a small number of open air markets and study only them regarding volume of goods sold illegally.

If a study of a subpopulation of regular local markets is impossible to conduct because of financial reasons we can limit ourselves to strategic open air markets only and extrapolate the result on the whole population by using what we call expert knowledge and applying appropriate multiplier. Of course, accepting such a solution will cause that the study will not be any statistical survey but in the case of lack of sufficient financial funds it could prove to be necessary.

In studying open air markets regarding the volume of goods sold illegally we should also use another type of stratification. The subject of stratification should be the season of the year, weekdays or weekends, separately Mondays should be treated, e.g. in *Jarmark Europa* in Warsaw most of stalls are closed on Mondays. The appropriate method of measurement of the volume of goods being in sales in open air markets we leave up to expert knowledge.

Another approach would be studying data about apprehended traffickers. This research is based on data which can be obtained from police departments. Poland should be divided once again into two subpopulations. One subpopulation should consist of strategic cities and towns regarding trade with East European countries. The remaining towns and countries would constitute the second subpopulation. In the first subpopulation complete enumeration is advisable, i.e. all entities should be studied and in the second one a survey sampling could be carried out.

By analogy to the previous method, when the research need to be conducted very quickly and using very small financial means, we can limit ourselves into three main cities like Warsaw, Białystok and Poznań and extrapolate the result on the whole Poland using suitable multiplier based on expert knowledge. Such a solution is a significant simplification if the reality. But such kind of a research has never been conducted in Poland so even simplified analysis can be very useful.

Illustrative research for Warsaw could be constructed as follows. One should receive data from police departments about the number of apprehended persons and about amount of goods being in their possession, for example the number of boxes of cigarettes confiscated in particular days of the year. A day in which the largest number of traffickers was apprehended may be seen as a day in which there were no illegally sold goods in market because of effective police action. Remaining days could be equalized to the day in which maximal number of apprehended traffickers was obtained. In the face of this, when maximum 50 traffickers were apprehended and they had 5000 boxes of illegal cigarettes in their possession and at the other day 10 persons were apprehended and they had 900 boxes of cigarettes, we can assume that on that day about 3600-4100 illegal boxes of cigarettes were available in the market.

Of course, here we also have very many problems to solve. Stratification into weekdays and weekends should be applied, separately Mondays should be treated. Also division into seasons of the year should be applied. One should decide, whether a point of reference should be maximal number of apprehended goods or apprehended traffickers. Answers to all these questions are left to experts dealing with studying different forms of parallel economy.

From among methods proposed above the last one based on data obtained from the police about apprehended traffickers and their goods is definitely the most cheap and most easy one to conduct. At the same time it is the least efficient, it does not poses any statistical or mathematical basis. As it seems, the most sensible way to assess the volume

of unregistered trade with the East European countries would be to use all three proposed methods because, in fact, each method measures a little different phenomenon. Maybe when we compare results of different studies we would be able to get some broad information about this unfathomable aspect of market functioning.