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## **THE EMPIRICAL STUDY OF TAX EVASION AND ITS DETERMINANTS IN RUSSIA**

*This study develops a methodology that uses microeconomic data from Russian Longitudinal Monitoring Survey of households to explore tax evasion patterns in Russia and their changes due to the possible impact of personal income tax reform that was launched in the beginning of 2001. Our empirical test verifies significant relationships between tax evasion and tax rates as well as other economic and demographic characteristics of households that could provide a supporting evidence for the suggested fiscal policy recommendations.*

## Introduction

The increasing concern on the extent of tax evasion has induced a lot of studies in different countries on the amount of unreported incomes and factors accounting for this phenomenon. Although a number of motives may impel to non compliance behavior, the prevalent judgment is that agents take into account the existing level of tax rates, while deciding on how much to evade.

"Keeping all other things being equal, higher marginal tax rates should drive more economy into the shadow". It is likely that this kind of view gained enough support among policy makers who were in time to put their efforts into profound reforms in the area of taxation of personal income in many developed and developing countries several decades ago. The common features of all these reforms were reduced marginal tax rates and a broadened tax base.

Transitional economies, although not in line with their predecessors, have also tried to embody similar intentions by means of the flat tax rate enforcement. In Ukraine and Russia, where the effective personal income tax rate was about 16 % and 17 %, a 13 % tax rate has become applicable to all citizens regardless of their incomes since January 1, 2004 and January 1, 2001, respectively.

The Ukrainian government has predicted that after the new law takes effect, budget revenues from personal income tax (PIT) will proliferate as chronic tax-dodgers will log out from the "shadow". At the same time a lack of convincing evidence concerning the effect of the level of the tax rate on the amount of tax evasion seems to be highly compensated by the mere credence into Russian successful experience with the flat-tax rate. Indeed, in 2001, the first year under the flat tax, personal income tax (budget) revenues were 19 % higher than in 2000, after adjusting for inflation, and rose another 20.7 % in 2002 compared with 2001.

Unfortunately the statistics just presented above has nothing to say about tax incidence. "It is just too aggregate and general for fiscal policy implications" as one may admit. However that may be, Ukraine and Russia are very similar economies and Ukrainian PIT reform mimics in many details the Russian PIT reform. Taking these fact as given, we suggest that Ukraine is in a suitable position to learn from the Russian experience of influencing tax evasion by means of tax rate cutting and should not disregard this exclusive opportunity for its own benefit. The only our requirement for the forthcoming research strategy of relying upon the Russian statistics while retrieving some general empirical evidence for Ukraine is that we should make use of

microeconomic data that will be a logical complement to the already existent macroeconomic study delivered by the group of Russian economists Sinelnikov, Murylev and Batkibekov in 2003 [1].

Unlike the analysis conducted in the study of Sinelnikov-Murylev et al (2003), which is the only empirical study devoted to the assessment of the results of PIT reform in Russia, our analysis is based on the data set with lower level of aggregation (household data) that enable us controlling for many important factors such as the size of household, its income, source of income and, demographic characteristics of the respondents etc.

Taking into account that Ukraine and Russia are very similar economies and that Ukrainian PIT reform mimics in many details the Russian one; we believe that our findings can be useful in terms of fiscal policy implications for both countries.

## Literature Review

Tax noncompliance behavior, among other reflections of the desire to avoid government regulations and restrictions, is possibly the oldest feature characterizing relations between the government and the rest of economic agents that interact within the common economic field. Every tax influences economic agents' behavior as it makes agents to consume less or adjust their working hours (at the expense of leisure) leaving them with reduced consumption whatever is the case. That is why with few exceptions economists agree that individuals generally perceive taxes as "bad" that takes away their welfare. Noncompliance behavior, in this respect, is usually seen by economists as a rational response of an economic agent who maximizes his/her utility or income.

At the same time, scholars' opinions diverge profoundly when effects on evasion resulted from application of different fiscal instruments are discussed. In this context debates on the effect that tax rates produce on the magnitude of evasions seems to be the ardent ones. This can be seen directly from a clash between the pioneering works on tax evasion performed by Allingham and Sandmo (1972) and Yitzhaki (1974).

More specifically, Allingham and Sandmo (1972) [2] posed the tax evasion problem in the framework of the decision making under uncertainty. Having choice either to report a full income or just a part of it, a risk-averse individual *with decreasing risk aversion*, will tend to increase or decrease the amount of unreported income as marginal tax rate increases. This indeterminate effect is the result of the interaction between the substitution and

income effects. *Substitution effect* that it is more attractive to evade taxes on the margin when tax rate increases, while *income effect* implies less evasion, because increased tax rate makes individual less wealthy, and, under decreasing absolute risk aversion assumption, one tends to reduce evasion.

The crucial assumption underlying this result is that penalty due to the exposed deception definitely links to the *income understatement*. Formally, it means that penalty (fine) is calculated as  $\{G \cdot (Y - X)\}$ , where  $(Y - X)$  stands for the gap between true income (Y) and the reported income (X), and (G) is the penalty rate.

Alternatively, as this was first noticed by Yitzhaki (1974) [3], it is more likely that not an *income understatement*, but rather a *tax understatement* defines the size of the penalty in practice, which implies that penalty (fine) is calculated according to the following rule  $\{t \cdot G \cdot (Y - X)\}$ , where  $t$  stands for the tax rate. Introduction of this slight change into agent's target function alters the conclusion obtained from the Allingham and Sandmo framework, implying that the taxpayer increases his reported income and reduces the amount of tax evasion, as the tax rate increases. Economic explanation proposed by Sandmo is that if the penalty or fine is defined like,  $G \cdot t \cdot (Y - X)$ , the overall sum of fine increases proportionally with  $t$ . Hence, substitution effect disappears and we are left only with the income effect. It is worth of being noted here that in Ukraine as well as in Russia penalty is calculated as the function of unpaid taxes, in contrast to the function of unreported incomes. This observation, at least from the theoretical point of view presented by Yitzhaki (1974), suggests that the level of tax rate and tax evasion might have negative relationship, which highly contradicts to the general belief that the high tax rates stimulate tax evasion.

Summing up the contribution of numerous theoretical models aiming to predict the linkage between tax rates and incentives for evasion, Adreoni et al. (1998) [4] conclude "Theoretical models generate no clear predictions on the effects of tax rates on compliance. The presence of both income and substitution effects complicates the analysis, and special assumptions about the form of penalties, distribution of income, and shape of preferences are often required to identify any comparative static".

Within the view that theoretical studies did produce contradicting inferences regarding the effect of tax rates on the amount of tax evasion the empirical studies should be of the ultimate interest for the researchers involved into the issue.

According to Slemrod (1985) [5] the first trace of this "healthy infusion" of empirical studies should be associated with the study of Clotfelter (1983) [6], who originally applied micro-unit data from *Internal Revenue Service's Taxpayer Compliance Measurement Program (TCMP)* and suggested that in the United States estimates of the elasticity of unreported income with respect to marginal tax rates were positive with point estimates in the range from 0.5 to over 3.0.

It should also be noted that the relationship between marginal tax rates and tax evasion is not always found to be positive. Geeroms and Williamson (1985) using Belgian data find precisely the converse conclusion, i.e. tax increases lead to less evasion (Cullis and Jones, 1998 p. 200 [7]).

However, not only changes in tax rates explain variation of unreported incomes. The source of income is another possible circumstance that should be kept in mind while studying evasions. Furthermore, original model by Allingham and Sandmo (1972) and its version amended by Yitzhaki (1974); both suggest that individuals will naturally evade less the more risk-averse they are and the higher is perceived probability of being disclosed. Furthermore, some surveys found that there is a positive relation between incomes and evasions as well as that aged people are more reluctant to conceal taxable incomes than younger people (Vogel, 1974[8]).

The first fact could be partially attributed to relatively higher opportunities to avoid taxation rules available to relatively well-off agents of the society. Another possible explanation is that as income grows the attitude to the risk may change so that the same agent becomes less risk-averse (concave utility function). This, in turn, can also imply that wealthy people have lower subjective estimates of the probability of being caught than poor do, which means that latter evade less vis-a-vis well-to-do agents. The second finding reflects the hypothesis that older people tend to have relatively high degree of risk-averseness if compared with young.

Overall earlier economic studies suggested that in general - income, wage share in the income structure, marital status, tax rate and age — comprise a set of appropriate variables for empirical studies. Other variables such as field of employment, region, and complexity of taxation might also add to the whole picture [5].

So far, our overview included only empirical studies related to countries with developed market economies. This fact by no means signifies that tax underreporting is not the important issue for the less developed economies such as transition economies are. As far as transition economies are concerned, the shortage of related studies is the matter of rele-

vant data. Reasons accounting for the difficulty or impossibility of obtaining data on the subject for these countries maybe diverse. The most trivial one, perhaps, is that data sets analogous to the one obtained for the US (TCMP-survey held by Inland Revenue Service (IRS)) simply do not exist. Nevertheless, there are still some ways to perform evasion studies for transition economies and our research tool represents one of the possible ways.

### Methodology of the Research

Apparently, the most convenient way to explain the methodology that we resorted to in our study is to outline in some details the technique applied by Clotfelter (1983), whose concept serves as a starting point for our empirical analysis. The data set used by Clotfelter is the tax audit survey by Internal Revenue Service, called Taxpayer Compliance Measurement Program (TCMP) for 1969. The data on reported income (X) and the amount of income that IRS auditors determined (Y) per individual are available in TCMP. According to Clotfelter the difference between true (Y) and reported income (X) is the sum of deliberate evasion (V) and "honest" error (U):  $Y - X = V + U$ . While comparing the reported sum with the sum determined by an auditor, Clotfelter found that the tendency to underreport far exceeded the tendency to "overreport". In addition, the average of understatements in every class of taxpayers was larger than the average for overstatements. So, Clotfelter's main assumption was to use an underreported income as a proxy for the tax evasion, although it contains both an error term and deliberate evasion component.

Following Clotfelter (1983), we adopted his idea to generate proxy for tax evasion. However, instead of taking data from a tax audit survey, we exercise a fragment of an abundant and valuable stock of information from Russian Longitudinal Monitoring Survey (RLMS) that contains panel data on conditions of life, property, estimated expenditures and incomes as well as their structures for households in Russia. Specifically, we generate a series of unreported income, (Gap), defined as total household estimated expenditures, (TE), net of household total incomes, (TI). The TI can be obtained for each household and according to the questionnaire this is the total income encompassing all possible sources of income for a household (wages, stipend, subsidies, pension, alimony repayment of loans, received gratuitous money, etc).

On the other hand, TE is the total expenditures estimated for a household by the specialists from RLMS, using the information on what has been

bought, in what volume as well as how much money was paid by a household for some product during a certain period of time etc. Specifically, by TE we imply all financial decisions of the household, so irrespective of whether the household buys some product, lend outside, return its debt or set aside a fraction of current income in order to increase consumption in the future, we treat these financial decisions as separate expense items of TE

Of course, Gap, or (TE-TI), is a very rough approximation for the real sum of unreported income. The problem associated with (TE-TI) as a proxy for tax evasion is that (TE-TI) can be negative for some households.

Clotfelter (1983) has solved this question by converting that negative values into zeroes by using Tobit estimation technique in his analysis. Such a transformation, although is very appealing and instructive, solves only a part of the problem, as it implies that households having  $(TE-TI) < 0$  are treated in a similar way as households that are thought of not to resort to underreporting (households with  $(TE-TI) = 0$ ). This assumption, leads us to another inconvenience, namely censoring at zero excludes the possibility to underreport expenditures versus incomes. For instance, a household representative could underreport his/her household total income at some rate and downplay his/her household total expenditure even at a higher rate. As a result, some bias will be built into Tobit estimates.

In order to handle this bug associated with Tobit, there are at least two options at our disposal. First of them, implies filtering of our data, so that all observations containing negative Gap will be dropped out of the sample. Obviously, this practice will lead to the loss of efficiency as a lot of information from the original sample will be disregarded. So, we cannot commit ourselves with the assertion that truncation is preferable to censoring with Tobit and will make use of both of them.

Alternatively, we may convert our negative gaps into positive. This trick will enable us to measure evasion in absolute terms, allowing for both income, as well as expenditure understatement, where the latter is another possible technique of evasion we did not mention before.

Let's now shift our attention to the possible advantage of our proxy. Despite the disadvantages that Gap-measure entails, this proxy might include some income that is unobservable for taxpayers audit surveys (moonlighting, income from cash only business, some kind of expenditures etc.). Consequently, other things being equal, there is no a priori evidence that audit survey would yield a better

proxy than the Gap which we constructed using RLMS.

Now that we explained how the dependent variable can be created, we may describe econometric specification that we use to test our main hypothesis that PIT reform in Russia, launched at the beginning of 2001, has discouraged tax evasion.

The most straightforward and appropriate way to complete this task is to estimate the following regression:

$$Gap = \beta_0 + \beta_1 X_1 + \dots + \beta_k X_k + \delta_0 Year\_2000 + \delta_1 Year\_2001 + \delta_2 Year\_2002 + u. \quad (1)$$

Equation (1) is a pooled regression across the years 1998, 2000, 2001 and 2002, where *Gap* is the difference between *TE* and *77*; *X*s are explanatory variables (the number of household members, wealth (assets) and estimated expenditures (as a proxy for the true income), propensity to save etc). The variables *Year\_2000*, *Year\_2001* and *Year\_2002* are year dummies. Dummy equals one if the observation comes from 2000, 2001 or 2002, respectively, and zero if otherwise. The intercept for 1998 is  $\beta_0$ , while  $\beta_0 + \delta_0$  is the intercept for year 2000 and  $\beta_0 + \delta_1$  for the year 2001 etc. Under plausible, however, conventional assumption we may think that the effect of the PIT reform is fully captured by  $\delta_1$  and  $\delta_2$ , meaning that other exogenous effects are of minor importance, and therefore they do not affect  $\delta_1$  and  $\delta_2$  significantly, we would conclude that the PIT re-

form (2001) induced less of unofficial economic activity, if  $\delta_1 < 0$ , and otherwise if  $\delta_1 > 0$ ,  $j = 1, 2$ . Furthermore, the comparison of  $\delta_1$  and  $\delta_2$  is also of interest, since it allows some judgments on the power of such an anti tax fraud preventive measure as the PIT reform in Russia (2001) in fact is. If it turns out that  $\delta_1$  are significant and statistically different from  $\delta_2$ , than we have the evidence that the reform accounts for changes in the amount of tax evasion. The direction of this change will show whether tax evasion has increased or decreased in Russia, following the reform.

To obtain more information from our data, for example one may be interested whether high earners get more incentives not to evade taxation (not to understate their true incomes/expenditures) due to the reform, we may want to interact those independent variables of interest with a year dummies.

Due to already mentioned disadvantages connected with the choice of *Gap*, as a proxy for tax evasion, our **research strategy in the empirical part** is as follows:

1. Because of the large proportion of households that have negative *Gap*, our specifications will be estimated using Tobit maximum likelihood procedure. The observations that have *Gap* < 0 will be converted to zeroes when using Tobit.

2. Afterwards, instead of Tobit we will use OLS, Random Effects and Fixed Effects to estimate regressions for *Gap* > 0.

3. Finally, and in addition to the first two approaches, we will estimate regressions with the absolute value of *Gap*.

**Table 1. Tax evasion explanatory variables and their expected signs<sup>1</sup>**

NOTATION	DESCRIPTION	EXPECTED SIGN
Household size	Number of household members	Positive/Negative
Sex	Sex of the respondent (1-male, 2-female)	Negative
Age	Age of the respondent (in years)	Negative
real incm	Total household expenditure as a proxy for the real income of the household	Positive
luxury_ratio	Proportion of expenditure on luxuries in the ReaHncm (for ex. 23 (means 23%))	Positive
rent dum	Dummy (whether household has an income in the form of rent)	Negative
bond dum	Dummy for holding bonds	Positive/Negative
gov incm ratio	Percentage of income received from government sector	Negative
Savings ratio	Total household savings as a percentage of total household expenditures	Negative

Descriptive statistics for the variables from Table 3.2 is reported in the Appendix (see Table A.2).

d98	Year dummy	Positive
d2001	Year dummy	Negative
d2002	Year dummy	Negative
Gap_r	Gap, difference between total expenditures and total income, calculated in 1992, rubles	Dependent variable
Abs gap r	The absolute value of Gap, calculated in 1992, rubles	Dependent variable

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
gap_r	1243.923	8701.121	-210781.5	169200.1
household size	2.983464	1.499665	1	13
sex	1.889846	.3130976	0	1
age	51.93448	14.94632	21	79
d98_realjncm	1422.427	4434.606	0	150803.1
d2001 real incm	1952.852	5667.861	0	133957.2
d2002 real incm	1977.268	5475.206	0	130414.5
savings_ratio	2.477359	8.991039	0	94.36511
rent_dum	.0073238	.0852697	0	1
bond dum	.0008907	.0298334	0	1
realjncm	7117.096	8795.864	10.39	174079.8
gov_incm_ratio	42.47091	32.27885	0	100
luxury ratio	1.518816	8.093376	0	96.72311
d98	.2408947	.4276477	0	1
(12001	.2537609	.4351839	0	1
d2002	.2536619	.4351279	0	1

As far as explanatory variables are concerned the majority of them are mainly suggested by theory and other empirical studies. The list of potential explanatory variables their expected signs as well as descriptive statistics can be found in Table 1 and Table 2 respectively. Let's comment the content of the Table 1. At the bottom of the table different measures of Gap are presented. The only difference between them is that  $abs\_gap\_r = |gap\_r|$ . We will use both of the measures for the reasons explained earlier.

The list of the explanatory variables begins with the **household size** (number of household members). The appropriateness of this variable is dictated by our intention to control for unintentional error when reporting household income or household expenditures to the interviewer (recall that Gap is the mixture of deliberate underreporting and unintentional mistake). As one may notice the expected sign is ambiguous, according to the table. The in-

tuition behind positive expected sign is that a representative of the big household is more likely to misreport a household income (or expenditures) unintentionally than a representative of a small household would do, but on the other hand, we expect that a representative of the big household is likely to be more risk-averse than a representative of a small household, other things being equal. The latter interpretation can be found in Gerxhani, 2002. Therefore, priory we cannot predict which effect will be of dominant importance.

The meanings of sex and age as explanatory variables are straightforward and their influence on the tax evasion is predetermined by the results obtained in the previous researches, namely women evade less and so older people do. Taking into account that the effect of age can be non-linear by its nature, we will use both age as well as  $age^2$  in our specification to control for the effects of age on our dependent variable.

In order to control for the source of income while studying tax evasion, we propose to use the following variables: **rent\_dum**, **bond\_dum**, **gov\_incm\_ratio**. The first variable tells us whether a household receives income in the form of apartment rental. If it does, one would expect that this household is in the better position to evade more, since apartment rent is usually paid in cash and therefore has lower probability for being detected by tax auditors. On the other hand, if the apartment rent is so suitable for underreporting and households share this view, we should expect that only a little fraction of households will report on this income item to an RLMS interviewer. The logic is as follows: a rational household representative will inform the interviewer on the apartment rental income if and only if it already pays tax on this income. If the rental income is kept in secret from the tax office, a rational household representative would prefer not to share this information with the interviewer due to some probability of data leakage to a tax officer. Taking this view into account it is likely that the observed coefficient near the **rent\_dum** will be negative, signaling that the respondents with **rent\_dum** = 1 were more sincere during the interview, hence a smaller gap should be expected. The same logic should be applied to a **bond\_dum**, however in the case of bonds we may encounter the effect with the opposite direction, because being a bondholder seemingly demonstrates more of risk-loving behavior than otherwise. Hence the expected sign near a bondholder dummy cannot be determined at this stage.

In studying how the source of income affects the patterns of evasion, we also distinguish a share of income received from the government. Preliminary we predict that households whose major sources of income come from the government (**gov\_incm\_ratio**) should have fewer incentives to evade than households that receive their incomes from other sources, because government practices personal income taxation at the source, which means that taxation procedure is fulfilled automatically before a household member receives his net income (income net of sum paid in taxes). Therefore, keeping the rest of arguments unchanged, it is reasonable to expect that having larger share of incomes from the government institutions should automatically translate into the smaller gap.

As for the rest of the variables, we use amount of total expenditures, **real\_incm**, as a proxy for real (virtual) income to control for the incentives that

real income create for tax evasion. On the similar grounds, percentage of expenditures spent on luxuries, **luxury\_ratio**, is also presented. The expected sign is negative, due to decreasing absolute risk-aversion, an attractive assumption supported by everyday life<sup>1</sup>.

Note that some of the explained variables will be interacted (year\_dummy\*variable) using d98, d2001 and d2002. This will allow us to observe how the effects of the chosen variables have changed over time, namely before and after personal income tax rate cut in Russia (January 1, 2001).

### Estimations

Now that we explained and specified which variables are essential for tax evasion analysis, we will follow our research strategy as we defined it earlier: Note that the structure of our data allows conducting a panel data analysis. For this reason, in addition to the OLS and Tobit estimates (both of which rely on pooled data) we report fixed effects and random effects estimates in our output table, Table 3. Note that results reported in Table 3 are valid only for observation with positive gaps<sup>2</sup>. The estimates based on the absolute value of gap are not reported in the separate table because of their high similarity with estimates reported in Table 3.

Let's comment the information presented in the Table 3. Estimated coefficients near the *size of the household* proved to be significant and negative for all estimation techniques we applied. This observation is in line with our expectation that representatives of big households tend to exhibit more risk-aversion than individuals from the small households. Moreover, the effect stemming from the relationship between size of the household and risk-aversion seems to be superior in absolute terms than the effect connected with the relationship "degree of unintentional mistake and household size".

As to demographic characteristics (sex and age in our case), estimates near **sex** of the respondent tend to be positive, but insignificant in all cases, except for the Tobit. The significant and positive coefficient near sex for the Tobit regression evidences that women are likely to evade more than men do.

This result is unexpected and contradicts the findings of the previous studies, which possibly can be attributed to the different attitudes towards the risk among men and women in Russia.

<sup>1</sup> The assumption of decreasing absolute risk aversion means that the willingness of an individual to engage in a bet increases as his income increase (Gandi p. 142).

- Only Tobit estimates are based on the whole sample available, because all negative gaps are automatically mapped into zeroes.

**Table 3. Estimates Based on the Positive Values of Gap<sup>1</sup>**

Variables	ols	re	fe	tobi <sup>2</sup>
household size	-245.69425***	-262.30417***	-188.05616**	-227.2061***
sex	119.79082	133.40846	182.76377	175.9047*
age	-96.934355***	-87.785505***	35.168767	-73.43424***
d98_real_incm	-.03160518*	-.0204393	.01696122	-.00675
d2001_real_incm	-.13456574***	-.12971996***	-.11560818***	-.0597587***
d2002_realjncm	-.20825119***	-.19204394***	-.15218341***	-.0870108***
savings ratio	-45.381757***	^4.597114***	-38.534968***	-27.00444***
rent_dum	-860.34034	-1036.5935*	-1511.4261*	-799.51***
bond dum	-151.6898	-146.05836	-732.45089	-1417.956***
real incm	.81548165***	.81943869***	.86822731***	.4439307***
gov incm r~o	-16.595279***	-17.469483***	-25.279321***	-18.40598***
luxury ratio	54.886462***	54.062544***	45.555814***	28.44123***
d98	552.69078***	518.99911***	424.50111**	218.952*
d2001	740.28144***	686.60042***	485.55217**	159.3721
d2002	1179.6726***	1035.8946***	635.52595***	213.2705*
cons	182.51118	^4.85444	-2948.9997**	
legend: * p < 0.05; ** p < 0.01; *** p < 0.001				

The effect of the age on tax evasion (proxied by gap\_r) seems to be non-linear according to Tobit, OLS and Random Effect estimates. The positive coefficient near age<sup>2</sup> and the negative one near the age, strongly support the conclusion of Song and Yarbrough [9], suggesting that individuals in their middle age are likely to twist with their tax liabilities less, than old and young people usually do.

Recall that we decided to use **real\_incm** (total household expenditures in rubles 1992, which is used as a proxy for real incomes) and **luxury\_ratio** (the percentage of expenditures spent on luxuries) to study the relationship between income and tax evasion. The estimated coefficients near both of them are stable positive and statistically significant irrespective of whether OLS, Fixed Effects (FE) or Random Effects (RE) was applied. Note, however, that Tobit estimates are also statistically significant, but approximately two times smaller if compared to the coefficients estimated by OLS, RE and FE.

The similar patterns, in terms of the stability of the coefficients, can be observed for the estimated coefficients near interaction terms **d2001\_real\_incm** and **d2002\_real\_incm**.<sup>3</sup> Note, however, that coeffi-

icients near **d98\_real\_incm** are either negative but close to zero or not significantly differ from zero, which means that the relationship between the total expenditures and tax evasion (gap\_r) was pretty much the same at the end of the years 1998 and 2000, i.e. additional ruble spent was translated into approximately 0.44 through 0.86 rubles of gap, depending on the computational technique we applied. Nonetheless, the relationship between **gap** and **real\_incm** changed due to tax rate cut at the beginning of 2001, so that at the end of 2001 and 2002, the marginal effects of real incomes on the measure of gap fell into the range (0.38, 0.76) for 2001 and (0.32, 0.72) for 2002. Altogether this implies that income and tax evasion are positively related in Russia, although the degree of this association becomes weaker due to Personal Income Tax Reform in Russia, initiated at the beginning of 2001.

In order to ascertain how the source of income affects propensity to pay taxes in Russia, one should draw some attention to the estimated coefficients near **rent\_dum**, **bond\_dum**, **gov\_incm\_ratio**. As far as the first variable is concerned, one may notice that coefficients near dummy for receiving income

<sup>1</sup> The HO for F-test that all fixed effects are simultaneously are equal to zero is rejected with p < 0.001. The Hausman test reveals that using random effects method instead of fixed effects is inefficient but consistent.

<sup>2</sup> The column labelled "tobit" reports marginal effects at mean values of non-dummy explanatory variables. As far as dummies are concerned, the reported coefficients should be treated as the marginal effects of a discrete change of a dummy variable from 0 to 1.

<sup>3</sup> Coefficient near interaction term, for example the coefficient near d2002\_real\_incm, reflects how the effect of variable (realjncm in our case) changed in the year 2002 relative to the baseline year, which is 2000 for Table 3.3. Consequently, the coefficient near real\_incm shows the marginal effect of the additional ruble spent on tax evasion only for the year 2000.



in the form of rent (rent\_dum) are negative and significant for all methods applied, except for the OLS. This observation fits our prediction well and reinforces our conclusion that the data we use are of a good quality in the sense that RLMS interviewers seemingly obtained the data on household income, which wouldn't differ much should tax officers have collected them instead of RLMS interviewers.

The coefficients near the dummy for the household being a bondholder, bond\_dum, proved to be not significantly different from zero in the majority of cases, except for the Tobit. The latter predicts that the bond-holding households evade less that contradicts to our prior expectation that a bond-holding household will generally demonstrate more evasion because of higher level of risk susceptibility of its owners.

Finally, negative and significant coefficient at gov\_incm\_ratio is compatible with our prediction that the household with high share of true income received from the government should have fewer incentives to underreport their true incomes.

Let's now comment the coefficients near year dummies. In the methodology section we stressed the role of the coefficients near year dummies in studying the effectiveness of the PIT reform on tax evasion. Although year dummies for 2001 and 2002 have positive and statistically significant coefficients it doesn't necessarily mean that the amount of eva-

sion has increased after the end of the year 2000, which is a baseline year in the setting of our regression and the last year when the progressive PIT system was operating in Russia. The reason that motivates us not to base the analysis of the reform using year dummies coefficients only, is that some interaction terms in the set of explanatory variables, i.e. d2001\_real\_incm and d2002\_real\_incm. proved to be essential for the model and coefficients near these terms can also tell us something about the results of PIT reform in Russia.

Specifically, we can observe from the Table 3 that the positive slope relating tax evasion and the amount of true income (proxied by total household expenditures) became more flat in 2001 than in the year 2000 and even more flat in the 2002. At the same time it can be seen from the intercept and coefficients at year dummies that the positive intercept in year 2000 was lower than the intercepts for subsequent years. This implies that keeping rest of the factors unchanged, tax rate cut and other measures undertaken in compliance with the PIT reform have led to the situation, when households with a total amount of true income below a certain amount of threshold level (X), began to underreport more than they had done before the reform; while the household with total income above the threshold level (X), found it worth-while to underreport in fewer amounts (see Figure 1).

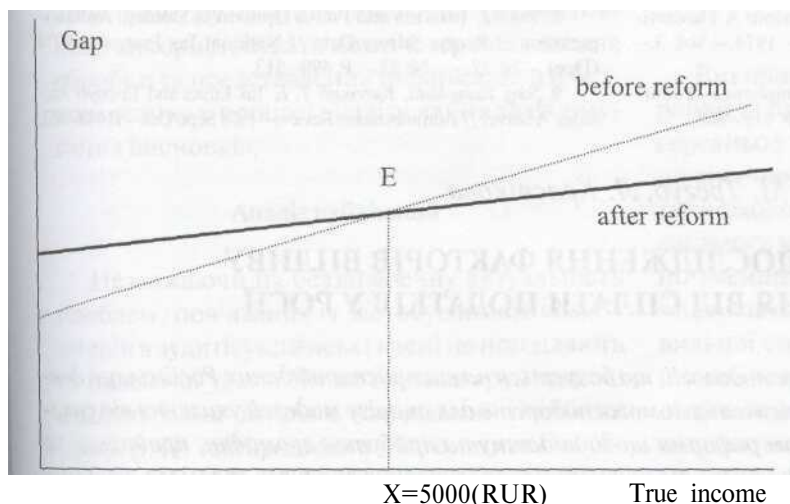


Fig. 1. The Impact of Pit Reform on the Households Decisions on How Much to Underreport in Russia

### Conclusions and Implications

From our point of view the situation described above can be interpreted as follows: the households with the true income below X, could have decided to evade more in the after reform period because of two reasons. The first reason, is that although 13% level of flat tax corresponds to the minimal PIT rate in the pre-reform period, the PIT in Russia after the reform is levied from the broader base of taxa-

lion. The second reason is that, assuming that the major target of the reform was to make a relatively better off stratum to start paying PIT adequately, tax collecting bodies could have shifted their efforts from the households with the true incomes below X to the more well off households (this conclusion draws heavily on the assumption that tax authority's capacity of disclosing tax crimes remained unchanged after the reform was implemented). So, relatively better off households has encountered not

only reduced PIT rates, but faced a higher probability of being accused in underreporting. As a result, the probability of being detected has decreased for households with incomes below X that led naturally to increased level of underreporting for them. Here, it is worth of being mentioned that the analyses of the PIT budget collections before the reform shows that the majority of taxes were paid by the people whose marginal tax rate were low, or in the other words, by people with low incomes. Combining this fact with our finding, we may conclude that flat PIT rate system in fact turned out to be more equity tuned and more progressive than a nominally progressive PIT system had been before 2001.

The latter observation calls into question a wide spread believe that lower tax rates stimulates less evasion, but it does not contradict to the conclusion stemming from the theoretical model of Alingham and Sandmo (1972). Framing our empirical evidence into this model, we put forward the following interpretations of the patterns observed:

it is quite possible that income effect of tax rate cut appeared to be more powerful than the substitution effect for the households with true incomes below the threshold and otherwise for the households with incomes above the threshold. Another possible explanation is that relatively better off households faced a higher probability of being detected due to PIT reform, whilst the probability of being detected has decreased for the households with incomes below the specified threshold. The second explanation, however, implies that tax authority's capacity of disclosing tax crimes did not increase after the reform had been implemented.

Finally, taking all above into account we conclude that mere tax rate reduction is not a guarantee against the mass tax noncompliance. In order to diminish the scale of tax evasion we would recommend increasing the probability of tax crime revelation, although the combination of these two measures might lead to even more devastating effect on tax evasion incentives.

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### ЕМПІРИЧНЕ ДОСЛІДЖЕННЯ ФАКТОРІВ ВПЛИВУ НА УХИЛЕННЯ ВІД СПЛАТИ ПОДАТКІВ У РОСІЇ

*Статтю присвячено розвитку методології, що базується на використанні даних Російського довгострокового моніторингового обстеження домогосподарств для аналізу моделей ухилення від сплати податків та їх зміни під впливом реформи щодо податку на прибуток громадян, прийнятої на початку 2001 р. За допомогою емпіричного тесту перевірено існування значного взаємозв'язку між ухиленням від податків та рівнем податку, так само як і іншими економічними та демографічними характеристиками домогосподарств. Отримані результати узгоджуються з запропонованими рекомендаціями щодо фіскальної політики.*