Behavioral Responses to Flat Taxes in an Emerging Economy: Revisiting the 2001 Reform in Russia with Micro-Level Data*

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Abstract

The effect from the Russia's 2001 flat rate income tax reform is examined. Using the firm-level data, I construct an employee-employer panel to identify behavioral effects of both employees and employers. First, using the difference-in-differences approach I find that there is a significant presence of tax evasion for the income groups below both of the tax thresholds. Second, using regression discontinuity approach I find that around the lowest threshold there was a significant discontinuity in salary growth rate around the threshold. Finally, I find that labor effect on employee's income is out-weighted by the evasion effect.

Keywords: tax evasion, Russia

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1 Introduction

Which tax regime are people willing to follow? One of the most famous arguments in favor of switching from progressive taxation to a flat tax rate is lower tax evasion and increased motivation for individuals with previously high marginal tax rates, a so-called labor-supply effect. Discussions about moving to a flat-tax regime, so that people are paying taxes rather than evade them, are present in different countries including Italy.

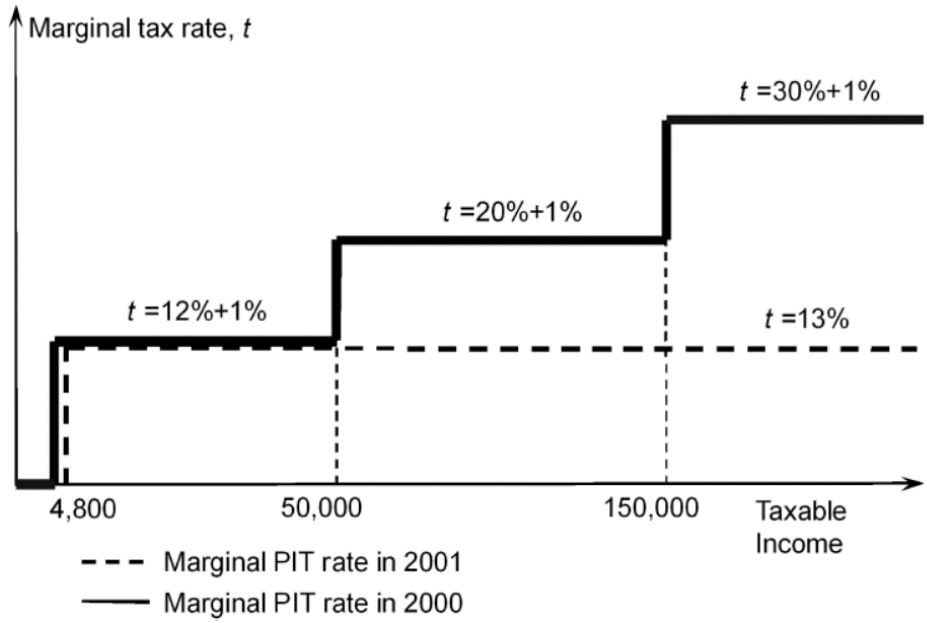
However, these discussions should be supported by the evidence of the countries that had experienced both progressive and flat tax schemes for a substantial period of time. Russia is one of the most famous examples in this field (Gorodnichenko et al., 2009). In January 2001, a fairly dramatic change in tax policy was introduced. Russia has become one of the first countries to implement the flat income tax rate in the post-Soviet bloc. Over the next year, the tax income from the personal income tax grew by 25%. This growth continued at 20% in 2002 and almost 12% in 2003. These outstanding numbers could be hardly explained only by the labor-supply effect.

Measuring evasion is a complicated task, notoriously known not only for the difficulties in evaluation but for the lack of decent instruments of detection. Most of the countries do not have programs for the proper estimation of it, neither does Russia. This article does not aim to estimate the precise amount of evasion. However, I will argue that it is problematic to interpret some of the shown results without stating the presence of evasion.

My approach is distinct from other studies. The previous researches could be classified into two categories. In the first category, the data on the groups of the taxpayers who are known to comply as a benchmark is used for the comparison with the other groups of individuals. It is complicated to use this approach with Russian data since the evasion was widespread across employees, self-employed, and even some firms.

The second and the most present category uses the difference between reported income and reported consumption to identify whether there is a significant difference between them. This approach has several weak spots. It requires proper control for savings on the individual level since individuals could also keep their money for consumption smoothing motives, for instance. Also,

Figure 1



Source: Gorodnichenko et al (2009)
Note: Marginal personal income tax rate before and after the reform. Taxable income is annual and in rubles. The 2000 marginal PIT rates include a 1 percent contribution to the pension fund. Standard deductions were 3,168 rubles in 2000, but they increased to 4,800 rubles in 2001. Standard deductions are applicable only for those with an annual income less than 20,000 rubles.

there is a concern that both reported income and reported consumption are only fractions of their true value. This could result into bias in both directions depending on which of the values is more under-reported.

My approach uses firm-level administrative data to evaluate the differences in income dynamics for individuals in different income groups. The design of the tax reform allows for the unambiguous definition of the control group since for some of the individuals' marginal tax rate has not changed. This means that this group of individuals should not have any motive for the changes in their labor decision. As a result, income in the control group could change only due to the labor mobility motives.

This approach still has its limitations. Because the data is collected by the tax authorities, the results are based on two crucial assumptions. The first assumption is that the system of tax administration is well-established and well-operated. This means that, for example, tax authorities are determining taxable income not as the reported salary, but as the sum of all salaries from all

Table 1: Russian Economy Before and After the Tax Reform

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Nominal GDP (billions)	1,585.0	2,200.2	2,585.9	2,741	4,767	7,302	9,041	10,830.5	13,243.2	16,966.4	21,598.0
Real growth (%)	−4.1	−3.5	0.8	−4.9	5.4	9.0	5.0	4.7	7.3	7.2	6.4
Annual CPI, end year	232.2	121.8	111.0	184.4	136.5	120.2	118.6	115.1	112.0	111.7	110.9
Budget deficit (−; billions)	−49.1	−94.2	−127.9	−155	−44	138	265	97	174	760	1759
Nominal tax revenues (billions)	353.3	464.3	593.4	524.8	891.4	1,481.9	1,955.8	2,331.0	2,671.9	3,299.6	4,627.2
Real growth (%)	. . .	−9.9	11.1	−25.4	−1.5	20.7	13.3	3.0	0.6	4.7	15.7
Nominal tax revenues from PIT (billions)	36.7	56.7	75.6	72.2	117.1	174.3	255.5	357.8	455.3	574.2	706.6
Real growth (%)	. . .	6.0	15.9	−19.4	−5.9	8.1	25.8	21.1	11.7	6.9	1.6
% of tax revenues	10.4	12.2	12.7	13.8	13.1	11.8	13.1	15.3	17.0	17.4	15.3
Top marginal PIT rate	30	35	35	35	45	30	13	13	13	13	13

Source: Gorodnichenko et al (2009)
Note: All tax revenues are for the consolidated budget and exclude nonbudgetary funds. Real growth of GDP and tax revenues is calculated using a GDP deflator.

the firms that individual is present. This assumption is not always fulfilled. The second crucial assumption is that the evasion is present only on the employee level, but not on the firm level. If the firms are massively under-reporting, then they could still have an incentive to hide part of the employee's wages even after the reform. This could result in an underestimation of the evasion effect. I state that there is evidence of firm-level evasion. However, despite the presence of this effect, evasion could still be estimated at the employee level. The existence of the evasion is highly likely for employees that remained in the same firm throughout the observation sample.

The rest of the paper is organized as follows. Section 3 contains some background information about the institutional conditions in Russia at the beginning of 21st century. Section 2 contain current literature review and some of the present results in this topic. Section 4 contains description of the dataset as well as some statistics on the Russian GDP and tax revenues. Section 5 presents specifications of used models and discusses its implications. My main results are presented in Section 6. In Section 7, I provide the results of robustness tests. Section 8 concludes.

2 Related Literature

One of the possible ways to estimate tax evasion is to examine the behavior of reported income and reported consumption. This approach was used in Gorodnichenko et al. (2009) on the Russian data for the same reform. This research was conducted on the data from the surveys on consumption and income for the time period 1998, 2000-2004. Using the difference-in-differences approach and consumption-income gap as a variable of interest authors have estimated the evasion effect for all the samples. It was found that the consumption-income gap decreased by about 9–12 percent more for households that experienced a reduction in marginal tax rates.

The key difference between the previous article and this one is that this research is conducted on the **administrative** data, but not self-reported one. This allows for eliminating the self-reporting bias, which could be present in the survey data. This research contributes to the literature to the flat tax reform.

Another possible way to estimate the response from the tax reform is to use the elasticity approach. One of the ways to implement this strategy is to stress the attention on the labor market effects of the tax evasion. In Chetty et al. (2010) labor supply model with job search costs and endogenous hours constraints is built. The constructed model is used to examine the behavior of the elasticity of labor supply with respect to tax changes. Predictions suggest that the observed labor supply elasticity increases with the size of the tax variation from which the estimate is identified and the number of workers affected by a tax change or kink. In our approach, there is no constraints are put on the workers so we do not limit the labor mobility in any way.

Elasticity approach could be used not only for estimating labor effects, but also for income effects. One of the primary concerns in Johnson and Breunig (2016) is estimating the elasticity of the taxable income with respect to the changes in the marginal tax rate. With establishing the model of a utility-maximizing individual facing quasi-linear budget constraints two main conclusions were drawn. First, in the Australian tax system, there is a statistically significant bunching at all notches. Second, the highest elasticities are for the self-employed tax filers at the top-notch. Stating the heterogeneity in the firm and self-employed responses is extremely important because

there is an understanding that self-employed individuals could evade more efficiently. However, in this research defining the group of self-employed is an extremely complicated task, since not all self-employed individuals label themselves in this status.

Apart from the direct estimation of the evasion, administrative data could be used as a source of official salary. Specifically in the article Braguinsky et al. (2014) the same data set is used as an identifier of a reported income. The primary concern of this research is to identify the differences in evasion throughout private industries and the governmental sector. Using the well-known approach of comparing earnings and consumption, as the reference for consumption authors used the dataset on car owners in Moscow. According to this research, up to 80 percent of car owners' earnings in the private sector are hidden.

One of the main possibilities that give the administrative data is estimating the bunching effect at kink points. One of the aims in Saez (2010) article was to investigate the presence of this effect using US administrative data. Having the exact location of taxpayers on the tax schedule and using quasi-linear and isoelastic utility function it is possible to gain several empirical results. Evidence of bunching at the threshold of the first tax bracket has been found. Although, there is no evidence of bunching for other kink points of the tax schedule, regardless of the size of jumps in marginal tax rates.

Tax evasion is considered to be heterogeneous across firms in economic literature. There is an understanding that multinational firms should be relatively more transparent than a local firm. This happens since multinational firms have to follow specific transparency standards to be able to operate worldwide, whereas local firms do not have this obligation. Braguinsky and Mityakov (2015)

It is important to mention that in this article I focus only on the evasion reaction and discuss the presence of it. The presence of tax avoidance will not be considered in this research. However, it is still important to be able to distinguish between the tax evasion and tax avoidance. For instance, as an extension to Saez (2010), Daniel le Maire le Maire and Schjerning (2013) provides the method to differentiate between bunching and income shifting. According to the authors, neglecting this

option leads to the serious over-estimation of bunching. Income shifting is a well-known tax planning technique, one of the possible techniques to avoid paying taxes on a legal basis. In this article, the issues of legal options of not paying taxes are not considered. We do not claim that there was no tax avoidance effect. The main hypothesis is that the tax evasion effect is prevailing the other effects.

Significant changes in tax schedules often are examined in terms of efficiency, changes in evasion, and welfare gains or losses. Another example of the significant change in the personal income tax regime and its examination is presented in Waseem (2014). In this article, the effect from the rise of the income tax. It is worth mentioning that some of the dynamics that were presented in this research are similar to the one observed in my dataset. For instance, the author claims that the tax rate rise caused the number of firms reporting positive taxable earnings declined by nearly 40%. In case of Russian statistics, the number of firms declined after reform as well, but the marginal tax was going down. It suggests that possibly there was a mechanism of tax evasion regarding part of these firms. Also, it is worth mentioning that in Waseem (2014) the welfare analysis was conducted and the spillover effects from the tax change were calculated.

In this research, I do not have an option to distinguish individuals with hourly fixed salary and wage rate. These two groups of workers could have different behavioral responses to the changes in marginal tax rates. The significance of this difference was shown in Blomquist and Selin (2010). In this article, the elasticity of both the hourly wage rate and labor income was estimated. It turned out that the hourly wage rate elasticity could be up to two times lower than the labor income elasticity. In this research, I will not distinguish between hourly wage and labor income. The basic hypothesis is that the main group of individuals has labor income.

3 Background

Before 2001 in Russia there was a progressive income tax rate with three tax brackets, implemented in 1994. The main idea behind this tax schedule was to put the main tax burden on the rich part of the population. The reason why this policy existed is an economic crisis at the beginning of 1990s. The Soviet Union was dissolved, Russia's economy has moved to the free market conditions, the shock therapy has started. Over the next years after the dissolution the GDP of Russia has been falling down (in 1998, Russia's GDP has felt down for 40% comparing to year 1991), as well as the production in main sectors and industries of economy.

However, tax collections were pretty low and the present level of tax administration was not enough to cope with the evasion. which resulted in undermining the stability of the government finance. In order to increase tax collection and to be present on the international markets, Russia has changed its tax policy to increase both tax revenues and, as a result of decreased evasion levels, increase transparency.

4 Data

Data description The data used in this research consists of several administrative databases of incomes merged together. Each of the datasets contains information about reported incomes. These reports were filed by officially registered firms and other income-generating institutions in Moscow from 1999 to 2003. The databases became available in 2004 when they were placed in the public domain. It is unknown for sure whether this happened accidentally or through a leak. This dataset has already been employed by academic researchers (see, for instance, Guriev and Rachinsky 2008; Braguinsky 2009; Mironov 2013). Braguinsky et al (2014) did their own checks of this dataset, comparing official Moscow labor statistics published by the Russian Federal State Statistics Service to sample averages obtained from the databases, year by year. They have found a close match both for all 5 years on average and in any given year, as well as for most sector-year averages.

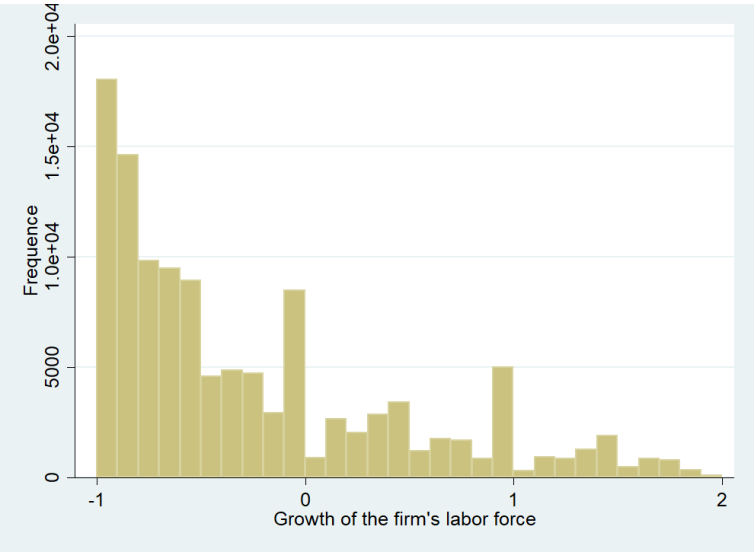
Sample construction Based on this data, the employee-employer panel was constructed. This panel contains information on around 5 million individuals and nearly 200 thousand firms. The tax records that generate the dataset regularly contain errors and duplicates. For instance, one individual could be present in the same firm twice or more. Also, some of these tax records contain information on the amount of tax that individuals has paid. For some of them, their income does not match the tax paid. For instance, if individual reports yearly income of around 1 million rubles ($\simeq$ 33 thousand \$) and zero tax. One extra source of robustness check of the data is monthly income. It is available for the observations in the years 2002 and 2003. If the yearly income and sum of monthly incomes were not equal, the observation is treated. The data on monthly income also allows for the separation of the individual on two groups: with regular income and irregular income. Current theory does not have any suggestion regarding whether the evasion in one of these groups is more regular or easier to handle. So we do not drop the observation with irregular income, even if the individual gains money one or two months a year. I do not treat those observations as evasion.

These duplicates, as well as the firms with errors in names, individuals with errors in names, people registering zero income, were dropped from the sample. Usually, with these observations, researchers drop individuals that have reported income lower than the minimum wage. I do not make these sample restrictions since the behavioral effect could be present even for these categories of individuals.

Data Discussion Using the data available for the employees, I am able to track whether individuals have moved from one firm to the other or have been present in several firms within the same year. The reason why considering labor mobility is important is the following. Individuals could be registered in several firms and some of the registration could be "fictional". This is done in order to split the "true" income and reduce the amount of tax paid. The trick is possible because of the bad tax administration.

This theory is supported by the dynamics of the firms. On the Figure 2 one can observe the dynamics of the labor force in the year of the tax reform implementation. One could find that nearly

Figure 2: Fixed Effect coefficients, DID design, yearly based



Notes: Growth of the labor force of the firms in the year of tax reform

80 thousand firms (which is half of the number of firms present in 2001) have been decreasing their labor force. Among these 80 thousand firms 55 thousand firms have cut their labor force more than a half. Around 90% of this decrease were due to the small firms. Moreover, in the year 2000 there were registered nearly 100 thousand small firms. During 2001, this number decreased to 75 thousand and remained almost the same afterward. The dynamics of medium and large firms were not that abrupt. The exact numbers are presented in Table 2. These facts suggest that some of the small firms were used for the tax evasion schemes.

Table 2: Number of firms by different firm sizes

Year	2000	2001	2002	2003
Small Firms	96299	74334	70760	75753
Medium Firms	41421	38380	37421	38642
Large Firms	47775	44181	43405	44271

Notes: Small firms had mean number of employees (N) $N \leq 10$, Medium firms - $10 < N \leq 25$, Big firms - $N > 25$.

The main variable to examine is an individual's salary. In case of this dataset, the salary that is provided is not the exact sum that is paid to the individual. This is the pre-taxed salary, the exact

sum that is used on the tax schedule. The distribution of income before and after the tax reform could be found in Appendix (Figure A1 and Figure A2 respectively)

To try to make some kind of preliminary results, one can examine the income growth in the year of the tax reform. The distribution of the growth is shown on Figure A3. From this graph, we can only see that there was a significant redistribution effect in terms of salaries. The number of people who lost money in terms of salaries is close to the number of those who gained.

5 Empirical Strategy

5.1 Difference-in-Differences Design

As a first step in estimating the evasion effects of reduced marginal tax and separating this effect from other factors, I use difference-in-differences approach (DID).

To exploit this method properly one has to clearly state the control and treatment groups' separation. In this type of research defining the control group will be extremely crucial since we need to find the group of individuals who should not be affected by the changes of a marginal tax rate. In case of the Russian flat tax reform, such group could be found. The marginal tax rate for the lowest bracket of the individuals has not changed. This allows for the assumption that these individuals should not be affected by the tax reform. Following this assumption and using the DID approach I claim that the difference in the growth of average income between control and treatment groups could be only due to the effect of the tax reform. So the main hypothesis is that without this reform different income groups would have parallel trends in income growth. It is complicated to test this hypothesis since I have data only for two years before the tax reform. However, there was no other reform stated or anticipated at that time, so it is hard to come up with some alternative.

There are two possible channels that could drive this difference. The first one is the labor channel. Individuals in the second and third tax rate brackets have experienced significant tax decrease. This could result in additional working hours since the fraction of earning income has gone up which boosts the incentives to work harder. If there is no evasion and labor effect is present,

one should expect that the income in the treatment group is growing faster than in the control group.

The second channel is evasion, the primary concern of this article. Individuals with income below the tax threshold could have been hiding part of their true income. Reduction of the tax margins has decreased the incentives to hide money since the benefits from not reporting part of the income have decreased and the fines remained the same. This should result in increase of the officially reported income that is driven neither by labor mobility not by labor incentive motives.

The estimated specification is presented below:

$$log(income_{ijt}) = \alpha_t + \gamma_{ij} + \sum_t \beta_t D_{ijt} + \varepsilon_{ijt},$$

Here, $income_{ijt}$ - is an income of individual i in firm j at the time t. α_t - fixed effect at year t, which controls for common yearly shocks. γ_{ij} - fixed effect on the firm-individual level, which account for time-invariant firm-individual heterogeneity. D_{ijt} - dummy variable equal 1 if income of individual i in firm j at time t is below the tax threshold. Since there are two tax thresholds that were present in the previous tax system, the dummy variable is constructed for each of the thresholds. I cluster standard errors at the firm-individual-pair level.

In this specification, we do not make any assumptions on the main drivers of the effect. Evasion could be present throughout the whole sample, regardless of the firm size and distance of an individual's income from the threshold. As a robustness check, I will estimate the following DID specification for the different firm sizes. One of the aims of this test is to confirm or reject the hypothesis that small firms or self-employed had the most evasion effect. Also, the distance between the individual's income and the tax threshold will be limited. This is done both for the rigorous check and identification of the main "evaders" in the sample. Identifying the main "evaders" is also crucial since the fraction of hidden income could be independent of the officially stated income. Also, previous literature suggests that tax evasion had rather astonishing scales (up to 80% of the individual could have been hidden), so determining possible heterogeneity in fractions of hidden income could also contribute to the research.

5.2 Regression Discontinuity Design

DID specification is only one of the approaches to estimate the effects of flat tax reform. This approach does not really allow to estimate the bunching effect around the tax threshold. In this section, the regression discontinuity (RD) design will be presented. RD is regularly used to evaluate differences in variable behavior around the kink points. In this case, it will be used to examine evasion around the marginal tax "switch points".

RD design allows for limiting a number of possible channels of influence on an individual's income up to two. Both of them were previously stated: labor channel and evasion channel.

The estimated specification is presented below:

$$log(\overline{Y_{i,2000}}) = \beta_1 \times (Income_i - 50,000) + \beta_2 \times D_i + \beta_3 \times D_i \times (Income_i - 50,000) + \varepsilon_i$$

Here D_i - dummy variable equal to 1 if $Income_i \geq 50,000$. $Income_i$ - income of individual i in year 2000. $\overline{Y_{i,2000}} = Y_{i,2000-2003} - Y_{i,2000}$. $Y_{i,2000}-$ salary of individual i in year 2000, $Y_{i,2000-2003}$ - mean salary of individual i in 2000-2003, ε_i - error term.

The estimation technique is based on the theory-based method stated in Calonico et al. (2014). The regressions are run in Stata the help of *rdrobust* command. Standard errors are heteroskedastic and estimated using the nearest matched neighbors method. Equation is estimated around the first threshold: $|Income - 50,000| \leq 2500$. Results that are presented in 6 are robust for the changes of the sample selection bonds.

Baseline specification will be estimated with an extra hypothesis about labor mobility. For simplicity, on the first stage of analysis, we do not consider individuals who have changed their employers. On this stage, the sample will consist of individuals who are present only in one firm throughout the observed period of time. This assumption still allows for the proper estimation of the evasion. However, I will not claim that the effect will be valid for all the firms and individuals.

Current literature results suggest that the reaction of the individuals to marginal tax rate change is heterogeneous by the firm size. The main idea is that it is way easier for the small firms and self-

employed to evade since the costs of evasion are lower. Because of this suspicion, regression will be run for different firm sizes. However, firms can change their sizes throughout time and Russia's economy was growing at that time, so expanding from small to medium firms, for instance, is likely to happen.

This brings us to the discussion of possible ways to account for labor mobility. Data suggests that the size of the firm was not quite stable over the observed period of time. People could look for better paid jobs and move from small to medium firms, which would result in labor force growth of the latter. Or there is an option of moving from two part-time jobs to one full-time job. Moreover, labor mobility could be considered as one of the ways to avoid paying higher marginal rates. For instance, if a person registries his or her income in several firms, the final amount of tax paid could be lower.

One of the outcomes of this discussion is that defining the size of the firm using the data **after** the reform could lead to the endogeneity. For the sake of avoiding such errors, I define the size of the firm based on the data before the tax reform. Specifically, I calculate the mean number of employees for two years before the reform. Defining the firm sizes in this way solves the endogeneity problem. However, this does not solve completely the issue of extreme labor mobility.

Another issue comes from the data examination. Around 50% of the individuals registered in the data have changed the jobs. Around 80% of individuals have been present in more than one firm within one year. Both of these observations once again suggest that labor mobility should be taken into proper consideration.

Before presenting a possible solution to this problem, I would like to state an example of how this labor mobility could bias the result. Say we have two individuals with the same total income before the reform: one "evader" and one "honest" person. "Evader" shows income 40,000 rubles a year (below the tax margin), but his or her true income is twice large - 80,000 rubles. "Honest" person has two part-time jobs and on both of them, the salary is 40,000 rubles. Say after the reform honest person has quit one of the part-time jobs and got a full-time job with the same total income of 80,000 rubles. If the evasion effect is estimated based on the **salary**, but not **total income**, these

two individuals would be both considered as evaders.

To tackle this problem I would run the same baseline RD specification, but using the total income that individuals had, not only salary. This would allow to get rid of the bias mentioned above. Yet in this case, the effect could be not detected if the main evaders are firms, but not employees.

6 Empirical Results

6.1 DID Results

Results for the main specification could be found in Table 3. The year 1999 is taken as a base year. Coefficients on income dummy variables state differences between mean log incomes of the individuals in corresponding tax brackets. The sign of these variables was expected to be negative as it turned to be. The main interest is in the coefficients of yearly fixed effects. For both of the thresholds income below was growing significantly faster than the one above. Within-firm and within-employee panel structure accounts for all time-invariant heterogeneity. This means that the results account for all the possible sources of changes in the specific firms, industries, labor market, etc.

The results of the specification (2) show that the income of the individuals below the first threshold was growing $\simeq 60\%(\exp 0.48 * 100\%)$ faster than the income of the individuals above the first threshold. For the second threshold, the result is that people with incomes below the threshold have experienced growth which was 9% higher than for the people with the income above it.

This result could not be completely explained by the changed incentives or the average salary growth. In fact, if the results were mainly driven by the incentives change, one should have expected coefficient to be negative rather than positive. On the contrary, we can see that all the yearly fixed effects are positive for all the years.

In order to identify who are the main drivers of the effects, I run additional regressions with some restrictions. In the baseline scenario, all the individual is used to estimate the effect. Equa-

Table 3: Difference-in-Differences results

	(1)	(2)	(3)	(4)
VARIABLES		Log Income Yearly		
[Income<50000]	-2.74***	-2.49***	-0.71***	-1.17***
	(0.009)	(0.003)	(0.002)	(0.002)
[Income<150000]	-1.39***	-1.3***		
	(0.019)	(0.01)		
[Year>2000]*[Income<50000]		0.48***	0.02***	0.09***
		(0.004)	(0.002)	(0.003)
[Year>2000]*[Income<150000]		0.09***		
		(0.01)		
Year Fixed Effects	YES	YES	YES	YES
Firm-Individual Fixed Effect	YES	YES	YES	YES
Observations	4,105,402	4,105,402	431,609	1,229,950
R^2	0.730	0.730	0.830	0.752
Mean	9.64	9.64	10.58	10.32
Standard deviation	1.874	1.874	0.393	0.617

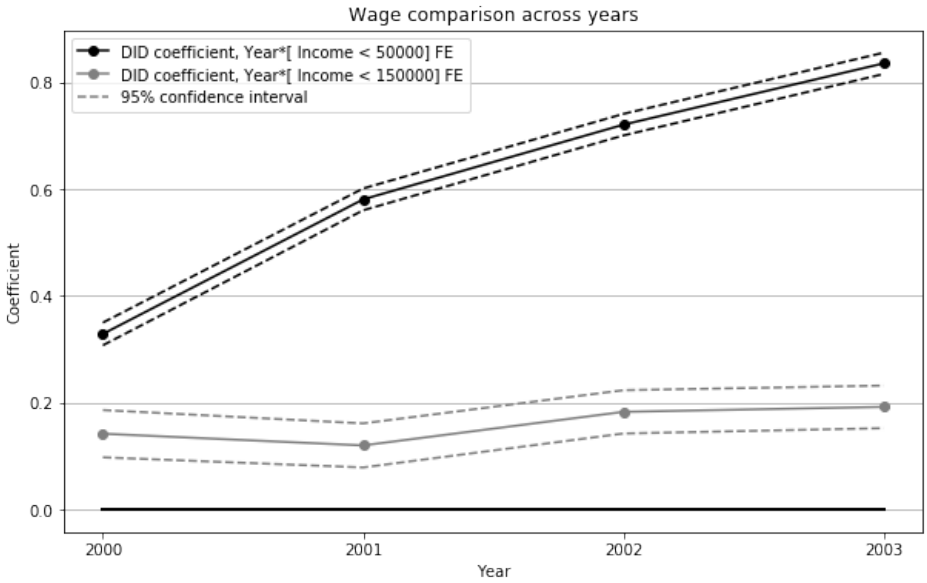
Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in brackets are clustered at the firm-individual-pair level. Specification (3) was run with the data restriction: distance between individual's income and value of the first threshold (50 thousand rubles) is no more than 30 thousand rubles ($\simeq$ 1000$ in 2001). Restriction for specification (4) - 40 thousand rubles ($\simeq$ 1350$ in 2001).

tions (3) and (4) have similar specifications but are run on the different samples. Equation (3) is run only for individuals with income within 30,000 rubles ($\simeq$ 1000$ in 2001) distance from the tax threshold. Restriction for the equation (4) - 40,000 rubles ($\simeq$ 1350$ in 2001). Results suggest that the main contributors to the effect are individuals with the lowest income. The previous conclusion comes from the following argumentation: by expanding the restrictions of the sample selection, the effect grows. The effect is positive and the individuals above the threshold should be experiencing labor supply effects from lower marginal tax rates, which should lower the coefficient. As a result, the only source of the coefficient's growth is the group of low-income individuals. So the lower is individuals' income, the more he or she is a "suspect" to evasion.

The previous conclusion is extremely vital for the claim that the evasion was widespread. The RD design allows for the estimation of discontinuity only around the tax threshold. However, present literature suggests that the main contributors to the evasion effect are small firms employees and self-employed individuals.

However, I do not claim that all the effect that is observed is due to the evasion. For example, as

Figure 3: Fixed Effect coefficients, DID design, yearly based



Notes: year 1999 was taken as the base year.

we can see from the Figure 3, the yearly fixed effects for the first threshold are growing over time. This effect could be not solely due to evasion. In the years 2000-2003 Russia was experiencing economic growth. New firms were established, salaries were growing, people were moving to better-paid jobs. This could contribute to the difference in growth rates.

One of the issues that raise the questions and demands explanation is the difference in the dynamics of the yearly fixed effects coefficients in DID specification. This difference could be observed on the Figure 3. The yearly coefficients for the second tax threshold remain almost the same, whereas the coefficients for the first threshold are growing over time.

There are two potential sources of this difference. The first one is that the employees who had income in the last tax bracket were mostly in the big firms. In the year before the reform, there were nearly 20 thousand individuals with income higher than 150,000 rubles working in small and medium firms. For the big firms, this number was around 60 thousand. And the big firms could have responded the same year the tax reform has been implemented. This could have happened since with the decrease of the marginal tax the costs of tax administration went down significantly, so it was easier to audit big firms. On the contrary, the employees from small and medium firms

have prolonged their reaction in time.

The second source comes from heterogeneity in salaries growth. Since Russia had been experiencing and economic growth, salaries across the economy have been rising as well. However, individuals with small and medium salaries could have had a higher income growth rate. One of the reasons why it happened is simply because of the low base effect. If the salary 30 thousand rubles is increased by 3 thousand, the relative increase is 10%. For the salary of 100 thousand rubles, the same increase will be 3%. Another reason is that since the number of small and medium firms went down, the resources could have been concentrated in the firms that have survived. And these survived firms have been able to raise salaries to their personnel with small and medium salaries in order to keep them.

6.2 RD Results

The results of the basic RD specification are shown in Table 4.

According to the results for the salary regression, the main evasion effect comes from the medium and large firms. For the firms that were small before the reform, there is no significant effect. This does not mean that there was no evasion in this firm category. One of the reasons for the absence of the effect is the low survival rate of the firms. Employees could have moved from one small firm to the other firm quite often. Also, because of the extreme dynamics in the small firms' sector, there is a lack of proper observation, which could have affected the final result.

As well as in the DID section, I do not claim that the observed effect is completely driven by the evasion. However, in this case, the coefficient could have been affected only by the labor effect. So the effect of the boosted motivation could be present in the data, but the overall effect was pushed by the evasion.

Presented results partly contradict the hypothesis stated in the literature. The main evasion group is not the small firms and self-employed but medium firms. This could be partly explained by the position of the tax thresholds and the distribution of salaries throughout the firm sizes. For the small firm sizes the mean and the medium salaries are around 10% lower than for the medium

Table 4: Regression discontinuity results

VARIABLES	Salary regression
N Employees <=15	-0.97
	(0.871)
15 <N Employees <=25	-2.3*
	(1.217)
N Employees >25	-0.42***
	(0.109)
N Employees >50	-0.17**
	(0.086)
N Employees >100	0.02
	(0.052)
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Notes: "N Employees" stands for the mean amount of employees in the firm before the reform. The regressions are estimated for the following boundaries: |Income - 50,000| <= 2500, where Income is a variable of interest in rubles. Results are robust for increasing the boundaries up to 5000 rubles and decreasing them to 1000 rubles.

firms. This ratio hold for the year before and year after the reform. Because of this difference in income distribution, there is a smaller number of individuals that could potentially have incentives to evade.

Possibly, the reason why this logic does not hold for the big firms and the reason why the effect for the big firms there is no evasion effect found for the big firms was better tax administration and more rigorous control in general. Big companies were the main taxpayers in Russia on that days, so the government had a strong interest in better monitoring. Also, most of the international firms that were present in Russia were big (or, at the very least, medium), so they had to follow international standards of transparency. Moreover, the bigger is the company, the more incentives it has to expand on the international market. This expansion, as well as the cooperation with the international firms, requires certain standards of transparency that company has to follow. As a result, company could decrease the evasion and benefit from it via having an increased number of clients around the world.

7 Robustness Check

7.1 DID Check

As discussed in Section 5, there could be heterogeneity in response to the different firm sizes. In order to check this theory, I run the basic specification on three different samples: employees from small, medium, and large firms. The size of the firm is defined using the same procedure described in the RD specification of Section 5 with almost the same brackets. The values of the brackets could be found in notes for Table 5. Results of the regressions also could be found in Table 5.

Table 5: Difference-in-Differences results

VARIABLES	Log Income Yearly					
Firm Size	Small Firms		Medium Firms		Large Firms	
[Income <50000]	-2.77***	-2.52***	-2.72***	-2.47***	-2.74***	-2.48**
	(0.026)	(0.013)	(0.02)	(0.01)	(0.01)	(0.01)
[Income <150000]	-1.45***	-1.4***	-1.4***	-1.36***	-1.37***	-1.25**
	(0.019)	(0.026)	(0.04)	(0.02)	(0.03)	(0.01)
[Year >2000]*[Income <50000]		0.5***		0.451***		0.46***
		(0.013)		(0.01)		(0.01)
[Year >2000]*[Income <150000]		0.16***		0.163***		0.08***
		(0.027)		(0.022)		(0.02)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm-Individual Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	1,554,522	1,554,522	1,031,333	1,031,333	1,479,817	1,479,817
R^2	0.743	0.743	0.726	0.726	0.72	0.72
Mean	9.74	9.74	9.77	9.77	9.54	9.54
Standard deviation	1.759	1.759	1.82	1.82	1.941	1.941

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are shown in brackets. The size of the firms was determined by calculating mean number of employees (N) before the tax reform. Small Firms - $N \leq 10$, Medium Firms - $10 < N \leq 25$, Large Firms - $N > 25$.

There are two issues regarding these results that are worth noticing. First is that the yearly fixed effect cumulative coefficient does not significantly change for different firm sizes. Although for the small firms the coefficient for the first threshold (50,000 rubles) remains the highest, which coincides with the theory assumptions. The significance of the coefficient suggests that tax evasion was widespread among the firms. Second is that the effect for the second threshold (150,000 rubles) is present for all the firm sizes and is two times less for the large firms than for the medium and

Table 6: Difference-in-Differences, total income results

VARIABLES	Log Income Yearly					
Firm Size	Small Firms		Medium Firms		Large Firms	
[Income <50000]	-1.93***	-1.6***	-1.81***	-1.55***	-1.81***	-1.47***
	(0.034)	(0.017)	(0.02)	(0.013)	(0.03)	(0.01)
[Income <150000]	-1.27***	-1.24***	-1.39***	-1.23***	-1.39***	-1.13***
	(0.062)	(0.035)	(0.05)	(0.026)	(0.05)	(0.01)
[Year >2000]*[Income <50000]		0.48***		0.42***		0.35***
		(0.018)		(0.015)		(0.01)
[Year >2000]*[Income <150000]		0.22***		0.25***		0.18***
		(0.036)		(0.03)		(0.02)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm-Individual Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	1,554,502	1,554,502	1,031,326	1,031,326	1,479,676	1,479,676
R^2	0.54	0.54	0.54	0.54	0.55	0.55
Mean	11.05	11.05	11.13	11.13	10.87	10.87
Standard deviation	2.093	2.093	2.07	2.07	2.07	2.07

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are shown in brackets. The size of the firms was determined by calculating mean number of employees (N) before the tax reform. Small Firms - $N \leq 10$, Medium Firms - $10 < N \leq 25$, Large Firms - $N > 25$.

small firms.

The last result is extremely surprising for several reasons. One could have expected that this effect would be present only for medium and large firms. Moreover, quantitatively the effect in small firms is pretty much the same as for medium firms. This result is a strong supporter of the presence of evasion in all types of firms.

In constructing the DID specification I have not been discussing labor mobility as thoroughly as in the RD section. The mechanisms described in the RD section could result into bias the same way in the DID specification. In order to account for this labor mobility, I run additional specification using the logarithm of total income but not salary as the variable of interest.

The result of this robustness check could be found in Table 6. The significance and signs of the coefficients remained the same comparing with Table 5. It is worth noticing two facts regarding comparison Table 5 and Table 6. The difference in yearly fixed effect coefficients in Table 6 is higher than in Table 5. This result suggests in favor of the consolidation of income. Individuals with lower income who were working in large firms were able to split their income into parts or were working on several jobs. Accounting for labor mobility resulted in elimination of the upward

bias. The second fact worth mentioning is that the coefficients for the yearly fixed effects for the second threshold (150,000) rubles have risen. This also suggests in favor of the significance of the labor mobility effect.

7.2 RD Check

As discussed in Section 5, one of the ways to tackle the issue of labor mobility is to run the RD regression using total income as the variable of interest. The result of the estimation is presented in Table 7.

Table 7: Regression discontinuity results

VARIABLES	Income regression
N Employees <=15	-0.15
	(1.204)
15 <N Employees <=25	-0.75
	(1.203)
N Employees >25	-0.23
	(0.211)
N Employees >50	-0.29
	(0.227)
N Employees >100	-0.2
	(0.236)
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Notes: "N Employees" stands for the mean amount of employees in the firm before the reform. The regressions are estimated for the following boundaries: |Income - 50,000| <= 2,500, where Income is a variable of interest in rubles. Results are robust for increasing the boundaries up to 5000 rubles and decreasing them to 1000 rubles.

The results in this case are completely insignificant for all firm sizes. This, however, does not reject the result of the basic specification. The result of the basic specification could not be explained without the evasion effect.

This result could be explained in two ways. First is that there was a lack of proper tax administration, which allowed for massive evasion. Specifically, some individuals were registering their

income in several firms, which reduced the final sum of the tax that they paid. This theory is partly supported by the dynamics of small firms. The number of small firms went down by 25% after the tax reform and did not change much afterward. Given that Russia was experiencing economic growth, the number of firms is expected to be going up, rather than decrease. The second explanation comes from the idea that the main "evaders" were firms, but not employees. Firms, as well as the workers, have incentives to hide true salary. Decreasing the reported salary firm allows itself to pay fewer taxes, which reduces its costs.

In any of the specifications and in any of the data used to run the RD specification, the presence of the labor effect has not been found. There could be a lot of reasons why this happened, but I would like to state two of them. The first one has already been stated in several forms. The effect of evasion could have been so huge that it out-weighted the labor effect. The results suggest that it is the main explanation.

The second explanation could come from the structure of the labor market. For the labor effect to be present an employee has to have an opportunity to work extra hours in order to increase their total income. This opportunity does not exist for the office workers who have fixed working hours, for instance. This effect could be present only for the jobs that have wage by hours of work and the employee is able to influence the number of working hours by himself. It could be the case that most of the employees on the labor market had a fixed number of working hours. This could also explain part of labor mobility. The individuals on the labor market cannot increase their working hours, but they can move from one job to the other. For instance, if as the result of the tax reform one of the firms was able to increase the salary of the employees, workers have an additional incentive to move from their current job.

8 Conclusion

In 2001 Russia has established a new tax system, that changed the progressive income taxation scheme to the flat one. This policy had a dramatic impact on the economy and tax collections specifically. With this kind of experience, Russia has contributed some positive evidence on shifting the tax system. Moreover, several countries have followed this example and switched the tax system to the flat one. Some researchers claim that the main contributor to such an effect was the evasion, but not labor effect. In this article, I examine whether the evasion effect was prevailing or not without estimating the welfare effect from the reform.

Since tax evasion is hard to observe directly, we use indirect approaches to follow the dynamics of the tax evasion. In this article, I construct several models to be able to state whether there was a substantial change in the structure of evasion. The core theoretical argument is that the possible influence of the reform is limited up to two well-known effects: labor and evasion effect. Using DID and RD designs to figure out which of the effects prevailed, I state two important results. First, there was a substantial behavioral effect in response to the change of the marginal tax rate. Second, out of the possible behavioral effects evasion effect has overcome labor effect in driving the income dynamics throughout all the firm sizes.

Even with showing evidence proving the presence of evasion, this topic remains open for future research with the same dataset. Three possible directions could be stated. First, examine the behavior and the dynamics of the small firms and self-employed more thoroughly. Finding no solid evidence of evasion in small firms contradicts with some views and results made in the mentioned articles. This suggests that either the main "evaders" in the case of Russia were indeed medium and large firms or that the techniques that small firms and self-employed used in order to avoid paying taxes is more complicated than the current analysis suggested. Second, evidence from the robustness check suggests that the evasion could have been widespread in a way that the evasion could happen not on the individual level, but on the firm level. Finally, the presence of the labor effect has not been carefully examined. The question of whether the labor effect exists in the data or it is negligible is intriguing itself and deserves proper research.

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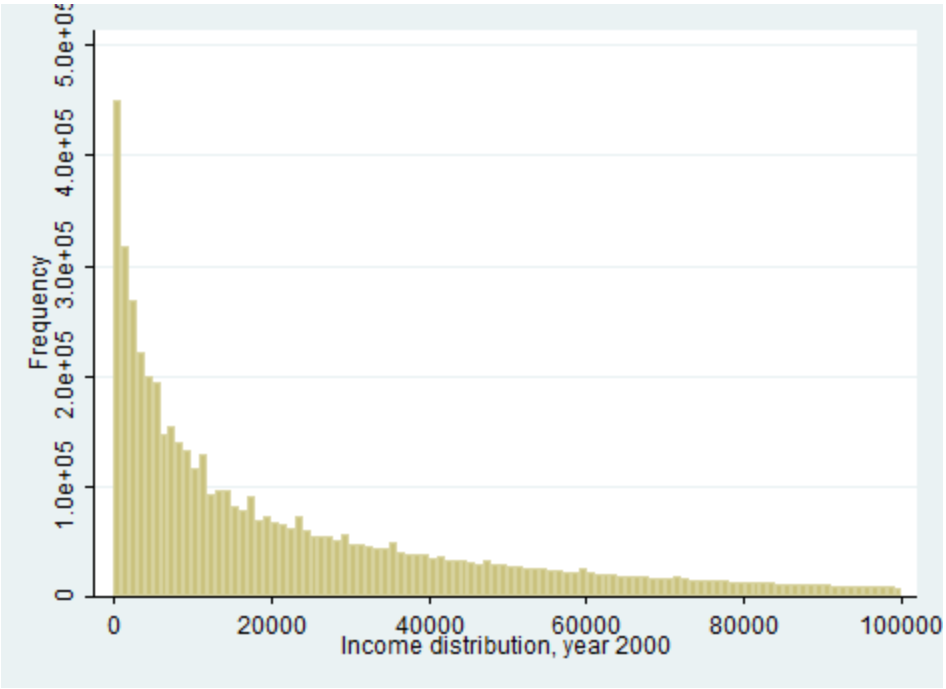
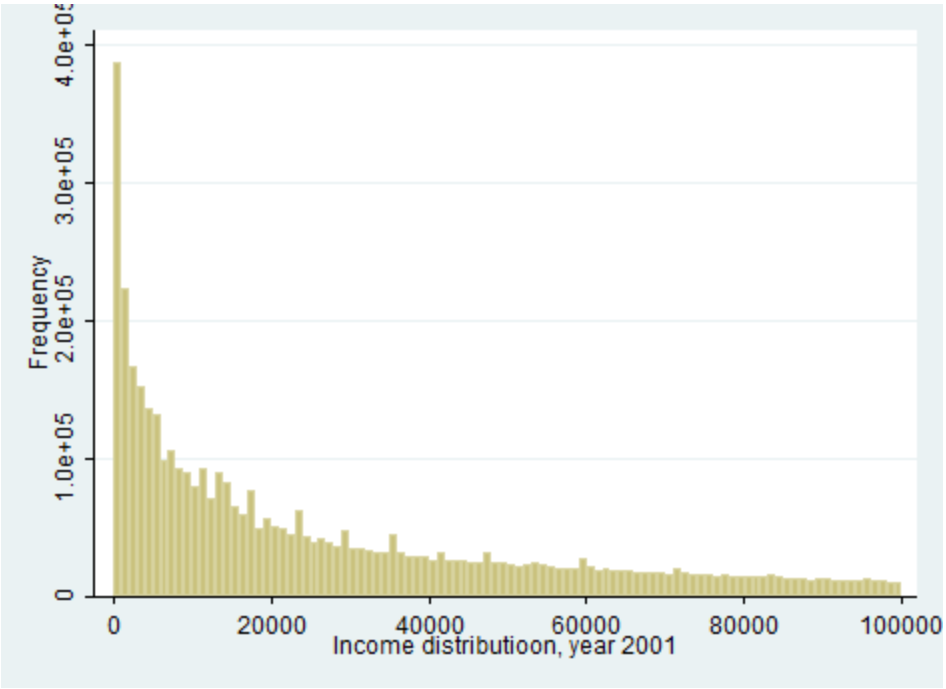
Appendix

Figure A1: Pre-reform salaries distribution, year 2000



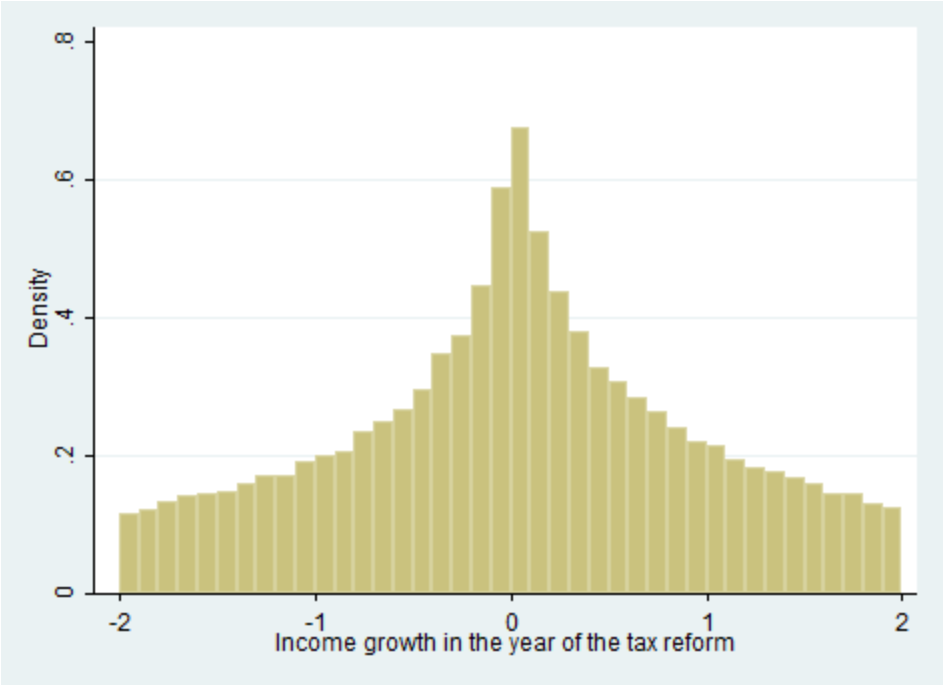
Notes: Size of the bin is standardized and equal to 1000 rubles

Figure A2: Pre-reform salaries distribution, year 2000



Notes: Size of the bin is standardized and equal to 1000 rubles

Figure A3: Salaries' growth rate, year 2001



Notes: Size of the bin is standardized and equal to 10 percentage points