THE EFFECTS OF THE ROMANIAN FLAT TAX REFORM ON

TAXABLE INCOME AND HOUSEHOLD CONSUMPTION

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Abstract

Following the example of a number of Eastern European countries, Romania adopted a highly disputed flat tax rate system in 2005, stipulating a radical cut in personal income taxes. The aim of this study is to evaluate taxpayer's behavioral responses triggered by this substantial fiscal relaxation. For this purpose I estimate the taxable income and consumption elasticity employing a diff-in-diff methodology on the cross-sectional dataset of the Romanian Household Budget Survey for the period 2003-2007. My findings reveal that the taxable income of the group experiencing large tax rate cut declined relative to those facing a lower tax cut. The elasticity estimate for the full sample of employees is about -0.26 while for the sample restricted to employees in the private sector is substantially larger negative. This result might be due to a strong income effect or to the employer's response to the tax cut. The estimates for consumption are not significant, implying that if there was any positive effect of the reform on consumption, it was not differentially larger in the income groups experiencing large tax cut.

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Introduction

The adherence to the famous "flat tax system", like a radical fiscal revolution wave started sweeping over the former communist nations after the collapse of the Soviet Union, resuming a heated dispute among the advocates and critics of the flat tax idea. The snowball was rolled off by Estonia in 1994, when it was the first to adopt the flat tax system, then it took up the other Baltic countries, it increased significantly with the adherence of Russia, the first large economy, in 2001 and it rolled along about eight more eastern European countries in the past decade. According to the Center for Freedom and Prosperity (US) 24 countries in the world declared flat taxes in 2008. The snowball is still rolling and growing, even though the empirical evidence on the flat tax performance in practice is very limited and ambiguous.

According to economic theory, the main merit of the flat tax, compared to the more social progressive tax, is its superior efficiency. It is widely assumed that the adoption of a flat tax structure leads to increased productivity by reorienting resources to the most productive uses and by stimulating work effort and also to a better compliance in countries with high tax evasion rates. Hence, one expects to observe higher gross incomes as a result of a flat tax reform which might lead to increased tax revenues. However, these effects rely heavily on the behavioral response of the economic agents, which varies both over time and country. The mechanical consequence of the reform, accompanied by a tax rate cut would be a sharp decline in government revenues. Thus, analyzing and measuring these behavioral responses presents importance for economists and tax policy purposes as well. However, despite the popularity of this type of tax system, there are just a few number of studies analyzing the empirical effects of flat tax reforms and are mainly focused on the Russian flat tax experience. My thesis aims to extend the literature on this topic by evaluating the flat tax effects on productivity and consumption in Romania. The goal of my study is to observe how gross incomes reacted to the introduction of the flat tax reform in Romania, by estimating taxable income elasticity. In Romania the flat tax system was adopted in 2005, replacing a progressive tax structure with four brackets. It meant a large cut in taxation, affecting to different extent, but the whole working population. My research question focuses on how the tax cut affected work incentives. A positive effect is assumed to materialize in higher taxable incomes after the reform. Hence, using the diff-in-diff method, I seek to evaluate how taxable incomes reacted to the tax rate cut and to obtain an estimate of the taxable income elasticity. Due to the lack of panel data I am constrained to conduct a pooled cross-section analysis, which has the drawback that it does not allow for changes in the income distribution. However, it enables me to investigate the effect of the tax rate cut on a longer time period, capturing not only the immediate effect.

My results, similarly to the findings obtained by Ivanova, Keen and Klemm(2005) for the Russian case, show that the reform had, if any, a slight negative effect on the taxable incomes of the treated group, which consist of taxpayers whose earnings would be above the lowest tax bracket, had the progressive system remain in place after 2005. The elasticity estimate obtained for the full sample of employees is small, amounting to -0.26, while the same estimate for those working in the private sector is significantly larger negative of about -0.69. The dataset used enables me to evaluate, as well, how consumption was affected by the reform. My findings suggest that, contrary to the expectations, the tax rate cut did not have a significant effect on consumption expenditures.

The rest of the paper is structured as follows. The first chapter presents the main findings of the related literature, followed by a short overview of the flat tax idea in chapter two. The next chapter summarizes the tax reform adopted in Romania in 2005 and briefly presents the expectations regarding it. Chapter 4 describes the data and the methodology used, while chapter 5 presents the results obtained. The final section concludes the study.

1. Empirical evidence

1.1 Flat tax effects on work incentives and tax revenues

Despite its increasing popularity, the existing empirical evidence on the flat tax impact is very limited and it is marked more by assertion than by thorough empirical analysis as Keen, Kim and Varsano (2006) argue.

As they suggest some information in this respect might be revealed by a simple look at the raw statistical PIT revenue data. However, one should be very cautious in drawing an overall conclusion based on the raw data, as there might be many other factors, besides the tax reform, affecting it. Contrary to the expectations based on Laffer's theory, in the majority of adopting countries no tax revenue increase is observed after the tax cut accompanying the flat tax reform. In a few countries, Slovakia and Ukraine, the total tax revenues even decreased in the year right after the reform. In the majority of adopting countries, however, the total tax revenues increased slightly but due to the fact that the incomes from indirect taxes compensated the losses in the personal income tax and very often also in the corporate income tax revenues. Hence, it cannot be attributed to the Laffer-type behavior. Russia seems to be the only exception, where the tax rate cut was followed by a boost in both personal and corporate income tax revenues.

Nevertheless, for a valid inference to be drawn there is need for causal analysis. Thus, in their study Ivanova, Keen and Klemm (2005) show, using the diff-in-diff method, that the increase in revenues from personal income taxes in Russia is not related to the flat tax but to an exogenous increase in real wages. Their results show an increase in tax compliance attributable to the reform, but find no evidence of a supply side shock effect of the reform. As far as I know, this is the only study evaluating the efficiency effects of a flat tax reform.

1.2 Taxable income elasticity

Since the Laffer type behavior and the effects on work incentives are more the consequence of the tax rate change than the flatness per se, the vast empirical literature on the taxable income elasticity to taxation is relevant for the flat tax case as well. Thus, I briefly present the main results and methods used in the most relevant studies on the behavioral responses of taxation.

The behavioral response is approximated in these studies by an estimate of the elasticity of taxable incomes with respect to the tax price, defined as the percentage change in reported income to a 1% change in the net-of-tax rate. The related literature reveals a wide range of elasticities, from levels above 1 to results close to 0, reflecting the large variety of approaches and estimation methods used, as well as differing behavioral responses over time and country. I present first the most important findings and then summarize the main methods used.

The research conducted by Lindsey (1987) was the first to estimate taxable income elasticity. He analyzes the effects of a series of tax rate cuts between 1982 and 1984 in the US. Using pooled cross sectional data, Lindsey builds a projection of what the income distribution would be like had there be no reform or other changes only economic growth. By comparing this projection to the actual tax return data after the tax cuts he finds large elasticity estimates of above 1. His results also suggest that the elasticities are rising with the income level. A major limitation of his study is that it assumes that except the macroeconomic growth controlled for, the income distribution would not change absent the tax cut.

In order to address this problem, Feldstein (1995) pioneered in using panel data to investigate the 1986 TRA effect on taxable income. Employing a diff-in-diff method, he obtains large elasticity estimates ranging from 1 to 3.

However, while the panel data solves the problem of a dynamic income distribution, it raises a new one, that of mean reversion. Thus, Auten and Caroll (1999) improve Feldstein's

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analysis by conducting it on a larger dataset and by controlling for mean reversion due to the differences in the tax systems and the characteristics of the reform. They adopt a two-stage least-square regression approach, using as an IV the synthetic marginal tax rate. Their results from investigating the same tax reform of 1986 yields much lower elasticity estimates of 0.55

In order to check the robustness of these large elasticity estimates found in the 80's Goolsbee (1999) investigates whether these significant behavioral responses can be observed in other time periods as well. He uses aggregate cross sectional date to study the behavioral responses for five major tax changes in the US from 1920 to 1966. The estimates he obtains, for this period are significantly lower, below 0.6, than those obtained for the 80's in US. He argues that, even though elasticities might differ in time, the evidence from the 80's seems atypical.

Gruber and Saez (2002), using a long panel of tax returns, also examine a series of tax reforms taking place in the US in the 80's. The novelty in their analysis consists in the fact that they separate the income and substitution effects of the tax rate change and use a larger set of controls for mean reversion. The income effect is found to be insignificant, concluding that the compensated and uncompensated elasticities are similar. Their overall elasticity estimate is slightly lower of about 0.4 but they find a more elastic response in the upper part of the income distribution.

The above presented studies all focused on the taxable income elasticity in the US. I also mention some results obtained for other countries.

Following the Gruber and Saez approach but using only two years of data, Gottfried and Schellhorn (2004), find an elasticity estimate for the German tax reform, adopted in 1990, of 0.58 and an insignificant income effect.

Using the same method, Bakos, Benczur and Benedek (2008) report a very low overall tax-price elasticity of 0.06 for the Hungarian tax reform enacted in 2005 but a significantly larger elasticity of about 0.3 for the upper income group.

Kleven and Schults (2009) use a long panel of Danish tax return data to analyze the responses to a number of tax reforms for the period 1984-2005. The method applied is the one proposed by Gruber and Saez completed with additional controls. They find insignificant income effects and small overall elasticity, which is, however, increasing in income level.

In short, the findings vary significantly over time and country and depending on the method used. The higher income brackets are found to be more elastic and the income effects generally very small, often insignificant.

Based on the structure of the dataset used, the studies on income elasticity can be separated in two groups. The majority of the papers on this topic use panel data which has the advantage that it enables observing the change in the taxable income of an individual affected by the reform. Just a few studies use pooled cross sectional data. Opposed to the panel structure, the cross sectional data only shows the change in the taxable incomes of income groups affected by the reform and not on individual level. Thus the main limitation of a pooled cross sectional analysis is that it assumes static income distribution, which is quite often not the case.

Regarding the methods used, there are basically two approaches: diff-in-diff and regression method approach. In the latter, the income change is regressed on the change in tax price and the synthetic tax rate, calculated as the after-reform tax rate without behavioral response, is used as IV for identification (Auten and Caroll). It can be further improved by controlling also for income effects (Gruber and Saez). This method can only be applied in case of panel data since a cross sectional dataset does not allow calculating the synthetic tax rates. The diff-in-diff method compares the percentage change in the taxable income of the

group experiencing a tax change with that of a control group which was not or less affected by the reform (Feldstein). This method can be applied also for repeated cross sectional analysis. Lindsey uses a diff-in-diff method for cross sectional data but instead of comparing to a control group he compares the taxable income change to a projected income distribution.

Due to the lack of panel data I am constrained to employ a cross sectional analysis and use the diff-in-diff method. However, since I do not have data to construct a projection of the income distribution, I apply the Feldstein style diff-in-diff approach and compare the change in the taxable income of the treated group to that of the control group. As suggested by Saez, Slemrod and Giertz (2009) I instrument the endogenous net of tax rate variable with the post reform dummy and treatment dummy interaction term. The methodology is described in more detail in chapter 3.

There are two main conclusions which can be drawn from the empirical evidences presented in this chapter. On one hand the findings of the taxable income elasticity literature, focusing on tax reform episodes stipulating tax changes but not also a flattening of the rate structure, suggests a positive behavioral response which varies, though, significantly from case to case but in a positive range. On the other hand, this positive behavioral response cannot really be observed in the case of flat tax reform. However, there is need for more empirical analysis in this area for a thorough conclusion to be drawn.

2. Flat tax in theory and practice

2.1 True flat rate tax system

It is well documented that taxes distort economic activity by inducing a wedge between the price paid by the buyer and the one received by the seller, in order to serve redistributive purposes and to satisfy the revenue needs of the government. The efficiency losses arise from the decline in the quantities of goods and services bought due to the price increase and from distorting the choices and behavior of economic agents. Thus a tax system is considered efficient if it achieves its goals in the least distortionary way. (Mirreeles review 2010)

The flat tax idea evolved from this consideration. In its pure form, a flat tax rate system applies a single uniform tax rate to all incomes and profits without any exception and only once at the source. Thus, it resembles an expenditure taxation levied on income which encourages savings and investments, key elements for a stable and robust economy (Hall and Rabushka 1985) By treating all income types uniformly, it comes close to what is called a neutral tax system¹, which does not cause economic agents to shift their choices between different income sources due to differential tax treatments. Thus under a true flat tax system, arbitrage opportunities for tax avoidance, which might imply socially unproductive efforts (Mirreeles review 2010) are eliminated. By not punishing success and effort with higher tax rates as in the progressive system the productivity and entrepreneurial effort might increase. Another major advantage of this type of taxation is its simplicity. Resources used for tax administration and compliance in case of a complicated progressive tax structure can be reoriented to socially more productive uses under a flat tax system. (Hall and Rabushka 1985)

An ideal flat tax system where all income earners and types of income are taxed with the same rate represents a base broadening compared to a progressive structure with allowances and exemptions. Hence the flat rate can be set at a lower level. In a revenue

¹ An ideal neutral tax would take the form of a lump sum tax. Taxes as a percentage of the tax base cannot avoid, just reduce the distortion of increasing incentives towards leisure or the underground economy

neutral scenario the shift from a progressive to a flat tax structure implies a cut in the tax payments of individuals in the upper part of the income distribution and an increase in the tax rate faced by some lower income taxpayers. The more tax deductions and exemptions are eliminated by the reform the lower flat rate can be set. Changes in the tax rates trigger behavioral responses from the taxpayers affected. On one hand a decline in the tax rate reduces, while an increase creates more incentives for tax evasion as far as it is perceived as an inconvenience (Keen, Kim and Varsano 2006). On the other hand tax rate changes also influence an individual's work incentives, through the substitution and income effects. Evidence suggests that generally the substitution effect is dominant and taxes negatively affect work incentives (Mirreeles review 2010). According to the empirical findings behavioral responses increase with income, hence the positive effects on work incentives and compliance in the upper part of the income distribution outweigh the negative responses of the lower income groups facing a tax increase, leading to productivity gains and improved tax collection.

Considering these behavioral responses, Laffer argues that at a 100% just as at 0% tax rate the government would not collect any revenues from taxes, since at this tax rate individuals would have no incentives to work or to report their incomes. According to his theory there is a revenue maximizing rate somewhere between 0% and 100% and the increase in the tax pressure above this level would lead to a decline in the collected tax revenues.

Using taxable income elasticity as a measure for the behavioral response of taxpayers to a tax change the revenue maximizing tax rate can be calculated by equating the two effects of a tax change on revenue, the mechanical and the behavioral responses (Lindsey 1987; Saez 2009). The revenue maximizing top tax rate, satisfying this condition is found to be lower than the revenue maximizing across the board rate, due to the fact that the behavioral over the mechanical response ratio is larger in this case. Thus, a progressive rate structure produces a lower revenue maximizing rate. This comes as an argument against the flat rate structure. However, it should be taken into consideration that even if tax rates are lower in the upper bracket in a progressive scheme, as long as there are even lower rates and loopholes in the system the incentive exists to use tricks to take advantage of them. Thus, by broadening the taxable base and eliminating these arbitrage opportunities the flat tax system might achieve the revenue objectives with lower rate.

As another major argument against flat tax, critics reason that the marginal utility of income is decreasing with the amount of income. Hence, it is socially suboptimal to tax the marginal income the same amount independent of income level. Thus, the trade-off is between penalizing success and effort and not considering the decreasing marginal utility of income.

In conclusion, the flat tax system in its pure form increases efficiency by lowering the tax rate for a substantial part of the income distribution and by significantly mitigating tax distortions inducing changes in the economic behavior. It might also increase tax revenues due to the behavioral responses of high-earners. However it does not fulfill the other objective pursued by the government with taxation: redistributing income from high-income individuals to those in need. Thus, in this form the flat tax system is not feasible, since the increase in the tax rate and the elimination of all allowances at the bottom of the income distribution would generate social tensions. Hence different flat tax types evolved, trying to correct for this shortcoming.

2.2 Flat tax system with deductions

The flat tax version advocated by Hall and Rabushka in their proposal to reform the federal tax system of the US in the 80' differs from the pure flat tax form by applying the flat tax rate on incomes above an exemption level, depending on the family status of the individual. No other deductions are allowed and in its all other aspects it resembles the

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original version. Thus this tax allowance induces a progressivity in the system, since there are two tax rates just like in a progressive tax system with two brackets: 0 for those earning below the basic deduction level and the flat rate above that level. Even above the deduction level, where taxpayers face a constant marginal tax rate, the average tax rate still remains progressive due to the deduction and hence a more correct denomination of this system would be a marginally flat tax structure. In this case there is no completely equal treatment of all individuals, but this is a cost that has to be paid in order to redistribute income to the poor and also to compensate the losers of such a reform. Hall and Rabushka argues that granting a generous personal allowance induces enough progressivity to limit the burden of taxes on the poor and it does not has to be combined with increasing marginal tax rates at the upper income distribution since it provides opportunities and incentives for the rich to evade taxes.

Keen, Kim and Varsano (2006) demonstrate theoretically how the adoption of a marginally flat tax may actually lead to an increase in progressivity, in the sense that a smaller share of the total tax liabilities falls on the poorest. The World Bank (2005) study, by comparing pre and post reform indices of tax payments and after tax income distribution, finds evidence of such an increase in progressivity after the adoption of the flat tax reform in Slovakia.

The flat tax system proposed by Hall and Rabushka is an important benchmark in the flat tax theory, since it combines the efficiency gains of a flat tax with the distributional effects of a progressive system. However, it was never applied in practice in this form.

In his book Capitalism and Freedom (1962) Friedman sets forward another type of flat tax system, with negative income tax for individuals whose earning incomes are below the deduction level. It is similar to the flat tax system with allowance with the difference that when deductions exceed income, the taxable income becomes negative and hence the individual receives a "social dividend". However, as argued in the Mirreeles review, if the

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government wants to redistribute a generous social dividend to the poor than the tax rate applicable should be high in order to finance it. Thus, the significant social dividend increases the participation tax rate², decreasing the incentives to take on paid activities while the high marginal tax rates increases the effective marginal tax rate³ reducing the incentives for those involved in a paid activity to earn more (Mirreeles review). Hence this type of taxation might generate significant efficiency losses.

2.3 Flat personal income tax system

Another type of flat tax system which diverges more significantly from the original idea is the flat personal income tax. As its name suggests it refers only to the personal income tax structure and does not equate the flat PIT rate with the corporate income tax rate. In this case the neutrality of the income tax system is significantly affected by the distortion induced in the economic choice between the different legal forms of the income generating activity. Several economic activities can be undertaken as an employee of a company, or selfemployed or in an incorporated business form. Additionally an owner-manager can choose between compensation in form of dividends or salary (Mirreless review 2010). Thus a wedge between the individual and corporate tax rate might encourage some individuals, especially high earners to take advantage of the lower rate and shift the form of their activity to the less taxed legal form. Hence a major efficiency gain of the flat tax concept is lost in this case.

In this category can also be included those flat tax systems which equate though the personal and corporate income taxes but do not remove the taxes on dividends. Based on the above explanation, in this case the corporate form is more costly compared to the individual form taxed under the personal income structure.

The other advantages of a flat tax system such as the improved efficiency due to simplicity, increased work incentives and tax compliance if it is accompanied by a tax rate cut

² Participation tax rate is defined as one minus the financial gain from work over gross income

³Effective marginal tax rate measures the loss in a marginal increase in gross earnings due to tax payments and loss of social benefits

might still apply. It should be noted though, that the observed behavioral responses might be a combined effect of the tax rate change and the above mentioned income shifting, which might increase or push down the real effect depending on how the two tax rates relate to each other. This latter effect neither increases productivity and nor does it generate more revenue to the government. The effect on savings and investments is ambiguous in this case, and it depends on how their treatment changed after the reform. Most likely it does not have such a positive effect on savings and investments as the expenditure type flat income tax, which eliminates double taxation of these items. Flat-tax supporters also add among the advantages of a flat structure, which might apply to all types mentioned before, the discouraging effect it might have on lavish government spending due to the fact that as compared to the progressive system, in the flat tax case any tax rate increase would affect all taxpayers.

In practice the majority of flat tax systems adopted can be included in this last flat tax type. Even though in some cases, as it is also in the case of Romania, the PIT and CIT rates are equated, in none of the cases is double taxation of savings is completely eliminated so as to have one single tax rate applied to all incomes and only once⁴. The flat tax systems adopted in different countries vary significantly in the level of flat rate relative to the pre-reform rate structure⁵, in the way they treat allowances and social contributions and in the accompanying changes in other taxes besides the PIT. Hence the effects of these reforms in different countries may vary substantially. Since dysfunctional tax administrations, low levels of tax collection and large underground economies are common features of the flat tax adopting Western European countries (Keen, Kim and Varsano 2006), improvement of revenue collections seems to be a common objective pursued with the adoption of the reform. While there is evidence of increased tax compliance in the Russian case (Gorodnichenko,

⁴ Estonia and Slovakia eliminated dividend taxes but not the interest and capital gain taxes

⁵ Few countries set the flat tax level at the pre-reform top rate, others somewhere in the middle some other set the lowest rate and Romania set a rate below its pre-reform lowest rate.

Martinez and Sabirianova 2009; Ivanova Keen and Klemm 2005), the positive effects on work incentives and increased tax revenues, as discussed above are doubtful.

A number of studies (Murphy 2006; Kim, Keen and Varsano 2006) assign a political significance to the flat tax reform, arguing that the main point behind it is actually the message it conveys to the world, that of a regime change to a market oriented economy. Considering that the adopting countries were planned economies moving to a market economy and the reforms were generally adopted after a fundamental change in government, it seems a reasonable assumption.

3. Taxation in Romania

<u>3.1 Romanian tax system</u>

Since the fall of the communist regime, a long process of modernization of the Romanian tax system took place trough several tax reforms, in order to achieve compliance with the western European standards. After a period of increase in taxation between 1997-2000, the trend became downward sloping just like in many other european countries, trying to gain field in the tax competition emerged in the begining of the 21st century. Apparently, Romania exceled in cutting taxes. According to a study published by the European Comission (2010), in 2005, after the last major tax cut adopted, Romania had the lowest level of taxation in the EU. Even though by 2008 a few other countries (Bulgaria, Czeh Republik,Lithunia) adopted lower PIT rates than Romania, it still kept its position as the country with the lowest tax to GDP ratio in the EU.

The same study reveals that Romania displayed the fourth highest reliance on indirect taxes in UE in 2008, representing a share of 42.7% of total taxes, compared to the 33.9% EU average. Personal income taxes accounted for only 12.1% of total taxes, half of the EU average and reached the lowest share in 2005 after the adoption of the flat tax reform. Interestingly, though the top personal income tax rate decreased after the reform by 24 percentage points, below the half of the EU average, the implicit tax rate on labor measuring the effective tax burden on labor did not show a very significant decline after the reform. Nor did the tax wedge for a single worker at two-thirds of average earning⁶ present a large decline. Another interesting fact is that the tax wedge for a single worker at two-thirds of average income is above the implicit tax on labor. A possible explanation offered in the Eurostat study is that the former refers to single persons and does not capture the effect of tax allowances.

⁶ computed in the Eurostat study as the percentage of taxes and social contributions in total labor costs of the employer

Graph 1: Evolution of tax wedge for single worker at two-thirds of average earnings and implicit tax rate on labor



Source: Eurostat study (2010)

3.2 The flat tax reform

The highly disputed flat tax reform, introduced in 2005, ushered in radical changes in the Romanian tax structure. The main features of the reform are summarized in the table 1.

	Before reform (2004)	After reform (2005)
PIT rates	18%,23%,28%,34%,40%	16%
Allowances	200RON +100RON/dependent	Function of income
CIT rate	25%	16%
Social Contributions Employer and Employee	32,5%, 17%	No change ¹
Dividends	5%	10% ²
Interest and capital gains	1%	10% ²
VAT rate	19%, 9%	No change

Table 1: Romanian tax reform, 2005

Source: Emergency Ordinance of the Governemnt 2004; Keen, Kim, Varsano 2006

1: Social contribution rates for the employer were reduced in 2004, 2006 and 2007, but there was no change in the contribution rates of the employee.

2: Dividends paid to individuals, interest and capital gains were raised to 16% in 2006.

The new tax structure adopted in 2005 was built around a 16% target rate. Everything, except for the VAT rates, above this level was cut and all rates below it were raised, gradually though, to this level. The choice of the flat rate might seem surprising, being set below the lowest PIT rate of the previous progressive system, implying a significant decline in the PIT.

The idea of equating tax rates on all types of income might misleadingly suggest that the tax system adopted in Romania comes close to the second category of flat tax system, described in the previous chapter, which significantly eliminates tax distortions in the economy. However, as discussed above, equating income tax rates is only half of the criteria needed for a true flat tax system with deductions. The second condition which refers to taxing all incomes only once is not satisfied. When some incomes are taxed twice then the true tax on these items is higher, creating distortions in the economic behavior as discussed in the previous chapter. In the Romanian flat tax system this is the case for example with the dividend income, on which the tax rate instead of being eliminated was increased in the first year to 10% and one year later to 16% for individual shareholders. Thus it is taxed once as corporate profit and then again when the shareholder receives the dividends. The true tax rate on dividends paid to individuals increased slightly from 28.75% to 29.44%, while for corporate shareholders declined to 24.4%. These higher rates might induce reclassification of some incomes as personal rather than corporate incomes, as discussed in the previous chapter. In the case of interest and capital gain taxes the income is taxed first when it is earned and again when it gives interest, encouraging individuals to consume today rather than to save for future consumption.

The "flat" labor income tax is also delusive. Even though, a single uniform tax rate applies to the labor income, the PIT structure still remains progressive due to the regressive nature of the personal allowances stipulated by the reform.

Table 2: Month	y personal anowances		
Gross income	Before reform (2004)	After reform (2005)	MTR ¹
<=1000RON >1000RON & <3000RON	200RON +100RON*dependents 200RON +100RON*dependents	250RON+100RON*dependents (250+100*dependents)*(1- $\frac{GI-1000}{2000}$)	16% 18-21%
>=3000RON	200 RON+100RON*dependents	0	16%

Source: Tax code 2004, Ordinance of the Ministry of Finance 2005, own calculations (calculations in appendix) 1: Marginal tax rate

After the reform the allowances were deductible only from wage income. As the above table shows, the deductible amount slightly increased for workers earning below 1000RON,

whereas for those earning between 1000 and 3000 RON, it became a decreasing function of their gross incomes. Above the 3000RON limit no deductions were allowed. Thus, neither the average nor the marginal tax rate is uniform over the whole income distribution under the new "flat" system. While the majority of taxpayers were subject to the 16% marginal rate, since the largest share of the income distribution was below 1000RON in 2005, some taxpayers, earning between 1000 and 3000RON faced higher rates, between 18 and 21% depending on the number of dependents. Hence, the PIT rate stipulated in this reform is just seemingly flat, but since very few taxpayers would calculate their true marginal tax rate, it was probably perceived by the population as a flat tax rate. In addition, even the slightly higher marginal rates under the new system are below the rates the taxpayers faced before the reform.

<u>3.3 Expectations and some results</u>

Just like in the majority of Eastern European countries, the Romanian flat tax reform was adopted right after a fundamental change in government. The government on power until 2004 also came up with a plan to reform the tax system, which was less radical than the one figuring on the program of the winning coalition, focusing mainly on an equitable distribution of income and increasing the predictability of taxation. In contrast, the main feature of the reform proposed and adopted by the winning coalition was a drastic cut in taxation.

The objectives of the new government were to assure large disposable incomes, increasing job formation, reducing the underground economy, encouraging savings and investments, stimulating the expansion of businesses and the increase of foreign direct investments. Major reasons of adopting the new tax system were to improve the competitiveness of the Romanian corporations on the European market and to attract foreign investments in the country. Thus, the statistical data shows that foreign investments reached a record of 9.1 millions of Euro and also the businesses of large corporations expanded significantly in 2006, the year after the introduction of the reform. Though, taking into

consideration that it was a growth period, it would not be wise to account this result as the consequence of the tax reform but most likely the cut in taxation had a contribution to it.

The improvement of the tax revenues collected by the government was also among the expectations regarding the reform, which seems to be left unfulfilled. According to the study released by Eurostat (2010), since 2001 Romania shows a quite stable tax to GDP ratio with very little fluctuations and since 2002 it has the lowest ratio among the current EU member states. In the years following the reform, there was a very slight improvement in this ratio but the 28% of GDP in 2008 was still very much below the 39.3% EU average. This slight improvement, however, was due to the increase in consumption taxes whereas the revenues from personal income taxes decreased⁷. It is among the aims of this study to reveal how the reform contributed to the improvement in revenues collected from consumption taxes.

Another shortcoming of the reform was presented by Socol, Marinas and Socol (2007). They demonstrate, using aggregate data, that the reform implied a strong demand side shock and affected to a much lower extent the supply side, triggering strong inflationist pressures and budgetary deficit. At the time of its adoption, the IMF expressed its optimist views regarding the new fiscal policy of Romania, warning, though, about a possible exacerbation of the budget deficit.(Tax-News.com) After the onset of the financial crisis the budget deficit of Romania increased to high levels in 2009⁸ and five years after the adoption of the reform the government was discussing with IMF officials a possible hike in the flat rate or even the possibility to abandon this type of taxation, as part of the IMF reform package, the government appealed to. (Tax Justice Network 2010)

In conclusion, the flat tax system introduced in Romania is highly controversial. The aim of this study is to shed light on some of its consequences, regarding its effect work incentives and consumption.

⁷ See graph 6 in appendix

⁸ 8.3% according to Eurostat; 7.4% declared by the Romanian government

4. Data and methodology

<u>4.1 Data</u>

The dataset used in this study comes from the Household Budget Survey conducted by the Romanian National Institute of Statistics, for the years 2003 to 2007. The survey is organised over a period of 12 consecutive months, on a sample of 36 072 dwellings representing about 33000 households and 85000 individuals yearly, distributed in monthly independent sub-samples of 3 000 dwellings.

For this analysis the sample is restricted to those individuals who earn an income, included in the aggregate annual income, which is taxed under the PIT system. Before the reform the aggregate annual income included salaries, incomes from rent and from independent activities. At the end of the year this agregate income was compared to the annual tax norm and tax payments were regularized according to it. After the adoption of the flat tax system, monthly tax payments on salaries became definitive. Tax payments on incomes from rent, independent activities and also agricultural activities were still regularized at the end of the year due to the fact that monthly payments were based on an anticipated income. Since incomes from agriculture were treated differently before the reform, I limit my sample to employees, individual entrepreneurs and individuals receiving rent income.

I also exclude from the sample, individuals who earn a taxable income but do not report any tax and social contribution payments, as social contributions are mandatory even if the taxable income is below the deduction level and as such no tax payments are due. Hence I assume that the data is not correctly reported in these cases and I drop these observations. These excluded individuals represent about 2500-3000 observations yearly.

The survey records information on net income, type of income, amount of taxes and social contributions paid in the previous month, but not on the amount of personal allowances the individual is eligible to. Nor does it contain data on the number of dependents and from whose tax base the corresponding allowances are deducted, if there are more income earners in the household. This information is necessary to compute the marginal tax rate after the reform for taxpayers earning between 1000-3000RON and to classify the individuals in the post-reform years in control and treatment groups based on the pre-reform allowance level in order to separate the effect of the tax rate change from that of the change in the allowances. Hence I do some computations to obtain this number. The sum of net income and taxes paid is the taxable income. From the taxable income are the allowances deducted to get the effective tax base on which the tax rate is applied. Thus, the effective tax base can be calculated by dividing the amount of taxes paid with the tax rate and with simple maths the empirical deduction level is obtained with to the below formula:

$$Deductions = Net Income + Tax - \frac{Tax}{Marginal Tax Rate}$$

The dataset contains information on the number of minors in the household and total household members, implying constraints on the possible level of allowances. According to the tax code minors are considered dependents and the number of dependents cannot be more than the total household members less the number of income earners. In addition, according to the tax code allowances above the basic personal deduction level are deductible only from one income earner's tax base in a household⁹. According to the tax code and considering the above constraints a theoretical basic allowance and maximal allowances, for more possible number of dependants, are computed. The empirical allowance is compared to the possible theoretical deductions and the number of dependants is chosen for which these two match approximately so as to also satisfy the third constraint. The individuals, for whom the empirical and theoretical allowances do not match, representing about 3000 observations yearly are dropped from the sample.

My final sample consists of 83411 observations, as presented in Table 3.

⁹ before the reform it was possible to split it among income earners in the household

	2003	2004	2005	2006	2007
Income earners	20234	24227	23945	23550	23111
No tax data	-2342	-3166	-3474	-3322	-3039
Incorrect allowance data	-2299	-4095	-3015	-3580	-3278
Final sample	15593	16965	17453	16648	16796
Employees	15535	16881	17367	16549	16725
Active employees ¹⁰	15311	16629	17299	16500	16682
Households	10538	11545	12251	11692	11562

As the above table shows my final sample is highly dominated by employees, independent entrepreneurs and other income earners (rent) representing less than 1% of the sample. Significantly adds to this very low share, the fact that taxes on rent and independent activities are paid only in every third month. Hence several observations might be dropped because there were no tax payments in the month surveyed. For this reason, though I run the majority of regressions for the full sample as well, my most favored sample consist of active employees only.

A major shortcoming of the survey data is that it does not have a panel structure. However, compared to the data provided by the tax authorities, the survey contains, besides income, also a detailed household consumption expenditure data and a larger set of variables on personal characteristics. The consumption data enables me to study the effect of the reform on consumption.

In the two types of regressions a wide set of personal characteristics are included, which might be correlated with income and consumption changes. Besides life-cycle characteristics such as age and schooling, urban and gender dumies are included in order to control for the difference in income change in urban and rural areas and for males and females. Family status might also affect income changes, hence I include a dummy for children and anotherone reflecting whether the individual leaves alone or with other householdmembers. I also include a dummy for the type of sector (private vs. public) and year dummies. My dataset also enables

Table 3. Sample

¹⁰ Persons on maternity and sick leave excluded.

to control for occupation which might have a significant effect as suggested by Auten and Caroll (1999).

All income and consumption expenditure variables are expressed in December 2007 prices. In household level regressions, the head of the household is considered the person with the largest income. In cases when there are more individuals within a household with the same income than the head of the household is chosen based on age and sex criteria.

4.2 Estimation method

A change in the tax rate might trigger behavioral responses from the taxpayers, due to the change in the share of the gross income the taxpayer takes home. In the case of a tax cut individuals may take advantage of the lower rates by working more hours or more efficiently, by seeking promotion, getting a better paid job or redirecting their incomes from other higher taxed forms¹¹. It might even encourage individuals to reveal their hidden incomes since the cost which should be paid on it decreased. These behavioral effects are measured by the related literature as the percentage change in the taxable income due to a percentage change in the tax rate, which is called the taxable income elasticity.

In order to estimate this elasticity I employ a difference-in-difference methodology for pooled cross-sectional data, proposed by Saez, Slemrod and Giertz (2009). This method gives an estimate of the tax reform's effect on taxable income, by comparing the change in reported income of the treatment group with that of the control group. The key advantage of this method is that it controls for factors simultaneously affecting the two compared groups.

The treatment group consists of individuals facing the tax change, while the control group is composed of those who do not experience the same change in taxation. In the case of this reform, I do not have a clear control group, as the whole working population experienced a cut in the PIT rate, but to different extents. Thus, I define the control group as those

¹¹ Income shifting

taxpayers who were in the lowest tax bracket before the reform, since they were the least affected by the reform. The same way the control group in the post-reform years consists of those individuals who would have faced the lowest PIT rate had the progressive system remain in place, using the inflated pre-reform allowance level for the number of dependents I calculate for the person. The PIT rate for the control group declined by 2 percentage points after the reform, while for the treatment group it decreased by 7 to 24 percentage points. The table below presents the distribution of my sample in control and treatment groups.

	Pre-reform MTR	2003	2004	2005	2006	2007	Total
Control group	18%	10319	10476	9496	7983	6114	44388
	23%	3887	4356	5311	5538	6499	25591
Treatment	28%	911	1327	1666	1915	2405	8224
group	34%	273	432	536	720	960	2921
	40%	190	350	445	492	819	2296

Table 4: Control and treatment groups

As the above table suggest, about half of the individuals in my sample are included in the control group, and the top bracket represents only 2.7% of the total sample.

The dependent variable of the regression is the log of reported income. Since there was no change in the social contribution rates for employees in the years studied, the dependent variable is defined as gross income less social contributions (net income plus tax). The variable of interest is the log of net-of-tax-rate or tax price, defined as one minus the marginal tax rate. Due to the regressive nature of the allowances for salary incomes between 1000 and 3000 RON after the reform, I calculate the true marginal tax rate for these taxpayers based on the below formula¹²:

MTR = (1.125 + 0.05 * no. dependents) * 0.16

The regression of the reported income on tax price yields the taxable income elasticity, showing the percentage change in taxable income due to one percentage change in the net-of-tax rate:

¹² Calculations are presented in the appendix

$$e = \frac{[E(\log y_{it_1}|T) - E(\log y_{it_0}|T)] - [E(\log y_{it_1}|C) - E(\log y_{it_0}|C)]}{[E(\log (1 - MTR_{it_1})|T) - E(\log (1 - MTR_{it_0})|T)] - [E(\log (1 - MTR_{it_1})|C) - E(\log (1 - MTR_{it_0})|C)]}$$

However, as Saez, Slemrod and Giertz (2009) point it out, a simple OLS regression would not identify the elasticity, due to the fact that in case of the progressive tax scheme the tax rate is correlated with potential income. Hence, following Saez, Slemrod and Giertz (2009) I instrument the log tax price variable with the post-reform and treatment dummy interaction term. For the instrument to be valid two conditions should be met. First, the IV should be correlated with the endogenous variable, in this case with the log of tax-price, after netting out the other explanatory variables. Since the net-of-tax-rate of the treated group increased more after the reform than that of the control group it is reasonable to assume that the IV is positively correlated to the endogenous variable. This condition can be easily checked in Stata. The second criteria states that the IV should not be correlated with the error term, which is met if we assume that there was no economic change which affected differentially the potential incomes of the treated and control groups.

The methodology used for estimating the consumption elasticity of taxation is similar to the one described above, with the difference that in this case the dependent variable is a measure of household consumption.

Sources of bias

This estimation method yields an unbiased elasticity estimate only if the parallel trend assumption holds. The parallel trend assumption refers to the fact that absent the tax change the treatment and control groups would experience the same income growth. If this is not the case than the change in the taxable income of the control group is not a good benchmark for what the change in the treatment group would be absent the tax reform and the estimates will be biased. I test this assumption by comparing the income growth of the two groups in pre and post-reform years.

U	U							
	Pre-reform years			Post-reform years				
	2003	2004	Perc.	2005	2006	Perc. Δ	2007	Perc. Δ
Control group	423.77	430.87	1.7%	438.36	456.36	4.1%	500.6	9.7%
Treatment group	970.44	1049.47	8.1%	1054.32	1081.8	2.6%	1130.88	4.5%

Table 5: Average income growth before and after the reform

Source: Own calculations based on my sample

As the above table shows the income growth of the two compared groups was different in both the pre- and post-reform years. Thus, it is reasonable to assume that the income growth of the two groups would be different, absent the tax change, in the year of the reform as well. Saez, Slemrod and Giertz (2009) suggests to deal with this bias by pooling together several pre- and post-reform years and adding to the regression separate time trends for the control and treatment groups. My dataset enables me to follow this approach but since I only have two pre-reform years, the linear trend line would be highly dominated by the postreform years, capturing also some part of the reform's effects. Hence instead of the time trends I only include year dummies, following Gorodnichenko, Martinez and Sabirianova (2008), which allow for different average income of the control group in each year. This way, the problem caused by the violation of this assumption is not cured and the sign of the bias is rather ambiguous, since before the reform the treatment group was growing faster whereas after the reform the control group. In the case of consumption the equal growth assumption is also violated. Both in the pre and post-reform years the consumption of the control group increases faster. This implies a downward bias in the estimates.

The Romanian tax reform, as it is usually the case, is not an ideal randomized experiment, where a randomly selected treatment group faces a tax rate change. Observations are assigned to the treatment and control groups based on the income level, the dependent variable of the regression. Since the tax rate change is correlated with income, non tax related changes in taxable income, varying systematically by income groups might bias the estimates. In order to mitigate this bias I include a large set of control variables.

In addition, the behavioral responses of the compared groups might differ significantly. In cases when the elasticities of the two groups differ, the diff-in-diff method fails to give a consistent estimate of the taxable income elasticity. The literature on this topic argues that individuals in the upper part of the income distribution have higher elasticities since they have more opportunities to redirect their incomes between different sources, to hide incomes or to work more or less. Thus, if the treatment group has a higher elasticity and the control group is not clear, in the sense that it also faces a change in the tax rate but to a lower extent, the elasticity estimate obtained with the diff-in-diff method will be upward biased. In the case of consumption expenditures, the standard assumption is that low-income individuals might have higher elasticity especially regarding basic consumption items. Hence, in this case the estimates are possibly downward biased.

Finally, since the income distribution is not static the use of a constant real cutoff level between the control and treatment group in the post-reform period might not be realistic (Gruber and Saez 2002). If there is any widening or increase in the skewness of the income distribution for non-tax reasons, the estimation method yields biased results.

5. Results

As described in the previous chapter my basic specification takes the below form:

 $log dep_var_{it} = e \cdot log(1 - MTR_{it}) + \alpha \cdot treatment_{it} + \beta \cdot post_reform_{it} + \gamma \cdot X_{it} + \varepsilon_{it}$ $IV: treatment_{it} \cdot post_reform_{it}$

Where dep_var represents the dependent variable studied: in the first case the income measure and then household consumption. The first term on the right side is the tax price, the variable of interest which is found to be endogenous¹³ and hence instrumented with the treatment dummy and post reform dummy interaction term. The treatment dummy takes the value 1 if the observation is in the treatment group and 0 otherwise, while the post reform dummy is unity for the years after the reform and 0 otherwise. X_{it} contains the year dummies and the controls described in the previous chapter.

5.1 Taxable income elasticity results

Table 6 presents my basic results for different sample specifications. The first three columns show the regression outcomes for years 2004 and 2005, reflecting the immediate effect of the reform while the last three specifications include all the five years from 2003 to 2007 in order to capture a longer term effect of the reform. For both cases the estimates are reported first with no further restrictions, then for the sample restricted to active employees only and finally to individuals employed in the private sector. The entire regression output with the coefficients on the full set of covariates is reported in table 15 in the appendix

In all cases the exogeneity of the log of tax price variable is strongly rejected at 1% significance level. In the first stage regressions the coefficients on the IV are always significant at the lowest significance level, hence as indicated by the large first stage F-statistics, the condition for the IV to be correlated with the endogenous variable is satisfied.

CEU eTD Collection

¹³ As it will be shown later

	2004-2005	2004-2005	2004-2005	2003-2007	2003-2007	2003-2007
		Employees	Private		Employees	Private
		only	sector		only	sector
Log(1-MTR)	-0.186**	-0.273***	-0.514***	-0.206***	-0.261***	-0.691***
	(0.0781)	(0.0743)	(0.0976)	(0.0539)	(0.0517)	(0.0677)
Treatment d.	0.677***	0.664***	0.659***	0.638***	0.627***	0.607***
	(0.00516)	(0.00480)	(0.00589)	(0.00302)	(0.00284)	(0.00333)
Post reform d.	0.0502***	0.0588***	0.0677***	0.0536***	0.0604***	0.0810***
	(0.00544)	(0.00483)	(0.00582)	(0.00443)	(0.00405)	(0.00491)
Number of obs.	34,389	33,974	21,296	83,411	82,521	52,571
Endogeneity test	2997.983	3143.413	1636.157	6392.342	6701.374	3149.653
Chi-sq(1) P-val	0	0	0	0	0	0
First stage partial-F	12109.53	12016.77	5822.75	22182.91	22066.42	9882.75
P-value	0	0	0	0	0	0

 Table 6: Elasticity estimates

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level. All specifications include the year dummies (omitted categories 2004 and 2005) and the full set of covariates mentioned in the text: age, age square, gender dummy, dependent dummy, urban dummy, capital dummy, highest school graduated and occupation dummies. Full output reported in the appendix.

The elasticity estimates are small negative and significant in all the cases, suggesting that the taxable income of the treated group increased less after the reform than that of the control group. A one percentage increase in the net of tax rate implies a more than 0.2 percentage decline in the taxable income. This negative estimate does not fit in the findings of the previous taxable income elasticity literature, with estimates ranging from small positive (0.06 for Hungary Bakos, Benczur, Benedek 2008) to Feldstein's estimate of above 1 for the US (1995). This sharp difference in the elasticity estimates might be, however, a consequence of the differences in tax systems and reforms, even in the case of similar behaviors (Slemrod 1998). Thus, interestingly the Russian flat tax reform yielded similar results: the taxable income of the most affected by the reform decreased compared to the less affected group. (Ivanova, Keen, Klemm 2004)

The estimates are slightly more negative when the sample is restricted to employees, supporting the assumption that entrepreneurs are more responsive to tax changes. It would be interesting to look at the behavioral response of the individual entrepreneurs separately but my dataset does not enable it. The immediate and longer term effects are very much similar in the first two sample specifications, but the estimates differ and are larger in the case when the sample is restricted to taxpayers employed in the private sector. The reason why I restrict my sample to workers in the private sector is that due to the elections in 2004, the year just before the reform the wages in the public sector were increased as part of the campaign action of the government in force. It is also reasonable to assume that workers in the private sector have more flexibilities in responding to the tax reform trough increased working hours, improved effort and better compliance. Thus, I expected an increase towards positive values in the estimated coefficient when restricting the sample to the private sector. Interestingly though, the results show an even larger negative effect. In the followings I present two possible explanations for the negative elasticity estimates.

The first one considers the impact of the tax rate change on work incentives, by decomposing the tax effect into substitution and income effects. Keen, Kim and Varsano (2006) show that in case of a tax reform there are two forces affecting the behavioral response of an individual. The change in the marginal tax rate triggers the substitution effect which acts towards increasing work incentives if the marginal tax rate falls, while the income effect improves work incentives if the average tax rate increases¹⁴. The graphs below present how the marginal and average tax rates changed in the case of Romania, after the adoption of the flat tax reform. Graph 2 plots the average and marginal tax rates an employee with no dependents faced in the year just before and after the reform as a function of pre-reform income¹⁵, whereas in graph 3 the same tax rates are presented for an employee with four dependents¹⁶. Both of the graphs refer to employees, because after the reform allowances became deductible only from salary income, implying different marginal and average tax rate structures for entrepreneurs and employees. I focus on employees since they represent the vast majority of my sample and hence employees only specification is my benchmark estimate.

¹⁴ Under the assumption that leisure is a normal good.

¹⁵ Gross income less social contributions.

¹⁶ Above this number of dependents no additional deduction is allowed.







. Source: own calculations. ATR is calculated as tax payments over labor income less social contributions

The graphs reveal that both the average and marginal tax rates decreased compared to the pre-reform level for all income levels¹⁷. This implies that there are two opposite incentive effects: the cut in the marginal tax rate acts towards increasing work incentives while the decline in the average tax rate diminishes work incentives. Thus, the work incentive effect of the reform is ambiguous. My dataset does not enable me to control for the income effect¹⁸ and since the average and marginal tax rates are correlated¹⁹ my elasticity estimates capture a part of the income effect as well, which, as shown above acts towards decreasing work incentives. The previous literature found small and often insignificant income effects of tax changes on reported income (Gruber and Saez 2002; Bakos, Benczur and Benedek 2008²⁰), implying that the compensated and uncompensated elasticities of reported income are very much similar. Nevertheless, the behavioral responses might be different in the case of Romania, considering that the features of the reform, the pre-reform tax system and a number of other circumstances differ significantly from those cases for which the above estimates were found.

¹⁷ Pre-reform gross salary income less social contributions.

¹⁸ As discussed above, the instrument for it cannot be constructed in the case of cross sectional data

¹⁹ A tax change implies a change in both MTR and ATR

²⁰ They found insignificant income effect for in case of the overall estimate but significant income effect of about -0.26 for the upper income brackets

Another possible explanation for the negative elasticity is based on the behavioral response of the employers to the tax reform. Employers might also react to the flattening of the PIT structure and take advantage of the fact that, employees earning higher wages are made better off by the reform. Hence for compensating those who gained less from the reform and also as a tax cutting measure for the corporation, employers might increase less the salaries of high-income individuals after the reform compared to low-wage workers²¹ on the short term. On the long term this explanation might hold if the two types of workers are not perfect substitutes. In this case, individuals in the upper part of the income distribution experience an increase in the after-tax-income while facing a decline in the gross income relative to the low-income workers. This might explain my finding that, mainly in the private sector, the taxable income of the treated group increased less after the reform compared to the control group. An argument against this theory is that by acting according to it, the motivation and work incentives of high-skilled workers might be deteriorated.

In addition there might also be some factors which retain an individual from improving his work effort. These factors include: no possibility or compensation for over-time, the lack of an adequate compensating scheme of the work effort, fixed wage contracts etc.

For robustness check in table 7 I present the estimates for the sample restricted at the bottom to those who earn above the basic personal allowance level, and also for the case when very large incomes, above 10000RON in 2007 values are dropped. Following Gruber and Saez (2002) I also report estimates weighted by income which are more suggestive on the impact on income tax revenues.

Restricting the sample at the bottom and at the top, does not change significantly the results. In the case of income weighted elasticity estimates the short term results are similar to the unweighted estimates, whereas in the case when all the five years are considered the

²¹ Labor unions would not allow a cut in wages.

weighted elasticities are less negative compared to the unweighted estimates. It is even slightly positive when only employees are considered.

	2004-2005	2004-2005	2004-2005	2003-2007	2003-2007	2003-2007
		Employees	Private		Employees	Private
		only	sector		only	sector
Lower bound	-0.325***	-0.319***	-0.573***	-0.205***	-0.185***	-0.624***
	(0.0725)	(0.0726)	(0.0960)	(0.0508)	(0.0510)	(0.0672)
Number of obs.	33,729	33,481	20,968	82,006	81,544	51,925
Upper bound	-1.86***	-2.73***	514***	-0.206***	-0.263***	-0.693***
	(0.078)	(0.074)	(0.097)	(0.0538)	(0.0516)	(0.0675)
Number of obs.	34,389	33,974	21,296	83,404	82,515	52,567
Weighted	-0.206***	-0.201***	-0.558***	-0.004**	0.0250***	-0.504***
	(0.00267)	(0.00267)	(0.00323)	(0.00196)	(0.00196)	(0.00231)
Number of obs.	34,389	33,974	21,296	83,411	82,521	52,571

Table 7: Elasticity estimates

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%. Only the elasticity estimates are presented.

Giertz (2008) reasons that while on one hand weighted estimates might better represent the overall response, on the other hand they are likely dominated by a very small number of high-income taxpayers and in case of heterogeneous responses throughout the income distribution the estimates are not representative for the population studied. The fact that the income weighted estimates are closer to 0 and are even slightly positive in one of the specifications suggests that individuals with very high earnings have most likely positive elasticities. This is in line with the finding, presented in a number of studies, that elasticities in the upper part of the income distribution are larger since high-income individuals might have more opportunities to react to the tax rate change. However, as mentioned before a large difference in the true elasticity of the control and that of the treatment group induces an upward bias in the diff-in-diff estimations.

Even though observations in the upper two tax brackets based on the pre-reform tax structure represent a share of only 6.3% of my total sample, when leaving them out the results change substantially, as presented in table 8.

<u>,</u>	2003 2007	2003 2007	2003 2007
	2003-2007	Employees only	Drivete sector
		Employees only	Frivate sector
Log(1-MTR)	-0.695***	-0.762***	-1.065***
	(0.0552)	(0.0521)	(0.0679)
Number of observations	78,194	77,368	49,959

Table 8: Elasticity estimates based on the sample excluding the upper two tax brackets

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%. Only the elasticity estimates are presented.

These results reinforce the assumption that the elasticity is larger for higher incomes and also suggests that my estimates might be upward biased. There might also be a downward bias, though in my results due to the fact that the repeated cross section does not capture the jump of some individuals from the control to the treatment group as a consequence of the tax rate cut. A major shortcoming of the repeated cross section analysis is that by using a constant real cutoff level between the control and treated groups it does not control for changes in the income distribution due to non-tax reasons (Gruber and Saez 2002). Hence for a robustness check I restrict the control group to individuals earning below 80% of the initial threshold level and the treatment group for those earning more than 120% of the cutoff income and leave the rest out. The estimates, reported in the appendix are similar to my previous findings.

In table 9 I focus on taxpayers with no dependents in order to eliminate the effect of the change in the allowance structure.

	Employees	Private sector	Employees	Private sector	Employees
	1	2	3	4	5
Log(1-MTR)	0.158**	-0.180**	0.182*	-0.183	-0.199**
	(0.0634)	(0.0831)	(0.0988)	(0.125)	(0.0974)
Number of obs.	52,453	34,176	19,135	12,353	17,267

Table 9: Elasticity estimates based on the sample excluding the upper two tax brackets

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%. Only the elasticity estimates are presented.

The first two specifications include individuals who had no allowances except for the basic personal allowance deducted from their tax base. This does not necessarily mean that there are no dependents in the household but the allowances granted for them are deducted from another member's tax base. The positive estimate in case of the sample restricted to employees only and the significantly less negative result in case of private sector workers is

surprising, in the light of the previous findings. It might be explained by the fact that since it is not stipulated from which household member's tax base the allowances should be deducted, before the reform it was most likely the member with the largest income who reported dependents in order to fall in a lowest tax bracket whereas after the reform this incentive not just disappeared due to the elimination of the tax brackets, but its opposite arose as a consequence of the regressive nature of the allowance structure. Thus, if in the pre-reform years mainly lower-income individuals reported 0 dependents, whereas after the reform mainly household members earning large incomes than this result does not necessarily suggest a positive behavioral response of this group.

The effect of the change in the allowance structure is really eliminated in specifications 3 and 4, which refer to individuals from households where all members are working, hence there are no dependents in the household. The results are quite similar though, to the previous case. In this sample, however, university graduates and individuals in the highest tax brackets based on the pre-reform system have a larger share than in the full sample²². The fact that individuals in the upper part of the income distribution who are, as discussed above more elastic to tax changes, are better represented in this sample, on one hand contributes to the increase in the elasticity and on the other hand also induces a stronger upward bias. In the last specification I consider the same sample as in the third case but I exclude observations in the top two tax brackets according to the pre-reform definition. The estimate in this case becomes negative again and significant at 5%, but substantially less negative compared to case when this restriction was applied to the full sample of employees. On one hand these results are not affected by the change in the allowance structure and as such might be more reliable, while on the other hand it is also likely that individuals with no dependents have a slightly better response to the tax rate cut, which might be in line with both of the explanations given above.

²² University graduates represent more than 24% compared to 16% in the full sample, individuals in the highest tax bracket represent 4.5% compared to 2.7% in the full sample, while observations in the upper two tax brackets represent almost 10% compared to 6,2% in the full sample.

It is reasonable to assume that an individual with no children sacrifices more easily an hour of leisure than a person with family, hence the substitution effect is most likely stronger than the income effect in this case. The theory regarding the behavioral response of the employer might also hold based on the assumption that these individuals are mainly high-skilled persons, whom the employer does not want to lose or demotivate, and hence offers them an adequate increase in income.

A number of studies document the difference in the labor supply and taxable income elasticity of males and females (Goldin 2006; Blau and Khan 2007). The usual finding is that married females are more responsive to tax changes than males, but this elasticity is very sensitive to a number of factors, such as the spouse's income and the number of children. In the table below I present regression outcomes separately for men and women.

Table 10: Elasticity estimates for males and females separately

~			1 2	
	Female	Male	Female-no child	Female-with child
	1	2	3	4
Log(1-MTR)	-0.399***	-0.125*	-0.151	-0.693***
	(0.0784)	(0.0694)	(0.0989)	(0.131)
Number of obs.	37,351	45,170	21,704	15,647

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%, *significant at 10%. Only the elasticity estimates are presented.

In all the above presented cases the sample is restricted to employees only. The pattern is similar in the case of the full sample and workers in the private sector as well, with the difference that in the case of the full sample the estimates are slightly closer to 0^{23} , while in the private sector all estimates are more negative. The pattern observable from the table is that the negative elasticity estimate is mainly driven by women with children. The elasticity of males is closer to 0 than my benchmark estimate for the full sample of employees, whereas the estimate for females on average is below it. In the last two columns the elasticity of females is further decomposed to females with and without children. The estimate for females without children is not significantly different from 0 at the conventional significance levels,

²³ In the case of males not significantly different from 0 at the standard significance levels.

whereas female employees with children show a large negative response to the tax rate cut. This might be the consequence of the fact that in the case of this reform, both the income effect and the increase in the spouse's after-tax-income point towards decreased work incentives for mothers.

In conclusion, my benchmark specification yields an elasticity estimate of about -0.27 for employees, which is mainly driven by women with children, while individuals with no dependents seem to have a slight positive elasticity. Thus the large cut in taxation together with this quite significant negative behavioral response most likely had a strong negative revenue implication for the government, which I am not able to approximate reliably due to the several changes in the allowance structure. Since I use survey data my elasticity estimate might refer more to the productivity effect of the reform and underestimate the revenue effect if the respondents of the survey revealed their true incomes. In this case my estimates do not capture the reform's effect on tax compliance. In order to find out whether respondents of the survey revealed their true or their reported income the survey data should be compared to tax authority data which I do not have access to. Also, the effects of the reform on the extensive margin are just partially captured by my estimates. The behavioral responses on the extensive margin might be very significant considering that the participation tax rate decreased substantially after the reform.

5.2 Tax effects on household consumption

In this section I present my findings on the effect of the tax rate change on household consumption. The method used and the set of covariates²⁴ included in the regression are the same as in the previous subchapter, only the dependent variable changes to a measure of household consumption. I use two measures of consumption. The first measure includes only non-durable items, such as agricultural products and foods, alcoholic beverages, services and

²⁴ Except for the occupation dummies. Including them does not change the results and are insignificant.

purchases from second hand. The second consumption measure comprises also other nonfood purchases which besides clothing, footwear, fuel expenses etc also include durable items such as appliances, vehicles, furniture.

The main estimates are presented in table 12 while the full regression output is reported in the appendix. The first two specifications use the first consumption measure while in the case of the last two specifications the dependent variable is the second measure of consumption expenditures. Both the immediate and longer term effects are reported. The exogeneity of the tax price variable is strongly rejected as expected based on a similar intuition as in the taxable income case, since income shocks also affect expenditures.

^	(1)	(2)	(3)	(A)
	(1)	(2)	(3)	(4)
VARIABLES	C1 2004-2005	C1 2003-2007	C2 2004-2005	C2 2003-2007
Log(1-MTR)	0.119	-0.0407	0.0146	-0.131
-	(0.121)	(0.0854)	(0.129)	(0.0907)
Treatment dummy	0.285***	0.279***	0.346***	0.340***
	(0.00863)	(0.00543)	(0.00923)	(0.00580)
Post reform d.	0.0422***	0.0523***	0.0501***	0.0589***
	(0.0758)	(0.0485)	(0.0763)	(0.0488)
Number of obs.	23,796	57,588	23,796	57,588

Table 11: Con	sumption exp	penditure elastic	ity estimates t	to tax rate change

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level.

The results suggest that the tax rate cut had no significant effect on household consumption expenditures or at least not significantly larger effect on those experiencing a differentially larger tax rate cut. The short term elasticity estimates are slightly above while the longer term estimates are slightly below 0 and in none of the cases are statistically significant at the standard significance levels. The post reform dummy reveals that consumption expenditures increased in the years after the reform but according to my results, households more affected by the reform did not experience a larger increase in consumption than the less affected ones.

The graph below presents the evolution of the average consumption, using the first consumption measure separately for control and treatment groups in the studied years based on my sample. According to my results the lines should be almost parallel after the reform.



Graph 4: Evolution of average consumption expenditures based on my sample

Interestingly the graph shows a larger increase in the average consumption of the treated group than that of the control group from 2004 to 2005, which is not reflected by my regression results. In the rest of the post-reform years the movement of the control and treatment group is almost parallel.

For years 2004 and 2005, I run the regression on the log tax price variable, the treatment and post reform dummies only, without including any other controls in order to see whether this increase in the treated group was captured in my regressions by other variables. The results of this regression are reported in the appendix in table 15, column 5. The elasticity estimate is very much similar to the case when the controls are included and is still not significantly different from 0.

However, averages might be very much affected by a few outlying values. Thus, the sharp increase in the average consumption expenditure of the control group in 2004 might be

mainly driven by a few very large values, as the graph below suggests, which might explain the pattern in the evolution of consumption averages observed above²⁵.



Graph 5: Scatter plot of C1 in the control group

In table 12 I report the elasticity estimates for the sample restricted to households in which whether all income earners are treated or all are in the control group. Since in this case "truly" treated households are compared to households where none of the members is treated I consider this specification as my benchmark.

			e	L
	(1)	(2)	(3)	(4)
VARIABLES	C1 2004-2005	C1 2003-2007	C2 2004-2005	C2 2003-2007
Log(1-MTR)	0.0506 (0.128)	-0.0947 (0.0906)	-0.0103 (0.138)	-0.173* (0.0960)
Number of obs.	20,461	48,732	20,461	48,732

Table 12: Consumption expenditure elasticity estimates to tax rate change for the restricted sample

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%,* significant at 10%

In all the specifications the estimates are slightly smaller than in the full sample case. In the case of the first consumption measure there is no significant change in the results, the

²⁵ It is also supported by the fact that the consumption weighted estimates are positive and significant

estimates are still statistically insignificant and small in magnitude. In the case of the second consumption definition, however, the short term estimate changed sign but remained insignificant while in the specification including all years the small negative estimate became significant at 10%.

My results, however most likely underestimate the effect of the reform on consumption. On one hand the violation of the parallel trend assumption, as discussed above, might induce a downward bias. On the other hand, it is reasonable to assume that consumption elasticity of low-income households, included in the control group is larger than that of the treatment group. Since individuals in the treatment group are richer, they could most likely afford especially the items included in the first consumption measure in the quantity wanted, prior to the reform as well and there is not much point in buying more food or using more health care services due to the increase in the after-tax income. The increase in the take-home-income might eventually induce a change in the composition of consumption, towards more expensive items. Low-income individuals might, however, very likely increase their consumption due to a decrease in the tax payments.

The downward bias might be lower in the case of the second definition of consumption, since this measure includes also jewelries, clothing, equipments for leisure activities and some luxury goods for which the demand of the treatment group might also increase or switch to more expensive items as a consequence of the decline in tax payments. Interestingly, my estimates for the second consumption measure are always slightly below those for the first one and even significantly negative on longer term in the case of the restricted sample.

Taking into consideration that the gain of the control group from this reform is very small and even smaller if the effect of the increase in allowances is netted out, it is not very likely that these mainly insignificant estimates are due to a strong response of the control group. Hence the downward bias in these results, induced by the different consumption

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elasticity of the two compared groups, is most likely not large and does not really change the conclusion that based on my dataset the effect of the tax rate cut did not have an important effect on consumption expenditures.

The increase in the consumption in the post-reform period is mainly due to the fact that the reform was adopted in a period of economic growth and according to my results the tax rate cut did not have a significant contribution to it. The significant decrease in both the lending rate, from 25.6% to 19.6% and the deposit rate from 11.53 to 6.41 in the year of the reform might have had a stronger effect on consumption of both groups than the tax cut. In addition, the conditions for obtaining a credit were significantly reduced in that period. Thus, the fact that more low-income individuals became eligible for credit and hence could afford buying non-durable consumption items might explain the small negative elasticity estimate found on longer term for the second consumption measure.

Conclusion

In this paper I study the effect of the Romanian flat tax reform on work incentives and consumption. Thus, first I investigate whether the large cut in taxation stipulated by the flat tax reform of 2005 encouraged taxpayers to earn more by working more hours or more efficiently, reflected by an increase in the taxable income. I also study whether the increase in the after-tax-income encouraged an increase in consumption. Hence, I estimate a taxable income and consumption elasticity using a diff-in-diff method for the period 2003-2007.

I find no evidence of either a supply or a demand side shock due to the reform. My estimates for taxable income elasticity are small and negative, of about -0.26 for the full sample of employees and larger negative for the sample restricted to employees in the private sector. Thus, it implies that the taxable income of the income groups more affected by the reform decreased relative to the least affected group. These findings might be due to a strong income effect or to the behavioral response of the employers to the reform, who may raise the gross incomes of the winners of the reform to a lesser extent compared to that of the relative losers. The elasticity estimates for consumption are insignificant suggesting that there was no differentially larger increase in the expenditures of those gaining more from the reform compared to the group gaining the least.

This study pioneers in investigating the effects of the Romanian flat tax reform on taxable income and consumption using micro-level data. However, the cross-sectional nature of the survey data used poses some limitations on the research. The assumptions of a stabile income distribution and similar behavioral responses of the treated and control groups, needed for a cross sectional diff-in-diff analysis, might be too severe. Thus, a possible further improvement of the research might be the use of panel, which enables to employ a 2SLS regression approach instead of the diff-in-diff methodology and allows controlling for the income and substitution effects separately.

Appendix

1. The evolution of tax revenues from different sources for the period 2000-2008



Graph 6: The evolution of tax revenues

2. Calculating the marginal tax rate in the post-reform period for individuals earning salary income between 1000 and 3000 RON.

The marginal tax rate measures the amount of tax paid on a marginal increase in taxable income. When the allowances deductible from the tax base are decreasing in income, in case of a marginal increase in income tax is paid also on the loss in the allowances.

The level of allowance in this income range is calculated with the below formula:

$$Deduction = (250 + 100 * no. dependents) * (1 - \frac{GI - 1000}{2000})$$

Thus the amount of tax paid in case of a one unit increase in the gross income can be calculated as follows:

$$MTR = (1 + Deduction1 - Deduction2) * 0.16$$

Where Deduction1 is the allowance applicable before the increase in gross income and Deduction2 is the one deductible after the one unit increase. Substituting in the formula for the deduction level the below expression can be obtained:

Source: Eurostat study (2010)

3. Taxable income elasticity full estimation output:

Log(taxable inc.)	(1)	(2)	(3)	(4)	(5)	(6)
Log(1-MTR)	-0.186**	-0.273***	-0.514***	-0.206***	-0.261***	-0.691***
	(0.0781)	(0.0743)	(0.0976)	(0.0539)	(0.0517)	(0.0677)
Treatment d.	0.677***	0.664***	0.659***	0.638***	0.627***	0.607***
	(0.00516)	(0.00480)	(0.00589)	(0.00302)	(0.00284)	(0.00333)
Post reform d.	0.0502***	0.0588***	0.0677***	0.0536***	0.0604***	0.0810***
	(0.00544)	(0.00483)	(0.00582)	(0.00443)	(0.00405)	(0.00491)
Year2003				-0.0385***	-0.0372***	-0.0337***
				(0.00328)	(0.00316)	(0.00405)
Year2006				0.0407***	0.0390***	0.0411***
				(0.00342)	(0.00314)	(0.00372)
Year2007				0.124***	0.121***	0.124***
				(0.00346)	(0.00322)	(0.00373)
Dependent d.	0.166***	0.174***	0.167***	0.161***	0.167***	0.165***
-	(0.0044)	(0.00404)	(0.00501)	(0.00284)	(0.00266)	(0.00325)
Age	0.0298***	0.0147***	0.0156***	0.0289***	0.0156***	0.0151***
	(0.0025)	(0.00134)	(0.00163)	(0.00148)	(0.0008)	(0.001)
Age square	-0.00035***	-0.00014***	-0.00016***	-0.00034***	-0.00015***	-0.00016***
	(3.30e-05)	(1.75e-05)	(2.20e-05)	(1.96e-05)	(1.09e-05)	(1.37e-05)
Female d.	-0.0889***	-0.0862***	-0.0731***	-0.0975***	-0.0940***	-0.0825***
	(0.00387)	(0.00356)	(0.00427)	(0.00248)	(0.00230)	(0.00272)
Primary sch.	-0.209***	-0.0533***	-0.0274	-0.211***	-0.0554***	-0.0239*
	(0.0393)	(0.0192)	(0.0247)	(0.0259)	(0.0117)	(0.0143)
Professional sch.	0.0463***	0.0516***	0.0450***	0.0395***	0.0388***	0.0340***
	(0.00722)	(0.00624)	(0.00717)	(0.00475)	(0.00396)	(0.00457)
Highsch.	0.0779***	0.0856***	0.0729***	0.0684***	0.0694***	0.0581***
	(0.00734)	(0.00639)	(0.00740)	(0.00483)	(0.00407)	(0.00474)
College	0.106***	0.112***	0.0798***	0.108***	0.107***	0.0824***
	(0.00918)	(0.00814)	(0.0103)	(0.00599)	(0.00529)	(0.00672)
University	0.212***	0.221***	0.181***	0.227***	0.230***	0.204***
	(0.0130)	(0.0119)	(0.0156)	(0.00828)	(0.00766)	(0.0100)
Urban d.	0.0473***	0.0374***	0.0301***	0.0449***	0.0353***	0.0292***
	(0.00381)	(0.00346)	(0.00422)	(0.00241)	(0.00221)	(0.00265)
Capital city d.	0.0973***	0.0998***	0.115***	0.0998***	0.101***	0.117***
	(0.00623)	(0.00592)	(0.00728)	(0.00398)	(0.00386)	(0.00469)
Private d.	-0.0497***	-0.0377***		-0.0464***	-0.0369***	
	(0.00395)	(0.00364)		(0.00252)	(0.00237)	
Family1 d.	-0.00485	-0.0328***	-0.0412***	-0.0160***	-0.0393***	-0.0390***
	(0.00906)	(0.00738)	(0.00917)	(0.00537)	(0.00451)	(0.00529)
Family2 d.	-0.0124***	-0.00143	-0.00891*	-0.00264	0.00840***	0.000864
	(0.00461)	(0.00399)	(0.00485)	(0.00298)	(0.00264)	(0.00318)
Ocup1	0.432***	0.413***	0.398***	0.477***	0.462***	0.436***
	(0.0190)	(0.0184)	(0.0220)	(0.0131)	(0.0129)	(0.0154)
Ocup2	0.246***	0.231***	0.282***	0.256***	0.246***	0.293***
	(0.0132)	(0.0122)	(0.0172)	(0.00839)	(0.00785)	(0.0109)
Ocup3	0.169***	0.157***	0.153***	0.180***	0.172***	0.174***

Table 13: Taxable income elasticity

	(0.00856)	(0.00770)	(0.0101)	(0.00543)	(0.00491)	(0.00640)
Ocup4	0.128***	0.134***	0.142***	0.138***	0.142***	0.145***
	(0.0103)	(0.00823)	(0.0110)	(0.00631)	(0.00520)	(0.00671)
Ocup5	0.0645***	0.0472***	0.0424***	0.0641***	0.0522***	0.0468***
	(0.00729)	(0.00639)	(0.00749)	(0.00468)	(0.00402)	(0.00465)
Осирб	-0.0234	0.0451***	0.00727	-0.0170	0.0621***	0.0420***
	(0.0334)	(0.0170)	(0.0221)	(0.0220)	(0.0116)	(0.0148)
Ocup7	0.135***	0.120***	0.111***	0.124***	0.112***	0.104***
	(0.00675)	(0.00580)	(0.00671)	(0.00420)	(0.00362)	(0.00412)
Ocup8	0.155***	0.139***	0.124***	0.146***	0.134***	0.118***
	(0.00756)	(0.00672)	(0.00781)	(0.00468)	(0.00416)	(0.00473)
Ocup10	0.305***	0.308***	0.160**	0.330***	0.335***	0.183***
	(0.0152)	(0.0147)	(0.0637)	(0.0101)	(0.00985)	(0.0532)
Constant	5.181***	5.445***	5.383***	5.220***	5.462***	5.376***
	(0.0470)	(0.0296)	(0.0350)	(0.0290)	(0.0192)	(0.0230)
Observations	34,389	33,974	21,296	83,411	82,521	52,571
R-squared	0.681	0.705	0.698	0.687	0.708	0.711

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%,* significant at 10% . Models (1),(2),(3) refer to period 2004-2005, specifications (4), (5), (6) consider all the five years 2003-2007. In models (2) and (5) the sample is restricted to employees while in models (3) and (6) to employees in private sector.

4. Taxable income elasticity with the threshold for the control group set at 80% of the

cutoff line and for the treatment group at 120%.

Table 14. Tayable income	algebraity for restricted	control and treatment groups

Log(taxable income)	(1)	(2)	(3)
Log(1-MTR)	-0.238***	-0.300***	-0.712***
	(0.0540)	(0.0514)	(0.0677)
Treatment group	0.754***	0.741***	0.724***
	(0.00333)	(0.00308)	(0.00364)
Post reform dummy	0.0532***	0.0608***	0.0804***
	(0.00458)	(0.00410)	(0.00490)
Year2003	-0.0303***	-0.0293***	-0.0269***
	(0.00340)	(0.00325)	(0.00411)
Year2006	0.0376***	0.0359***	0.0377***
	(0.00362)	(0.00328)	(0.00388)
Year2007	0.111***	0.108***	0.112***
	(0.00373)	(0.00344)	(0.00399)
Dependent dummy	0.162***	0.169***	0.167***
	(0.00299)	(0.00277)	(0.00337)
Age	0.0283***	0.0137***	0.0134***
-	(0.00160)	(0.000869)	(0.00108)
Age square	-0.000333***	-0.000134***	-0.000143***
	(2.12e-05)	(1.14e-05)	(1.45e-05)
Female dummy	-0.0892***	-0.0859***	-0.0735***

	(0.00262)	(0.00241)	(0.00284)
Primary sch.	-0.207***	-0.0472***	-0.0207
, and the second s	(0.0267)	(0.0117)	(0.0143)
Professional sch.	0.0360***	0.0347***	0.0304***
	(0.00502)	(0.00405)	(0.00465)
Highsch.	0.0597***	0.0606***	0.0498***
C	(0.00508)	(0.00416)	(0.00482)
College	0.0952***	0.0942***	0.0730***
C	(0.00630)	(0.00545)	(0.00692)
University	0.212***	0.214***	0.190***
•	(0.00860)	(0.00786)	(0.0103)
Urban dummy	0.0400***	0.0296***	0.0224***
,	(0.00252)	(0.00229)	(0.00272)
Capital city dummy	0.0971***	0.0980***	0.113***
	(0.00424)	(0.00409)	(0.00498)
Private dummy	-0.0447***	-0.0339***	
-	(0.00267)	(0.00248)	
Family1 dummy	-0.00489	-0.0312***	-0.0330***
	(0.00588)	(0.00484)	(0.00567)
Family2 dummy	0.00187	0.0138***	0.00894***
	(0.00318)	(0.00278)	(0.00334)
Ocup1	0.439***	0.424***	0.401***
	(0.0132)	(0.0129)	(0.0155)
Ocup2	0.222***	0.212***	0.254***
	(0.00872)	(0.00809)	(0.0111)
Ocup3	0.150***	0.142***	0.144***
	(0.00571)	(0.00507)	(0.00664)
Ocup4	0.112***	0.118***	0.120***
	(0.00681)	(0.00541)	(0.00694)
Ocup5	0.0558***	0.0429***	0.0377***
	(0.00487)	(0.00407)	(0.00467)
Ocup6	-0.0267	0.0615***	0.0393***
	(0.0240)	(0.0120)	(0.0150)
Ocup7	0.108***	0.0958***	0.0872***
	(0.00438)	(0.00369)	(0.00416)
Ocup8	0.126***	0.113***	0.0984***
	(0.00489)	(0.00427)	(0.00482)
Ocup10	0.281***	0.287***	0.159***
	(0.0103)	(0.00998)	(0.0507)
Constant	5.196***	5.461***	5.378***
	(0.0309)	(0.0197)	(0.0237)
Observations	71,610	70,780	44,934
R-squared	0.739	0.762	0.767

Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%,* significant at 10%. All specifications refer to the period 2003-2007. In model (2) the sample is restricted to employees while in model (3) to employees in private sector.

5. Consumption elasticity full estimation output

Log(consumption)	(1)	(2)	(3)	(4)	(5)
Log(1-MTR)	0.119	-0.0407	0.0146	-0.131	0.149
	(0.121)	(0.0854)	(0.129)	(0.0907)	(0.137)
Treatment dummy	0.285***	0.279***	0.346***	0.340***	0.411***
, in the second s	(0.00863)	(0.00543)	(0.00923)	(0.00580)	(0.0101)
Post reform d.	0.0422***	0.0523***	0.0501***	0.0589***	0.0297***
	(0.00997)	(0.00802)	(0.0105)	(0.00844)	(0.0113)
Year2003		-0.0901***		-0.0846***	
		(0.00577)		(0.00606)	
Year2006		0.00990*		0.0127**	
		(0.00546)		(0.00587)	
Year2007		0.0674***		0.0771***	
		(0.00551)		(0.00593)	
Dependent dummy	0.0617***	0.0578***	0.0577***	0.0510***	
	(0.00781)	(0.00508)	(0.00837)	(0.00541)	
Age	0.00178	0.00217	-0.00257	-0.00126	
-	(0.00235)	(0.00156)	(0.00244)	(0.00162)	
Age square	1.79e-07	-1.30e-05	3.93e-05	1.63e-05	
	(2.93e-05)	(1.94e-05)	(3.04e-05)	(2.01e-05)	
Female	-0.00243	0.00127	-0.0193***	-0.0146***	
	(0.00611)	(0.00390)	(0.00655)	(0.00417)	
Primary sch.	-0.167***	-0.179***	-0.202***	-0.183***	
	(0.0355)	(0.0239)	(0.0366)	(0.0242)	
Professional sch.	0.0807***	0.0864***	0.0892***	0.0969***	
	(0.0123)	(0.00791)	(0.0128)	(0.00827)	
Highsch.	0.164***	0.163***	0.188***	0.189***	
	(0.0123)	(0.00795)	(0.0128)	(0.00833)	
College	0.235***	0.235***	0.276***	0.275***	
	(0.0144)	(0.00920)	(0.0152)	(0.00975)	
University	0.382***	0.389***	0.445***	0.463***	
	(0.0144)	(0.00916)	(0.0152)	(0.00968)	
Urban dummy	0.281***	0.312***	0.145***	0.168***	
~	(0.00695)	(0.00438)	(0.00738)	(0.00461)	
Capital city d.	0.174***	0.162***	0.129***	0.112***	
D 1	(0.00886)	(0.00578)	(0.009/3)	(0.00636)	
Private dummy	0.0156***	0.016/***	-0.00228	0.00451	
F	(0.00603)	(0.00387)	(0.00645)	(0.00410)	
Family1 dummy	0.464***	0.450***	0.496***	0.491***	
E 11.0.1	(0.0104)	(0.00627)	(0.0112)	(0.00663)	
Family2 dummy	0.0743***	0.0801***	0.0811***	0.085/***	
C	(0.00802)	(0.00524)	(0.00864)	(0.00558)	C 077***
Constant	$5.3/3^{***}$	5.330***	5.800***	5.801***	6.277***
	(0.0530)	(0.0356)	(0.0554)	(0.0373)	(0.0308)
Obcomunican	22 706	57 500	22 704	57 500	22 704
D servations	23,190	0 292	25,790	0.361	25,190
K-squared	0.345	0.385	0.323	0.301	0.143

Table 15:	Consumption	elasticity
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Heteroskedasticity robust standard errors in parentheses. *** significant at 1% significance level, **significant at 5%,* significant at 10% . Models (1),(2) refer to period 2004-2005, specifications (3), (4) consider all the five years 2003-2007. In the first two specifications the first consumption measure is the dependent variable while in the last two the second definition of consumption.

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