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The Impact of the Flat Tax Reform on Inequality:  
The Case of Romania





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# THE IMPACT OF THE FLAT TAX REFORM ON INEQUALITY. THE CASE OF ROMANIA \*

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## Abstract

In this paper we focused on the flat tax impact on inequality in Romania. We compared 2005 against 2004, when we were able to isolate the flat tax impact from other factors.

We found that the higher the gross wage, the higher the flat tax gains. The inequality indicators we calculated (the Gini index, the relative mean deviation, the coefficient of variation, the standard deviation of logarithms, the Mehran index and the Piesch index) show an increase in inequality determined by the flat tax. The Lorenz curve is illustrative, as only the last quantile of the population (richest 20%) appears as the clear winner of the flat tax. The results also indicate that the income elasticity of consumption is decreasing across quartiles, from 81 to 71 percent.

We conclude that the flat tax led to increased income inequality and it stimulated households consumption particularly among the wealthiest households.

**Keywords:** flat tax, inequality, income distribution, consumption elasticity

**JEL:** H24, H31, I 39, E62, E21, J31

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## 1. Introduction and context, structure

Flat tax is a proposal made by two American economists, Hall and Rabushka, in the early '80s, developing an idea originally launched by Milton Friedman. It is important to remark that their proposal, then and now (their seminal work was published in a revised edition in 2007), has been justified, in their view, by a particular feature of the existing US tax system: “(...) the shocking fact that over half of all business income never shows up in anyone’s adjusted income”<sup>1</sup>. They want to replace the existing progressive tax system, which suffers from loopholes and deductions, with a single uniform tax rate for all income, applied only once – the flat tax. Nevertheless, the flat tax “(...) is progressive where it counts most: for the poor”<sup>2</sup>, in the sense that it would come with an exemption for incomes below a certain threshold<sup>3</sup>, and another rate<sup>4</sup> for all the other incomes. Insulating the poorest from taxation is probably a trade-off for accepting what the authors acknowledge to be “(...) a tremendous boon to the economic elite”<sup>5</sup>. In a revenue-neutral scenario, there are winners and losers of a flat tax reform; if the poorest are exempted, and the richest are definitely better-off, the tax burden moves upon the middle class.

While levied on income, the flat tax is actually considered a consumption tax as it removes all new investment from the tax base – at least in Hall and Rabushka’s view. From this perspective, a consumption tax should lead to less consumption, therefore creating “incentives to save and invest”<sup>6</sup>. Flat tax, as originally proposed, should have stimulated the supply side of the economy. Evidence shows that in countries where the flat tax has been introduced this condition was not met, as all new investments were not exempted from the tax base.

Flat tax was not introduced in the US – except for a number of six federal states, but it has become increasingly fashionable in Eastern Europe. Estonia was first to introduce it in 1994, followed by the other two Baltic states, then by Russia in 2001, Serbia in 2003, Slovak Republic and Ukraine in 2004, Romania and Georgia in 2005. Some countries maintained different income and corporate tax rates, so the flat tax referred in most cases to income tax only; the latter varies from 12% in Ukraine to 33% in Lithuania and even 37.5% in Iceland. Except for Latvia and Georgia, the introduction of flat taxes was associated with an increase in personal allowances. In 2007 more countries introduced the flat tax: Macedonia, Montenegro, Mongolia, Kyrgyzstan, Kazakhstan, followed in 2008 by Albania and Bulgaria (a 10% rate), as well as by the Czech Republic. As of 2008, 24 countries have reported flat taxes<sup>7</sup>, among which Iraq – an example of how the flat tax idea has been exported before being tested.

It is noteworthy that in Hall and Rabushka’s proposal there is nothing which goes beyond the US tax system. In fact, the flat tax systems introduced in Eastern Europe have little in common with the original idea, as none of them meets all the additional

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<sup>1</sup> Hall and Rabushka (2007), pp.142

<sup>2</sup> Hall and Rabushka (1985), pp.466

<sup>3</sup> The threshold they propose for US is 22,500 USD annually

<sup>4</sup> They propose a 19% rate.

<sup>5</sup> Idem 1, pp.152

<sup>6</sup> Idem 4, pp.63

<sup>7</sup> According to the US-based Center for Freedom and Prosperity

requirements needed for an “orthodox” flat tax (as proposed by Hall and Rabushka), namely: no tax on savings (including pensions), no tax on foreign earnings, no tax on capital gains, no tax on inheritances, no tax on charities, no allowances and reliefs, and business being taxed on cash flow, not on profits (Murphy, 2006). The level of conformity with the original flat tax proposal varies from country to country; Slovak Republic comes closest, as it introduced the same flat tax rate for labour, income and consumption (VAT)<sup>8</sup>. Since the flat taxes introduced in Eastern Europe do not have many of the characteristics of the “orthodox” flat tax, it is doubtful whether the original arguments in favor of a flat tax (as controversial as they are) could still apply in these cases.

The main argument in favour of the flat tax is its simplicity and efficiency; one tax rate is easier to understand by tax payers and easier to administer by tax authorities. Hall and Rabushka (2007) consider that there is a virtual consensus on this issue. Flat tax supporters invoke this argument very often<sup>9</sup>. However, McCaleb (1985) questions the superior efficiency of the flat tax, saying that one should not ignore the interdependence between tax rules and spending decisions.

A strong argument of flat tax enthusiasts is that it increases the incentives to work, by decreasing the marginal effective tax rate. Capriolo (2006) and Heineken (2006) hold it true based on simulations for Slovenia, respectively Netherland. But Theather (2005) mentions a number of instances in which the wage supply might be inelastic to a change in tax rates, such as: minimum wages are set by government, not by market; higher-paid people already work at their full capacity; the structure of employment contracts limits the elasticity of labour supply.

Another major argument of the flat tax proponents is that it would help improve tax collection by lowering tax evasion and broadening the tax base, hence increasing the budget revenues. Evidence so far is mixed, at best. Keen, Kim and Varsano (2006) show that, in the first year after the introduction of a flat tax, budget revenues from personal income tax (as a share in GDP) dropped in Estonia, Georgia, Romania, Slovak Republic and Ukraine, while they increased in Latvia, Lithuania and Russia. For Latvia and Lithuania the explanation is that in these countries the flat tax rate was set at the highest marginal tax rate prior to reform (which is, in fact, quite contrary to the flat tax logic). For Russia, an econometric study by Ivanova, Keen and Klemm (2005) concludes that the strong increase in revenues from the income tax can not be attributed to the flat tax, but to an increase in real wages unrelated to the flat tax reform.

Regarding Slovak Republic, Golias and Kicina (2005) present detailed data on budget revenues in the first year of the flat tax. Revenues from personal income tax and from corporate income tax decreased significantly, as a share in total revenues, from 18.3% to 14.6%, respectively from 15.4% to 12.5%; moreover, they also decreased in nominal terms. These losses were more than compensated by the increase in VAT revenues (as a share in total revenues) from 41.9% to 44.9%; overall, the budget revenues increased by 7.4% in nominal terms. A similar situation happened in Romania in 2005, the first year when a 16% flat tax on income and profit was

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<sup>8</sup> Incidentally, the flat tax rate was set at 19%.

<sup>9</sup> See, among others, Grecu (2004), Vanasaun (2006), Krajcir (2006)

introduced. Revenues from personal tax income and corporate tax income decreased in real terms (while slightly increasing in nominal terms, though), but these losses were balanced by the large increase in VAT revenues. In the following years, the revenues from personal income tax and corporate income tax recovered in real terms, but only after a series of tax levels was raised; for example, the tax on dividends increased from 5% to 16%, the tax on capital gains increased from 1% to 16%, and the tax on interest gains increased from 1% to 16%. Based on this data, it is hard to say that the Slovak and the Romanian economy got a supply side kick; rather the opposite, they got a demand side kick. This demand side stimulus was quite obvious in Romania, as the current account deficit increased from 8.5% in 2004 (the year before the flat tax reform) to 13.9% in 2007, and the budget deficit increased from 1.3% in 2004 to 2.7% in 2007 and 5.2% in 2008. However, there are other factors apart from the flat tax that might explain these developments: wage increases unrelated to the flat tax reform, past years of repressed consumption, a strong currency appreciation, a boom of household loans, and an increased pressure on the public expenditures side due to EU integration.

Even though the success of the flat tax has not been proved in terms of increasing the budget revenues, some countries continue to join the flat tax bandwagon. Murphy (2006) provides a plausible explanation, when he holds that the flat tax is a political objective, not a taxation policy. Keen, Kim and Varsano (2006) also believe that the main rationale for the flat tax is the area of marketing, as a sign to the world of a fundamental regime change; it is quite often, actually, that the flat tax reform followed a radical change in government, as it was the case, among others, for Russia, Georgia, Ukraine and Romania.

In this paper we will try to answer two research questions related to the flat tax impact on inequality in Romania. First, what were the distributional gains and losses from the flat tax reform? And second, was the extra disposable income consumed or saved? We do not, however, adopt a normative approach towards the issue of the flat tax reform; neither do we address its macroeconomic implications.

## **2. Literature review on the flat tax impact on inequality**

The international literature on the flat tax impact on inequality is not vast. Most studies are in fact simulations, based on a budget revenue neutrality assumption. They were made in countries which did not implement the flat tax, but were contemplating it. Few of these studies estimate that flat tax can reduce inequality. Davies and Hoy (2002) calculate, for US, that the introduction of a flat tax could reduce inequality, if the tax rate is not set too high. Davies, Hoy and Linch (2003) hold that, for Canada, a flat tax reform would reduce inequality for all family types if complemented by tax base broadening; for flat tax without base broadening, they calculate the tax rate that would be inequality-neutral. Ironically, this rate is quite high (over 40% for Canada), which contradicts their previous finding for US. Hall and Rabushka (2007) forecast that the introduction of a flat tax in US would lower tax burden on both low earners and high earners, at the expense of middle class; they do not calculate, however, any inequality measure *per se*.

Most of these studies suggest that flat tax would lead to increased inequality. Dunbar and Pogue (1998) find, for US, that switching to the flat tax would increase the tax

burden for most taxpayers, while it would significantly redistribute tax burdens, mainly from the top decile to other taxpayers. Ventura (1999), in an estimation based on US data as well, calculates that the introduction of a flat tax would contribute to higher concentration of income and wealth; income Gini would increase from 0.43 to 0.46, and wealth Gini would increase from 0.60 to 0.68. Murphy (2006), after a simulation exercise of introducing a flat tax (even with a high threshold for tax exempted income) using UK data, summarizes the results in a paradox: flat tax is not progressive enough to prevent the system as a whole to become regressive.

Peichl (2006) simulates the effects of a potential introduction of a 30% flat tax rate in Germany. He finds that the flat tax increases inequality (the Gini index increases by 2.56 percentage points). In this scenario, the first decile (poorest people) would neither gain nor lose, the second and third deciles would gain just a little (an increase in net wage by 0.08%, respectively 0.28%), the other deciles up to the ninth would lose from the flat tax (largest losses for the seventh decile, by 1.1%), while the large winner would be the tenth decile (richest people), gaining 5.87% to their net wage. Nevertheless, polarization slightly decreases (by 0.47%), due to the higher homogeneity between the poorest deciles and the middle deciles (the latter's losses bring them closer to the poorest deciles).

Gonzales-Torrabadella and Pijoan-Mas (2006) make a similar simulation for Spain. They find that the introduction of a flat tax would raise inequality significantly: the Gini index for wages would increase from 0.31 to 0.35, and the Gini index for earnings would increase from 0.34 to 0.37. Different to the results for Germany or US, the first two quintiles would lose, the third quintile would stagnate, and the last two quintiles (richest 40% of population) would gain.

Larsen (2006) calculates the impact of a flat tax for Denmark, in various revenue-neutral scenarios. A flat tax rate of 35.2% without any personal allowances would create huge inequalities, as the first decile (poorest people) would pay higher taxes by 70%, while the tenth decile (richest people) would pay less taxes by more than 20%. The second and the third decile would also pay higher taxes by 30%, respectively 20%; first seven deciles are clear losers of the system, the eighth decile is not affected, and the last two deciles are winners. Another two scenarios test the effect of higher flat tax rates combined with personal allowances. In these scenarios, the first decile has a little to gain (about 3% less in taxes), the next five deciles lose (paying up to 20% more taxes), the seventh and the eighth deciles are not affected, and the last two deciles win by a lesser margin (5% to 15%). The author concludes that in the short run a revenue neutral flat tax would have unacceptable distributional effects.

Capriolo (2006) tests various scenarios for the introduction of a revenue-neutral 20% flat tax rate in Slovenia. Under an unchanged gross wage, the net wage of low skilled workers would decrease, and the net wage of high skilled workers would increase, therefore increasing inequality. He also finds that, while the total tax burden slightly decreases, it would shift towards the individuals earning up to the average gross wage. After the flat tax reform, the tax burden would increase for 70% of the workforce, but it would decrease significantly for a minority of employees earning (before the reform) more than three times the average gross wage.



The World Bank (2005) calculated the actual impact of the flat tax in Slovakia (where flat tax was implemented in 2004). In our opinion, the overall results are influenced by the fact that 2004 (the first year after reform) is compared against 2002 (which was not the last year before the reform); this might yield results attributable to other causes than the flat tax itself. Moreover, flat tax reform was complemented by the simultaneous unification of VAT rates and the reform of the benefits system. When taking them altogether, the resulting fiscal system seems slightly more progressive and redistributive than before: the Gini index is unchanged, and the Kakwani progressivity index increases. According to the World Bank, all deciles of population benefited from the reform. Only smaller groups of people were worst off, mainly households with three or more children where all adults are unemployed - these are probably the poorest households. However, when flat tax impact is singled out, the study shows that the Kakwani index almost halved (from 0.11 to 0.06); a decrease in the index signals an increase in polarization.

Also for Slovakia, Krajcír (2006) finds that in the first year after the introduction of the flat tax, the real disposable income increased by 3.1% for the individuals earning minimum wage, by 0.9% for the individuals earning the average wage, and by 8.9% for individuals earning three times the average wage. Gonzales-Torrabadella and Pijoan-Mas (2006) find, based on simulations for Spain, that the last quintile (richest people) is most stimulated to consume more by a flat tax; consumption grows by up to 20% for this category of population, while it also grows by smaller margins for the rest of the population.

To summarize the literature on the impact of the flat tax, one could say that most studies estimate an increase of inequality. There are few studies on the consumption behaviour after a flat tax reform; one could expect more consumption, but there is no evidence so far on the elasticity of consumption. Most of these studies, however, are simulations. Our analysis, on the other hand, would draw on the actual data for Romania, before and after the 2005 flat tax reform.

### **3. Statistical analysis**

Our research is based on the 2004 and 2005 waves of the yearly Households Budget Survey (HBS) run by Romania's National Statistics Institute. The HBS samples about 3,000 households a month, resulting in more than 33,000 households surveyed in each year (33,195 in 2004 and 33,066 in 2005). Every household member over 15 years old is interviewed and data on personal characteristics (occupational status, education, etc) and income (all net income sources and all taxes and contributions paid) is recorded. In 2005, 99,414 individuals were surveyed (out of which only 20,777 earned a salary), compared to 101,692 individuals (20,759 salary-earners) in 2004. The household head is the member that earns most. At household level, geographical characteristics (county, urban/rural area) and consumption expenditures are recorded. The consumption expenditures are recorded for each good purchased, which enables us to distinguish between durable and non-durable goods.

In 2004, before the flat tax reform, a gradual labour income taxation system was in place, with rates ranging from 18 to 40 percent, applicable on the monthly taxable income (i.e. gross wage less health and social insurance contributions). In addition to

this, a non-taxable allowance was granted: for an employee with no dependants, the amount was 210 RON, increasing by 50% for each additional dependant.

*Table 1. Personal income tax, 2004*

Monthly Taxable Income	Tax
Up to 251.6 RON	18%
From to 251.3 to 608.3 RON	45.3 RON + 23% of what exceeds 251.3 RON
From to 608.3 to 975 RON	127.3 RON + 28% of what exceeds 608.3 RON
From to 975 to 1362.5 RON	230 RON + 34% of what exceeds 975 RON
Over 1362.5 RON	361.8 RON + 40% of what exceeds 975 RON

On January 1<sup>st</sup>, 2005 a flat tax reform was introduced. The flat tax rate was set at 16%, applicable on the monthly gross wage. In addition to that, the non-taxable allowance was increased, ranging from 250 RON for individuals with no dependants to 650 RON for individuals with four or more dependants (the allowance increases by 100 RON with each additional dependant, flattening at 650 RON). However, this allowance was not granted to all employees: those with a salary below 1000 RON were entitled to a full allowance, then for wages between 1000 and 3000 RON the allowance decreased linearly, bottoming at zero (no allowance) for those earning 3000 RON or more.

According to HBS, salaries represented 43.7% of the total net monthly income earned by household members in 2005; hence changes in salary tax had the most important distributional effects. Pensions, the second ranked source of income (18.2%), were not affected by the flat tax reform in 2005 (although pensions would be taxed starting from 2006). An important change introduced by the flat tax reform from an individual point of view was the increase of the dividend tax, from 5% in 2004 to 10% in 2005 and 16% in 2006. However, as dividends account for less than 4% of the total family income, one could submit that its distributional effects were negligible. Moreover, for small companies where firm management and ownership were the same, under the flat tax it became more effective to increase wages than to pay dividends. From 2006 onwards, other personal taxes increased, such as the tax on interest gains and on capital gains (both increased from 1% to 16%) – but their cumulated share in total income is less than 1%. Furthermore, as these changes were introduced in 2006, we are not covering them in this paper. Instead, we compare 2005 against 2004 data, and try to isolate the impact of the flat tax.

### **3.1. The distributional effect of the flat tax**

The first question we attempt to answer in this paper is what were the distributional gains and losses from the flat tax reform.

Figure 1 shows the differences in the taxes paid under the proportional and the flat tax system for gross wages between the minimum wage (280 RON in 2005) and the maximum wage in the HBS (5500 RON). One can remark that:

- (a) the higher the gross income, the higher the gains from the flat tax system, and
- (b) the gains from the flat tax system are decreasing with the number of dependants.

The fact that for the same gross income those with more dependants gained less is explained by the decrease in allowance for those earning more than 1000 RON.

The effects of the flat tax reform on net labour income were therefore propagated via two channels: first, the flat tax (16%) replaced the progressive one (between 18 and 40%), and second, the personal allowance became a decreasing function of the gross wage (flat up to 1000 RON, linearly decreasing up to 3000 RON, nothing above this amount). In Figure 2, we single out the effect of first channel, by assuming the allowance system was the same in 2005 and 2004, so the only effect comes from the implementation of the 16% flat tax. We notice that the gains are generally higher, and the dispersion caused by the number of dependants is lower. However, for the same gross wage, the gains are again decreasing as the number of dependants increase. The explanation is that an increase in the number of dependants, hence an increase in allowance, diminishes the average tax rate to significant extent under the progressive scheme. Under the flat scheme, both the average and the marginal tax rates are constant. Hence, the change in the average tax rate is smaller the higher the number of dependants, so the gains are smaller as well.

Figure 1: Theoretical profit/loss (P/L) from flat tax, with a regressive allowance, 2005

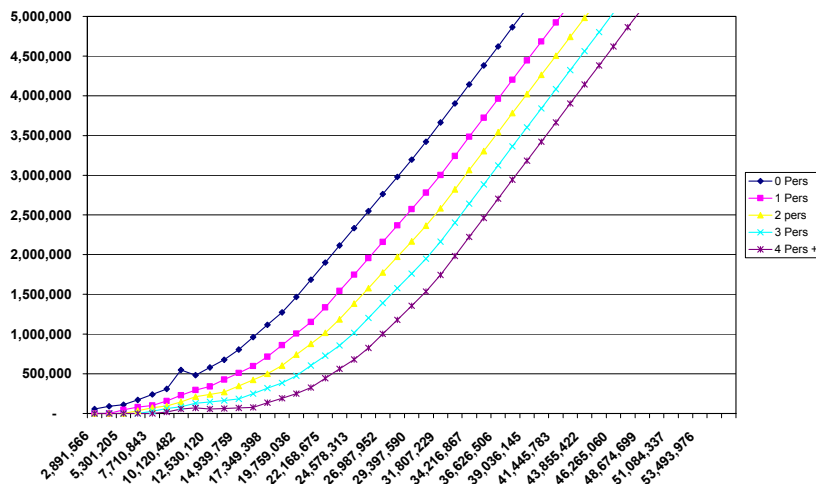


Figure 2: Theoretical profit/loss (P/L) from flat-tax, with a flat allowance, 2005

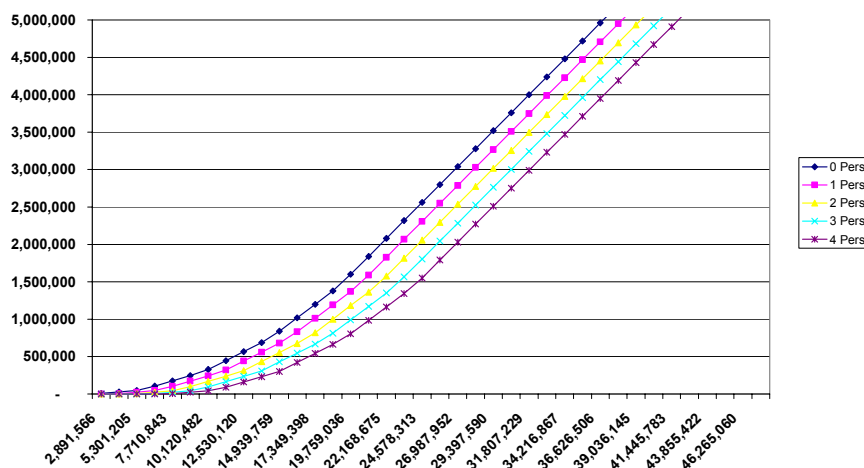
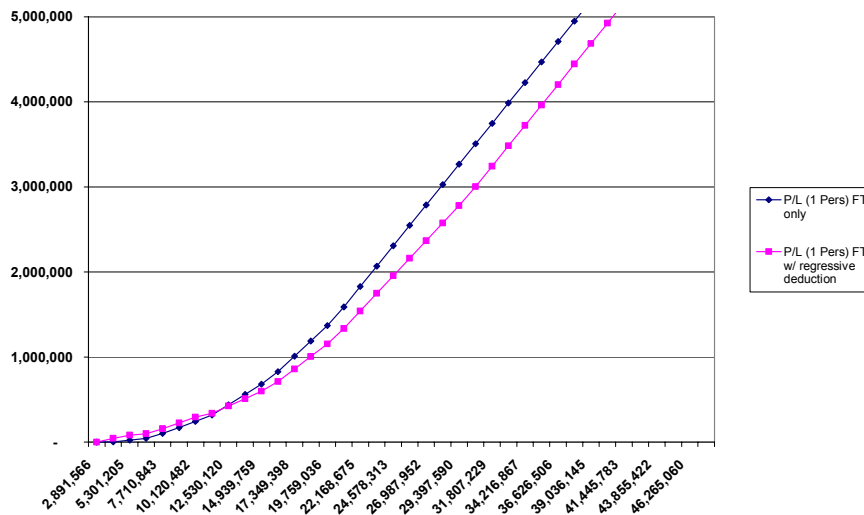


Figure 3 plots the gains under a 16% labour income tax with the 2005 regressive allowance against the gains obtained by keeping the same allowance system as in 2004 (flat allowance).

Figure 3: Profit/loss (P/L) from flat tax with and without a regressive allowance, 2005



So far we have focused on the theoretical gains following the implementation of the flat tax reform. We saw that, due to the higher allowance, nobody losses in absolute terms, and that the gains are increasing with wages.

However, looking at the distribution of gross salary income in Figure 4 and Table 2, we see that 75 percent of the employees surveyed earn less than 868 RON per month. From the theoretical gains plotted in Figure 1 (or the detailed Figure 1 in the Annex), it follows that the maximum gain for these employees is around 30 RON (for an individual with no dependants).

Figure 4: The distribution of gross salary income, 2005

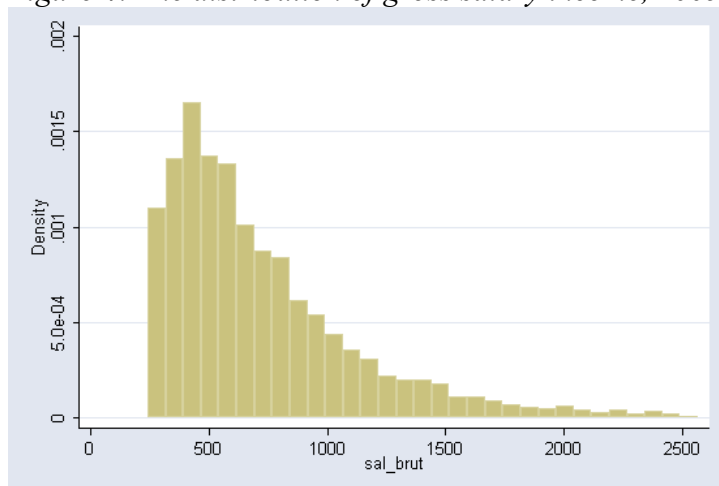


Table 2: The distribution of gross salary income, 2005

Percentiles	P/L	Smallest		
1%	302	278.08		
5%	310	278.5		
10%	313	279	Obs	13793
25%	426.81	280	Sum of wgt.	13793
50%	600		Mean	724.0804
			Std. Dev.	454.0788
		Largest		
75%	867.5	5050	Variance	206187.6
90%	1224	5415.01	Skewness	3.001604
95%	1555	6200	Kurtosis	20.39903
99%	2412	7400.34		

In order to assess the empirical distribution of gains from the flat tax reform, we first double-checked the data. We looked at the salary income and taxes paid in 2005 and asked ourselves: how much would this employee have paid in taxes under to 2004 labour income tax regime? Because we only have data on taxes paid, but not on the number of dependants, we tried to compute this number by looking at the amount paid in taxes. By dividing the effective labour income tax paid by 0.16, we get the taxable base. The “empirical” allowance is computed as the difference between the net income plus the effective labour income tax paid and the taxable base. Then, from the gross wage, the “theoretical” allowance is computed for all possible number of dependants. Then we look for what number of dependants do the “empirical” and “theoretical” allowance match ( $\pm 10$  RON). The rest of employees, we assume, had incorrectly reported their earnings or taxes paid, so we dropped them from the sample. This way we have a sample of 13,816 wage earners (out of 20,777) for which we can accurately compute the gains from the flat tax reform.

Table 3 shows these gains were rather small: the average gain was 25 RON, with 90 percent of the workers earning less than 50 RON (see Figure 5). The fact that the average gain is almost twice the median (13.2 RON) shows how skewed to the right the distribution of gains is: 10 percent of the employees amassed 40 percent of the gains. In relative terms, the gain for the average worker was 3.73% of his/her net wage, while only around 2 percent of the employees gained more than 10 percent (see Figure 6).

Table 3: Empirical profit/loss (P/L) from flat tax, 2005

Percentiles	P/L	Smallest		
1%	5.58	-106.96		
5%	8.82	-106.92		
10%	9.238401	-106.92	Obs	13816
25%	10.44	-106.82	Sum of wgt.	13816
50%	13.2		Mean	25.30547
			Std. Dev.	37.68452
		Largest		
75%	27.6201	591.16	Variance	1420.123
90%	49.96001	663.8301	Skewness	7.469597
95%	75.09	820.6	Kurtosis	109.1856.
99%	189.8	1059.484		

Figure 5: Empirical profit/loss (P/L) from flat tax, 2005

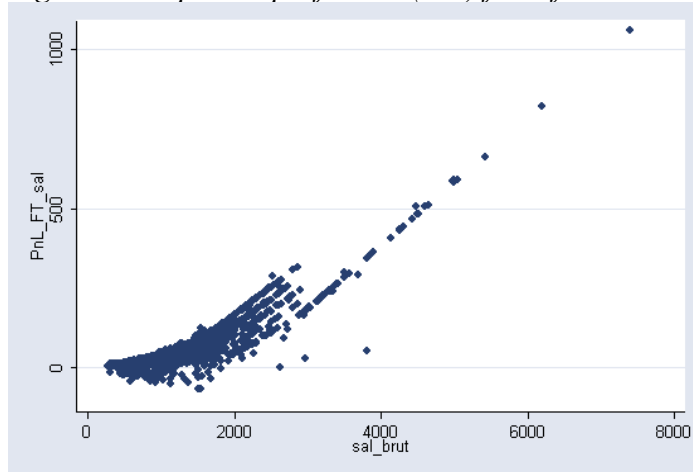
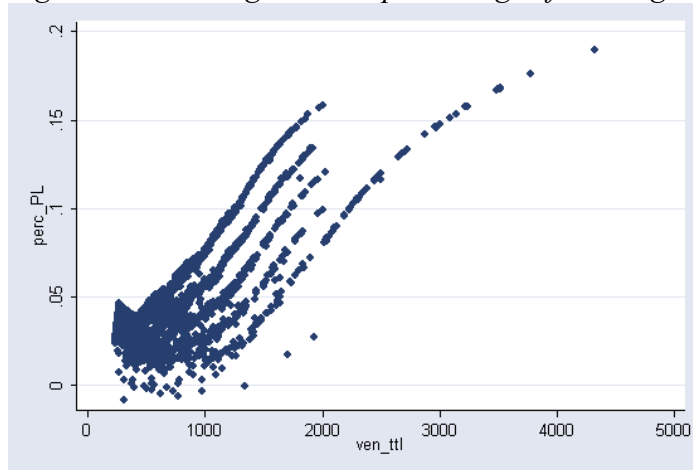


Figure 6: Flat tax gains as a percentage of net wage



Our conclusion that the gains from the flat tax reform were unequally distributed, hence aggravating the existing inequality, is emphasized when we look at broader inequality measures like the Gini coefficient. The Gini coefficient for the gross labour income was 29.26% in 2005, compared to 28.38% in 2004 (see Table 4). One might argue that the increase is only one percentage point in absolute terms (or three percentes in relative terms), which does not seem very worrying. Nevertheless, this increase in the Gini index took place in only one year, and it refers to total labour income; the impact of the flat tax on total labour income might have been compensated by wage increases (unrelated to the flat tax), by a slightly lower level of social contributions, or by a higher level of personal allowances.

We look then at the inequality of the distribution of the flat tax gains themselves. If the flat tax is really flat, then the gains inequality should be the same as the wage inequality. But the Gini for the flat tax gains was substantially higher, at 49.22%. A higher Gini for the flat tax gains implies that the flat tax reform generated more inequality.

Moreover, when we calculate inequality measures for 2006, based on the same Households Survey, we remark that these have not changed significantly compared to 2005. Gini, for example, has exactly the same value. This means that the surge in the

Gini index in 2005 against 2004 was determined by the flat tax reform (which was introduced on January 1st, 2005), a factor which was not replicated in 2006.

*Table 4: Inequality measures*

	Labour income inequality, 2004	Labour income inequality, 2005	Flat tax P/L inequality, 2005	Labour income inequality, 2006
Relative mean deviation	.20625756	.21162044	.36815114	.21065361
Coefficient of variation	.61856576	.62343994	1.4891845	.63181646
Standard deviation of logs	.48228888	.49844337	.73306533	.49646259
Gini coefficient	.28384865	.2925929	.49217524	.29226494
Mehran measure	.37555264	.38830901	.60300479	.387894
Piesch measure	.23799663	.24473485	.43676052	.24445044
Kakwani measure	.07332774	.07724796	.2249182	.07717882
Theil entropy measure	.14322329	.14962984	.50081085	.15049996

The relative mean deviation (RMD) is a simple measure of inequality, showing the proportion of income that would need to be transferred from those above mean to those below mean to achieve equality. The interpretation is RMD is that the higher the RMD, the higher the inequality. Flat tax largely increased RMD, which points towards increasing inequality.

The coefficient of variation is another inequality measure that meets the Pigou-Dalton condition that an inequality index decreases whenever income is transferred from a richer individual to a poorer individual. The coefficient of variation is more than double for flat tax profit/loss, which also indicates more inequality. Standard deviation of logarithms is an alternative measure of inequality; it is also higher for flat tax.

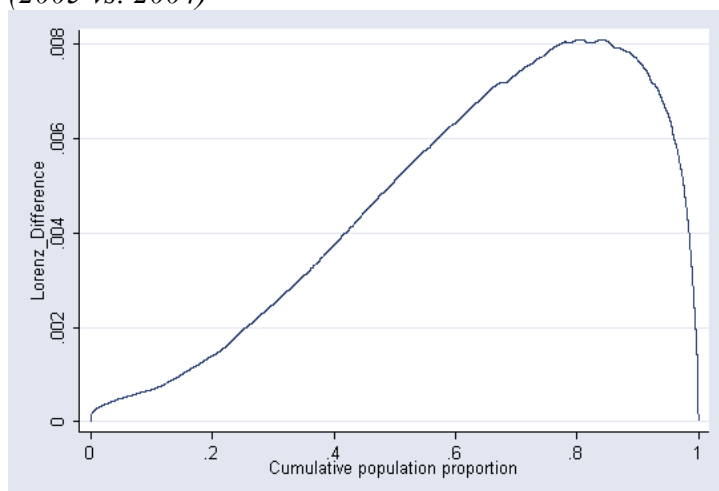
*Figure 7. Lorenz curve from the flat tax reform*



The Gini coefficient is a weighted average of the Mehran and Piesch indexes, and they are all three Lorenz-based measures. Gini is defined as the ratio of twice the area

between the Lorenz curve and the 45 degree line to the area of the box as a whole. The Mehran measure is most affected by those with low incomes, while the Piesch measure is most affected by those with high incomes. Both the Mehran and the Piesch indexes show increased inequality after the flat tax introduction. The Lorenz curve is very illustrative for the fact that the last quintile of the population was better off due to the flat tax (see Figure 7 and Figure 8).

*Figure 8. Difference between the Lorenz curves, before and after the flat tax reform (2005 vs. 2004)*



The Kakwani index seems to indicate progressivity, in the sense that the concentration of taxes distribution is higher than the concentration of income distribution. However, this is an in-built result for a flat tax reform (concentration of taxes is very high for a flat tax – actually, it would have been equal to 1 in the absence of allowances). With respect to gross labour income, the difference in the the Kakwani index is not significant.

### **3.2. The flat tax impact on the consumption and savings behaviour**

Our second research question is whether the extra disposable income was consumed or saved. To this end, (a) we look at the elasticity of consumption for those families who gained from the reform compared to those who did not, and (b) we test the hypothesis that the income elasticity of consumption is increasing with flat tax gains. If the income elasticity of consumption in the top quartile of the flat tax gains distribution is higher than in the bottom quartile, one could assume that the extra income was consumed.

Our data source registers consumption and savings per families, so we have to aggregate the gains from the flat tax reform. Moreover, sampling weights are provided at family level, but not at individual level. Keeping only those families for which at least one worker was included in the sample used above (those workers for which we were able to back up the number of dependants), our sample includes 9884 families. Table 5 shows that the average family gained 36.1 RON in 2005 from the flat tax reform, while the median gain was 21.6 RON.

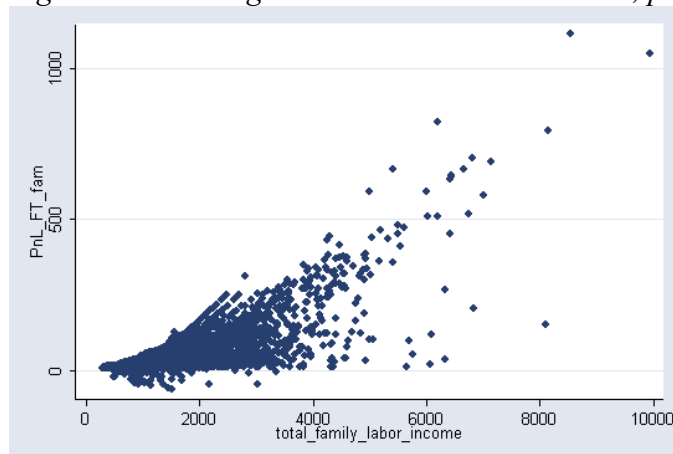


The empirical distribution of gains per family, as a function of total gross salary income, is shown in Figure 7. As the flat tax gains depend not only on the gross income, but also on the number of dependants per family, the elasticity estimates have to be a function of these two variables.

Table 5: Profit and loss (PnL) from the flat tax, per family per month

Percentiles	PnL_FT_fam	Smallest		
1%	5.688001	-65.24		
5%	8.838001	-58.64		
10%	9.44	-52.1764	Obs	9884
25%	11.379	-47.33609	Sum of Wgt.	2591831.24
50%	21.66		Mean	36.11603
			Std. Dev.	51.91648
		Largest		
75%	40.00881	794	Variance	2695.32
90%	72.14001	820.6	Skewness	6.582792
95%	112.13	1047.885	Kurtosis	77.7014
99%	263.32	1115.395		

Figure 7: Flat tax gains and total labour income, per family per month



An interesting fact is that there were a few losing families (0.6% of the sample), probably because of the regressive allowances, on the one hand, and of the limited maximum level of the allowances, on the other hand.

A typical winning family is in the top 25% of the net labour income distribution. It has the following characteristics: 76% completed at least the high-school (34% have a university degree), 83.5% live in the urban area, 35.8% have three members, 48% have no dependants (from a tax point of view), and – most important- the average family income was 1787 RON, which was three times the average salary (in 2005).

The average 2005 flat tax gain, consumption expenditures (defined as the expenditures on food and agricultural products, non-food items and services), and net income are computed for these groups and shown in Table 6 (the “winners” are in the top half of the flat tax gains distribution, while the “non-winners” are in the bottom half).

Table 6. FT gains, Consumption, and Net Income in 2005

	FT Gain (2005, RON)	Consumption (2005, RON)	Net Income (2005, RON)

Dependants	Winners	Non-Winners	Winners	Non-Winners	Winners	Non-Winners
0	73.9	21.1	1414.3	697.5	1797.1	713.9
1	52.0	17.3	1378.9	713.4	1653.0	737.9
2	44.7	14.8	1350.4	752.5	1629.3	745.9
3	22.5	11.4	1142.5	652.4	1415.7	674.1
4+	17.1	10.3	1152.1	657.5	1271.9	667.1
Overall	55.0	17.2	1365.3	709.9	1671.1	724.7
No borrowing	52.7	16.7	1354.0	690.5	1592.6	686.5

Consistently with the theoretical flat-tax gains depicted in Figure 1, the empirical gains decrease with the number of dependants. Overall, the flat tax gains represent about 3.3 percent of the total net income for the “winning” families, and 2.4 percent for the “non-winning” ones. As far as consumption is concerned, on average, it represents 82 and 98 percent of total income for “winning” and “non-winning” families, respectively.

As food and other necessity goods with low income elasticity constitute a large share of consumption, the data shows that the consumption share of income decreases with income, as expected. As a function of the number of dependants, the consumption share of income increases up to two dependants, then decreases for families with three and four dependants (which make up only 9.6 percent of the sample, though).

*Table 6A : Descriptive statistics by income quartile and number of dependants*

Income Quartile	Average Income (RON)	Consumption Share of Income	No of Dependants	% of Total	Average Income (RON)	Consumption Share of Income
1	425	100.70%	0	3592	1,227.00	91.20%
2	745.3	95.70%	1	3642	1134.5	92.30%
3	1136	88.80%	2	1913	1075	93.30%
4	2209.8	82.50%	3	532	806	91%
			4+	205	666.5	93.10%

Since we lack panel data, a comparison with the 2004 wave needs to rest on the assumption that there is no net income mobility between large groups. More precisely, we assume that the “winning” families were in the same percentile of the net income distribution in 2004 as in 2005 (the top half), for the same number of dependants. Table 7 compares the net income threshold (i.e. the median income) for 2004 and 2005, across the number of dependants. The largest increase in net income occurs for families with three or more dependants, which have the least to gain from the flat tax in absolute terms. On average, the flat tax gains contributed a modest 2.4 percent to the increase in the net income for the median family.

*Table 7. Income changes after flat tax, for families*

Dependants	Net income threshold 2005 (RON)	Net income threshold 2004 (RON)	Income Change	Median flat tax gain 2005 (RON)	Flat tax gain as % of 2004 income
0	1064	992	7.3%	28.41	2.9%
1	1057	926	14.1%	22.4	2.4%
2	1053	872	20.8%	19	2.2%

3	953	773	23.3%	11.4	1.5%
4+	903	746	21.0%	10.33	1.4%
Overall	1045	917	14.0%	21.66	2.4%
No borrowing	1005	893	12.5%	20.88	2.35%

A first attempt at estimating the marginal propensity to consume is by looking at the changes in consumption and income across quartiles of the income distribution, between 2004 and 2005. This assumes that (a) little income mobility occurred during the period, hence the families in a certain quartile in 2004 were in the same quartile in 2005 as well, and (b) the breakdown by income quartile is highly correlated with the gains from the flat tax reform. While the first assumption cannot be tested in the absence of panel data, the second one can be established by looking at Figure 7: flat tax gains are increasing in net salary income.

To test how accurately we can predict the flat tax gains quartile based on the net salary income quartile, we use a principal discriminant analysis. This analysis is run around the three quartile points (25, 50, and 75 percentile) and will show how many observations of the respective income group (above/below the income threshold) are correctly classified in the same flat tax gain group (above/below the flat tax gain threshold). Even though the FT gains are linear in income, there are many practical reasons why the prediction accuracy is less than 100 percent, the most important being that FT gains are also a function of the number of dependants, as shown in Figure 1. Besides, it is likely that either the salary income or the taxes paid are sometimes not rigorously reported. The results are shown in Table 8:

Table 8. Flat tax gains prediction, by income quartiles

Bottom quartile

IncomeGrp	----- Predicted FT Grp -----		Total
	Above 25%	Below 25%	
Above 25%	5183	2231	7414
Below 25%	665	1805	2470
Total	5848	4036	9884

Correctly predicted = 70.70 %  
Model sensitivity = 69.91 %  
Model specificity = 73.08 %  
False positive = 11.37 %  
False negative = 55.28 %

Median quartile

IncomeGrp	----- Predicted FT Grp -----		Total
	Above 50%	Below 50%	
Above 50%	3317	1628	4945
Below 50%	933	4006	4939
Total	4250	5634	9884

Correctly predicted = 74.09 %  
Model sensitivity = 67.08 %  
Model specificity = 81.11 %  
False positive = 21.95 %  
False negative = 28.90 %

Top quartile

Actual	----- Predicted FT Grp -----		Total
	Above 75%	Below 75%	
Above 75%	1725	746	2471
Below 75%	999	6414	7413
Total	2724	7160	9884

Correctly predicted = 82.35 %  
 Model sensitivity = 69.81 %  
 Model specificity = 86.52 %  
 False positive = 36.67 %  
 False negative = 10.42 %

The prediction accuracy varies between 70.7 and 82.35 percent, the prediction becoming more accurate as the flat tax gains increase. To give an example how the prediction accuracy is calculated, we can look at the analysis around the median: out of 4,945 households with an income above median, 3,317 are correctly predicted to have a flat tax gain above the median. Also, out of 4,939 households with an income below the median, 4,006 have a flat tax gain also below the median. Therefore, the prediction accuracy is  $(3317+4006)/(4945+4939)=0.741$ .

To compute the marginal propensity to consume (MPC), we use the average family consumption (chelt\_cons) and net income (venit\_net) in RON across quartile, for 2004 and 2005:

*Table 9: Marginal propensity to consume, by income quartiles*

Quartile	Variable	2004	2005	% Change	Elasticity
1	chelt_cons	483.3124	574.2201	18.8%	82.3%
	venit_net	453.6966	557.4431	22.9%	-
2	chelt_cons	688.9238	845.8292	22.8%	109.8%
	venit_net	739.1441	892.4057	20.7%	-
3	chelt_cons	925.3501	1084.129	17.2%	87.9%
	venit_net	1032.54	1234.017	19.5%	-
4	chelt_cons	1450.807	1646.367	13.5%	81.2%
	venit_net	1807.869	2108.071	16.6%	-

It is apparent that the (unconditional) income elasticity of consumption decreases with income, for the second, third, and fourth quartile. A possible reason for the lower income elasticity is the underreporting of income levels at the bottom of the income distribution, a problem highlighted by many authors (see Butelmann and Gallergo (2001) for Chile, or Denizer et al. (2002) for Bulgaria, Hungary, and Poland). Another way of looking at the income elasticity of consumption elasticity is to obtain estimates conditional on household characteristics like number of dependants (pintr\_fam), rural/urban area (mediu, coded as rural=0, urban=1), education (dummy variables edu2 and edu3, reflecting high-school and university educated head of households, respectively) and age of head (varsta) and its square (varsta2). To this end, we regress the log of consumption expenditure on the log of net income (lvenit\_net and lchelt\_cons, respectively) and the other explanatory variables for each income quartile, for 2005 (the results are shown in Table 10). Since income and consumption are in logs, the coefficient on log income can be interpreted as elasticity.

Table 10. Robust regression, dependant variable: log of consumption

First quartile robust regression estimates Number of obs = 2471  
F( 7, 2463) = 245.30  
Prob > F = 0.0000

lchelt_cons	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lvenit_net	.8103154	.0211361	38.34	0.000	.7688691	.8517618
pintr_fam	.0116152	.0053621	2.17	0.030	.0011005	.0221299
mediu	-.0802428	.0113688	-7.06	0.000	-.102536	-.0579496
varsta	.001462	.0024796	0.59	0.556	-.0034004	.0063243
varsta2	-.0000292	.0000262	-1.11	0.266	-.0000807	.0000222
edu2	.0203598	.0121193	1.68	0.093	-.0034053	.0441248
edu3	.0832907	.0273008	3.05	0.002	.0297559	.1368256
_cons	1.190968	.1423062	8.37	0.000	.9119157	1.47002

Second quartile robust regression estimates Number of obs = 2471  
F( 7, 2463) = 40.99  
Prob > F = 0.0000

lchelt_cons	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lvenit_net	.8072038	.0520152	15.52	0.000	.7052057	.9092019
pintr_fam	.0175617	.0052981	3.31	0.001	.0071724	.0279509
mediu	-.0653710	.0122768	-5.32	0.000	-.0894450	-.0412970
varsta	.0013288	.0025866	0.51	0.607	-.0037433	.0064009
varsta2	-.000021	.0000259	-0.81	0.417	-.0000717	.0000297
edu2	.0021319	.0119918	0.18	0.859	-.0213831	.0256469
edu3	.0346612	.0209424	1.66	0.098	-.0064053	.0757277
_cons	1.193735	.3537667	3.37	0.001	.5000242	1.887446

Third quartile robust regression estimates Number of obs = 2471  
F( 7, 2463) = 34.73  
Prob > F = 0.0000

lchelt_cons	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lvenit_net	.7348997	.0565763	12.99	0.000	.6239576	.8458418
pintr_fam	.0195813	.0057731	3.39	0.001	.0082607	.0309019
mediu	-.0694594	.0133632	-5.20	0.000	-.0956638	-.0432550
varsta	.0076063	.0029332	2.59	0.010	.0018544	.0133581
varsta2	-.0000746	.0000291	-2.56	0.010	-.0001317	-.0000175
edu2	.0487408	.012566	3.88	0.000	.0240998	.0733818
edu3	.0504181	.0180065	2.80	0.005	.0151086	.0857275
_cons	1.515102	.4053313	3.74	0.000	.7202765	2.309927

Fourth quartile robust regression estimates Number of obs = 2471  
F( 7, 2463) = 146.69  
Prob > F = 0.0000

lchelt_cons	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lvenit_net	.7188098	.0241215	29.80	0.000	.6715093	.7661103
pintr_fam	.0272588	.0074035	3.68	0.000	.012741	.0417766
mediu	-.0296547	.0090231	-3.29	0.001	-.0473485	-.011961
varsta	.0028302	.0035733	0.79	0.428	-.0041768	.0098372
varsta2	-.0000228	.0000358	-0.64	0.524	-.0000929	.0000473
edu2	.0087709	.0176417	0.50	0.619	-.0258232	.043365
edu3	.0433525	.0189998	2.28	0.023	.0060954	.0806097
_cons	1.749997	.1983758	8.82	0.000	1.360997	2.138998

The results show that the higher the income level, the lower the elasticity of consumption with respect to income. A possible explanation for this is that families save more as their income grows, since the consumption necessities grow slower than income, especially in the top half of the income distribution (households below the

median do not save or have negative savings). This explanation is supported by studies on household savings behaviour who find that families in the upper part of the income distribution have higher saving rates compared to families in the lower part (Harris et al (1999), Denizer et al. (2002)).

*Table 11. Elasticity of consumption by income quantiles, results*

	Elasticity	FT Gain (RON)	Amount Spent
0-25%	81.0%	15.4	12.5
25-50%	80.7%	33.5	27.0
50-75%	73.5%	62.1	45.6
75-100%	71.9%	159.4	114.61
Total		270.4	199.8

Table 11 summarizes the impact of income elasticity on flat tax gains: since the majority of the gains are concentrated in the fourth quartile, that elasticity has the biggest impact on the average: those families gaining, on average, almost 160 RON have spent 115 RON. We estimate that, on average, about 74 percent (199.8/270.4) of the flat tax gains went into consumption.

Since much of the extra disposable income went into consumption, we would like to know if it went into durable goods. We look at the share of expenditures on durable goods in total consumption, as a function of flat tax gains.

*Table 12. Durable goods consumption, as a function of flat tax gains*

Quartile FT Gain	No. of families	Bought Durables	Share of total income
1	2471	322	19.3%
2	2471	365	8.8%
3	2471	452	14.0%
4	2471	518	17.1%

Out of 9884 families with at least one employee survey, only 1657 (less than 17%) bought durable goods during the survey month. The nature of the survey (registering the family income and expenditures on a monthly, not yearly, basis) clearly underestimates both the number of families who bought durables, and the amount spent. However, if the sample is representative, then we can safely conclude that the higher the flat tax gain (hence, the income), the higher the probability of spending on durable goods. As far as how much of the total income is spent on durables, the fraction appears to be increasing with flat tax gains (and income). The first quartile is again an exception, and the likely explanation is that (as we mentioned before) there may be significant income underreporting in this quartile, which leads to a higher share of income spent on durables.

#### **4. Conclusions and policy recommendations**

In this paper we focused on two research questions related to the flat tax impact on inequality in Romania. We compared 2005 against 2004, when we were able to isolate the flat tax impact from other factors.

First, how were the gains and losses from the flat tax distributed? We found that, the higher the gross wage, the higher the flat tax gains; and the higher the number of dependents, the lower the flat tax gains.

The average monthly gain was 25 RON; 90% of the employees gained less than 50 RON. The flat tax gains were unevenly distributed: 10% of the total employees received 40% of the total flat tax gains. In relative terms, the average flat tax gain represented 3.73% of the net wage, while only 2% of the total employees gained more than 10% of their net wage.

The inequality indicators we calculated (the Gini index, the relative mean deviation, the coefficient of variation, the standard deviation of logarithms, the Mehran index and the Piesch index) show an increase in inequality determined by the flat tax. The Lorenz curve is illustrative, as only the last quantile of the population (richest 20%) appears as the clear winner of the flat tax.

Second, was the extra disposable income spent or saved? Our analysis was made at household (family) level, as individual data were not available for consumption behaviour.

A typical winning family from the flat tax has the following characteristics: is part of the top 20% in terms of the net income labour; 76% of the winning families heads graduated from high school at least (34% of them have college education); 83.5% live in the urban area; 48% of them do not have dependants (from the fiscal point of view); and – most important – the average net income of the winning families is three times higher than the average net wage.

The flat tax gains represent 3.3% of the total net income for the top half families in the income distribution and 2.4% for the bottom half. For only 1% of the families, the richest ones, the flat tax gains represent 10% of their total net income. Most of the flat tax gains were spent, instead of saved. Our estimation is that on average 74% of the flat tax gains were spent on current consumption goods (the richest families spent 72%, the poorest families spent 81%).

The results indicate that the higher the income level, the lower the income elasticity of consumption. One possible explanation is that the poorest families cannot afford to save as their income is barely enough to meet the basic needs, and once their income grows, they start saving a higher fraction of it.

We recommend to replace the flat tax by a progressive tax, with two or three brackets, with large differences between them. This would reduce inequality, and would also leave more money to the poorest families, helping them also to access credits.

In the current global economic crisis, there is a strong urge from governments' side to increase revenues by, if possible, increasing fiscality. Particularly in countries with a flat tax, who found themselves in need of an emergency loan from the International Monetary Fund (such as Latvia and Romania), we recommend not to increase VAT, neither to increase the rate of the flat tax – these two measures would also increase inequality, but rather to replace the flat tax by a progressive tax system, serving two goals: increasing budget revenues and decreasing inequality.

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## Annex

*Figure 1 (detail): Theoretical profit/loss (P/L) from flat tax, with a regressive allowance, 2005*

