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Source / Izvornik: **Newsletter : an occasional publication of the Institute of Public Finance, 2011, 13, 1 - 6**

Journal article, Published version

Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

Permanent link / Trajna poveznica: <https://urn.nsk.hr/urn:nbn:hr:242:981563>

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Download date / Datum preuzimanja: **2024-10-06**



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# Distribution of tax burden in Croatia

IVICA URBAN Institute of Public Finance

*Do the persons with higher incomes bear greater tax burdens than those with lower incomes? What is the contribution of different taxes to the overall tax burden for different income groups?*

*Information about the distribution of the overall tax burden are important for economic policy and for the transparency of public finances. This article presents preliminary results of research on the distribution of the tax burden in Croatia 2008, which is based on data from the Household Budget Survey of the Croatian Bureau of Statistics and covers the main groups of taxes – personal income tax with a surtax, value-added tax and excise taxes, whereby the social security contributions and broadcasting fee are also treated as taxes.*

The key results are:

- The overall tax burden is increasing in absolute and relative terms. “In absolute terms” means that people with higher income pay larger money amounts of taxes. For example, on a monthly basis, people from the bottom decile group paid 300 kuna on the average for all of the analysed taxes, while people from the top decile group paid an average amount of 4,300 kuna.
- “In relative terms” refers to the average tax rate (ATR), i.e., the ratio between overall tax and gross income. People with higher gross incomes face higher ATR, so it can be concluded that the analysed tax system shows the trend of *progressivity*. Thus, the total ATR for people from the bottom decile group equals 33%, while for the top decile group ATR increases to 46%.

- However, while the personal income tax and social security contributions are *progressive*, value-added tax and excise taxes are *regressive* – their ATR is falling with gross income. VAT and excise taxes are regressive because for people with lower incomes the share of expenditures in their gross income is considerably higher than for people with higher incomes.

## I. CALCULATION OF TAX BURDEN

Previous studies of the distribution of the tax burden in Croatia have focused almost exclusively on the personal income tax and surtax (henceforth PITS). They have shown that PITS is progressive – in relative terms its burden falls relatively more heavily on taxpayers with higher incomes, while those with low incomes – thanks to the personal allowance – actually pay zero amounts of PITS.<sup>1</sup> However, the burden of PITS represents only a fraction of the total tax burden in Croatia. To obtain a more complete picture, this study examines the distribution of other important taxes – VAT, excise taxes and social security contributions (SSC).

Thus, the research has covered the following types of taxes:

- PITS;
- *employers’* SSC for health and unemployment insurance;
- *employees’* SSC to the 1<sup>st</sup> pillar of the pension system. Mandatory contributions to individual accounts (2<sup>nd</sup> pi-

<sup>1</sup> Kesner-Škreb and Madžarević-Šujster (2003), and Urban (2006). These analyses were based on administrative data obtained from the Tax Administration.

llar) are not treated as taxes, but as a form of personal savings;

- SSC of the self-employed: to the 1st pillar of the pension system and for health insurance;
- value added tax;
- excise taxes: on cars, petrol, alcoholic and non-alcoholic beverages, beer, tobacco products, coffee, luxury products, etc.;
- broadcasting fee (BCF; “RTV-pristojba”). Although it is a fee, this analysis includes it in taxes.<sup>2</sup>

Taxes covered by the research (excluding BCF) totalled 105 billion kuna and accounted for 79% of general government revenue (GGR) in 2008. Of major taxes only the corporate income tax is not covered; it accounted for 8% of the total GGR.<sup>3</sup>

With standard assumptions about the incidence of taxation (see Appendix 1), it can be concluded that the burden of PITs is borne by income earners, while SSC create a burden on employees and the self-employed. Statutory obligation to pay VAT and excise taxes lies on the firms, but they shift the burden of these taxes to buyers.

Table 1 summarizes the assumptions about the incidence of various taxes.

The study used the Household Budget Survey (HBS) of the Central Bureau of Statistics, which contains a wealth of data on the socio-economic characteristics, assets, income and consumption of households and their members.

HBS does not contain information on amounts of various taxes, and therefore, their amounts must be calculated. For this research the author has created a *microsimulation model* (MSM) which uses data on households and their members to calculate amounts of their gross income and taxes.

Different data (on net incomes of household members, the number of children and adult dependents, place of residence, and even on the amounts of insurance premiums and interest on housing loans), are used first to calculate personal allowances and deductions for every person in the sample, and accordingly the burden of PITs. Then, from the data on gross wages, the amounts of SSC are calculated. The contributions of self-employed people are calculated separately.

To estimate the burden of VAT and excise taxes, the model uses the HBS data on the expenditures of households for a plethora of different goods, in order to calculate the amount of a tax “within the price of the product”.<sup>4</sup> It was not necessary to calculate BCF using the model because its amounts already exist in the HBS.

## 2. GROSS INCOME

*Gross income* is a sum of market income, pensions, cash social benefits, value of production for own use and transfers from private persons. Market income is income (before taxation) from wages and salaries, self-employment, property and capital.

**Table 1**

*Assumptions about the economic incidence of taxes*

| Types of taxes           | Who bears the burden  |
|--------------------------|---|
| PITs                     | income earners (wages and salaries, pensions, self-employment, rentals) |
| employers' SSC           | employees (labourers)   |
| employees' SSC           | employees (labourers)   |
| SSC of the self-employed | the self-employed people  |
| VAT                      | purchasers of market goods  |
| excise taxes             | purchasers of market goods  |
| broadcasting fee         | owners of TV and radio sets   |

<sup>2</sup> General tax law distinguishes taxes from SSC and fees (Kesner-Škreb and Kuliš, 2010). However, common to all of these public dues is that they are used to finance public services, and that citizens are legally obliged to pay them. It therefore seems reasonable to put SSC and BCF into the common analytical framework with taxes.

<sup>3</sup> The other taxes not covered by this research represent 4% of GGR. Other general government revenues (from sales of goods and services, administrative fees, etc.), which make up 11% of GGR, are also ignored.

<sup>4</sup> For example, in 2008 suppose that a household purchased 100 litres of beer at price of 6 kuna per litre. In 2008 the VAT rate on beer was 22%, which means that the total “VAT inclusive” amount of 600 kuna contains 108.20 kuna of VAT. However, there is also to be paid the beer excise tax, equalling 200 kuna per hectolitre of beer (assuming that the volume percentage of alcohol is 5%), and it turns out that the household has “paid” 200 kuna of beer excise tax. Appropriate procedures are applied to all products and all households.

Table 2 shows the income boundaries of decile groups (D), which are marked below with D<sub>1</sub>, D<sub>2</sub>, etc.<sup>5</sup> For example, in the first decile group, D<sub>1</sub>, there are persons whose monthly gross income does not exceed 1,300 HRK; in D<sub>2</sub> are those with monthly gross income between 1,300 and 1,700 kuna, etc. In the D<sub>10</sub> are persons with a monthly gross income of more than 6,300 kuna.

Graph 1 shows the monthly gross income per person (in thousands of kuna). On average, persons from D<sub>10</sub> have almost twice the gross income than the people from the next lower group, D<sub>9</sub>, and 11 times more than the lowest decile group, D<sub>1</sub>.

Graph 2 shows the structure of the population by decile groups. Dependants prevail in D<sub>1</sub>, and in groups D<sub>2</sub> to D<sub>5</sub> the pensioners prevail.<sup>6</sup> The share of employed persons is only 5% in D<sub>1</sub>, rising to 61% in D<sub>10</sub>. Children are equally present in all groups except in D<sub>10</sub>, where their share is slightly lower.

### 3. TAX BURDEN BY DECILE GROUPS

Gross income can be imagined as a “cake” that is cut by the government which takes away its pieces from the citizens.<sup>7</sup> The process of taxation is carried out in phases. First, SSC and PITS are deducted from gross income, and the remaining amount is called net or disposable income, because people can freely dispose of it. Disposable income can be used for different purposes – current consumption, purchases of durable goods, savings, investment or loan repayment. Buying goods for current consumption (non-durable consumer goods) and goods that can be used over a longer period (durable goods), the persons bear the burden of VAT and excise taxes. Part of disposable income goes to pay BCF.

Graph 3 shows the average monthly amounts of different taxes per person. For D<sub>10</sub> the most significant is the burden of SSC and PITS, while excise taxes and VAT have a lesser role. It is quite the contrary with D<sub>1</sub>, for which

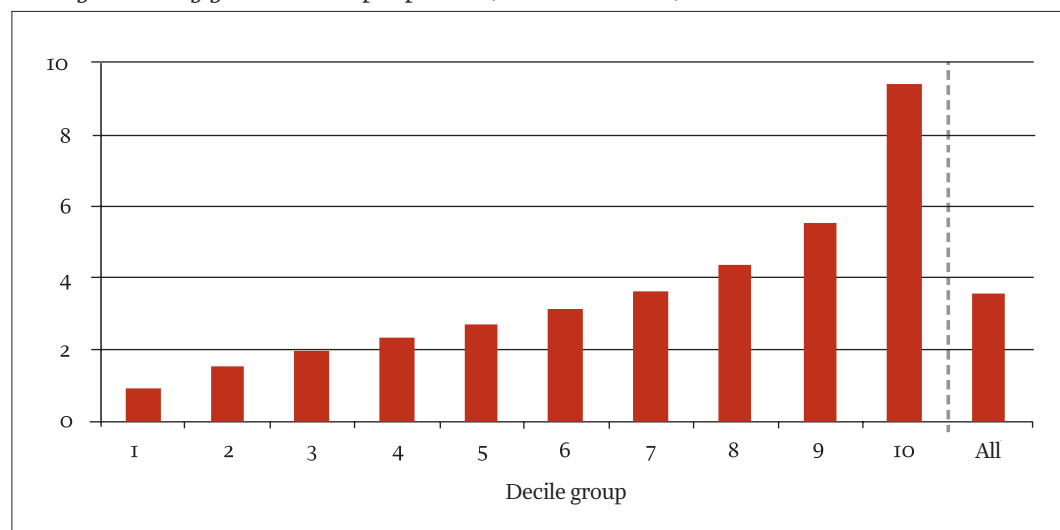
**Table 2**

*Boundaries of decile groups, in monthly gross income per person (kuna)*

| Decile group | D <sub>1</sub> | D <sub>2</sub>  | D <sub>3</sub>  | D <sub>4</sub>  | D <sub>5</sub>  | D <sub>6</sub>  | D <sub>7</sub>  | D <sub>8</sub>  | D <sub>9</sub>  | D <sub>10</sub> |
|--------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Boundaries   | 0-<br>1,300    | 1,300-<br>1,700 | 1,700-<br>2,100 | 2,100-<br>2,500 | 2,500-<br>2,900 | 2,900-<br>3,300 | 3,300-<br>3,900 | 3,900-<br>5,800 | 4,800-<br>6,300 | 6,300<br>& more |

**Graph 1**

*Average monthly gross income per person (thousands kuna)*



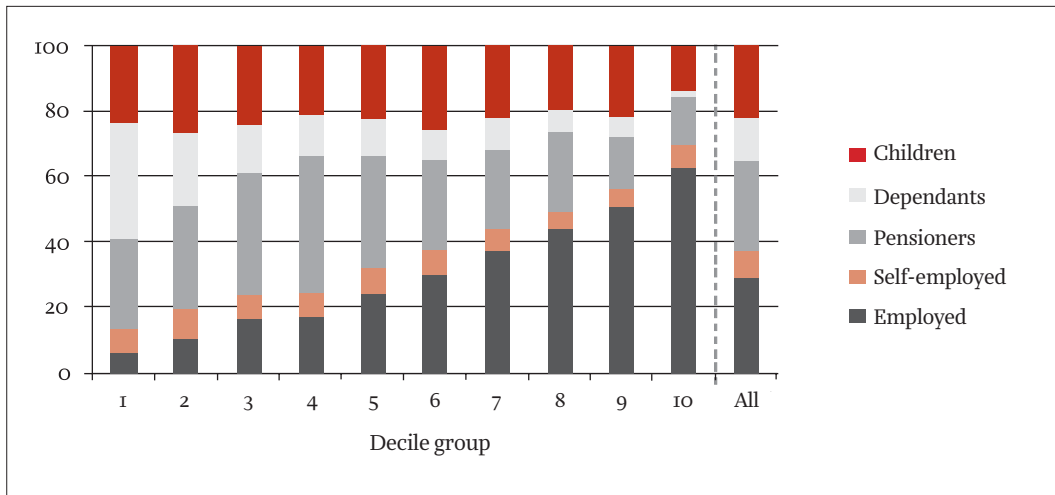
<sup>5</sup> Each household is divided into persons – its members, so that to each person an equal share of gross household income and taxes is assigned. For example, the three-member household with a gross income of 6,000 kuna and the tax burden of 1,500 kuna is divided into three persons. Each person is assigned the gross income of 2,000 kuna and the tax burden of 500 kuna. Persons are sorted in increasing order of gross income, and then assembled into ten groups so that each has equal number of persons (decile groups).

<sup>6</sup> “Dependants” are unemployed, housewives and unable to work. “Children” are preschool and school children, and students.

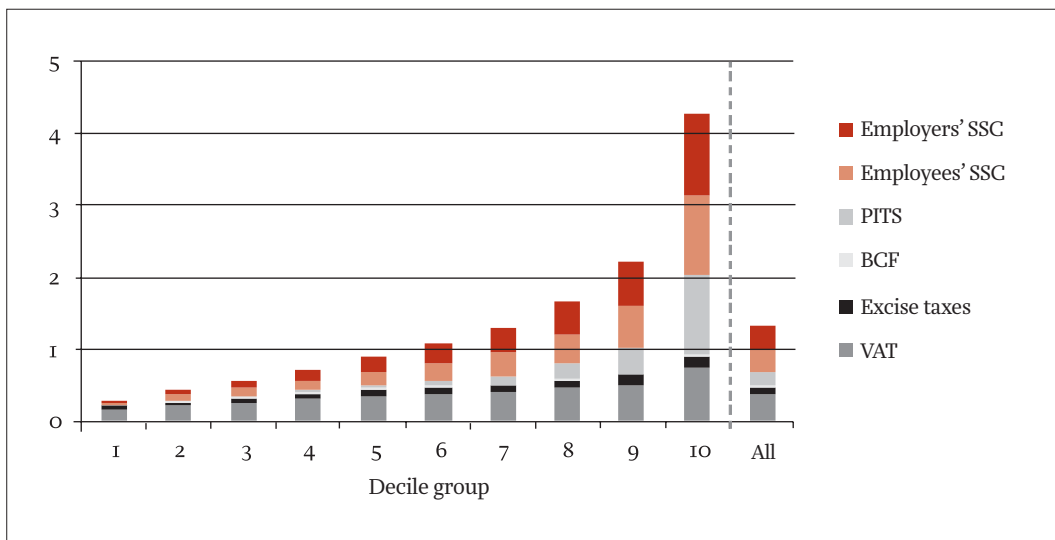
the main burden is represented by VAT. All taxes on the average increase with income, but there are differences in the pattern of change. The amounts of SSC and PITS

<sup>7</sup> However, if the guest is too “gourmand”, it might occur that the host will offer a smaller cake on the next occasion. Taxes decrease the profitability of economic activities, reducing the size of production and gross income (see footnote 13 and Entin, 2004).

**Graph 2**  
Population by economic status (%)



**Graph 3**  
Average monthly tax burden per person (thousands kuna)



increase rapidly with gross income, while the amounts of VAT and excise taxes are increasing more slowly.<sup>8</sup>

Differences in the total tax per person are significant. Graph 3 indicates that, on average, persons from D1 pay 300 kuna monthly, whereas those from D10 pay around 4,300 kuna.<sup>9</sup>

So, in absolute or money terms, the tax burden rises with income. But what happens in “relative” terms: how does the average tax rate change with gross income? The ave

<sup>8</sup> SSC of the self-employed are displayed along with other SSC: a part of SSC for health insurance has been placed in the “employers’ SSC”, and a part of SSC for the pension fund is added to “employees’ SSC”.

<sup>9</sup> DG10 is an “open” decile group to which belong all persons with a monthly gross income of more than 6,300 kuna. The greatest monthly gross income of one person in the sample was 41,500 kuna, with the corresponding tax burden of 22,000 kuna.

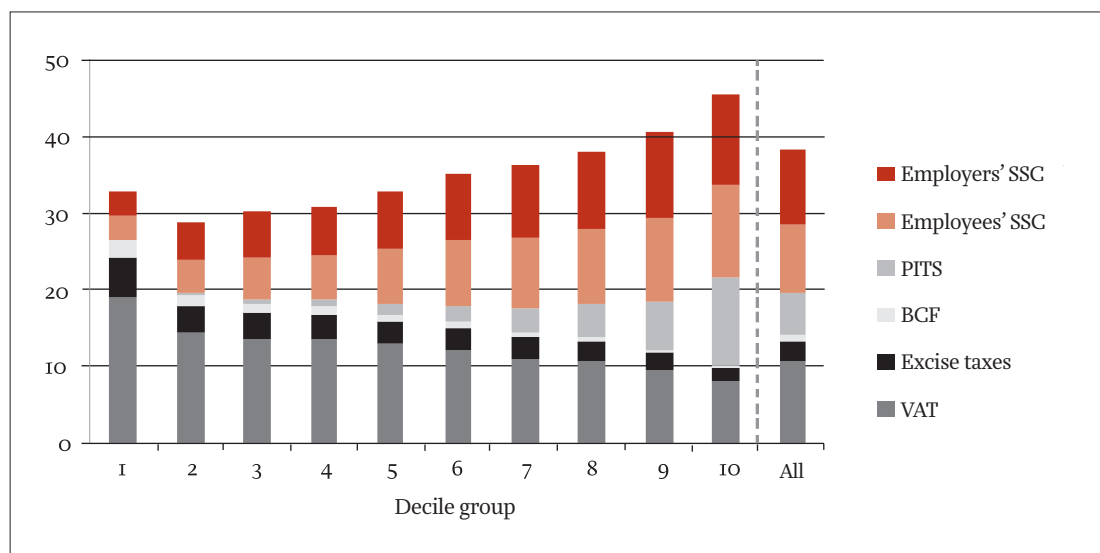
rage tax rate (ATR) is defined as the ratio of tax burden to total gross income. ATR can be calculated for individual taxes and all taxes together, thus to obtain an overall ATR.

As shown in Graph 4, in the first column on the right, the overall ATR for the entire population is about 38%. For D1 overall ATR is 33%, then falling to 29% for D2, but after that rising throughout to 46% for D10, by which it can be concluded that the analysed tax system is progressive.

However, the relative burdens of different taxes do not follow the same pattern: for PITS and SSC, ATR increases with gross income, which means that these taxes are *progressive*. On the other hand, the ATR of the VAT, excise taxes, and BCF all fall, which indicates their *regressivity*.

Graph 4 shows that PITS’s progressivity “compensates” for the regressivity of VAT, excise taxes and BCF: as much

**Graph 4**  
Average tax rates (%)



as the aggregate ATR of those taxes falls, by so much grows the ATR of PITS. Thus, without SSC, the system would be roughly proportional, with a total ATR of 19% for all decile groups (except for D1). But, where does the progressivity of SSC come from? It is a consequence of the fact that in the lower decile groups there are fewer employed persons (who pay SSC) than in the upper decile groups, where pensioners and dependants prevail (recall Graph 2).

Why are the VAT and excise taxes regressive? By purchasing goods, people “pay” VAT and excise taxes. Since people with lower incomes spend a higher percentage of their gross income to purchase goods than people with higher incomes, the share of VAT and excise taxes in gross income is also higher for the former than for the latter ones. However, one should ask: *why* do people with lower incomes spend a relatively higher portion of their income than people with higher incomes? There are two main reasons:

- PITS and SSC are progressive. Since, on average, these taxes take a larger part of gross income from people with higher incomes, they are left with relatively lower disposable income which can be spent on purchasing goods.<sup>10</sup>
- Employed people of mature age are saving and investing in order to pile stocks that will be spent in old age. Graph 2 shows that employed people prevail among those with higher incomes, while pensioners prevail in the groups with lower income. Thus, on average, the upper decile groups are spending relatively less and saving relatively more (creating a pool of savings), while the lower groups are doing the reverse (spending previously created supplies).

<sup>10</sup> On average, SSC and PITS represent 35% of gross income for persons in DG10, and only 6% of gross income for persons in DG1.

#### 4. FURTHER RESEARCH

The reliability of the information about the distribution of the tax burden is dependent on the correctness of assumptions about the incidence of taxes, on the performance of the model which calculates taxes, and on the accuracy of data on incomes and expenditures of households. Some constraints regarding the data are discussed in Appendix 2.

In addition to the already used methodology and data sources, further research will employ others, in order to obtain a more complete picture of the distribution of the *tax burden*, but also of the *benefits* the citizens receive from public spending (public services, social transfers, subsidies, etc.). That is to say, as the tax burden varies from person to person, so do the benefits from public spending.

#### APPENDIX I: TAX INCIDENCE ASSUMPTIONS

Taxes affect the quantities and prices of goods (products and factors of production), and consequently income, consumption and, generally, the living standards of individuals. The tax burden is the reduction in living standards of an individual caused by the taxes. *Tax incidence* is the field of economics that studies the size and distribution of the tax burden.<sup>11</sup>

Researchers usually apply certain assumptions about the incidence of various taxes, derived from theoretical and empirical research. If demand for a good is “perfectly inelastic”, the introduction of tax does not change the quantity sold, but the price paid by a purchaser (market price)

<sup>11</sup> From the broad literature on tax incidence see, for example, Kesselman and Cheung (2004), Ruggeri, Van Wart and Howard (1996) and Entin (2004).



increases by the amount of tax per unit of a good. The seller's revenue per unit of good remains the same, and the overall tax burden is "shifted" to the purchaser. Such an assumption of "perfectly inelastic demand" is used in estimating the burden of excise taxes, where it is said that the entire burden of excise taxes on coffee, cigarettes or petrol is borne by consumers.

If the supply of a good is "perfectly inelastic", the new tax will not affect the quantity sold or the price paid by purchasers (market price). However, suppliers' revenue per unit of good is reduced by the amount of the tax, which means that the overall tax burden falls onto them.<sup>12</sup> This assumption of "perfectly inelastic supply" is used in assessing the burden of the personal income tax and SSC. Thus, the overall burden of personal income tax is borne by income earners, while the full burden of SSC falls onto employees, including the part of the contributions for which the statutory obligation lies on employers.

The use of such simplified assumptions certainly facilitates research, but we should be aware of the limitations they carry. Specific conditions in different markets and their interaction are neglected. It is assumed that taxes do not reduce the supply of products and factors of production factors, but only decrease income and consumption of individuals.<sup>13</sup>

## APPENDIX 2: CONSTRAINTS OF ANALYSIS

From a total of 105 billion kuna of actual revenues collected from taxes included in this analysis, MSM has captured 67 billion kuna of the tax burden (excluding BCF). There are several reasons for incomplete coverage:

- MSM calculates excise taxes only for expenditures directly related to personal consumption. For example,

<sup>12</sup> The demand (supply) is "inelastic" when large price changes induce only small changes in the quantity demanded (supplied).

<sup>13</sup> However, in reality taxes do affect production and employment. For example, a large increase in excise taxes on small vessels caused the huge drop in sales and production (see Urban, 2009, and the Amendments to the Act on Special Tax on Personal Vehicles, other Motor Vehicles, Vessels and Planes, <http://www.vlada.hr/hr/content/download/118405/1701089/file/38-03.pdf>).

the excise tax on petroleum products is calculated only for the part that comes from buying gasoline for cars owned by households. However, citizens also bear the burden of this excise tax indirectly, through the taxation of gasoline used by firms in the production of various goods, but that part of the burden is not ascertained here. Concerning the excise taxes on beer and other alcoholic beverages, the model covers only the part of consumption "at home", and omits the part spent in the bars and restaurants.

- The expenditures on some goods (for example, cars, cigarettes and alcohol), and incomes of people in certain income groups (especially those with the lowest and highest incomes) are underestimated in the HBS. Consequently, the burden of some excise taxes, as well as of SSC and PITS, is most likely underestimated.
- Part of the burden of the VAT and excise taxes falls on tourists and other visitors from abroad, and a part of it is borne by the government through its acquisition of goods and services.

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