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The Distributional Impact of Taxes and Social Spending in Croatia

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Abstract

This paper describes the impact of fiscal policy on inequality and poverty, and examines recent policy changes and whether there is room for an increased role for fiscal policy in improving the well-being of the poor. Taxes and social spending reduced inequality in Croatia; however, once the impacts of indirect taxes are considered, the system is unable to reduce poverty, especially for families with children and retirees. Beginning in the second decile, households are net payers to the treasury, as the share of taxes paid exceeded the cash benefits received for all but the poorest 10 percent of the population. Microsimulations of recent tax changes find that inequality after taxes and transfers is expected to increase slightly in 2017, as most of the benefits of the reform were concentrated at the top of the distribution. Although the impact of lower value-added taxes on electricity and utility bills is expected to be slightly poverty reducing, this effect is small relative to the relief that is needed. A reduction in the standard value-added tax rate from 25 to 24 percent would result in a small decline in poverty and inequality. However, the impact may be much smaller, depending on how this measure would be financed.

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The Distributional Impact of Taxes and Social Spending in Croatia

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I. Introduction

Croatia is committed to a fiscal consolidation agenda in the context of its National Reform Program, aimed at achieving sustainable economic growth, increased employment, and the reduction of macroeconomic imbalances. As part of that effort, the government has recently designed and begun to implement a set of tax reforms and aims to align the education sector with labor market needs, improve the sustainability of the health care and pension systems, and improve the efficiency of the social benefit system, with the goal of reducing the number of persons at risk of poverty and social exclusion (National Reform Plan, 2017).² Given the potential tradeoffs in terms of meeting fiscal consolidation and social inclusion goals, comprehensive empirical analysis of the distributional impact of changes in taxes and social spending can help to inform policy by ensuring that the combination of policies recently implemented and policies being envisaged achieve the goals laid out by the government.

In this context, work on the role of fiscal policy in Croatia has recently expanded significantly. Early work using 2007 data highlighted the relatively high pre-fiscal income inequality in Croatia and despite the relatively large redistributive effect of the policies, these were still less redistributive compared to Slovenia (Čok et al., 2012). In particular, earlier work using data for 2010 emphasized the fact that horizontal inequities arising from the benefit system dampened to some extent the redistributive role of fiscal policy (Urban 2014 and 2016). More recent work has been done in the context of a broader effort to build microsimulation models in the EU through EUROMOD (Urban and Bezeredi, 2016). This analysis includes the distributional impact of changes in subsistence and means tested benefits undertaken in 2014, as well as changes in personal income taxes in 2015. The results suggest that these policies led to an overall increase in average household disposable income, driven by changes in the increase in personal income tax allowances. Nevertheless, the main beneficiaries were people located in the upper and middle part of the income distribution (Urban and Bezeredi, 2016). Similarly, analysis of subsequent changes that entered into force in 2017 found only slight increases in disposable income in the middle of the distribution, while most of the gain was concentrated in the top two deciles. As a result, both the 2015 and the 2017 reforms somewhat increased income inequality (European Commission, 2017).

However, the existing analysis has so far not included the redistributive effects of indirect taxation, despite the fact that it makes up about half of total tax collections and imposes a relatively large burden on the population. In addition, most studies do not include the impact of spending on education and health, despite the fact that they make up more than 40 percent of total social spending, and are at the root of the National Reform Plan. Finally, existing studies have not focused

² Croatia has recently exited the Excessive Deficit Procedure as a result of its fiscal consolidation efforts. See: <u>http://europa.eu/rapid/press-release_MEMO-17-1339_en.htm</u>.

on the impact of taxes and spending on poverty. This is important, as a system could reduce inequality but still lead to greater poverty levels.

This paper aims to move a step in this direction by presenting a more comprehensive analysis of the distributional impact of taxes and social spending in Croatia. Building on existing work, the analysis covers the impact of the contributory pension system, direct taxes and transfers. In contrast to previous studies, this work also includes the impact of value added and excise taxes, as well as the impact of education and health spending. The analysis assesses the progressiveness of each fiscal instrument and its contribution to poverty and inequality reduction. The approach follows the Commitment to Equity (CEQ) approach (Lustig, 2017), allowing for comparisons between Croatia with other countries where the CEQ methodology has been applied.³

The results suggest that the existing system leads to higher levels of poverty, mostly on account of indirect taxes. In fact, only the poorest 10 percent of the population receive more in benefits than what they pay in taxes. Starting from a relatively low level of market income inequality, the Croatian direct tax and transfer system is redistributive, with progressive and inequality-reducing direct taxes and transfers, in line with other European countries, and more so than other developing countries. However, indirect taxes are regressive and inequality-increasing, so much so that the redistributive power of direct taxes and transfers is offset. With regards to in-kind transfers, when the value of education and health are included in the analysis, there is an important redistributive effect, mostly on account of primary education.

In terms of the recent changes to taxes implemented, the analysis finds that both direct and indirect taxes became more progressive in 2017 compared to 2014. However, since most of the tax relief accrued to the top of the income distribution, the redistributive impact of personal income taxes and social security contributions was reduced. As a result, inequality after taxes and transfers is expected to increase slightly in 2017 compared to 2014. However, when it comes to poverty, the impact of a lower VAT on electricity and utility bills is expected to be poverty reducing, however this effect is small relative to the relief that is needed. Finally, a simulation of a reduction in the standard VAT rate from 25 to 24 percent is presented, yielding a small decline in inequality and a 0.21 percentage point decline in relative poverty at a cost of about 0.41 percent of GDP. Depending on the sources of financing for such a measure, this impact may be much smaller.

The analysis is built on 2014 household surveys collected by the Croatian Bureau of Statistics, data from National Income Accounts, and public finance accounts from the Ministry of Finance, Ministry of Health and Ministry of Science and Education. In terms of coverage of components of fiscal policy, the analysis includes 50 percent of tax revenue and 49 percent of government spending. The analysis does not cover the corporate profit tax or VAT paid by government or other institutions as these are difficult to assign to individual households based on the available information. On the spending side, the analysis only covers social spending, as it is very difficult

³ For more details, see <u>http://www.commitmentoequity.org</u>.

to assign benefits of other types of spending to individual households. Due to the difficulty in identifying veterans, we are unable to identify veteran benefits separately, but these are included as part of total pensions and disability benefits.

The rest of the paper is organized as follows. The next section describes the structure of taxes and social spending in Croatia, followed by the general methodology, the data used and assumptions made in estimating the taxes paid by households and the benefits received. Section IV describes the overall impact of fiscal policy on poverty and inequality. The incidence of taxes and spending are presented in section V, followed by simulations of recent tax changes in section VI and discussion of alternative reforms in section VII. Section VIII concludes.

II. The structure of taxes and social spending in Croatia: 2014

The Croatian Public Finance System

Public finance in Croatia consists of the central and local governments and public enterprises. Social security funds are part of the central government and include the Croatian Pension Insurance Institute, the Croatian Health Insurance Fund and the Croatian Employment Service. The structure of tax revenues in Croatia is shown in Table 1.

Indirect taxes made up about 68 percent of the total tax collection of the general government in 2014, with the bulk of indirect taxes collected from VAT (Table 1). Our analysis focused on the major tax items, namely personal income taxes, VAT, excise, and beverage taxes. These items made up about 83 percent of all tax revenue in 2014. Corporate taxes were not included given the difficulty of attributing the tax burden to specific households.

Direct taxes and social insurance contributions

Personal income tax (PIT) revenues accounted for 3.6 percent of GDP in 2014, which was shared between the central, regional and local self-governments. The PIT applies to employment earnings, income from self-employment, pensions, rental income, some forms of capital income (including rental, interest and dividend income). The personal income tax (PIT) system is an individual system, with spouses being assessed independently. The income tax brackets of the PIT were reduced from three (12, 25 and 40 percent) in 2011-2015, to two rates in 2017 (24 and 36 percent) and the basic personal allowance was significantly increased (from a threshold of HRK 2,600 to HRK 3,800). Other changes in the PIT include a more progressive scale for expanding the personal allowance for dependent children and other supported family members (see Appendix 1 for details of the tax and spending system).

In addition, a surtax is paid by PIT taxpayers to local self-governments using the amount of PIT as the tax base. Local self-governments set the level of the rate with some restrictions. The

maximum rate is 10 percent in municipalities, 12 percent in cities with a population below 30,000, and 15 percent in cities with a population over 30,000, except for Zagreb, where the current rate is 18 percent and could increase to a maximum of 30 percent.

	Fiscal data		Included in analysis (fiscal		iscal data)
	(III HKK)		Yes/No	Portion included	% of GDP
Total revenue	139,959	42.6		67,673	20.6
Total tax receipts	81,528	24.8		67,673	20.6
Direct taxes	17,612	5.4		11,890	3.6
Personal income tax + Surtax	11,954	3.6		11,890	3.6
Employment earnings (general schedule)	10,410	3.2	Yes	10,410	2.2
Income from self-employment (general schedule)	784	0.2	Yes	784	5.2
Capital tax (dividends, interest) - single 12% rate schedule	438	0.1	Yes	438	0.1
Rental income - single 12% rate	258	0.1	Yes	258	0.1
Income tax per annual report, net	64	0.0	No		
Corporate income tax (20%)	5,658	1.7	No		
Indirect taxes	55,783	17.0		55,783	17.0
VAT	40,923	12.5	Yes	40,923	12.5
Excise taxes	11,780	3.6	Yes	11,780	3.6
Beverages tax	1,067	0.3	Yes	2 070	0.0
Other indirect taxes	2,013	0.6	Yes	3,079	0.9
Other taxes	8,133	2.5	No		
Social contributions	41,702	12.7		41,702	12.7
General health contributions	16,732	5.1	Yes	16,732	5.1
Occupational health contributions	576	0.2	Yes	576	0.2
Employment contributions	1,933	0.6	Yes	1,933	0.6
Pension contributions A	22 4(0	()	Yes	22,460	6.8
Pension contributions B1	22,460	6.8			
Other revenue	16,729	5.1	No		

Table 1. Croatia: General Government Revenue, 2014

Sources: World Bank staff based on Ministry of Finance

In terms of social contributions, the 2002 reform of the Croatian pension system introduced three pillars: (i) intergenerational solidarity, (ii) mandatory individual savings, and (iii) voluntary individual savings. Savings in the second and third pillars are collected by private pension funds. Two parallel contributory schemes were created: scheme A for people who participate in pillar 1 only, and scheme B for people who participate both in pillar 1 and pillar 2.⁴ Persons who were aged above 50 (below 40) in January 2002 were automatically enrolled into scheme A (B), while people aged between 40 and 50 were able to choose to become members of scheme A or B. People in scheme A pay a 20 percent contribution to pillar 1 only; these contributions are called Pension

⁴ The terminology for scheme "A" and scheme "B" is taken from Urban and Bezeredi (2016).

contributions A. Correspondingly, people in scheme A receive pension from pillar 1 only. People in scheme B pay contributions to both pillars 1 (a 15 percent "pension contribution B1") and 2 (a "5 percent pension contributions B2").

Social contributions amounted to 12.7 percent of GDP in 2014, of which old-age pensions was the largest, amounting to 7.4 percent of GDP and health contributions amounted to 5.1 percent of GDP. Social contributions are paid by wage and self-employed workers based on different contribution bases. For wage earners, the social contributions base is equal to the gross employment earnings. Employer social contributions include a 15 percent general health contribution. a 0.5 percent occupational health contribution, and a 1.7 percent employment contribution. Employee social contributions include old-age pension contributions of 20 percent. For the self-employed, the contribution base is not income related, but instead is a lump-sum obtained as a percentage of the average gross wage of the previous year which ranges from 35 to 110 percent depending on the occupation. Self-employed persons pay the same general health, occupational health, employment, and old-age pension contributions as wage workers. Those earning other income (rents, dividends, interest) also pay old-age pension contributions based on the gross income amount, while the purchaser of services pays the relevant health contributions. Pensioners pay a special pensioner health contribution at two different rates, depending on the monthly gross pension.

Indirect taxes

VAT is the single largest component of tax revenue, contributing to about 50 percent of total tax collection in 2014. VAT is levied at a standard rate of 25 percent on most goods and services, a 13 percent reduced rate applies to accommodation and restaurant services, edible oils and fats, baby food, delivery of water, concerts tickets, culture/art magazines, etc., while a minimum rate of 5 percent applies to bread, milk, educational books, medical drugs, newspapers, cinema tickets, scientific journals. With the 2017 reform, VAT rates remained unchanged, but categories of goods and services were shifted across rates. In particular, the reduced rate of 13 percent is now being applied to inputs in agriculture, electricity and utility services with the objective of supporting small farmers and households. On the other hand, food and drink services were moved from the reduced to the general rate.

Excise taxes contributed 3.6 percent of GDP in 2014 and are levied on goods that are deemed to be a harmful to the health of the population or create pollution ("sin taxes"). These include: motor vehicles for personal use, coffee products, alcoholic and non-alcoholic beverages, tobacco products, energy products and electricity. Finally, beverages taxes contributed 0.3 percent of GDP in 2014 and were applied to providers of bar and restaurant services. The tax base is the sales revenue from served beverages.

Social spending

Overall expenditures in Croatia amounted to 48 percent of GDP in 2014, up from 45 percent in 2008, but have since declined (Eurostat). A large part of public spending is dedicated to social protection (14.2 percent of GDP), while education (4.3 percent of GDP) and health (5.6 percent of GDP) are also relatively important (Table 2). Total social spending in Croatia amounted to 24 percent of GDP or 50 percent of total spending. The analysis presented below covers 45 percent of all government spending and 91 percent of social spending. In what follows, we describe the main highlights of existing social spending. Direct (non-contributory) transfers include the following programs.

- *Family benefit programs*, including a one-time grant for newborn children received by all parents of newborn children and a child benefit, which is a means-tested benefit received by a parent or other person taking care of one or more children with substantial top-ups for households with three and four or more children. Supplements are also given for children without one or both parents and for children with health challenges.
- Social assistance programs include a subsistence benefit which became a guaranteed minimum benefit in 2014. It is a means-tested benefit intended for households whose income is below a basic needs threshold and depends on the characteristics and composition of the household. There is also a housing benefit, funded and distributed by local self-governments, and is a means-tested benefit that covers the costs of rent, electricity, gas, heating, water, and other housing bills for subsistence-benefit recipients. Local governments determine the income test and benefit amounts, with a maximum of 50 percent of the amount of Subsistence benefit. The recipients of the subsistence benefit also have the right to claim the benefit for covering wood-heating costs, which is also administered and financed by local governments. Finally, there is a lump-sum assistance, which is a purpose-defined benefit received by a household for covering the costs related to transportation, education, clothing, child birth, funeral expenses (Urban and Bezeredi, 2016).
- Programs for Croatian Defenders of the Homeland War include old-age pension supplement, disability pensions, orthopedic allowances, constant care supplement, survivor benefits and child benefits for surviving children. Beneficiaries are persons who participated in the organized armed defense in the period from August 1990 to June 1996. Disabled veterans (HRVIs) are categorized into 10 groups according to the level of bodily impairment sustained during the war, ranging from 20 to 100 percent impairment. Unfortunately, it is impossible to identify beneficiaries using the existing household surveys, so this is not included in the analysis.

Spending Component	Millions of HRK	% of GDP	Included in analysis	% of GDP
Total expenditures	158,037	48.1	60,816	18.5
Social Spending	78,847	24.0	60,816	18.5
Social Protection	46,749	14.2	28,977	8.8
Contributory social insurance benefits	35,976	11.0	25,341	7.7
Old age	21,054	6.4	21,054	6.4
Full-age retirement pension	19,106	5.8	19,106	5.8
Early-age pre-retirement pension	1,949	0.6	1,949	0.6
Other pension/benefits	14,921	4.5	14,921	4.5
Family pension	4,778	1.5	4,778	1.5
Disability pension	5,511	1.7	5,511	1.7
Unemployment benefit	1,496	0.5	1,496	0.5
Sickness benefit A	949	0.3	949	0.3
Sickness benefit B	345	0.1	345	0.1
Maternity leave benefit	1,842	0.6	1,842	0.6
Non-contributory benefits	9,386	2.9	3,636	1.1
Disability	949	0.3	949	0.3
Maternity, parental and child benefits	1,731	0.5	1,731	0.5
One-time grant for newborn children	92	0.0	92	0.0
Child benefit	1,639	0.5	1,639	0.5
Social assistance	956	0.3	956	0.3
Subsistence benefit	710	0.2	710	0.2
Housing benefit	171	0.1	171	0.1
Lump-sum assistance	75	0.0	75	0.0
HBDR/HRVI related benefits	5,750	1.8		
Benefits provided by local self-government units	1,387	0.4		
In-kind transfers	33,160	10.1	31,839	9.7
Education	14,081	4.3	14,081	4.3
Kindergarten	2,149	0.7	2,149	0.7
Primary school	5,840	1.8	5,840	1.8
Secondary school	3,553	1.1	3,553	1.1
Tertiary schools	2,897	0.9	2,897	0.9
Other education	36	0.0		-
Healthcare	18,507	5.6	17,757	5.4
Health insurance fund	17,757	5.4	17,757	5.4
Other health	749	0.2		
Other social spending	325	0.1		
Income support to individual farmers	140			
Other expenditure (non-social)	79,190	24.1		

Table 2: Croatia: General Government Spending, 2014

Sources: World Bank staff based on Ministry of Finance

• Local government benefits. Most local governments provide additional lump-sum grants for newborn children, cash supplements to low income groups (pensioners, disabled, unemployed), subsidies for transportation costs for vulnerable groups (pensioners, unemployed, people with disability, school children, etc.), lump-sum benefits and food packages for the poor, and benefits for students (grants, subsidies for school books, school meals).

Social spending on in-kind transfers in the form of education and health amounted to 10 percent of GDP in 2014. Kindergartens, primary schools, and secondary schools are financed by central, regional and local governments, however the bulk of spending on wages is funded by the central government (World Bank, 2008). The education system is mostly public in Croatia (private expenditure on education is small at all levels of education).

Health services are provided through the Croatian Health Insurance Fund (HZZO), which is financed from health contributions and the government budget. Although health contributions constitute the budget of HZZO, a large part of total health care expenditures are paid for from the state budget. Dependent family members are insured through other family members who pay contributions, and certain vulnerable groups, such as older pensioners and people with very low or no income, are exempted from paying contributions, yet insured nevertheless. The basic health insurance, which is compulsory, covers about 80 percent of costs of health risks. The basic "basket" of health care services includes: primary care, specialized care, inpatient services, drugs from the HZZO's list, health care while abroad, dental care, and orthopedic and other appliances. The remaining 20 percent is paid by patients themselves through out-of-pocket outlays, with a certain upper limit. The HZZO offers the 'supplemental' health insurance: for a fixed monthly fee, one gets an extension of the basic basket of services which covers a part of the 20 percent of costs not covered by the basic insurance.

III. Data sources, method, and assumptions

Data sources

Data for 2014 were used to conduct this incidence analysis study in line with the availability of survey data. Specifically, we used both the Croatian Household Budget Survey (HBS) for 2014 and the Population Income Survey (PIS) for 2015, which refers to 2014 income.⁵ The HBS contains both income and expenditure data, along with demographic and household characteristics, thus enabling the identification of indirect taxes across the distribution. However, the HBS does not have the level of detail on income and benefits received available in the PIS, nor a large enough

⁵ The PIS serves as the basis for the EU-SILC for Croatia, which aggregates some of the categories to arrive at a database that is harmonized with other European countries. We used the 2015 PIS, because the survey asks respondents to report their incomes from the previous year (2014, which is of our interest here).

sample size to ensure that a sufficiently large variation in household types was captured to assign and interpret the impact of particular taxes and benefits. As a result, the analysis is primarily based on the PIS. In order to capture the impacts of indirect taxes on consumption, the analysis employed survey-to-survey imputation to assign consumption to each household, as detailed in Appendix 2.

Household survey data are combined with data from National Income Accounts and public finance accounts from the Ministry of Finance. This included information on consolidated central government budgets, Local government budgets, and annual reports from the Central Bureau of Statistics on various sectors.

Approach

To analyze the incidence of each fiscal intervention, and the impact of taxes and social spending on poverty and inequality, we follow the Commitment to Equity (CEQ) approach of Lustig (2017) and measure per capita income before and after each fiscal intervention as described in Figure 1. In particular, for every household we define the following income concepts:

- *Market income* includes pre-tax and pre-contribution wages, salaries, and income earned from capital assets (rent, interest or dividends) and private transfers.
- *Disposable income* is constructed by adding direct transfers and subtracting direct taxes and social contributions to market income. The direct taxes considered in the case of Croatia include personal income taxes, surtaxes, taxes on vessel, road motor vehicles and vacation homes.
- *Consumable income* subtracts indirect taxes from disposable income. In Croatia, indirect taxes included in this analysis include the VAT, excises on alcohol and tobacco, fuel and automobiles, and other indirect taxes (not classified as VAT or excises).
- *Final income* adds in-kind benefits in the form of health and education to consumable income.

One area where there is no clear consensus in the literature is on how to treat contributory old-age pensions and the related contributions. Arguments exist in favor of treating contributory pensions as individual savings or deferred income, while others argue that they should be treated as a government transfer, with the related contributions being treated as a direct tax. Following Lustig (2017), we present three scenarios. Under our "main" scenario we treat old-age pensions as deferred income, and the corresponding contributions are treated as savings. In an alternative scenario, contributory old-age pensions are treated as transfers and added to market income. The corresponding contributions are treated as taxes and thus subtracted from market income to generate disposable income, in line with standard EU measurement of disposable income. Finally, in a third scenario in which the first pillar of the pension system (the pay-as-you-go pillar) is treated as a transfer, while the second pillar is treated as deferred saving. The alternative scenarios are presented in Appendix 3.



Assumptions

We assume that the economic incidence of direct taxes and contributions are borne entirely by the income earner. Since personal income taxes (PIT) and social security contributions across households are not directly identified in the household survey, the burden of these had to be simulated according to the tax legislation and contribution rules as detailed in Appendix 1. Statutory rates are used throughout the analysis. To the extent that informality in the payment of PIT and social contributions is high in Croatia, the distributional impacts could differ and the analysis is closer to an analysis of the de jure impact of policies. The analysis could further be refined under alternative scenarios on informality.

Social contributions are simulated only for individuals who reported that these were paid (either by employers in the case of wage workers or by themselves in the case of self-employed). The only exception is for people involved in farming/fishery/hunting/forestry, who report social contributions directly. For this group, the survey has no information that would distinguish each type of social security contribution. It is only possible to distinguish between pension contributions and other, non-pension contributions (general health, occupational health, employment). In terms of applying PIT allowances, only wage earners and pensioners report the number of children and adults they declare for purposes of the allowance. For other individuals, who were not asked to report the number of dependent family members declared for purposes of the allowance, we assume there are no family members who qualify to be used for increasing the allowance, and then take into account the amount of tax returned to them based on the yearly tax return which they all are assumed to submit. In terms of the surtax, each local government sets the corresponding rate. However, given the lack of information for each of the 127 cities and 428 municipalities, the surtax rate is assumed to be identical for all households and equal to the population-weighted average of the surtax rates across all the municipalities and cities, including those with zero surtax rate. The calculated rate is estimated at 8.79 percent.

The burden of indirect taxes is assumed to be borne entirely by the consumer. The burden of indirect taxes was estimated by applying statutory rates to the detailed consumption data in the HBS, which were mapped into the Croatian Classification of Goods and Services for which VAT rates are defined. Note that as in most household surveys, total consumption of households in HBS using the weights provided by the National Statistics Office amount to 77 percent of total household consumption reported in National Accounts. No assumptions about informality are made, such that using statutory rates, the amount of VAT calculated using the HBS constitutes 67 percent of total tax collections paid by the households. For excise taxes, we apply statutory rates to consumption of alcohol, tobacco, fuel and automobiles identified in the HBS to estimate the direct burden of these excises on households. Once the burden of each of these taxes was estimated, we followed the survey-to-survey imputation technique detailed in Appendix 2 to assign indirect tax burdens to households in the PIS. For both direct and indirect taxation, we employ statutory rates.⁶

On the spending side, the PIS provides detailed information on who received payment from contributory and non-contributory social protection programs. In terms of contributory benefits, family benefits including the maternity and parental benefits are identified in the survey. Similarly, unemployment, disability, sickness, survival, caregiver, housing and other benefits can be identified in the survey. In terms of non-contributory benefits, family benefits including the one-time grant for newborn children and the child benefit are directly identified in the survey. Similarly, social assistance benefits, including the subsistence, housing and lump-sum benefits are directly identified. Since these benefits are not taxable, the reported value can be directly used. Unfortunately, there is no way to identify beneficiaries of the programs for Croatian Defenders of the Homeland War (HBDR/HRVI) or beneficiaries of local government transfers. These benefits are therefore not included in the analysis.

The approach to estimate the incidence of public spending on education followed here is the socalled "benefit or expenditure incidence" or the "government cost" approach. In essence, we calculate per beneficiary input costs by level of education from government spending and the number of pupils in each level and assign the per pupil expenditure to each student. This approach is also known as the "classic" or "non-behavioral approach", and it amounts to asking the following question: how much would the income of a household have to be increased if it had to pay for the free or subsidized public service at the full cost to the government?

⁶ This assumption could be modified to incorporate the possibility of informality by using an effective tax rate as opposed to the statutory rate. However, there seems to be under-reporting of incomes in the PIS household survey, which may to some extent reflect this informality. Further work to assess this aims to use household consumption instead of income as a point of departure will aim to better assess potential levels of informality.

Since the education system is mostly public at all levels of education in Croatia and there is no evidence of wide-spread opting-out of public education, benefits were assigned to households according to the number of children attending each level of education, according to the cost-perpupil of delivering education service at each level. For health services, all individuals have access to services, so we use the cost of insurance approach and assign a per capita benefit equally to all individuals. This is to ensure that sicker individuals are seen as being "better off", simply because they use public services more often.

There are some important caveats about what the fiscal incidence analysis applied here does not address. First, it does not take into account behavioral, lifecycle or general equilibrium effects and focuses on average incidence rather than incidence at the margin. Our tax shifting and labor supply response assumptions are strong because they imply that that consumers have perfectly inelastic demand and that labor supply is perfectly inelastic too. Second, the analysis does not take into account the intra-household distribution of consumption. Third, the analysis cannot take into account the quality of services delivered by the government. In addition, we are unable to include some important taxes and spending. Corporate profit taxes, VAT paid by government or institutional consumption, and spending on infrastructure investments are excluded, even though the impacts of these may be substantial simply because the methods to assign these taxes and transfers are not robust. Finally, the analysis does not capture the growing debate on how asset accumulation and returns to capital impacts income inequality.

IV. Impact of taxes and social spending on poverty and inequality

The impact on inequality

The combined effect of taxes and social spending help to substantially reduce inequality in Croatia. Figure 2 shows the change in the Gini coefficient on account of taxes and spending following social the income concepts defined above for 2014. Prior to any fiscal intervention. market income inequality had a Gini of 0.383, if old-age contributory pensions are included and are treated as deferred income, but much higher (0.513) if these pensions are not included. If pensions in Pillar I are treated as



transfers and pensions in Pillar II are treated as deferred income, the Gini for market income, including pensions is 0.391. Once direct taxes, social security contributions and noncontributory transfers are accounted for, we end up with a measure of disposable income that has a Gini of 0.325 in all three scenarios. Indirect taxes are unequalizing as the Gini increases for consumable income to 0.355, which includes the impact of VAT, excise taxes, and other indirect taxes. Finally, in-kind transfers in the form of education and health helped to reduce inequality. The overall reduction in inequality was equivalent to 0.090 Gini points from market income to final income when old-age pensions are considered to be deferred income, but as much as 0.222 Gini points when pensions are treated as transfers.

The reduction in inequality achieved in Croatia on account of direct taxes and transfers is substantial relative to what is observed in other countries (such as Chile Uruguay), and although less so when considering old-



age pensions as deferred income (Figure 3). The Source: Armenia: Younger et al (2016); Brazil: Higgins & Pereira (2014); Georgia: Cancho & Bondarenko (2016); Russia: Lopez-Calvo et al (2016); EU countries (*): Euromod (2014); Poland: Goraus & Inchauste (2016); Croatia: own estimates using PHBS 2014. Pensions are treated as transfers in this figure to ensure comparability with Euromod.

redistributive effort through direct taxes and transfers in Croatia is comparable to other countries in Europe, with most of the reduction in inequality largely being achieved by pensions. This finding is in line with the existing literature that has so far focused on the impact on disposable income. However, once the impact of indirect taxes is taken into account, the redistributive effort is largely reversed as the Gini for consumable income is nearly as high as it was prior to any fiscal intervention (Figure 4). more so than in other countries in the region, Poland. including Once spending on education and health is taken into account, the overall fiscal effort is inequality-reducing,

although less so than other countries.



(2016); Poland: Goraus & Inchauste (2016); Russia: Lopez-Calvo et al (2016); Croatia: own estimates using Croatian PIS and HBS 2014.

The impact on poverty

Beyond the impact on inequality, which measures the relative position of households, it is important to see the impact on poverty, which depends on the absolute level of income of a household. The results suggest that the combination of taxes and social spending was poverty increasing in 2014. The share of the population whose market income (including pensions) was below the per capita US\$10 PPP-a-day poverty line was 28 percent (Table 3). Once the burdens of direct and indirect taxes are considered, these are larger than the direct benefits received from transfers, so that the share of the population whose consumable income is below the US\$10 PPPa-day poverty line increases to 50 percent. Similarly, if one were to use Eurostat's relative poverty line of 60 percent of the median equivalized disposable income, the headcount poverty rate increases from 20.5 percent for disposable income to 28.8 percent for consumable income. Most of the increase in poverty is on account of the burden of indirect taxes, as households are not being compensated for this burden through direct transfers. Even for extreme levels of poverty (such as those captured by the US\$2.50-a-day poverty line), social transfers are insufficient to mitigate the burden of taxes so that the level of extreme poverty after taxes and transfers is higher than before taxes and transfers are considered (Table 3). The poverty gap and the severity of poverty decline for all poverty lines when going from market to disposable income, but once indirect taxes are incorporated into the analysis, this effect is reversed.

	Market income + old-age pensions	Disposable income	Consumable income
	(1)	(2) = (1) - direct taxes - social contributions + direct transfers	(3) = (2) - indirect taxes
Poverty headcount			
US \$2.5 PPP-a-day per capita	5.2%	2.4%	5.9%
US \$5 PPP-a-day per capita	10.3%	8.4%	17.5%
US \$10 PPP-a-day per capita	28.1%	31.3%	50.0%
60% of median equivalized disposable income	20.4%	20.5%	28.8%
Poverty gap			
US \$2.5 PPP-a-day	3.1%	1.2%	2.5%
US \$5 PPP-a-day	5.3%	3.1%	6.8%
US \$10 PPP-a-day	12.1%	11.0%	20.3%
60% of median equivalized disposable income	8.7%	7.0%	10.8%
Poverty severity			
US \$2.5 PPP-a-day	2.3%	0.8%	1.6%
US \$5 PPP-a-day	3.8%	1.8%	3.9%
US \$10 PPP-a-day	7.5%	5.8%	11.4%
60% of median equivalized disposable income	5.7%	3.7%	5.9%

Table 3. Croatia. Changes in Poverty on account of taxes and transfers

Source: Own estimates based on Croatian PIS and HBS 2014.

To the extent that income is underreported in household surveys, one could imagine that this result is overestimated as households may actually have higher incomes than reported. In fact, there is evidence that this is the case in Croatia. However, the overall result that poverty increases with indirect taxes is robust to alternative measures of welfare, including those that use consumption as the basis for welfare measurement. Regardless of whether we measure welfare using disposable income in the PIS or HBS surveys, or consumption in the HBS survey, we find that the poverty rate increases once indirect taxes are taken into account such that consumable income has a higher level of poverty relative to disposable income (Figure 5A and Appendix 4). Finally, given that households do not observe the value of the benefits of in-kind education and health, we refrain from measuring poverty including those benefits, as standard in the literature. In terms of household type, Figure 5B shows that the impact of indirect taxes on poverty was particularly large among households with children and among retirees.



V. Progressivity, marginal contributions, and pro-poorness of taxes and transfers

How did each of the fiscal interventions contribute to the observed changes in poverty and inequality? Figure 6 presents the distributional impact of different components of the tax and benefit system as a share of market income (including pensions) in 2014. Most components of the system are progressive, with the bottom 10 percent of the distribution being net receivers of social benefits. However, in cash terms, households beginning in the second decile were net payers to the treasury in 2014, as the share of taxes paid exceeded the cash benefits received for all but the poorest 10 percent of the population.



Since the influence of specific interventions may be different from that of the overall system, a fundamental question in the policy discussion is whether a particular fiscal instrument (or a particular combination of them) is equalizing. If there were a single fiscal intervention, using the typical indicators such as the Kakwani index⁷ to determine whether a particular intervention is progressive or regressive would be sufficient to unambiguously determine whether that intervention was equalizing. Given there is more than one fiscal intervention, this one-to-one relationship between the progressivity of a particular intervention and its effect on inequality breaks down. As Lambert (2001) demonstrates, depending on certain characteristics of the fiscal system, a regressive tax—for example—can exert an equalizing force over and above that which would prevail in the absence of that regressive tax. This is because each fiscal intervention interacts with all the others. For instance, the proceeds of a regressive indirect tax could be used very effectively in a pro-poor transfer, leading to a situation where post-fisc incomes are more equal than in the absence of that regressive tax. One way to calculate the effect of a particular fiscal instrument on inequality is to calculate its marginal contribution. The marginal contribution of a tax (or transfer) is calculated by taking the difference between the inequality indicator *with* and

⁷ The Kakwani index for taxes is defined as the difference between the concentration coefficient of the tax and the Gini for market income. For transfers, it is defined as the difference between the Gini for market income and the concentration coefficient of the transfer. See, for example, Kakwani (1977).

without the tax (or transfer).⁸ Table 4 shows both the Kakwani progressivity index for each tax and transfer along with its marginal contribution to reducing inequality and poverty for each tax and transfer intervention in 2014 under the main scenario. Results for the alternative scenario where old age pensions are considered as transfers are presented in Appendix 3. We describe each of these in turn.

Taxes

Direct taxes and social contributions are progressive and inequality-reducing overall, however they also place a burden on the poor. That they are progressive can be seen by the fact that the Kakwani coefficient is positive, the fact that they are inequality-reducing can be seen by a positive marginal contribution to the redistributive effort (Table 4). However, they are also poverty increasing, as shown by a negative marginal contribution to poverty reduction when poverty is measured using US\$5 PPP-a-day poverty line. There is substantial heterogeneity across categories of taxes and contributions. For instance, while PIT is progressive and redistributive, direct taxes on agriculture/fishing/hunting are slightly regressive, potentially because these taxes could be overestimated by respondents in household surveys from where we take the information. Similarly, social contributions to pensioner's health and farmer's contributions are regressive, but small enough that they do not make a large impact on poverty or inequality. In particular, we find that direct taxes in 2014 were not just progressive, but also highly redistributive relative to other countries (Figure 7A).

In contrast, indirect taxes were regressive and contributed to increasing poverty and inequality in 2014. While it is true that regressive taxes can be equalizing,⁹ this was not the case in Croatia in 2014. In particular, VAT placed a large burden on low-income households, which was not compensated for by pro-poor spending, leading to an overall increase in poverty and inequality. Excise taxes were also regressive, but since they are not as large as VAT, their impact on poverty and inequality was substantially smaller (Table 4). When taken together, indirect taxes are not only regressive, but also highly unequalizing relative to other countries, including many Latin American and other developing countries (Figure 7B). These results point to potential improvements that could be achieved to reduce the burden on the poor.

⁸ Note that there is path dependence in estimating these marginal contributions, since the order in which each intervention is considered matters for the size of the estimated marginal contribution. The estimation approach uses a Shapely decomposition to address this issue, which involves estimating marginal contributions in every possible path and then taking the average.

⁹ For instance, the case of Chile. See Martinez-Aguilar et al (2017) and Lustig (2017).

Pensions as Deferred Income Scenario Marginal contributions Size (wrt Poverty Kakwani Concentration Redistributive Market Income Coeffecient Coefficient Effect Reduction Effect⁵ plus pensions) To Disposable Income 83.6% 0.1979 0.1848 0.1449 0.2049 All contributory pensions 21.5%

Table 4. Croatia: Marginal Contributions to Reducing Inequality in 2014

education related benefits	0.1%	-0.1553	0.5381	0.0006	0.0010
maternity/parental benefit	0.7%	-0.1926	0.5754	0.0038	0.0039
unemployment related benefits	0.3%	-0.1516	0.5344	0.0015	0.0017
disability related benefits	0.4%	-0.2067	0.5895	0.0019	0.0021
sickness benefits	0.2%	0.0220	0.3608	0.0007	0.0003
social asisstance	0.2%	-0.7476	1.1303	0.0021	0.0027
childrelated benefits	1.1%	-0.5380	0.9208	0.0109	0.0127
other benefits	0.6%	-0.5331	0.9159	0.0049	0.0066
All direct transfers excl contributory pensions	3.5%	-0.3669	0.7497	0.0276	0.0382
All direct transfers incl contributory pensions	25.0%	0.1188	0.2639	0.1802	0.2457
PIT	-7.1%	0.6878	0.3050	0.0273	-0.0005
dir.taxes of agri/fish/hunt/forest	-0.1%	0.2947	-0.0880	0.0001	0.0000
tax on vacation homes	0.0%	0.3637	-0.0190	0.0000	0.0000
tax on motor vehicles	-0.1%	0.3577	-0.0251	0.0000	0.0000
tax on vessels	0.0%	0.4904	0.1076	0.0000	0.0000
ssc general health	-10.7%	0.4303	0.0475	0.0100	-0.0084
ssc occupational health	-0.4%	0.4331	0.0503	0.0003	0.0000
ssc employment	-1.2%	0.4460	0.0632	0.0012	-0.0004
ssc pensioners health	-0.3%	0.2863	-0.0965	0.0001	-0.0002
ssc farmers nonpension	-0.1%	-0.0379	-0.4206	-0.0003	-0.0001
All direct taxes	-7.3%	0.6773	0.2946	0.0272	-0.0005
All contributions	-26.4%	0.4339	0.0512	0.0267	-0.0175
All direct taxes and contributions	-33.7%	0.4865	0.1038	0.0465	-0.0191
To Consumable Income	64.6%				
All direct taxes	-7.3%	0.6773	0.2946	0.0315	-0.0073
All contributions	-26.4%	0.4339	0.0512	0.0246	-0.0581
All direct taxes and contributions	-33.7%	0.4865	0.1038	0.0461	-0.0598
VAT	-17.1%	0.2173	-0.1655	-0.0283	-0.0877
excises	-1.7%	0.2366	-0.1462	-0.0030	-0.0116
other indirect taxes	-0.2%	0.2445	-0.1382	-0.0004	-0.0005
All indirect taxes	-19.1%	0.2194	-0.1634	-0.0303	-0.0913
All taxes	-26.4%	0.3458	-0.0370	-0.0030	-0.0918
All taxes and contributions	-52.8%	0.3899	0.0071	0.0162	-0.1103
To Final Income	84%				
All direct taxes and contributions	-33.7%	0.4865	0.1038	0.0520	-0.0196
All direct transfers excl contributory pensions	3.5%	-0.3669	0.7497	0.0222	0.0295
All indirect taxes	-19.1%	0.2194	-0.1634	-0.0170	-0.0393
All gross in-kind transfers	18.9%	-0.0673	0.4500	0.0623	
Gross education transfers	8.2%	-0.1562	0.5390	0.0115	
pre-primary education	1.3%	-0.0176	0.4004	0.0022	
primary education	4.4%	-0.2563	0.6391	0.0068	
secondary education	1.1%	-0.1761	0.5589	0.0046	
tertiary education	1.5%	0.0373	0.3455	0.0017	
Gross health transfers	10.8%	0.0000	0.3828	0.0435	
Source: own estimates based on PIS and HBS (2014).					

Notes:

1. Original income is considered as Market Income plus Pensions

2. Redistributive effect equals the difference between market income Gini and the relevant ending income concept Gini. The shown change is measured in Gini points.

3. Size equals the ratio of the amount collected or spent divided by total market income.

4. Marginal contribution equals the difference between the Gini coefficient of the relevant ending income concept without the intervention in question and the Gini coefficient of the relevant ending income concept (which, of course, includes that intervention). By definition, the sum of the marginal contributions does not fulfill the adding-up principle so it will not be equal to the redistributive effect unless by coincidence. The marginal contribution shown above is measured in Gini points.

5. Poverty Reduction effect based on poverty headcount index using the poverty line of \$5.00 per day in 2005 PPP.



■ Kakwani ● Marginal contribution

Source: Source: Armenia: Younger et al (2016); Bolivia: Paz Arauco et al (2014); Brazil: Higgins & Pereira (2014); Chile: Ruiz-Tagle & Contreras (2014); Colombia: Melendez (2014); El Salvador: Beneke et al., (2014); Georgia: Cancho & Bondarenko (2016); Mexico: Scott (2014); Peru: Jaramillo (2013); Poland: Goraus & Inchauste (2016); Russia: Lopez-Calvo et al (2016); Sri Lanka: Arunatilake et al (2016); South Africa: Inchauste et al (2016); Uruguay: Bucheli et al (2014); Croatia: own estimates based on the 2014 PIS and HBS.

Note: Old-age pensions are treated as deferred income for all countries shown. Marginal contributions are the difference between the consumable income Gini coefficient with and without indirect taxes.

Social spending

Contributory non-pension benefits and direct transfers are all progressive, reducing both poverty and inequality (Table 4). Abstracting from old-age pensions, contributory benefit programs are progressive in both relative and absolute terms – that is, they represent a larger share of the budgets of the poor, and are pro-poor, as most of the benefits are concentrated at the bottom 40 percent of the distribution for almost all categories of benefits with the exception of sickness benefits, which are more concentrated at the top. In particular, 57 percent of maternity benefits¹⁰ and 52 percent of unemployment benefits go to the bottom 40 percent of the distribution, while only 37 percent of sickness benefits do so (Figure 8).



In terms of non-contributory transfers, all are progressive in relative and absolute terms (they are pro-poor as a larger share of benefits goes to the bottom of the distribution) as demonstrated by negative concentration coefficients (Table 4). In particular, 84 percent of social assistance benefits, and 55 percent of child benefits are devoted to the bottom 20 percent of the distribution (Figure 8). Education benefits are perhaps the least well-targeted, with 49 percent of all benefits going to the top 60 percent of the distribution, likely because these are designed as performance-based stipends and not meant to target the bottom of the distribution. In assessing how education and health spending benefit the poor, we have to caution that our analysis does not address the quality of such spending. We use government expenditure data on the various forms of education and health services to estimate unit costs of these programs. The analysis thus assumes that the actual

¹⁰ Note that the sample of households receiving maternity benefits in the survey is small, so this result should be interpreted with caution.

benefit received by individuals is equal to the amount spent per capita. As the quality of school infrastructure, teachers, and health clinics and hospitals vary across the country then this is a clear limitation of the analysis.

The results show that education is progressive in relative terms, and given the amounts spent, it is also strongly equalizing.¹¹ In other words, the amount of spending on education is relatively high as a share of the incomes of those at the bottom of the distribution. However, there is variation across educational categories, with primary education being the most redistributive (Table 4). Although 50 percent of all spending on secondary is devoted to the poorest 40 percent, 52 percent of pre-primary and 61 percent of tertiary education spending is devoted to the top 60 percent (Figure 9). The overall result is a slightly progressive and equalizing education structure, although the overall concentration of spending in absolute amounts is more or less neutral.

Similarly, health spending is equally distributed across the population in absolute terms. However, in relative terms, health spending is strongly progressive, as it makes up a larger share of the incomes of the bottom of the distribution (Figure 9). Thus, the overall impact of in-kind benefits is a redistributive impact, as shown in Figures 2 and 4 above.



¹¹ Following CEQ conventions, we do not assess the poverty reducing impact of health and education spending.

VI. What is the impact of recent changes in taxes and benefits?

As noted earlier, reforms introduced in 2015 and 2017 were aimed at improving the fairness of the tax system. In 2015/16 the government increased the threshold for the top rate, increased the tax allowance slightly and introduced PIT on interest income. We estimate these impacts using the 2014 data, by changing solely the parameters of tax design, thus abstracting from any other changes that would have affected the distribution. The results suggest that the effect of these changes was a decline in collections and a more progressive PIT (Figure 10A) in relative terms as poorer households spent a smaller share of their incomes on direct taxes. This is also seen by an increase in the Kakwani index from 0.3049 to 0.3315. In 2017, the brackets of the personal income tax (PIT) were reduced from three to two and the personal allowance was increased. In addition, a more progressive scale for expanding the personal allowance for dependent children was introduced and the narrowing of eligibility criteria for other supported family members. Pensioners pay Personal Income Taxes calculated as 50 percent of the amount calculated based on the general PIT schedule (but their basic personal allowance is no longer lower than for non-pensioners). The effect of these changes was a further decline in collections and a slightly less progressive PIT, thus reversing part of the improvement that had taken place in 2016 (the Kakwani fell from 0.3315 to 0.3260).

In terms of changes to indirect taxes, in 2017 the reduced VAT rate of 13 percent is now being applied to inputs in agriculture, electricity and utility services while food and drink services were moved from the reduced to the standard rate. The effect of these changes, largely driven by lower electricity and utility bills was a less regressive VAT system (Figure 10B) as the Kakwani index for VAT fell from -0.1586 to -0.1515.



Although direct taxes became more progressive in relative terms between 2014 and 2017 (as poorer people paid a lower share of their incomes), when considering the absolute amount of tax relief, most of the gains of the changes in policy were concentrated in the top four deciles. This in turn has meant that the redistributive impact of PIT declined. The PIT's marginal contribution to redistribution fell by 0.008 Gini points between 2014 and 2017, while that of social contributions also fell slightly by 0.002 Gini points. The slight improvement in the redistributive power of the VAT (0.003) was not enough to offset this increase in inequality, leading to a slightly higher Disposable income Gini (Figure 11). This combined with an estimated 0.5 percent of GDP reduction in tax collections from both the PIT and the VAT (European Commission, 2017), implies that the reforms put in place so far led to lower collections and lower redistribution.

However, when it comes to poverty, the impact of lower VAT on electricity and utility bills is expected to be poverty reducing. Poverty, measured using the US\$10 PPP-a-day poverty line is expected to fall from 50 to 49 percent on account of the recent changes in VAT (Figure 12). Similarly, it declines from 17.5 to 16.6 percent using the US\$5 PPP-a-day poverty line. However, this impact is not large enough to mitigate the impact of the burden of other taxes in the system.



VII. Alternative reforms: Reducing the VAT rate to 24 percent?

The existing framework can also be used to simulate reforms going forward. For instance, one potential reform that has been discussed is a reduction in the VAT rate from 25 to 24 percent. A simulation of the distributional impacts of such a change, holding everything else constant shows that such a change would lead to a reduction in the relative poverty headcount rate by 0.21 percentage points and it would reduce consumable income inequality by only 0.001 Gini points (Figures 13). However, the cost of such a move would amount to about HRK1.3 billion in 2014

real terms (0.41 percent of GDP), which would have to be financed through expenditure reductions or tax increases to avoid increasing the deficit and impinging on fiscal sustainability. Depending on the financing instrument chosen, the distributional impacts could be different than what is presented here.



sources to compensate for the loss of revenue envisaged due to a reduction in the tax rate.

VIII. Conclusions

The analysis presented in this paper finds that starting from a relatively low level of inequality compared to other emerging high-income countries, such as Poland, the Croatian direct tax and transfer system is redistributive, with progressive and redistributive direct taxes and transfers, in line with other European countries, and more so than other developing countries. However, indirect taxes are regressive and unequalizing, so much so that the redistributive power of direct taxes and transfers is reversed. In cash terms, inequality is similar after all taxes and transfers than before them.

The results on poverty, on the other hand, show that indirect taxes effectively lead some households under the poverty line, and are therefore poverty increasing. With regards to in-kind transfers, when the value of education and health is included in the analysis, there is an important redistributive effect, primarily on account of primary education.

In terms of the recent changes to taxes implemented, the analysis finds that both direct and indirect taxes became more progressive in relative terms in 2017 compared to 2014, as poorer households paid lower taxes as a share of their incomes. However, in absolute amounts, most of the tax relief accrued to the top of the income distribution. As a result, the redistributive impact of personal income taxes and social security contributions was reduced, and inequality after taxes and transfers

is expected to increase slightly in 2017 compared to 2014. When it comes to poverty, the impact of lower VAT on electricity and utility bills is expected to be slightly poverty reducing, but not to provide enough of the kind of relief that would be needed given the impact of indirect taxes.

Finally, a simulation shows that reducing the statutory standard VAT rate from 25 to 24 percent would slightly reduce inequality, but could reduce poverty measured after taxes by 0.21 percentage points. However, this would cost about 0.41 percent of GDP, which would have to be financed either through expenditure cuts or tax increases to avoid increasing the fiscal deficit. Depending on the financing mechanism chosen, the positive impact of a VAT reduction on poverty and inequality would be smaller. Going forward, it will be important to consider similar exercises to better understand the redistributive and poverty-reducing impact of policies, including through assessment of the combination of policies.

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Appendix 1. Taxes, Transfers and Methodological Assumptions

This appendix details the assumptions for the Commitment to Equity analysis for Croatia based on the Croatian Population Income Survey (PIS) and Household Budget Survey (HBS) for 2014. The parameters and rules of the fiscal system are presented not only for 2014, but also for the following years, so that the analysis can later be easily updated.

Direct taxes and contributions

Income from employment is first evaluated within the social insurance system. Social security contributions are paid from dependent employment, self-employment, as well as farming activity.

1.1. Personal income tax

1.1.1. Description of the PIT system

Personal income tax (PIT) in Croatia is levied on individuals acquiring an income from any of the sources specified by Law on Personal Income Tax. These include:

- income from employment (salaries);
- income from past employment (pensions);
- income from self-employment (income from small business, from independent professional activities, from agriculture, fishery and forestry);
- income from property and property rights (rental and lease income, income from intellectual property rights);
- income from capital (income from dividends, profit sharing, shares in corporate income, interest, capital gains);
- income from insurance (receipts of voluntary retirement and life insurance premiums paid);
- "other income" (basically taxable income not included in any of the above categories).

The taxable base is not equal to the whole income acquired. Parts of income from the sources listed above are exempted from the PIT. For income from employment, there are a number of them, but they are too numerous to be mentioned here. Notable examples are the so-called "Christmas salary" and compensation for annual leave: upon adding up the two, only the amount in excess of 2,500 kunas is contributes to the taxable base. Another example for employment income is the compensation for sick leave longer than 90 days paid by the employer, which also contributes to the taxable base only in the amount exceeding 2,500 kunas per year. For capital income, income from interest was exempted in 2014, but the exemption was abolished in 2015. Income from dividends was exempted up to 12,000 kunas per year in 2014, and this exemption was also abolished in 2015. Also, capital gains were exempted until 2016, when the exemption was abolished.

The taxable base for the PIT can also be lowered through deductions, a number of which are available. Here we list the most notable among them:

- contributions to the voluntary pension fund (pillar III);
- donations (for education, science, culture, sport, medicine, religious institutions/charities);
- research and development expenditures by the self-employed;
- expenditures for training of young employees by the self-employed;
- deductions for self-employed employing persons from the areas of special state concern.

Depending on the source of income, some or all of the social contributions (see below) do not contribute to the taxable base:

- for the employed: pension contributions;
- for the self-employed: all their contributions (pension contributions, general health contributions, occupational health contributions);
- for "other income" earners: pension contributions;
- for pensioners: pensioner health contributions.

Finally, every individual acquiring income from the sources taxable by the PIT is eligible for the personal tax allowance. The personal tax allowance consists of:

- the basic personal allowance, which depends on whether the taxpayer is a pensioner or not and, if pensioner, on her pension;
- an additional allowance for dependent family members, if any, such as the spouse falling below a certain income threshold and dependent children. It depends also on the disability status of the taxpayer and the dependent family member(s), as well as on whether the place of residence is an area of special state concern.

The allowances for 2014, 2015/2016 and 2017 are shown in Table A1.

Regarding the rates to be applied to the taxable base, there is a general schedule, as well as incomespecific rates. In 2014 through 2016, there were three rates in the general schedule (12, 25 and 40 percent) and two income-specific rates (12 and 25 percent). As of 1 January 2017, there are two rates in the general schedule (24 and 36 percent) and two income-specific rates (12 and 24 percent). Tables A2 and A3 show the general schedules and income-specific rates, respectively.

Tuble 1	it i ci sonai can an	lo manees	
	2014	2015/2016	2017
Basic personal allowance			
Non-pensioner	2,200	2,600	3,800
Pensioner	2,200-3,400	2,600-3,800	3,800
Additional allowance			
For dependent adult	1,100	1,300	1,750
For 1 st child	1,100	1,300	1,750
For 2 nd child	1,540	1,820	2,500
For 3 rd child	2,200	2,600	3,500
For 4 th child	3,080	3,640	4,750
For 5 th child	4,180	4,940	6,250
For further children	Increases	Increases	Increases
	progressively	progressively	progressively
For taxpayer and each dependent family member, if with <100% disability	660	780	1,000
For taxpayer and each dependent family member, if with 100% disability	2,200	2,600	3,750
Notes. All values are in Croatian kuna	as per month.		

Table A1: Personal tax allowances

Table A2: General PIT schedule

	2014		
Tax band	Limits of mont	Rate	
	Lower	Upper	
1	0	2,200	12%
2	2,200	8,800	25%
3	8,800	-	40%
	2015/201	6	
Tax band	Limits of mont	hly taxable base	Rate
	Lower	Upper	
1	0	2,200	12%
2	2,200	13,200	25%
3	13,200	-	40%
	2017		
Tax band	Limits of mont	hly taxable base	Rate
	Lower	Upper	
1	0	17,500	24%
2	17,500	-	36%
Notes. The bounds are	in Croatian kunas.		

	I upic i let in	come specific i	II I uves	
Income source	2014	2015	2016	2017
"Other income"	25% (***)	25% (***)	25% (***)	24% (*) (***)
Interest income	-	12%	12%	12%
Dividends	12% (**)	12%	12%	12%
Capital gains	-	-	12%	12%
Rental income	12%	12%	12%	12%

Table A3: Income-specific PIT rates

Notes. (*) If yearly receipts of "other income" do not exceed 210,000 kunas; otherwise, the yearly general schedule is used, in which the upper (lower) limit of the yearly taxable base in the first (second) tax band is 210,000 kunas. (**) Applied only to receipts of dividends above the yearly deduction of HRK 12,000. (***) Applied to the tax base reduced by the "standardized expenditures", which equal either 30% or 55% of the tax base.

For the employed and pensioners who regularly receive their salaries and pensions, PIT is withheld regularly every month. Similarly, for "other income" earners, PIT is to be paid when the income is paid to the earner. These three types of taxpayers may choose whether they want to submit the yearly tax return. If they do submit it, the total and final amount of PIT they have to pay for a given year is determined on the yearly basis, that is, using total yearly income, total yearly amount of personal allowance (individual's total monthly personal allowance times 12) and the general schedule in which the limits of monthly taxable base brackets are multiplied by 12 to get the limits of yearly taxable base. If they do not submit it, the total amount of PIT paid over the year is considered final. On the other hand, the self-employed and those who were receiving income at the same time from more than one employer have to submit the tax return. In addition, if a taxpayer wants to lower her taxable base through a deduction, she has to submit the return. These rules applied until the end of 2016. As of 2017, the calculation of the final amount of PIT to be paid will be done by tax administration for all taxpayers. Effectively, for every taxpayer the final amount of PIT to be paid will be calculated as if she submitted the tax return.

There is another direct tax that is closely related to PIT, namely the surtax. It is a local tax levied by local self-government in more than 500 cities and municipalities. As in the case of PIT, the taxpayers are individuals paying the PIT, the latter being the taxable base for the surtax. The rates are set by cities and municipalities themselves, but under certain constraints: the rate can be at most 10 percent in municipalities, 12 percent in cities with population under 30,000, 15 percent in cities with population above 30,000, the only exception being the City of Zagreb where the ceiling is set to 30 percent. A city or municipality may choose not to levy it at all, that is, to set the rate at 0 percent. In publically available fiscal statistics, the surtax collected is not reported separately from PIT, but rather together with it, and under the heading "PIT". The rates actually set vary across cities and municipalities from 0 to 18 percent (in the City of Zagreb).

1.1.2. Obtaining PIT amounts from Population Income Survey data

The Population Income Survey (PIS) does not contain data on the amounts of PIT individuals paid, except for some income sources. In particular, PIT amounts are given for:

- income from agriculture, fishery, hunting and forestry;
- income from renting apartments, rooms and land;
- income from renting business premises and equipment.

For these three income sources, we simply take the amounts of PIT reported directly by the respondents. For all other income sources, PIT has to be simulated. Most of these incomes are given as net incomes, where "net" means net of PIT and social contributions, if any. To do the simulations, we have made some assumptions and done one necessary "intervention" in the data.

We have done the following "intervention" in the data. Some individuals did not report their incomes as single numbers, but rather chose one out of a number of intervals to which their incomes belong. To assign them single-number incomes, we use the following procedure. Using incomes of those who reported them as single numbers, we compute the median for each of the intervals offered to those who did not report their incomes as single figures. The medians are then assigned to those without single-number incomes, depending on the intervals they chose. The income sources to which this was applied are: salaries of the employed, pensions, income from self-employment (apart from self-employment in agriculture, fishery, hunting and forestry) and income from interest on savings accounts.

The assumptions we have made are the following:

- 1. Where the question asking respondents to report the amount of an income source is not explicit on whether the reported amount should be net or gross of PIT and social contributions, we assume respondents reported net amounts.
- 2. We simulate PIT under the assumption that all taxpayers do submit the yearly tax return; that is, the return is submitted even by those who are not obliged to do so. For those who are not obliged to submit it, we do not use information from the data on the amount of PIT returned to them by tax authority (if any), as well as information on how much they had to pay (if anything), in order to avoid double counting.
- 3. We do not distinguish households from families, but rather assume that all individuals living in the same household constitute a family.
- 4. Only salaried workers and pensioners were asked to report the number of dependent adults and the number of dependent children in their families who are used for the purpose of reducing the workers' and pensioners' taxable bases through increasing their personal tax allowances above the basic personal allowance. We assume what respondents reported can be trusted, and thus do not check if there are other family members who qualify to be dependent and who therefore could be used for increasing the personal tax allowance of

the family members who do not receive salaries or pensions but receive income from other taxable sources. In other words, we assume that all family members who qualify to be dependent are used by those family members (salaried workers or pensioners) who reported using them for increasing their personal tax allowance.

- 5. For families where no individual is either salaried worker or pensioner which means that no one was asked to report the number of dependents we do not look for dependents even if there might be some who are used by earners of taxable income sources (other than salaries and pensions). This, however, does not necessarily mean that we overestimate these taxpayers' final amount of PIT paid, since we assume that everybody acquiring income from taxable sources submit the yearly tax return (see assumption 2 above). In fact, we initially overestimate their PIT, but adjust it for the amount of returned to them, if any, upon the final calculation by tax administration of the amount of PIT they have to pay, and the final calculation takes into account, among other relevant information, information about the number of dependents (if the taxpayer provides the necessary documents proving there are any). And from the data we know how much was returned to the taxpayer after the final calculation on the part of tax administration.
- 6. In the data, we do not have income from dividend reported separately from other sources of capital income (shares in profit, interest on bonds, and income from other securities): all of them are reported together as income from investment in securities. We assume the whole amount reported is income from dividend.
- 7. Pensions from abroad are assumed to be public pensions from Germany. And public pensions from Germany are taxed in there, not in Croatia. We suppose that most people who worked abroad for a foreign employer, or who were self-employed abroad, did so in Germany, given that this country has been, and perhaps still is, the most frequent destination for Croatian people working abroad. We suppose that people who worked, and thus earned their pensions, in one of the countries formed after the break-up of Yugoslavia (other than Croatia) do not consider their pensions as pensions from abroad. In principle, the assumption makes a difference because pensions earned in ex-Yugoslavian states are taxed in Croatia.
- 8. All individuals who reported to have income from self-employment (other than income from agriculture, fishery, hunting and forestry) are assumed to pay PIT, rather than profit tax (corporate income tax). In addition, although some of the self-employed pay PIT as lump-sum, we do not have enough information in the data to identify them, and for that reason we assume that all pay PIT according to the general schedule.
- 9. Households (not individuals) with income from activities in agriculture, fishing, hunting and forestry were asked to report the amount of tax paid on that income. We do not simulate the amount of tax paid by these individuals, but rather simply take the amount reported. However, since the total amount reported largely exceeds the total amount of PIT recorded in administrative data, we do not consider it to be only PIT, but to include other types of taxes, including profit tax. We thus term these taxes "direct taxes paid on income from

activities in agriculture, fishery, hunting and forestry". The amount of PIT included, if any, may be paid either as lump-sum or according to the general schedule. We do not have enough information in the data to ascertain in what form these taxpayer pay PIT.

- 10. Some income sources considered by law as "other income" are exempted from PIT (for example, honoraria of sport referees). Since we do not enough information in the data to identify such income sources, we assume no one receives any of them.
- 11. With a few exceptions, most of in-kind components of salaried workers' compensation are subject to PIT (in some cases only if they exceed certain yearly threshold). The amount by which they contribute to the taxable base is equal to their market value in the place they were "paid out" to the receiver. Lacking information on whey they were "paid out", we assume the reported amounts equal the actual market values.
- 12. We do not know from the data the city or municipality in which individuals reside, and thus cannot know the exact city/municipality-specific surtax rate. We assume everybody pay the same surtax rate, calculated as the population-weighted average of the surtax rates over all cities and municipalities. So calculated, the single surtax rate is 8.8 percent. Perhaps it would be better to assign the surtax rates to individuals based on population density in their place of residence (densely, moderately or thinly populated), as in Urban and Bezeredi (2016), but the Croatian Bureau of Statistics, the institution administering the survey, did not provide the relevant variable.

1.2. Other direct taxes

Besides PIT and the related surtax, there are a couple of other direct taxes, as described below.

	Taxpayer	Amount of tax	Included in the analysis?
Tax on road motor vehicles	Legal entities or natural persons owning a registered passenger car or motorcycle	Increases with the vehicle's engine power and decreases with its age; the ranges are § 200-1,500 kn for passenger cars § 50-1,200 kn for motorcycles	Included in the analysis, as there is a question in PIS on the amount paid, which we take as is
Tax on vessels	Legal entities or natural persons owning a vessel, except for residents of islands	Depends on whether the vessel has a cabin, on whether it is powered by motor engine or by sails, on the engine power and on the vessel's length; in general, it is higher for lengthier vessels, vessels with a cabin, vessels powered by sails, and vessels with higher engine power; the ranges are § 100-600 kn for vessels without a cabin § 200-5,000 kn motor engine-powered vessels with a cabin § 300-4,000 kn for sails-powered vessels with a cabin	Included in the analysis, as there is a question in PIS on the amount paid, which we take as is

Table A4. Other direct taxes

Tax on vacation homes (estates used occasionally or seasonally)	Legal entities or natural persons owning a vacation home	5-15 kn per square meter of the vacation home's usable area	Included in the analysis, as there is a question in PIS on the amount paid, which we take as is
Inheritance and gifts tax	Legal entity or natural person who inherited, received as a gift or in acquired in some other way an asset subject to this tax, namely money, monetary claims, securities, movables (if its market value exceeds 50,000 kn)	 o <u>Taxable base</u>: the amount of money or the market value of the asset minus the costs and debts related to the asset o <u>Rate</u>: 0-5 percent (prescribed at the county level) 	Not included in the analysis, as there is neither a question in PIS on the amount paid nor information sufficient for simulation
Tax on trade name (company or name)	Legal entities or natural persons registered as performing a business activity and paying personal income tax or corporate income tax	Up to 2,000 kn per company or name	Not included in the analysis, as there is neither a question in PIS on the amount paid nor information sufficient for simulation
Tax on the use of public land	Legal entities or natural persons using the public space	Determined at the city/municipality-level	Not included in the analysis, as there is neither a question in PIS on the amount paid nor information sufficient for simulation

1.3. Social contributions

There are five types of social contributions (SCs):

- general health contribution;
- occupational health contribution;
- pensioner health contributions;
- employment contribution;
- pension contributions
 - o scheme A: only intergenerational solidarity (pillar 1)
 - \circ scheme B: intergenerational solidarity (pillar 1) and mandatory saving (pillar 2)¹²

Description of the system of SCs is best structured by income source. Table A5 describes, by income source, which types of SCs are paid on which source, at which rate, on which base and by whom.

¹² There is also voluntary saving (pillar 3).

Contribution	Base	Rate	Who pays?
Social Contributions on em	ployment income		
(a) General health contribution	Gross employment income; the minimum base is 35% of the average (national) gross wage from January to August of the preceding year (AGW); there is no maximum base	13% until April 2014; 15% after April 2014	Employer for each of her employees
(b) Occupational health contribution	Same as for the general health contribution	0.50%	Employer for each of her employees
(c) Employment contribution	Same as for the general health contribution	1.70%	Employer for each of her employees
(d) Pension contributions	Gross employment income; the minimum base is 35% of AGW; the maximum base is six times AGW	<u>Scheme A:</u> 20% for intergenerational solidarity (pillar 1) <u>Scheme B</u> : 15% for intergenerational solidarity (pillar 1) <u>Scheme B</u> : 5% for mandatory saving (pillar 2)	Each employed individual
Social Contributions on per	ision		
Pensioner health contribution	Gross pension; there are no minimum and maximum bases	1% if the base is lower than the average (national) net wage from January to August of the preceding year; 3% otherwise	Pensioners with public pensions

Table A5 Social	Contributions of	n employment	income and	nensions
I able AS. Social	Contributions of	п стрюутен	i meome anu	pensions

Besides incomes of various professionals and craftsmen, self-employment income includes incomes of the self-employed in agriculture, fishery, hunting and forestry. Table A6 presents social contributions is for the self-employed who do bookkeeping on cash basis and are PIT payers. They constitute the largest type of the self-employed.

Contribution	Base	Rate	Who pays?	
Social Contributions on	income from self-employment			
	Lump-sum, equal to AGW times a coefficient specific to occupation; the occupation-specific coefficients are:			
(a) General health contribution	o 1.1 for health care workers, veterinarians, lawyers, notaries, auditors, engineers, architects, bankruptcy trustees, interpreters, translators and tourist workers	13% until April 2014; 15% after April 2014	Individuals with income from self-	
	o 0.65 for craftsmen, nurses, dental technicians, physiotherapists, film workers, journalists o 0.55 for those in agriculture/fishery/hunting/forestry who do		employment	

Table A6. Social Contributions on income from self-employment

	bookkeeping on cash basis and are PIT payers			
(b) Occupational health contribution	Same as for the general health contribution	0.50%	Individuals with income from self- employment	
		<u>Scheme A:</u> 20% for intergenerational solidarity (pillar 1)	Individuals	
(c) Pension contributions	Same as for the general and occupational health contributions	<u>Scheme B</u> : 15% for intergenerational solidarity (pillar 1)	with income from self- employment	
		<u>Scheme B</u> : 5% for mandatory saving (pillar 2)		

	Table A7.	SCs	on	"other	income"
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Contribution	Base	Rate	Who pays?
Social Contributions	on "other income"		
(a) General health contribution	Gross "other income"; there are no minimum and maximum bases	13% until April 2014; 15% after April 2014	Individuals with "other income"
		<u>Scheme A:</u> 20% for intergenerational solidarity (pillar 1)	
(b) Pension contributions	Same as for the general health contribution	<u>Scheme B</u> : 15% for intergenerational solidarity (pillar 1)	Individuals with "other income"
		<u>Scheme B</u> : 5% for mandatory saving (pillar 2)	

SCs on sickness, maternity and parental benefits

For individuals receiving sickness, maternity or parental benefit, the state pays from the budget the pension contribution for pillar 2 (mandatory saving). The base equals the amount of benefit, and the rate is 5%.

Obtaining SCs from Population Income Survey data

In the PIS data, the amounts of SCs are not directly reported by the respondents, except for SCs paid by those with income from activities in agriculture/fishery/hunting/forestry. For them we just take the amounts reported. The relevant survey questions did not ask the respondents to report each type of SCs separately. Precisely, all non-pension contributions are reported together as a single amount. Therefore, for individuals receiving income from activities in agriculture/fishery/hunting/forestry the data allowed us only to have non-pension contributions and pension contributions.

For others, the amounts of SCs are simulated. The simulation was done after the simulation of PIT, since the income after SCs is the income before PIT. This order of simulation is necessary because the starting incomes, those that we have in the data, are incomes net of PIT and SCs. In the simulations, we have made the following assumptions:

- 1. The general health contribution rate was 13% until April 2014 and 13% thereafter, with no changes in the following years. We assume there was only one rate throughout 2014, equal to (0.25 * 13%) + (0.75 * 15%) = 14.5%.
- 2. We assume that all self-employed individuals do bookkeeping on cash basis, meaning that they pay PIT (rather than profit tax) and SCs.
- 3. Individuals with income from employment (salaried workers) were asked in the survey to report which types of SCs their employers paid for them. Similarly, the self-employed (apart from those in agriculture/fishery/hunting/forestry) were asked to report which SCs they paid for themselves. We assume that all respondents reported truthfully and correctly, and then simulated only those SCs actually paid, if any.
- 4. The contribution bases for the self-employed are determined as lump-sum, as the product of the average (national) gross wage from January to August of the preceding year and an occupation-specific coefficient (see section 2.3.3.). In the survey, information on occupation is not detailed enough to allow identifying the occupational type of a self-employed person and assign her the coefficient that actually pertains to her. We assume the coefficient is 0.65 for everyone, as this coefficient pertains to all sorts of craftsmen, supposedly the largest group among the self-employed.
- 5. SCs are not paid on some income sources from the category "other income" (for example, income that journalists, artists, researchers and scholars earn thorough "selling" their original works). Lacking detailed enough information, we assume that SCs are paid on the whole gross amount of "other income".

Indirect taxes

2.1 Value Added Tax

There are three VAT rates: one standard rate and two reduced rates. The standard rate is 25 percent, and the reduced rates are 5 percent and 13 percent. Below we list the goods and services to which the reduced rates applied in 2014.

In the computation of VAT paid by households, we had to make a couple of assumptions:

• All books have the content that qualifies them for the 5 percent rate.

• In the Household Budget Survey (HBS), expenditures for cinema, theater and concert tickets are reported together, as one expenditure category. We assume that the structure of expenditures is: 50, 20 and 30 percent for cinema, theater and concerts, respectively.

- All drugs are from the Croatian Health Insurance Fund's list, qualifying them for the 5 percent rate.
- All white sugar is crystal sugar, qualifying it for the 5 percent rate.
- All periodical magazines have the content that qualifies them for the 13 percent rate.

VAT at 5 percent	VAT at 13 percent
daily newspapers	concert tickets
books with professional, scientific, artistic, cultural and	periodical magazines, except those whose
educational content, including textbooks for all levels of	content is entirely or mostly advertisements
education	
scholarly journals	water supply
cinema tickets	baby food
medical equipment and appliances	edible oils and fats
drugs from the Croatian Health Insurance Fund's list	white crystal sugar
milk	catering services
bread	accommodation services

Table A8. VAT reduced rates

As of the beginning of 2017, changes in Table A9 were introduced. In the simulations of 2017 reforms, we were not able to take into account all the changes as described below.

Good/service	Can it be implemented?	
Increased from	m 13% to 25%	
Catering services	Yes	
White sugar	Yes	
Reduced from	n 25% to 13%	
Baby seats for cars	No, because it's part of a larger group of diverse commodities, most of which are commonly purchased.	
Electricity	Yes	
Refuse collection	Yes	
Urns and coffins	No, because it's part of a larger group of diverse commodities.	
Seedlings	No, because it's part of a larger group of diverse commodities.	
Fertilizers and pesticides and other agrochemical products	No, because it's part of a larger group of diverse commodities.	
Animal feed, apart from pet food	No, because it doesn't exist in COICOP classification.	

Table A9. Changes in VAT, Jan 1st, 2017

2.2 Excise tax

2.2.1 Excises on alcohol

There are excises on beer and on ethyl alcohol:

• beer: 40 kn per 1 percent volume of pure alcohol in a hectoliter (hl)

• ethyl alcohol: 5300 kn/hl (applies only to pure alcohol and that contained in liquors, but not to that contained in wine)

In the HBS, there are four categories of beer: "alcoholic beer", "other alcoholic beer", "low-alcohol and non-alcoholic beer", "beer-based beverages". We assume that "alcoholic beer" and "other alcoholic beer" are the regular beer with 5 percent alcohol volume, a reasonable assumption given that the most popular brands have about 4.9-5 percent. This assumption implies that the excise is 2 kn/l of the regular alcoholic beer. The categores "low-alcohol and non-alcoholic beer" and "beer-based beverages" are assumed to consist entirely of non-alcoholic beer. The assumption, reasonable or not, cannot affect the results as there are less than ten households with non-zero expenditure on these types of beer.

Households in the HBS report the expenditure for "alcoholic drinks and liquors with high volume of alcohol" and for "alcoholic drinks with low volume of alcohol". As the latter is non-zero for only a few households, we focus on the former only. We assume the volume of alcohol is 40 percent, which is the case for most popular hard liquors in Croatia. The assumption implies that the excise amounts to 21.2 kn/l of "alcoholic drinks and liquors with high volume of alcohol.

Excises on tobacco

There are excises on cigarettes, on finely cut tobacco, on other smoking tobacco and on cigars/cigarillos as described in Table A10. Changes introduced after 2014 are taken into account in the 2016 and 2017 tax reform simulations.

Cigarettes	Finely cut tobacco	Other smoking tobacco	Cigars/cigarillos
37% of the retail price			
197 kn/1000 cigarettes until 5 March 2014	450 kn/kg until 5 March 2014	380 kn/kg until 5 March 2014	600 kn/1000 cigar(illo)s
210 kn/1000 cigarettes after 5 March 2014	520 kn/kg after 5 March 2014	450 kn/kg after 5 March 2014	
	Changes	April 2015	
increase from 210 to 230 kn/1000 cigarettes	increase from 520 to 550 kn/kg		
increase from 37% to 38% of the retail price			
	Changes No	ovember 2016	
increase from 230 to 275 kn/1000 cigarettes	increase from 550 to 600 kn/kg		
reduction from 38% to 36% of the retail price			

Table A10. Excises on Tobacco

In the HBS, the quantity of cigarettes is reported as the number of packs. According to the list of all cigarette brands on the Croatian market in 2014, prepared regularly by the Customs Authority (Carinska uprava), 95 percent of all brands had 20 cigarettes per pack, and we assume this holds for every pack reported in the HBS. This implies the specific excise of 3.94 kn/pack until 5 March 2014 and 4.20 kn/pack after 5 March 2014. From these two, we compute the specific excise for the whole year as (0.18 * 3.94 kn/pack) + (0.82 * 4.20 kn/pack) = 4.15 kn/pack, where 0.18 and 0.82 are obtained as, respectively: 0.18 = 2.16 months / 12

months; 0.82 = 9.84 months / 12 months. The proportional excise (37 percent of the retail price) is calculated straightforwardly.

As for the other tobacco products, in the HBS there is only one category, namely "tobacco for pipe, cigarettes and chewing", with quantity expressed in packs. We assume that the relevant excise is that on "finely cut tobacco" (see above), which was 450 kn/kg until 5 March 2014 and 520 kn/kg after 5 March 2014. In the HBS, the quantity is reported in packs, and we assume that each pack contains 40 grams of tobacco, implying the following excises: 18 kn/pack until 5 March 2014, 20.8 kn/pack after 5 March 2014. Using the same weight as in the case of cigarettes (0.18, 0.82), the average excise for the whole year is 20.3 kn/pack.

The excises on other smoking tobacco and on cigars/cigarillos are not calculated at all: in the case of cigars/cigarillos because no household reported non-zero expenditure on them, and in the case of other smoking tobacco because there is no tobacco product in the HBS other than "tobacco for pipe, cigarettes and chewing" to which we could apply it.

2.2.2 Excise on electricity

The excise on electricity was 7.5 kn/MWh (or 0.0075 kn/kWh). To compute the total excise paid by a household, we need to determine the number kilowatt-hours spent by the household. We determine it by dividing the household's reported yearly expenditure for electricity (inclusive of all taxes) by the average price per kilowatt-hour (inclusive of all taxes). According to Croatian Energy Regulatory Agency (HERA), in 2014 it was HRK 0.99 per kilowatt-hour. The excise is then calculated as 0.0075 kn/kWh times the number of kilowatt-hours.

2.2.3 Excises on oil derivatives

Excises on petrol, on diesel, on natural gas, on propane-butane and on heating oil are presented in Table A11. Changes introduced after 2014 are taken into account in the 2016 and 2017 tax reform simulations:

Petrol	Diesel	Natural gas	Propane-butane	Heating oil:
3.46 kn/l until 14	2.66 kn/l until 14	8.10 kn/MWh	0.10 kn/kg	160 kn/kg
April 2014	April 2014			-
3.66 kn/l after 14	2.86 kn/l after 14			
April 2014	April 2014			
	Chan	iges April 2015		
increase from 3.66	increase from 2.86			
to 3.86 kn/l	to 3.06 kn/l			

Table A11. Excises on Oil Derivatives

For each of these, to calculate the total excise paid by a household, we need the quantity spent by the household, and since these are not reported in the HBS, we derive them indirectly. For this purpose, we use the information on household expenditure (inclusive of taxes), external information on the average price

per unit (inclusive of taxes) and, in the case of propane-butane for car (as opposed to household) use, additional external information.

The quantity of petrol is derived by dividing the petrol expenditure by the average price of petrol. According to Hrvoje Požar Energy Institute, the average price of the Eurosuper 98 type of petrol was HRK 10.99 per liter, and that of the Eurosuper 95 was 10.47 kn/l. Since we do not have information on the structure of petrol consumption, we take the average of the two to get 10.73 kn/l. Since the excise per liter changed on 17 April 2014, we use the weighted average of the excise that was applied until the date and the excise that was applied after the date, with the weights being equal to the respective fractions of the year (similar to what we have done in the case of cigarettes; see above): (0.3 * 3.46 kn/l) + (0.7 * 3.66 kn/l) = 3.60 kn/l.

The average price of diesel, according to Hrvoje Požar Energy Institute, was 9.85 kn/l. As in the case of petrol, the excise changed on 14 April 2014, meaning that the weights for the calculation of the weighted average of excise for the whole year are remain the same.

According to HERA, the average price of natural gas was 0.414 kn/kWh. To get the quantity, we first subtract from the reported yearly expenditure the yearly fixed fee, which varies depending on the quantity spent, and we assume all households pay the lowest fee (i.e. that they do not use more than 25.000 kWh). Then we divide by the average price.

Propane-butane is used in households for cooking, but also as a motor fuel. The first use can be directly identified from the HBS, since households report their propane-butane expenditures. In Croatia, people usually buy propane-butane in 10-kilogram steel bottles, and here we assume that everybody do buy it in such bottles. The price, for propane-butane purchased in such bottles and at INA (the biggest supplier), was 9.22 kn/kg. As for the car use, it is not reported in the HBS explicitly as propane-butane. Rather, we take "other motor fuels" to be mainly propane-butane, as some people use it in cars. According to Hrvoje Požar Energy Institute, the average price was 5.09 kn/l. Since the excise is expressed in kn/kg rather than in kn/l, we had to use the following calculation for conversion. Propane-butane is half propane, half butane. Their specific densities (weight per unit of volume) are 0.51 kg/l and 0.57 kg/l, respectively, and the density of propane-butane is thus the average of the two, 0.54 kg/l. Since the excise is 0.10 kn/kg, the excise per liter is: 0.54 kg/l * 0.10 kn/kg = 0.054 kn/l.

We were unable to find the average price of heating oil in 2014. We assume the ratio of the average price of heating oil to the average price of diesel was the same in 2014 as it is as of writing this: 0.53. Since the average price of diesel was 9.85 kn/l (see above), we infer the average price of heating oil to be 0.53 * 9.85 kn/l = 5.22 kn/l.

2.2.4 Excises on coffee and non-alcoholic beverages

Coffee and some non-alcoholic beverages are subject to the following excises:

Coffee	Non-alcoholic beverages
roasted coffee: 6 kn/kg	water, including mineral and sparkling water, sweetened or aromatized, except fruit juices and nectars: 40 kn/hl
substitutes for roasted coffee that contain coffee: 6 kn/kg	other beverages with less than 1.2% of alcohol volume, except mixtures of beer and non-alcoholic beverages with more than 0.5% alcohol volume: 40 kn/hl
non-alcoholic beverages containing coffee or extract/essence/concentrate of coffee: 6 kn/kg	syrups and concentrates for preparation of non- alcoholic beverages, except fruit syrups: 240 kn/hl
extracts, essences and concentrates of coffee: 20 kn/kg	powders and granules for preparation of non- alcoholic beverages: 400 kn/100 kg

Table A12. Excise rates on coffee and non-alcoholic beverages

Information from the HBS that we use to calculate the excises consist of expenditures and quantities, both directly reported by households. The only item which we were not able to identify in the HBS is "non-alcoholic beverages containing coffee or extract, essence or concentrate of coffee". For all other items we were able to find the corresponding item in the HBS.

2.3 Other indirect taxes

Special tax on the premiums of insurance from automobile responsibility

This tax is paid on the premiums of the so-called "insurance from automobile responsibility". The tax base is the value of premium, and the rate is 15 percent. In the case of casco-type insurance of road vehicles, the rate is 10 percent. In the HBS we were able to identify the expenditure on car insurance, but not if it is casco-type or not. Thus we apply the 15 percent rate.

Consumption tax

The tax is paid on consumption of drinks in cafes, bars, restaurants and similar establishments at 3 percent. The tax base is the sales price net of VAT, and we calculate it from the expenditure for "catering services" in the HBS.

Social Spending

3. Family Benefits and Social Assistance

Direct transfers including the one-time grant for newborn children, the child benefit, subsistence, housing and lump-sum assistance are directly identified in the PIS. Unfortunately there is no way to identify benefits related to HBDR/HRVI or benefits provided by local governments.

Appendix 2. Survey-to-Survey Imputation for Indirect Taxation

The Population Income Survey (PIS) used to obtain personal income tax, other direct taxes, social contributions and government transfers is very rich in terms of income components, and is a larger survey, thus can better represent smaller groups within the population. However, it does not contain information on household consumption expenditures. This information is contained in the Household Budget Survey (HBS), which we used to calculate indirect taxes – VAT, excises and other indirect taxes. In order to assess the distributional impact of both direct and indirect taxation, social contributions and government transfers, we imputed indirect taxes calculated in the HBS to every household in the PIS.

The imputation procedure is based on modeling the ratio of an indirect tax to household income as a function of household income. All indirect taxes computed from the HBS were first grouped into three groups: VAT (see Appendix 1 section 2.1.), excises (see Appendix 1 section 2.2.) and other indirect taxes (see Appendix 1 section 2.3.). Then household disposable income was created in the HBS as the sum of incomes from all sources (employment, pensions, self-employment, capital, and property), net of personal income tax and social contributions, plus the total amount of government transfers. The different income categories are contained in the HBS, net of personal income tax and social contributions, rather than as gross incomes. Therefore, we did not simulate personal income tax and social contributions to go from gross to net amounts. However, the disposable income aggregate that emerges from the HBS is not identical to the one obtained from the PIS, but the two are very close. Hereafter we refer to the former as "HBS disposable income" (HBSDI for short).

The following variables are constructed in the HBS for the imputation procedure:

- $\tau^{VAT} = T^{VAT} / Y$
- $\tau^{EXC} = T^{EXC} / Y$
- $\tau^{OIT} = T^{OIT} / Y$
- powers of ln y

where, for a given household, T^{VAT} , T^{EXC} and T^{OIT} are the amounts of VAT, excises and other income taxes, respectively, Y is HBSDI, and y is HBSDI per household member. We regress τ^{VAT} , τ^{EXC} and τ^{OIT} on a constant and a number of powers of $\ln y$. For each of the three types of indirect taxes the initial specification includes only the constant and $\ln y$. Then we keep adding further powers of $\ln y$ until the adjusted R^2 started to increase only marginally. Doing so, we end up with the following specifications:

$$\tau_{i}^{VAT} = \alpha^{VAT} + \beta_{1}^{VAT} \ln y_{i} + \beta_{2}^{VAT} (\ln y_{i})^{2} + \varepsilon_{i}^{VAT}$$

$$\tau_{i}^{EXC} = \alpha^{EXC} + \beta_{1}^{EXC} \ln y_{i} + \beta_{2}^{EXC} (\ln y_{i})^{2} + \varepsilon_{i}^{EXC}$$

$$\tau_{i}^{OIT} = \alpha^{OIT} + \beta_{1}^{OIT} \ln y_{i} + \beta_{2}^{OIT} (\ln y_{i})^{2} + \beta_{3}^{OIT} (\ln y_{i})^{3} + \beta_{4}^{OIT} (\ln y_{i})^{4} + \beta_{5}^{OIT} (\ln y_{i})^{5} + \varepsilon_{i}^{OIT}$$

The OLS estimates of the parameters are given in Table A2.1.

		2014		2016	20	17
	model for	model for	model for	model for	model for	model for
	$ au^{\scriptscriptstyle V\!AT}$	$ au^{\scriptscriptstyle E\!XC}$	$ au^{\scriptscriptstyle OIT}$	$ au^{\scriptscriptstyle E\!XC}$	$ au^{\scriptscriptstyle V\!AT}$	$ au^{\scriptscriptstyle E\!XC}$
ln y	-0.6943	-0.0915	7.4091	-0.0944	-0.6842	-0.0945
	(0.0803)	(0.0159)	(0.6874)	(0.0168)	(0.0796)	(0.0168)
$(\ln y)^2$	0.0287	0.0041	-1.6222	0.0042	0.0295	0.0042
	(0.0039)	(0.0008)	(0.1513)	(0.0008)	(0.0039)	(0.0008)
$(\ln y)^3$. ,	0.1742	. ,	· · · ·	. ,
,			(0.0164)			
$(\ln y)^4$			-0.0092			
			(0.0009)			
$(\ln y)^5$			0.0002			
,			(0.0000)			
constant	4.2154	0.5290	-13.2108	0.5468	4.1163	0.5475
	(0.4078)	(0.0803)	(1.2305)	(0.0849)	(0.4043)	(0.0851)
Adj. R ²	0.2429	0.0632	0.1419	0.0619	0.225	0.062
F statistic	335.54	69.29	68.02	67.87	293.66	67.84
F test p-value	0.000	0.000	0.000	0.000	0.000	0.000
N	2,029	2,029	2,029	2,029	2,029	2,029

Table A2.1: Parameter estimates for prediction of τ^{VAT} , τ^{EXC} and τ^{OIT}

Notes. OLS estimation. Standard errors are in parentheses. All estimates are significant at 0.01%. Estimates pertaining to VAT and OIT for 2016 are the same as those for 2014. Estimates pertaining to OIT for 2017 are the same as those for 2014. Sampling weights used in estimation.

The estimated parameters are then used together with data on disposable income in PIS – call it PISDI for short – constructed carefully to resemble HBSDI as much as possible. We then use the following equations to impute the thetas in PIS ($\tilde{\tau}_i^{VAT}, \tilde{\tau}_i^{EXC}, \tilde{\tau}_i^{OIT}$):

$$\begin{aligned} \widetilde{\tau}_{i}^{VAT} &= \hat{\alpha}^{VAT} + \hat{\beta}_{1}^{VAT} \ln \widetilde{y}_{i} + \hat{\beta}_{2}^{VAT} (\ln \widetilde{y}_{i})^{2} \\ \widetilde{\tau}_{i}^{EXC} &= \hat{\alpha}^{EXC} + \hat{\beta}_{1}^{EXC} \ln \widetilde{y}_{i} + \hat{\beta}_{2}^{EXC} (\ln \widetilde{y}_{i})^{2} \\ \widetilde{\tau}_{i}^{OIT} &= \hat{\alpha}^{OIT} + \hat{\beta}_{1}^{OIT} \ln \widetilde{y}_{i} + \hat{\beta}_{2}^{OIT} (\ln \widetilde{y}_{i})^{2} + \hat{\beta}_{3}^{OIT} (\ln \widetilde{y}_{i})^{3} + \hat{\beta}_{4}^{OIT} (\ln \widetilde{y}_{i})^{4} + \hat{\beta}_{5}^{OIT} (\ln \widetilde{y}_{i})^{5} \end{aligned}$$

where \tilde{y}_i denotes PISDI of household *i*. Once $\tilde{\tau}_i^{VAT}$, $\tilde{\tau}_i^{EXC}$ and $\tilde{\tau}_i^{OIT}$ are imputed to each household, we just multiply them by household disposable incomes \tilde{y}_i to obtain the imputed values of VAT, excises and other indirect taxes:

$$\begin{split} \widetilde{T}_{i}^{VAT} &= \widetilde{\tau}_{i}^{VAT} \cdot \widetilde{y}_{i} \\ \widetilde{T}_{i}^{EXC} &= \widetilde{\tau}_{i}^{EXC} \cdot \widetilde{y}_{i} \\ \widetilde{T}_{i}^{EXC} &= \widetilde{\tau}_{i}^{EXC} \cdot \widetilde{y}_{i} \end{split}$$

To check how well the imputation performs, we compare the "actual" amounts of taxes (computed from HBS: $T_i^{VAT}, T_i^{EXC}, T_i^{OIT}$), the "estimated" amounts of taxes (obtained by using the estimated parameters with

HBSDI: $\hat{T}_i^{VAT}, \hat{T}_i^{EXC}, \hat{T}_i^{OIT}$), and the imputed amounts of taxes $(\tilde{T}_i^{VAT}, \tilde{T}_i^{EXC}, \tilde{T}_i^{OIT})$ over all percentile groups based on percentiles of disposable income (percentiles of HBSDI for the actual and estimated, percentiles of PISDI for the imputed) (Figure A2.1). To be precise, the lines represent the average amounts of the actual, estimated and imputed amounts of taxes for each of the percentile groups along the distribution of the relevant disposable income (HBSDI or PISDI).

Figure A2.1: Actual, predicted and imputed amounts of VAT, excises and other income taxes across percentile groups based on HBSDI income









f. Other income taxes (same for 2014, 2016 and 2017)

Appendix 3. Results for Alternative Scenarios:

				Marginal cont	ributions
	Size (wrt Market Income plus pensions)	Concentration Coeffecient	Kakwani Coefficient	Redistributive Effect Marginal	Poverty Reduction Effect Marginal
				Contribution	Contribution
To Disposable Income	73.5%				
Pension	18.9%	0.1251	0.2667	0.1449	0.2049
education related benefits	0.1%	-0.1676	0.5594	0.0006	0.0010
Maternity/parental benefits	0.6%	-0.1411	0.5329	0.0038	0.0039
Unemployment-related benefits	0.2%	-0.1518	0.5435	0.0015	0.0017
Disability-related benefits	0.3%	-0.2445	0.6362	0.0019	0.0021
Sickness-related benefits	0.2%	0.0903	0.3013	0.0007	0.0003
child related benefits	0.2%	-0.7378	0.0086	0.0021	0.0027
other benefits	0.5%	-0.5108	0.9344	0.0109	0.0127
All direct transfers excl contributory pensions	21.9%	0.0581	0.3337	0.1802	0.2457
All direct transfers incl contributory pensions	21.9%	0.0581	0.3337	0.1802	0.2457
PIT	-6.2%	0.6871	0.2954	0.0273	-0.0005
Direct taxes of agri/fish/hunt/forest	-0.1%	0.2531	-0.1387	0.0001	0.0000
Tax on vacation homes	0.0%	0.3394	-0.0524	0.0000	0.0000
Tax on road motor vehicles	-0.1%	0.3624	-0.0294	0.0000	0.0000
Tax on vessels	0.0%	0.4531	0.0613	0.0000	0.0000
SSC - general health	-9.4%	0.4542	0.0624	0.0100	-0.0084
SSC - occupational health	-0.3%	0.4572	0.0654	0.0003	0.0000
SSC - employment	-1.0%	0.4700	0.0782	0.0012	-0.0004
SSC - pensioners' health	-0.2%	0.2143	-0.17/5	0.0001	-0.0002
SSC - pension	-12.1%	0.4/36	0.0818	0.0155	-0.008/
SSC - non-pension (agriculture/fishery/hunting/forestry)	-0.1%	-0.0301	-0.4279	-0.0003	-0.0001
All direct taxes	-0.1%	-0.0233	0.2844	-0.0003	-0.0001
All contributions	-0.470	0.4597	0.2644	0.0272	-0.0005
All direct taxes and contributions	-29.6%	0.5065	0.1147	0.0465	-0.0191
To Consumable Income	56.7%				
All direct transfers excl contributory pensions	21.9%	0.0581	0.3337	0.3216	0.2899
All direct transfers incl contributory pensions	21.9%	0.0581	0.3337	0.3216	0.2899
All direct taxes	-6.4%	0.6762	0.2844	0.0315	-0.0073
All contributions	-23.2%	0.4597	0.0679	0.0246	-0.0581
All direct taxes and contributions	-29.6%	0.5065	0.1147	0.0461	-0.0598
VAT	-15.0%	0.2144	-0.1774	-0.0283	-0.0877
Excises	-1.5%	0.2335	-0.1583	-0.0030	-0.0116
Other md. taxes	-0.2%	0.2404	-0.1514	-0.0004	-0.0005
All indirect taxes	-16.8%	0.2164	-0.1754	-0.0303	-0.0913
All taxes and contributions	-23.2%	0.3434	-0.0484	-0.0030	-0.0918
To Final Income	74 7%	0.4010	0.0078	0.0102	-0.1105
All direct taxes and contributions	-29.6%	0 5065	0 1147	0.0517	-0.0145
All direct transfers excl contributory pensions	21.9%	0.0581	0.3337	0.2088	0.2425
All Indirect taxes	-16.8%	0.2164	-0.1754	-0.0170	-0.0326
All gross in-kind transfers	18.0%	-0.0557	0.4475	0.0644	
Gross education transfers	8.5%	-0.1176	0.5094	0.0135	
pre-primary education	1.3%	0.0457	0.3461	0.0027	
primary education	5%	-0.1900	0.5818	0.0082	
secondary education	1.0%	-0.1772	0.5689	0.0053	
tertiary education	1.2%	0.0645	0.3273	0.0022	
Gross health transfers	9.5%	0.0000	0.3918	0.0422	

Old-age contributory pensions treated as direct transfers

Source: own estimates based on PIS and HBS (2014).

Notes:

1. Original income is considered as Market Income.

2. Redistributive effect equals the difference between market income Gini and the relevant ending income concept Gini. The shown change is measured in Gini points.

3. Size equals the ratio of the amount collected or spent divided by total market income.

4. Marginal contribution equals the difference between the Gini coefficient of the relevant ending income concept without the intervention in question and the Gini coefficient of the relevant ending income concept (which, of course, includes that intervention). By definition, the sum of the marginal contributions does not fulfill the adding-up principle so it will not be equal to the redistributive effect unless by coincidence. The marginal contribution shown above is measured in Gini points.

5. Poverty Reduction effect based on poverty headcount index using the poverty line of \$5.00 per day in 2005 PPP.

Appendix 4. Robustness Checks on Changes in Poverty on Account of Indirect taxation

	Disposable income (DI)				
	PIS	HBS, based on income	HBS, based on expenditures		
Gini	0.325	0.313	0.269		
pov. rate, 1.25\$					
ppp	1.4%	0.1%	0%		
pov. rate, 2.5\$ ppp	2.4%	0.9%	0.1%		
pov. rate, 4\$ ppp	5.3%	2.6%	0.3%		
pov. rate, 5\$ ppp	8.4%	5.9%	1.2%		
pov. rate, 10\$ ppp	31.3%	31%	20.4%		
aggregate amount	128,625,154,339	132,892,228,827	146,900,579,795		
mean	30,841	31,299	34,591		
median	27,050	27,282	30,870		

	Consumable income			
	PIS	HBS, based on income	HBS, based on expenditures	
Gini	0.355	0.352	0.267	
pov. rate, 1.25\$				
ррр	2.3%	1.4%	0%	
pov. rate, 2.5\$ ppp	5.9%	3.8%	0.1%	
pov. rate, 4\$ ppp	11.5%	10.3%	0.9%	
pov. rate, 5\$ ppp	17.5%	15.9%	3.6%	
pov. rate, 10\$ ppp	50%	50.7%	36.1%	
aggregate amount	99,260,363,474	102,416,133,085	116,424,484,040	
mean	23,800	24,271	27,415	
median	20,465	20,323	24,330	

Source: Own estimates using 2014 PIS and HBS.