WPS7787

Policy Research Working Paper 7787

The Distributional Impact of Taxes and Transfers in Poland

Karolina Goraus
Gabriela Inchauste

WORLD BANK GROUP
Poverty and Equity Global Practice Group
August 2016

Policy Research Working Paper 7787

Abstract

This paper assesses the impact of fiscal policy on the incidence, depth, and severity of poverty, and examines whether there is room for an increased role for fiscal policy in improving the wellbeing of the poor. The results show that the combined effect of taxes and social spending helped substantially to reduce poverty and inequality in Poland in 2014, in line with other European Union countries, with most of the reduction largely being achieved by pensions. 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. Although the Polish fiscal system in 2014 had the capacity to redistribute, it had a relatively weak capacity to reduce poverty given the resources at its disposal, and this was especially true for families with children. Microsimulations of the introduction of the Family 500+ program in 2016 show the redistributive and poverty reduction impacts of the new program, even after taking into account the potential increase in indirect taxes. Finally, alternative reforms of the tax-free allowance are considered, and estimates of their likely impact on poverty, inequality, and the potential fiscal cost are presented. The simulations show that there are potential efficiency gains from further targeting each of these new initiatives.

This paper is a product of the Poverty and Equity Global Practice Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at ginchauste@worldbank.org.

The Distributional Impact of Taxes and Transfers in Poland

Karolina Goraus and Gabriela Inchauste[1]

JEL classification: H22, I38, D31

Keywords: fiscal policy, fiscal incidence, social spending, inequality, poverty, taxes, Poland

[1] We are deeply indebted to Michał Myck and Mateusz Najsztub for guidance and support in building a microsimulation model for Poland. We are also grateful to Emilia Skrok, Cristobal Ridao-Cano and Leszek Kąsek for helpful comments and advice. All remaining errors are our own.

I. Introduction

There has been substantial work in better understanding the role of fiscal policy in Poland. Some of the highlights are work looking at the labor incentive effects of tax reforms (Morawski and Myck, 2010; Myck et al, 2013) and analyzing the combined effect of direct taxes, pensions, social security contributions, and social benefits (De Agostini et al 2014; Paulus, 2015; Brzeziński, 2015). There are well known country-level microsimulation models using the Household Budget Survey that have separately undertaken microsimulation analysis of specific reforms including changes in family benefits (Myck 2015a); Value Added Taxes (Myck, 2015b); and others. Existing work has shown the dominant role of pensions in overall incidence (Paulus, 2015) and the relatively small role of policy in reducing inequality (Myck and Najsztub, forthcoming).

Despite the large literature on the tax-benefit system in Poland, most of the existing analysis that has aimed to combine the impacts of taxes and spending has not included indirect taxation in the overall analysis, despite the fact that it makes up about half of total tax collections. Similarly, most studies have not included the impact of spending on education and health, despite the fact that they make up more than a third of total social spending and are an important component in terms of improving equality of opportunities across the population.

This paper aims to present a more comprehensive analysis of the impact of fiscal policy on inequality and poverty in Poland relative to earlier studies. Building on existing work done in Poland, the analysis covers the impact of the contributory pension system, direct taxes and transfers, 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 reducing poverty and inequality. The approach follows the Commitment to Equity (CEQ) methodology (Lustig and Higgins, 2013), allowing comparisons between Poland with other countries where the CEQ methodology has been applied.[2]

The analysis is built on the 2014 Polish Household Budget Survey (HBS) collected by the Central Statistical Office of Poland (GUS), and data from National Income Accounts and public finance accounts from the Ministry of Finance for 2014. Although most of the analysis follows a partial equilibrium approach, we use the 2010 input-output matrix is used to capture the second-round effects of excise taxes on intermediate goods, such as fuel, since these can be important as they are passed through to prices of all other goods. In terms of coverage of components of fiscal policy, the analysis includes 62 percent of tax revenue and 51 percent of government spending, in line with other CEQ studies. The analysis does not cover the corporate profit tax and VAT paid by government or institutional consumption as these are difficult to assign to individual households

[2] For more details, see http://www.commitmentoequity.org .

based on the available information. On the spending side, the analysis only covers social spending, as it is very difficult to assign benefits of other types of spending to individual households.

The analysis finds that the combined effect of taxes and social spending help to substantially reduce inequality in Poland, in line with other EU countries, with most of the reduction in poverty and inequality largely being achieved by pensions. Inequality is further reduced by in-kind transfers in the form of education and health. However, we find that 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.

In terms of the specific fiscal interventions, we find that most direct taxes are progressive and equalizing with the exception of agricultural taxes and farmer contributions, which depend on land size rather than on income generation. However, we also find that direct taxes and contributions are also poverty increasing to the extent that most contributions do not have a minimum threshold, thus posing a large burden on poor households. Moreover, indirect taxes are regressive and contribute to poverty and inequality increases. Direct transfers are progressive and equalizing, particularly family benefit and social assistance programs, which are pro-poor. Contributory benefit programs make up a large share of the incomes of the poor, but they are not pro-poor. Finally, spending on health and education is progressive and equalizing.

Overall, the Polish fiscal system in 2014 had the capacity to redistribute, but a relatively weak capacity to reduce poverty given the amount of resources at its disposal, particularly for families with children. Microsimulations show that the recent introduction of the Family 500+ program has already made an important change in this respect, potentially leading to a 3 percentage point reduction in extreme poverty and a strong redistributive impact of the system as a whole. The cost of the program is estimated to amount to 1.3 percent of GDP, once projected increases in indirect tax collections are taken into account. Similarly, proposals to extend the tax-free amount are expected to make the personal income tax more progressive and further improve the redistributive impact of fiscal policy. However, the change is expected to be much smaller than that of the Family 500+ as the benefits are expected to be more heavily concentrated at the top of the distribution. The fiscal cost of the proposed tax-free allowance reform is estimated to amount to an additional 0.4 to 1.1 percent of GDP, depending on the threshold that is decided. The simulations show that there are potential efficiency gains from further targeting each of these new initiatives. Going forward, it will be important to consider how these initiatives will be financed, and the potential distributional impact of measures needed to ensure that the government is able to keep to its deficit rule.

The rest of the paper is organized as follows. The next section describes the structure of taxes and social spending in Poland, 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 the Family 500+ program and alternative scenarios on the tax-free allowance in section VI. Section VII concludes.

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

The Polish Public Finance System

Public finance in Poland consists of local governments, a social insurance sector and the central government. Obligations to pay taxes and contributions are largely unified and collected within a centralized system with few regional and local taxes. Direct taxes are shared between central and local governments, while social insurance contributions fund the Social Insurance Institution (ZUS), the Social Insurance Institution for Farmers (KRUS), the Labor Fund, the Fund of Guaranteed Employees' Benefits, the National Rehabilitation Fund, and the National Health Fund (NFZ). According to internationally comparable definition total revenues amounted to 667.7 billion PLN (38.8 percent of GDP) in 2014, of which 19.8 percent came from tax collections, and 13.2 percent were social security contributions.[3] The structure of tax revenues in Poland is shown in Table 1.

Indirect taxes contribute about 54 percent of the total tax collection of the general government, with the bulk of indirect taxes collected from VAT (Table 1). Our analysis focused on the major tax items, namely social security and health insurance contributions, personal income tax, value-added tax, and specific excise duties on alcohol, tobacco, automobiles and fuel. These items make up about 62 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 4.6 percent of GDP in 2014. There are two rates of PIT, 18% and 32%, with the threshold for the first rate set at PLN 85,528 (US$21,919) of annual individual global income (Table 2). Couples or single parents may file jointly, with their income base added and then the tax is calculated from half of this amount and doubled.[4] PIT does not apply

[3] The internationally comparable definition of General Government excludes R&D institutions or Agricultural Market Agency that are included in the national definition, and includes Open Pension Funds that are excluded by the national definition.

[4] In this way the tax liability is lower if: (1) one of the income earners is below the threshold for second PIT rate, and the other is above, as part of the income of the high earning partner will be taxed with 18% rate instead 32% rate, (2) one of the partners is earning so little that is not using tax allowance then the spouse can use both tax allowances.

to agricultural income or social security contributions paid by the employee. Self-employed income can either be included in the global income or taxed separately at the flat rate of 19%.[5]

Table 1. Poland: Tax Revenue Structure 2014

	Fiscal data (Million PLN)	% of GDP	Included in analysis	Derived in survey (Million PLN)	Ratio of total amounts in the survey and external statistics, %
Total revenue	667,698	38.8		398,917	60%
Total tax receipts	339,851	19.8		119,416	35%
Direct taxes	108,657	6.3		45,840	42%
Personal income tax	78,617	4.6		45,840	42%
Employees & self-employed paying 18% or 32%	55,567	3.2	Yes	43,293	55%
Self-employed who choose 19% flat tax	16,972	1	No		
Capital tax	836	0.0	Yes	67	8%
Agricultural tax	2,090	0.1	Yes	2,479	119%
Other income taxes on households	3,152	0.2	No		
Corporate profit tax	30,040	1.7	No		
Indirect taxes	185,833	10.8		73,576	40%
VAT	124,262	7.2		54,833	44%
from household consumption 1/	83,043	4.8	Yes	54,833	66%
from other consumption	41,219	2.4	No		
Excise duties and consumption taxes	61,570	3.6	Yes	18,743	30%
Other taxes	45,361	2.6	No		
Net social contributions	227,548	13.2		205,926	90%
Old-age pension contribution	121,608	7.1	Yes	86,164	100%
Disability pension contribution			Yes	35,313	
Accident insurance contribution	6,212	0.4	Yes	8,540	137%
Sickness insurance contribution	10,849	0.6	Yes	9,593	88%
Labor Fund	9,569	0.6	Yes	10,841	113%
Fund of Guaranteed Employee Benefits	390	0.0	Yes	392	100%
Farmers old-age and disability contribution	1,518	0.1	Yes	1,503	99%
Farmers other contributions	701	0.0	Yes	713	102%
Health insurance contributions	61,204	3.6	Yes	52,869	86%
Other contributions	15,496	0.9	No		
Other revenue	100,299	5.8	No		

Sources: Eurostat, GUS, and own estimates based on HBS 2014.

1/ We assume that the share of VAT paid by households is equivalent to the ratio between total household consumption according National Accounts and total gross value added in the economy.

Similarly, capital gains and investment income, such as dividends, interest and proceeds from sale of shares, are subject to withholding tax at a flat rate of 19%. Income from renting property can be either included in global income, or individuals can choose the flat tax on revenues of 8.5%. Households can deduct costs of obtaining income, a basic tax-free allowance of PLN 3,000 per

[5] If a self-employed person decides to use the flat tax, they may not file jointly with their spouse or deduct child tax credit.

year, and health insurance contributions (see below). If health insurance contributions are higher than the pre-health insurance deduction personal income tax, then the health contribution value is decreased to the level of PIT. Finally, there are other important deductions, including a child tax credit, deductions for internet bill payments, and rehabilitation expenses among others. The most significant of these is the child tax credit (CTC), which cannot exceed the pre-CTC PIT value plus social security and health contributions paid.

Table 2. Poland: Tax and Social Security Contributions

Main taxes applicable to individuals in Poland			
Personal income tax - regular rates		18% and 32% (for income > PLN 85,528)	
Personal income tax – flat rate (may be applied to self-employment if certain conditions are met)		19%	
Dividends		19%	
Interest		19%	
Royalties		18% and 32%	
Capital gains		19%	
VAT		23% (standard rate), reduced rates of 8%, 5%, 0% along with some exemptions.	
Inheritance tax		3%-20%	
Special expatriate regime (only selected sources of income)		20%	
Social insurance contributions			
Insurance type	Cap on salary subject to contribution	Allocation of contribution cost	
		Employer	Employee
Pension	112,380 PLN per annum	9.76% of remuneration	9.76% of remuneration
Disability		6.5% of remuneration	1.5% of remuneration
Sickness	No cap applies	-	2.45% of remuneration
Accident		0.67% - 3.33% of remuneration (depending on risk category). 1.67% is the most common rate	
Health		-	9% (7,75% tax deductible)
Other employer's charges			
Labor Fund		2.45% of remuneration	
Employees' Guaranteed Payments Fund		0.1% of remuneration	

Source: Deloitte (2015).

Agricultural taxes are levied on ownership or possession of agricultural arable lands or woods. In case of farm land the taxable base is the number of conversion hectares (calculated on the basis of actual area, kind and quality of land and location in one of four tax zones, set depending on

economic and climatic conditions of agricultural production). For other land the taxable base is the number of hectares.

Social insurance contributions (SIC) are the largest source of revenues, accounting for 13.2 percent of GDP in 2014. These contributions include old-age, disability, accident and illness insurance contributions, some of which are shared between employee and employer as shown in Table 2. In terms of old-age pensions, Poland has a three-pillar pension system in place, under which both the employee and the employer make contributions to the first and second pillars. Employees can make voluntary payments to third-pillar funds, usually managed by insurers or banks. Fiscal incentives in the third pillar have been created to encourage employees and employers to set up retirement plans.

Note that social security contributions differ depending on the type of employment arrangement: self-employed workers and farmers pay lump-sum amounts based on the average wage[6] and land size, respectively, while dependent employees' contributions are a function of their wages. Moreover, dependent workers with Labor Code contracts have contributions paid from the total amount of their gross wage, while employees with Civil Code contracts (both those under commission contracts and those with contracts for results) do not. In particular employees hired under civil law contracts for results have no insurance, while those hired under commission contracts have health insurance contributions paid from total gross income but voluntary contributions for other social insurance schemes,[7] so that civil-contract employees could effectively pay close to zero social security contributions in 2014. Recent changes that became effective in 2016 aimed to limit this practice, but continue to be voluntary for illness insurance.

Mandatory health insurance contributions cover preventive, diagnostic, therapeutic, and rehabilitation costs. Nearly all social groups are covered, giving them access to health protection, disease and contusions prevention, early detection of illnesses as well as disability prevention. In case of dependent employment health insurance is calculated as 9% of gross wage minus social security contributions paid by employee. Health contributions apply to labor and commission contracts, but not to contracts for results. Health contributions are also paid from maternity leave benefit, unemployment benefit, old-age pension, disability pension, family pension, pre-retirement benefit, and social pension on terms similar to wage employment income. Self-employed workers contribute according to a fixed schedule.

[6] Minimum wages are used for those operating less than two years.

[7] Persons working on commission contracts had to contribute based on the first contract alone but contributions for subsequent contracts were voluntary. As a result, employers often signed two contracts with the same worker, one for a very low value, and other of the actual value of work. The contributions were paid from the low-value contract, thus enabling workers to pay (close to) zero contributions.

Indirect Taxes

VAT is a major component of indirect taxes, contributing to about 36 percent of total tax collection in 2014. VAT is levied at a standard rate of 23 percent on most goods and services, but a reduced rate of 5 percent applies to certain food, books and magazines or 8 percent is imposed on supplies, such as medicines, hotel and catering services, certain transport and municipal services. There exists also a rate of 7% for products bought from farmers who pay the tax as a lump sum. A zero-rate applies to the intra-EU community supply of goods, exports of goods, some international transportation and related services. Usually, in order to apply zero VAT rate additional conditions need to be fulfilled. Some financial, medical and cultural services are exempt. In particular, small entrepreneurs with yearly revenues below 150 thousand zloty, are exempt from paying VAT and may not deduct the VAT paid on inputs. The VAT gap has been estimated to be between 30% and 50% of VAT collected (PwC, 2013).

Excise taxes contribute 3.4 percent of GDP and they are levied on goods that are deemed to be a harmful for health reasons. The Ministry of Finance in Poland announces every year the excise taxes that apply to products that might be harmful to health or environment. Goods subject to excise duty include energy products, alcoholic beverages and manufactured tobacco products, based on the legislation of the European Union.

Social spending

Overall expenditures in Poland amounted to 42.1 percent of GDP in 2014, down from 45.5 percent of GDP in 2010 (Eurostat). A large part of public spending is dedicated to social protection (16.1 percent of GDP), while education (5.3 percent of GDP) and health (4.6 percent of GDP) are also relatively important. Total social spending in Poland amounts to 26 percent of GDP or 62 percent of total spending. The analysis presented below covers 51 percent of all government spending and 82 percent of social spending. In what follows, we describe the main highlights of existing social spending.

Spending on contributory pensions at 15.3 percent of GDP in 2014, accounts for the bulk of the social protection system. These benefits include old-age pensions which are by far the largest. In addition, there are several insurance schemes that deliver benefits, including disability and survivor pensions, maternity and unemployment benefits, as well as sickness allowances, funeral grants, family care, occupational and health rehabilitation allowances for insured individuals. In contrast, the non-contributory portion of the social protection system, accounts for only 0.9 percent of GDP in 2014 (Table 3). This figure includes spending on direct cash and near-cash transfers and can be thought of having three main pillars: family benefits, housing benefits, and social assistance.

Table 3: Poland: General Government Expenditure 2014

Spending Component	Millions of PLN	% of GDP	Included in analysis	Amounts in survey	Ratio of total amounts in the survey and external statistics, %
Total expenditures	724,465	42.1		367,516	51%
Social Spending	447,164	26.0		367,516	82%
Social Protection	276,949	16.1		207,823	75%
Contributory social insurance benefits	216,511	12.6		192,439	89%
Old age	148,859	8.7			0%
Gross retirement pension	133,049	7.7	Yes	145,682	109%
Gross pre-retirement pension	2,370	0.1	Yes	2,203	93%
Structural (farmer) pension	13,440	0.8	Yes	1,544	11%
Other pensions	67,652	3.9			0%
Gross family pension	29,668	1.7	Yes	16,834	57%
Gross disability pension	20,277	1.2	Yes	15,581	77%
Gross maternity benefit	6,736	0.4	Yes	6,975	104%
Gross unemployment benefit	9,692	0.6	Yes	3,620	37%
Gross rehabilitation benefits	1,279	0.1	Yes	605	47%
Non-contributory (social assistance) benefits	14,656	0.9		15,384	105%
Social assistance	1,859	0.1	Yes	2,590	139%
Social pension	2,267	0.1	Yes	5,154	227%
Family benefits	5,152	0.3	Yes	3,517	68%
Child birth grant in monthly terms	279	0.0	Yes	4	1%
Nursing Benefit (zasiłek)	1,702	0.1	Yes	1,115	66%
Nursing Allowance (świadczenie)	929	0.1	Yes	2,010	216%
Alimony fund maintenance income	1,497	0.1	Yes		
Housing benefits	971	0.1	Yes	995	102%
Other	45,781	2.7	No		
In-kind transfers	170,216	9.9		159,694	94%
Education	90,482	5.3	Yes	96,495	107%
Kindergarten subsidy			Yes	6,772	
Primary school subsidy			Yes	32,879	
Primary school (disability) subsidy			Yes	4,011	
Gymnasium			Yes	16,778	
Gymnasion (disability)	61,243	3.6	Yes	1,361	
High school			Yes	5,354	
High school (disability)			Yes	621	
Vocational school			Yes	7,629	
Vocational school (disability)			Yes	1,688	
Tertiary schools	14,477	0.8	Yes	19,403	134%
Other education	14,761	0.9	No		
Healthcare	79,734	4.6	Yes	63,199	79%
Health insurance fund	61,653	3.6	No		
Other health	18,081	1.1			
Other social spending					
Other expenditure (non-social)	277,301	16.1			

Sources: Eurostat, GUS, and own estimates based on HBS 2014.

Direct (non-contributory) transfers include the following programs.

- *Family benefits programs,* target low-income families with children (World Bank, 2015; De Agostini et al, 2015). The main component is a non-contributory means tested monthly grant to families that have dependent children called the Family Allowance. The Family Allowance is paid until the child finishes their education. In addition, the following supplements may also be granted: a one-time lump sum grant paid upon the birth of a child, supplements for parental leave, lone parents who do not receive alimony payments, education and rehabilitation of a disabled child, a supplement for the third and each subsequent child, a supplement for the start of the school year, and for starting school outside the place of residence. There is also a nursing benefit for disabled persons and a nursing allowance for a parent or guardian who resigns from employment or other paid job in order to take care of a disabled child.
- *Housing benefits* are means tested benefits granted to families based on the size of their home and number of people in the household.
- *Social assistance programs* include a non-contributory benefit for households that have insufficient resources while also meeting some specific social criteria (De Agostini et al, 2015). It is intended to benefit orphans, the disabled, unemployed, homeless, the chronically sick, pregnant women and those generally in poverty. There is a social pension, which provides compensation to individuals who are completely incapable to work due to an impairment of bodily functions which occurred before finalizing their education. In addition, there are three main Social Assistance programs: (i) a Permanent Compensation Benefit granted to a person who is unable to work due to disability or age and who does not qualify for social insurance or disability pensions; (ii) a Temporary Social Benefit granted to households with incomes below a given threshold experiencing financial problems caused by unemployment, prolonged illness or disability and (iii) a Special Purpose Benefit paid in case of unforeseen events like natural disasters.

Social spending on in-kind transfers in the form of education and health amounted to 9.9 percent of GDP in 2014. Kindergartens, primary schools, gymnasium, high schools and vocational schools are financed by local governments partly based on a central government educational subsidy based on the number of pupils, as well as based on their own resources. Although educational institutions are mainly public, where no required user fees are required, around 4% of primary schools, gymnasiums, or high schools students attend private schools. These private schools also receive subsidies from local governments based on spending per child in each level of public educational institution. The share of privately operated institutions is higher when it comes to kindergartens, covering around 40% of children attending kindergartens. For the kindergartens the subsidy per child for private institutions should be at least 75% of spending per child in public institutions. Tertiary education is subsidized by the central government, with public universities receiving a teaching subsidy based on the number of stationary students, which accounts for about 70% of their total revenue.

Health services are provided through the National Health Fund (NFZ), which is financed from health contributions. NFZ contracts health service providers and reimburses the cost of services provided to insured clients. The Ministry of Health directly funds a few highly specialized services along with pre-hospital emergency services. Contributions to the public system are mandatory for all classes of workers except those on pay-for-performance civil contracts, so most workers are covered, either directly or through family since anyone with uninsured family members can insure them. Persons receiving contributory benefits like pensions or unemployment benefits are also covered. In addition, an uninsured person without insured family members may have the right to health services financed from public money if they are: (a) below the age of 18, (b) pregnant or in the period of confinement, or (c) have income below the legal poverty threshold. In practice, only non-poor individuals who do not pay voluntary health insurance contributions are uninsured and would have to bear the cost of health services. Private insurance is available and is usually provided as a top-up to public health insurance, with people opting-out from publically provided services for primary or dental care, as well as some in-patient curative services.

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 the 2014 Poland Household Budget Survey (PHBS) by the Central Statistical Office of Poland (GUS). In contrast to the EU SILC, the PHBS contains both income and expenditure data, along with demographic and household characteristics, thus enabling the identification of direct and indirect taxes and benefits across the distribution. Following standard practice, the collected survey is corrected for nonresponse through sample grossing-up weights. However, these weights take into account and correct only for the original data sample design probabilities and do not reflect the additional bias in survey participation given the characteristics of participating households. For example, the survey over-represents children in the survey and people who live abroad for more than 12 months, so that the age structure does not match that of the census. In order to match the age structure of the population along with critical characteristics of the tax and benefit system, we follow Myck and Najsztub (2015) to correct population weights in the PHBS.[8]

Household survey data are combined with data from GUS Statistical Yearbooks, National Income Accounts and public finance accounts from the Ministry of Finance. This information is complemented with administrative data from the Social Insurance Institution (ZUS), National

[8] In particular, in addition to correcting for the age structure, weights are calibrated to ensure that the number of taxpayers, those paying health insurance, receiving pensions, unemployment benefits, and those benefiting from joint taxation are in line with administrative data.

Health Service (NFZ), Ministry of Family, Labor and Social Policy (MRPiPS), Ministry of Health, and Ministry of Education. Finally, we use the 2010 Input-Output matrix to estimate the indirect effect of indirect taxes as described below and detailed in Appendix I.

Method and Approach

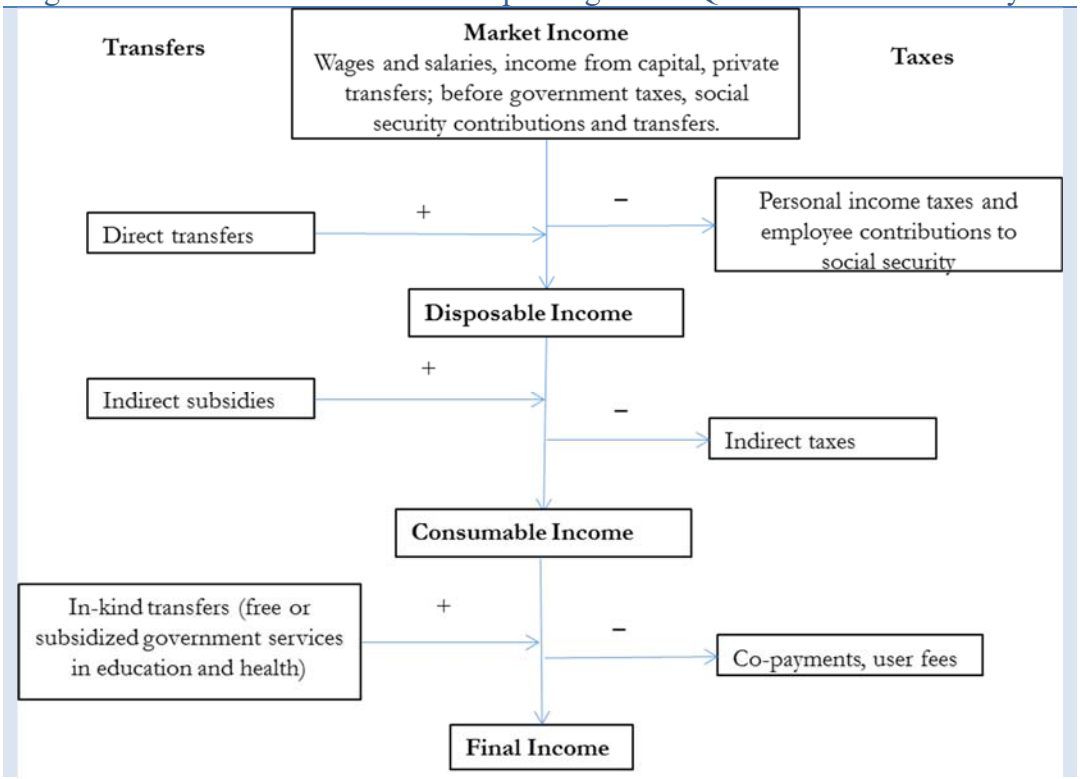
To analyze the incidence of each fiscal intervention, and the impact of taxes and social spending on poverty and inequality, we follow Lustig and Higgins (2013) and measure per capita income before and after each fiscal intervention as described in Figure 1. In particular, for every household we define the following income concepts:

- *Market income* includes pre-tax wages, salaries, and income earned from capital assets (rent, interest or dividends) and private transfers.
- *Disposable income* is constructed by subtracting direct taxes and social contributions and adding direct transfers and social pensions to market income. Direct taxes include the personal income tax, capital tax, and farm taxes. Social contributions include those for disability and farmer pensions, health, accident and sickness insurance, as well as contributions to the labor fund, the fund of employee benefits, and to other farmer benefits. Direct cash transfers include housing benefits, child birth grant, nursing benefit, nursing allowance, social assistance, and family benefits. In addition, there are pre-retirement, family, disability, maternity, unemployment and farmer pensions which are treated as transfers.
- *Consumable income* subtracts the impact of indirect taxes to disposable income. In Poland, indirect taxes included in this analysis include the VAT, excises on alcohol and tobacco, fuel and automobiles.
- *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 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 and Higgins, we present two scenarios. Under our "main" scenario all contributory pensions are treated as transfers, and the corresponding contributions are treated as taxes and therefore subtracted from disposable income, in line with standard EU measurement of disposable income. Under the "alternative" scenario, old-age contributory pensions are treated as deferred income, and the corresponding old-age contributions are treated as savings, and thus as part of disposable income.[9]

[9] All other pensions are treated as transfers and the corresponding contributions as taxes under the alternative scenario. One could argue that there is some double counting under the alternative scenario, as pensions are included

Figure 1. Definitions of income underpinning the CEQ Fiscal Incidence Analysis



Source: Lustig and Higgins, 2013

Assumptions

We assume that direct taxes are borne entirely by the income earner and that indirect taxes are borne entirely by the consumer. Personal income taxes and social security contributions across households are not directly identified in the household survey. Thus, the burden of these had to be simulated according to the tax legislation and contribution rules as detailed in Appendix I. Since pensions are subject to personal income taxes, gross pensions were estimated and the corresponding direct taxes computed. Simulation of direct taxes include detailed modeling of allowances, deductions and tax credits, including those that are permitted under joint filing for couples. Consistent with other conventional tax incidence analyses, we assume that the economic burden of direct taxes and contributions are borne by the recipient of income. Agricultural income taxes are calculated on the basis of land holding size as reported in the HBS.

The burden of indirect taxes is estimated by applying statutory rates to the detailed consumption data in the HBS, which were mapped into the Polish Classification of Goods and Services 2008

as part of disposable income for retirees, but savings (contributions) for future pensions are also included as part of disposable income for current workers as if these workers had the choice to consume these. To minimize this double counting, other social pensions are treated as transfers with the corresponding contributions as direct taxes.

for which VAT rates are defined.[10] Note that as in most household surveys, total consumption of households in HBS using the weights provided by GUS amount to 49 percent of total household consumption reported in National Accounts. Since we do not make assumptions about informality, 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 (net of VAT) identified in the HBS to estimate the direct burden of these excises on households. However, since fuel is an important intermediate product we use a cost-push model and the 2010 input-output matrix to estimate second round effects of excises on fuel to all other products in the economy.

On the spending side, the HBS provides detailed information on who received payment from contributory and non-contributory social protection programs. Family Allowance, Social Assistance, Nursing Allowance, Nursing Benefit, and Housing Benefit are directly identified in the survey and since they are not taxable, the reported net value can be directly used.

The approach to estimate the incidence of public spending on education followed here is the so-called "benefit or expenditure incidence" or the "government cost" approach. In essence, we calculate per beneficiary input costs by level of education from government spending at the voivodship level and the number of pupils in each level and voivodship. 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? Since the HBS does not provide information on educational enrolment by public versus private institutions, we identify children going to public schools based on household expenditures on tuition, and assign a lower public benefit to those households based on the standard subsidy amount per student in private institution (75 percent for those in private kindergartens, and 50 percent in other school types). For university students we calculate the share of public university subsidy per stationary student and assign this amount to students assumed to be attending public universities based on HBS data.

Finally, for health we use the cost of insurance approach and assign a per capita benefit to all individuals. However, some households opt out of public service and pay for private insurance to cover primary care, dental services, outpatient care, and rehabilitation, as identified in the HBS. For these households, we reduce the public benefit amount accordingly.

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 responses assumptions are strong because they imply that that consumers have perfectly inelastic

[10] Note that we do not apply statutory VAT or excise rates to expenditures related to farming activities as we treat those as intermediate products.

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

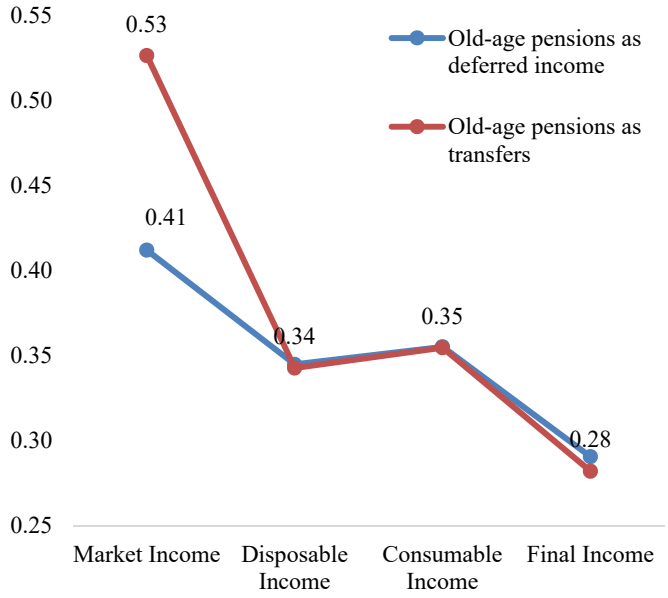
The impact on inequality

The combined effect of taxes and social spending help to substantially reduce inequality in Poland. Figure 2A shows the change in the Gini coefficient on account of taxes and social spending following the income concepts defined above for 2014. Prior to any fiscal intervention, market income inequality had a Gini as high as 0.41, if old-age contributory pensions are treated as deferred income and included, but much higher if these pensions are not included. Once direct taxes, social security contributions and noncontributory transfers are included, we end up with a measure of disposable income that has a much lower Gini. Indirect taxes are unequalizing as the Gini increases for consumable income, which includes the impact of VAT and excise taxes. Finally, in-kind transfers in the form of education and health helped to reduce inequality. The overall reduction in inequality was equivalent to 13 Gini points from market income to final income when old-age pensions are considered to be deferred income, but as much as 24 Gini points when pensions are treated as transfers.

The reduction in inequality achieved in Poland is more substantial than what is observed in other new high income countries (such as Chile and Uruguay) countries, even when considering old-age pensions as deferred income, and despite the effects of indirect taxes, largely on account of its spending on education and health (Figure 2B). However, compared to other established high income countries in Europe, the impact of direct taxes and transfers is in line with other EU countries, with most of the reduction in inequality largely being achieved by pensions (Figure 3).

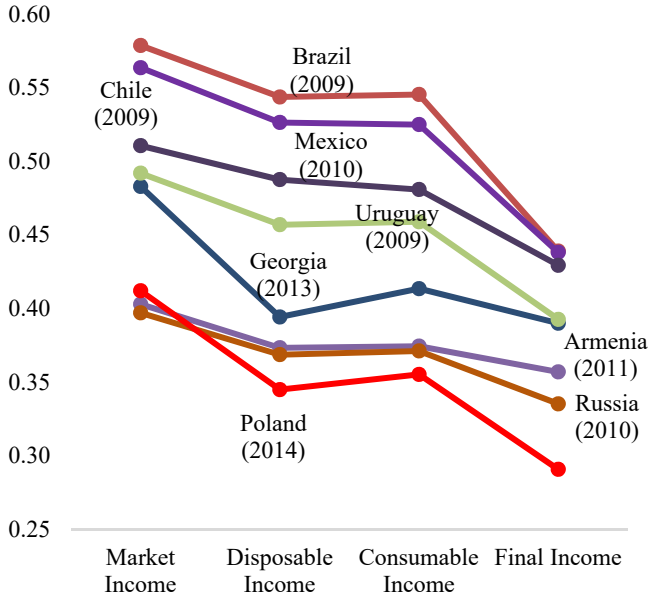
Figure 2. Inequality declines after taxes and social spending

A. Poland. Gini Coefficient



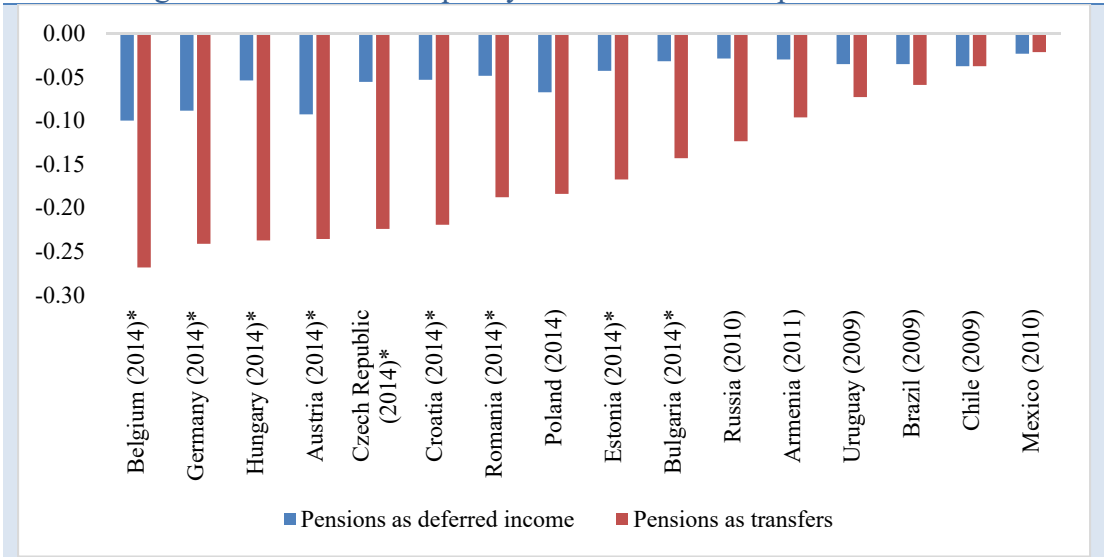
Source: Own estimates using PHBS 2014.

B. Emerging markets: Gini Coefficient (pensions as deferred income)



Source: Armenia: Younger et al (2016); Brazil: Higgins & Pereira (2014); Chile: Ruiz-Tagle & Contreras (2010) Georgia: Cancho & Bondarenko (2016); Mexico: Scott (2014); Russia: Lopez-Calvo et al (2016); Uruguay: Bucheli et al (2014); Poland: own estimates using PHBS 2014.

Figure 3. Decline in Inequality from Market to Disposable Income



Source: Armenia: Younger et al (2016); Brazil: Higgins & Pereira (2014); Chile: Ruiz-Tagle & Contreras (2010) Georgia: Cancho & Bondarenko (2016); Mexico: Scott (2014); Russia: Lopez-Calvo et al (2016); Uruguay: Bucheli et al (2014); EU countries (*): Euromod (2014); Poland: own estimates using PHBS 2014.

The impact on poverty

The combination of taxes and social spending also led to an important decline in poverty in 2014. The overall decline amounts to 16 percentage points from market to consumable income for the legal poverty line and 18 percentage points for the extreme poverty line.[11] Most of this decline is on account of contributory pensions, which could be thought of as deferred incomes. Starting from market income, the extreme poverty headcount rate measured using the National extreme poverty line[12] declined from 27.2 to 6 percent mostly on account of contributory old-age pensions (Table 4). Similarly, the legal poverty rate declined from 29.2 to 7.5 percent.

Table 4. Main Scenario: Changes in Poverty on account of taxes and transfers

	Market Income	Market income + contributory pensions	Disposable Income	Consumable Income
	(1)	(2) = (1) + contributory pensions	(3) = (2) - direct taxes - contributions + direct transfers	(4) = (3) - indirect taxes
Poverty headcount				
National legal	29.2%	7.5%	8.6%	12.9%
National extreme	27.2%	6.0%	5.5%	8.9%
US $5PPP a day	27.3%	6.1%	6.0%	9.2%
US $2.5PPP a day	19.0%	2.6%	1.9%	2.9%
Poverty gap				
National legal	20.5%	3.5%	3.0%	4.7%
National extreme	19.6%	2.9%	2.3%	3.6%
US $5PPP a day	19.1%	2.9%	2.4%	3.7%
US $2.5PPP a day	14.3%	1.6%	1.3%	1.9%
Poverty severity				
National legal	17.1%	2.3%	1.9%	2.9%
National extreme	16.5%	2.0%	1.6%	2.4%
US $5PPP a day	16.0%	2.0%	1.7%	2.5%
US $2.5PPP a day	12.4%	1.3%	1.2%	1.7%

Source: Own estimates based on HBS 2014.

[11] The extreme poverty rate reported by GUS in 2014 was 7.4 percent, while the legal poverty rate was 12.2 percent. The discrepancy is largely on account of the fact that these are measured using expenditures instead of income (see GUS: http://swaid.stat.gov.pl/en/WarunkiZyciaLudnosci_dashboards/Raporty_predefiniowane/RAP_DBD_WZL_11.aspx) However disposable income is typically very close to consumption for the population at the bottom of the distribution who typically would not be able to save.

[12] We use the definitions used by the Polish Central Statistics Office (GUS) to define the national extreme and legal poverty lines. The starting point adopted for constituting the extreme poverty threshold is subsistence minimum of PLN 544.09 in 2014 estimated by the Institute of Labor and Social Studies for a 1-person household. This value is multiplied by the number of persons in the household according to the original OECD equivalence scale.

Once direct taxes and all social contributions are subtracted and direct transfers are added, the extreme poverty headcount for disposable income declined further, to 5.5 percent. However the legal poverty headcount increases somewhat to 8.6 percent, on account of the relatively large burden of direct taxes and social contributions for all but those under the extreme poverty line. [13]

Once indirect taxes are incorporated into the analysis, all of the improvement in poverty that takes place through direct transfers is canceled out. In fact, indirect taxes result in a 3.5 percentage point increase in extreme poverty when compared to disposable income and a 2.9 percentage point increase when compared to market income plus pensions. Similarly, both the poverty gap and the severity of poverty decline with pensions and social transfers, but increase once indirect taxes are taken into account. Similar results hold when the international US$5-a-day (2005 PPP) and the US$2.5-a-day (2005 PPP) poverty lines are used.

How does this look for different types of households? As shown in Table 5, there is quite a bit of heterogeneity in terms of the impact of taxes and transfers on poverty across different types of households. Although poverty increases with indirect taxes for all types of households, households with children are especially hard hit, with extreme poverty being higher for consumable income than for market income for households with more than one child and the at-risk-of poverty rate being higher for single parents and for couples with children.

Table 5. Main Scenario: Changes in Poverty on account of taxes and transfers by household type

	Market Income	Disposable Income	Consumable Income	Total impact on extreme poverty
	(1)	(2) = (1) + pensions + direct transfers - direct taxes - contributions	(3) = (2) - indirect taxes	(4) = (3) - (1)
		Extreme Poverty		
Overall	27.2%	5.5%	8.9%	-18.3%
Single adult	24.4%	6.0%	9.4%	-15.1%
Single parent	22.6%	7.0%	10.6%	-12.0%
Couple without children	27.4%	3.9%	6.3%	-21.1%
Couple with 1 child	6.6%	4.1%	6.1%	-0.5%
Couple with 2 children	6.1%	4.7%	8.0%	1.9%
Couple with 3+ children	15.9%	9.9%	17.1%	1.3%
Single retiree	91.4%	0.5%	1.3%	-90.1%
Couple of retirees	93.6%	0.4%	0.8%	-92.8%
Mixed	24.0%	6.8%	11.2%	-12.9%

[13] Results for the alternative scenario where old age pensions are considered as deferred savings are presented in Appendix 2.

	At-risk-of poverty rate (60% of median disposable income)			
Overall	34.2%	17.1%	25.1%	-9.2%
Single adult	25.8%	9.4%	14.1%	-11.7%
Single parent	33.6%	25.1%	35.7%	2.1%
Couple without children	30.5%	11.9%	18.1%	-12.5%
Couple with 1 child	10.0%	10.6%	16.1%	6.1%
Couple with 2 children	10.8%	14.7%	22.6%	11.8%
Couple with 3+ children	26.6%	28.0%	41.0%	14.3%
Single retiree	96.3%	11.1%	20.0%	-76.3%
Couple of retirees	95.5%	2.5%	5.9%	-89.5%
Mixed	33.6%	20.8%	29.5%	-4.0%

Source: Own estimates based on HBS 2014.

V. Progressivity, Marginal Contributions, and Pro-poorness of Taxes and Transfers

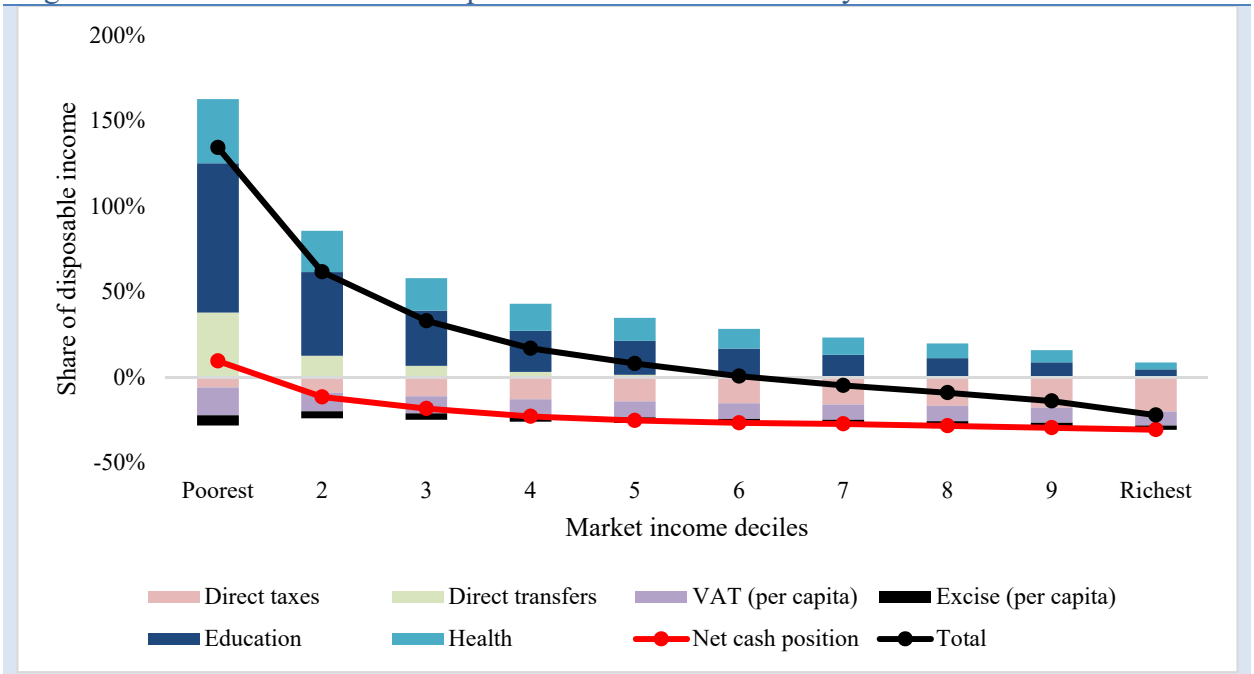
How did each of the fiscal interventions contribute to the observed changes in poverty and inequality? Figure 4 presents the distributional impact of different components of the tax and benefit system as a share of market income (including pensions). Most components of the system are progressive, with the bottom 50 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. This coincides with the results presented above, particularly once indirect taxes are included.

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 index[14] 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

[14] 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).

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.

Figure 4. Poland. Distributional Impact of the Tax and Benefit System in 2014



Source: Own estimates based on the 2014 HBS.

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 *without* the tax (or transfer). Table 6 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 deferred savings are presented in Appendix 2. We describe each of these in turn.

Taxes

Direct taxes and social contributions are only slightly progressive overall, and while they are redistributive, they place an important burden on the poor. This can be seen by the fact that the Kakwani coefficient is positive, indicating that taken together direct taxes and contributions are progressive, and by positive marginal contributions, indicating that they are redistributive (Table 6). However, direct taxes and contributions are also poverty increasing, as shown by a negative

Table 6. Main Scenario: Marginal Contributions to Reducing Inequality in 2014

	Size	Concentration Coefficient	Kakwani Coefficient	Marginal Contributions		
				Redistributive effect	Poverty reduction effect US$5	Poverty reduction effect National Extreme
Total from Market to Consumable Income						
Direct transfers (excluding contributory pensions)	1.9%	-0.6066	0.9825	0.0257	0.0480	0.0466
Housing benefits	0.1%	-0.5890	0.9649	0.0016	0.0031	0.0029
Nursing Benefit (zasiłek)	0.1%	-0.4608	0.8367	0.0013	0.0023	0.0022
Nursing Allowance (świadczenie)	0.2%	-0.5678	0.9437	0.0026	0.0049	0.0047
Social assistance	0.3%	-0.7461	1.1220	0.0049	0.0085	0.0080
Family benefits	0.4%	-0.6561	1.0320	0.0064	0.0171	0.0147
Social pension	0.6%	-0.5532	0.9291	0.0076	0.0128	0.0124
Contributory pensions	23.3%	0.1709	0.2050	0.3165	0.2956	0.2949
Old-age pension	17.5%	0.2159	0.1600	0.2191	0.2107	0.2114
Other contributory benefits	0.1%	0.2509	0.1251	0.0004	0.0006	0.0007
Pre-retirement pension	0.3%	-0.1488	0.5247	0.0030	0.0044	0.0040
Family pension	2.0%	0.1548	0.2211	0.0230	0.0257	0.0259
Disability pension	1.9%	-0.1269	0.5028	0.0216	0.0292	0.0302
Maternity benefit	0.8%	0.2735	0.1025	0.0077	0.0113	0.0107
Unemployment benefit	0.4%	-0.1872	0.5631	0.0060	0.0087	0.0091
Structural farmer pension	0.2%	-0.0970	0.4730	0.0018	0.0023	0.0023
Direct taxes and contributions	30.0%	0.4205	0.0446	0.0137	-0.0424	-0.0413
Health insurance contributions	6.4%	0.3841	0.0082	0.0017	-0.0135	-0.0138
Capital taxes	0.0%	0.5675	0.1915	0.0000	0.0000	0.0000
Farm taxes	0.3%	-0.0587	-0.4347	-0.0019	-0.0025	-0.0023
Personal income tax	4.9%	0.5631	0.1872	0.0150	0.0016	-0.0003
Old-age pension contributions	10.4%	0.4080	0.0321	0.0001	-0.0230	-0.0213
Disability pension contributions	4.3%	0.4080	0.0321	-0.0012	-0.0124	-0.0113
Accident insurance contributions	1.0%	0.4269	0.0510	-0.0002	-0.0034	-0.0034
Sickness insurance contributions	1.2%	0.4402	0.0643	0.0000	-0.0034	-0.0037
Labor Fund	1.3%	0.4269	0.0510	-0.0002	-0.0043	-0.0041
Fund of Employee Benefits	0.0%	0.4402	0.0643	0.0000	0.0000	-0.0006
Pension contributions - farmers	0.2%	-0.2491	-0.6251	-0.0016	-0.0019	-0.0018
Other contrib - farmers	0.1%	-0.2800	-0.6559	-0.0008	-0.0011	-0.0009
Indirect taxes	8.9%	0.2602	-0.1157	-0.0140	-0.0331	-0.0355
Value-added tax	6.6%	0.2676	-0.1083	-0.0103	-0.0252	-0.0257
Excise taxes	2.3%	0.2383	-0.1376	-0.0054	-0.0108	-0.0112
Total from Market to Final Income						
Direct taxes and contributions	30.0%	0.4205	0.0446	0.0261	-0.0079	-0.0091
Direct transfers (excluding contributory pensions)	1.9%	-0.6066	0.9825	0.0156	0.0163	0.0168
Indirect taxes	8.9%	0.2602	-0.1157	-0.0066	-0.0084	-0.0096
In-kind transfers	19.2%	-0.0858	0.4617	0.0746		
Education	11.6%	-0.1382	0.5142	0.0356		
Kindergarten benefits	0.8%	0.0890	0.2869	0.0016		
Primary school benefits	4.0%	-0.1891	0.5650	0.0168		
Gymnasium benefits	2.0%	-0.2429	0.6189	0.0088		
High school benefits	0.6%	-0.0854	0.4613	0.0016		
Vocational school benefits	0.9%	-0.3245	0.7005	0.0048		
Tertiary school benefits	2.3%	0.1564	0.2195	-0.0003		
Health	7.6%	-0.0056	0.3816	0.0294		

Source: own estimates based on 2014 HBS.

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

2. Redistributive effect equals the difference in the Gini before and after the intervention.

3. By definition, the sum of the marginal contributions does not fulfill the adding-up principle so it will not be equal to the redistributive/overall poverty effect unless by coincidence.

marginal contribution to poverty reduction when measured by the extreme and the US$5-a-day poverty line.[15]

Moreover, there is substantial heterogeneity across categories of taxes and contributions. For instance, while personal income taxes are progressive and redistributive, many of the social contributions are not progressive and pose a burden on the extreme poor. This is because in general there is no minimum threshold for social contributions. Under the scenario that contributory old-age pensions are a deferred income, we find that even health insurance contributions are regressive and place a burden on the poor (see Appendix 2). Worse yet, agricultural taxes and farmer pension contributions are regressive in all scenarios, and contribute not only to increased poverty, but also to higher inequality. This is partly due to the fact that agricultural taxes and contributions are based on land size rather than on income, such that they can make up a larger share of market incomes of poor households. Together, direct taxes and contributions were only slightly progressive in 2014, but much less so than in other countries (Figure 5A), and while they were redistributive, they also posed an important burden on the poor.

Indirect taxes are regressive and contributed to increasing poverty and inequality as discussed in the previous section. While it is true that regressive taxes can be equalizing, this was not the case in Poland 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 even more regressive, but since they are not as large as VAT, their impact on poverty and inequality was not as severe (Table 6). When taken together, the regressive and unequalizing nature of indirect taxes in Poland is higher than what is observed in many Latin American and other developing countries (Figure 5B). These results point to potential improvements that could be achieved to reduce the burden on the poor.

Social Spending

Contributory pensions and direct transfers are all progressive, reducing both poverty and inequality (Table 6). Contributory old-age pensions are particularly large, and while not as progressive as other pensions, have an important poverty-reducing and redistributive effect (Table 6). Moreover, contributory benefit programs are progressive only in relative terms – that is, they represent a larger share of the budgets of the poor, but they are not pro-poor, as most of the benefits are concentrated at the top 40 percent of the distribution. Although disability and unemployment benefits are more concentrated at the bottom of the distribution, maternity, family and old-age pensions are relatively more concentrated at the top (Figure 6).

[15] We find similar results using higher poverty lines, such as the legal poverty line.

Figure 5. Progressivity and Redistributive Effect of Taxes

Figure A. Direct Taxes

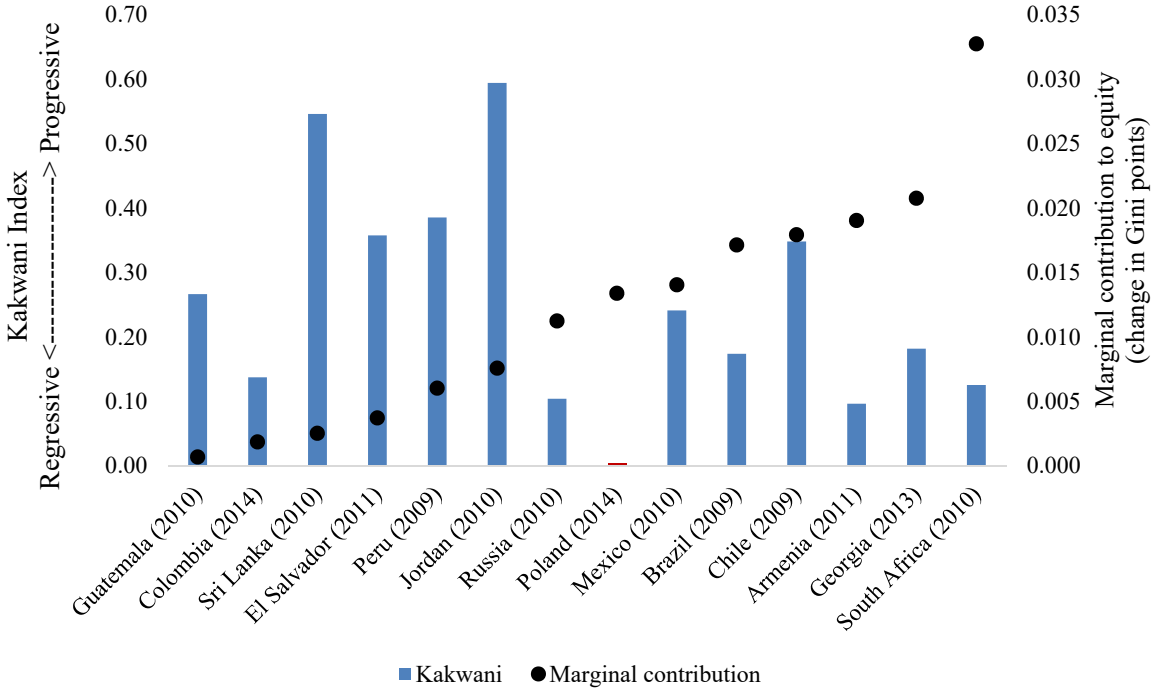
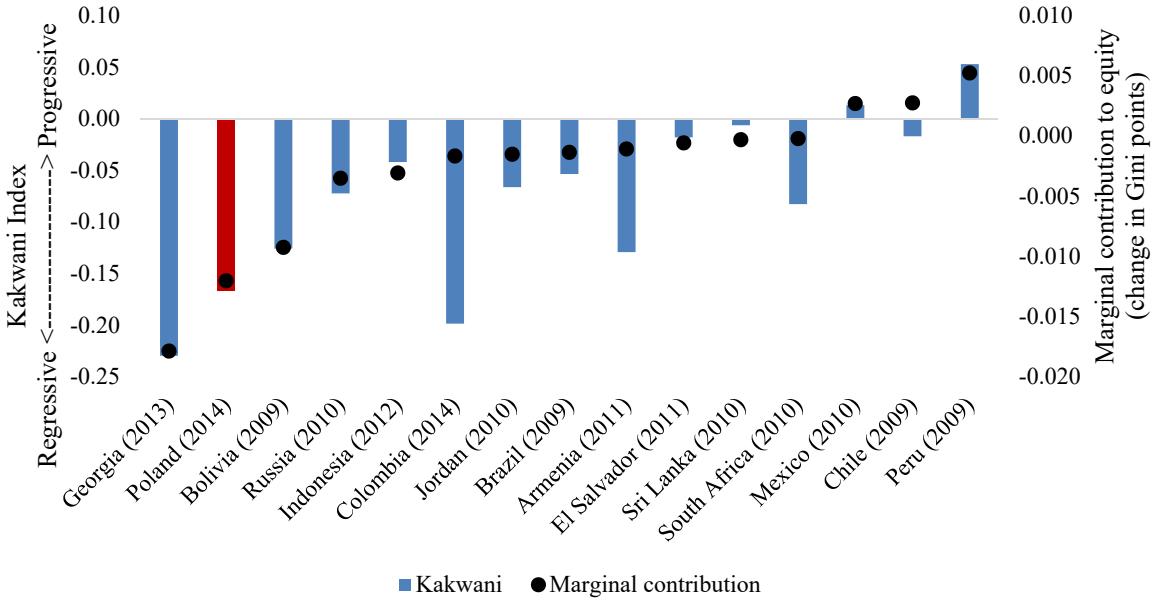


Figure B. Indirect Taxes



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); Russia: Lopez-Calvo et al (2016); Sri Lanka: Arunatilake et al (2016); South Africa: Inchauste et al (2016); Uruguay: Bucheli et al (2014); Poland: own estimates based on the 2014 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.

Among non-contributory transfers, family benefits and social assistance programs are the most progressive, but social assistance has a relatively small redistributive effect given its small size (Table 6). Social pensions have the largest redistributive effect, and together with family benefits have the largest impact on extreme poverty. With the exception of the child birth grant, all of the noncontributory programs are targeted to the bottom 20 percent of the distribution (Figure 6).

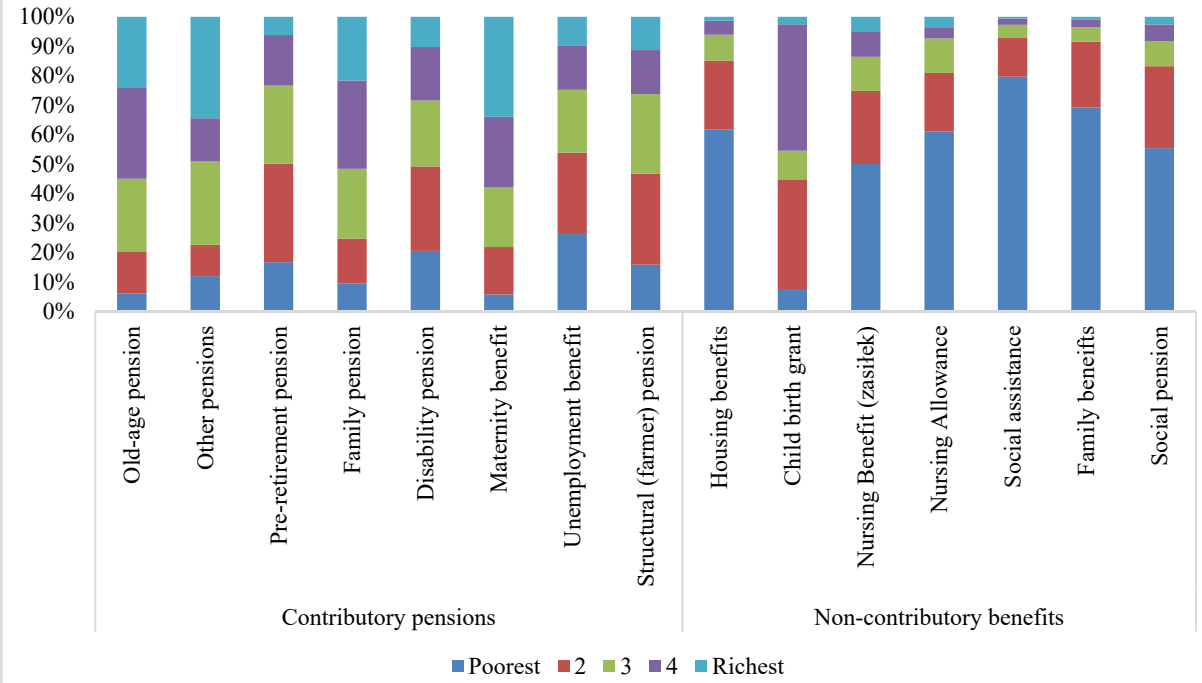
In assessing how education and health spending benefit the poor, we have to caution that our analysis does not address the quality of such spending. We use government expenditure data on the various forms of education and health services to estimate unit costs of these programs. The analysis thus assumes that the actual 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 both education and health are progressive and equalizing.[16] For education, 29 percent of total education spending goes to the bottom 20 percent of the distribution, while only 15 percent was concentrated at the top 20 percent. This is mostly on account of primary school spending which has the largest redistributive effect (Table 6). Indeed, primary, gymnasium and vocational school spending benefit families at the bottom of the distribution slightly more than those at the top, in part because lower income households tend to have more children (Figure 7). Interestingly, tertiary education spending is much less concentrated at the top of the distribution than what is typically observed in middle-income countries. It is also interesting to note that 26 percent of spending on kindergarten is benefiting the top 20 percent of the distribution, mostly on account of greater access to these services in urban areas. However, this could also reflect the fact that the subsidy for private kindergarten is as much as 75 percent of the standard subsidy for public services.

Health spending is equally distributed across the population, with slightly more (20.3 percent) spending concentrated at the bottom 20 percent of the distribution given that some wealthier households opt-out of public care (so that 19.7 percent of health spending is concentrated at the top 20 percent). Note that in relative terms, health spending is strongly progressive, as it makes up a larger share of the incomes of the bottom of the distribution.

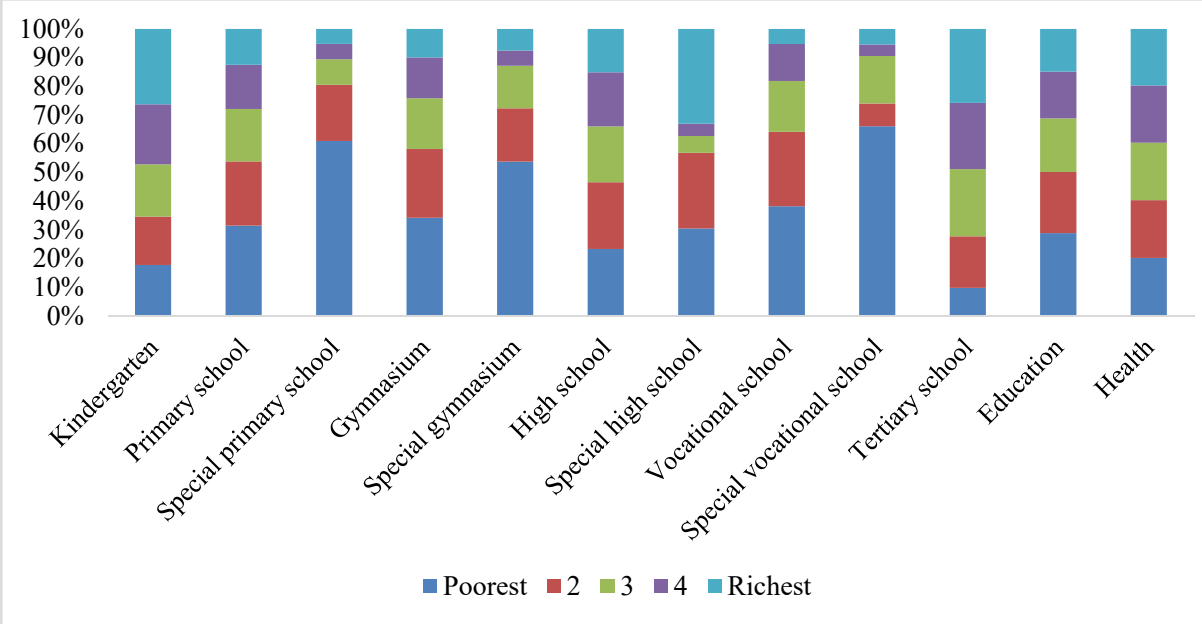
[16] Following CEQ conventions, we do not assess the poverty reducing impact of health and education spending, since households do not necessarily feel wealthier on account of this spending. Moreover, since these are investments in human capital, the full benefit of this spending will not be clear in a static setting such as this one.

Figure 6. Concentration of Social Protection Programs by market income quintiles



Source: World Bank estimates based on HBS 2014.

Figure 7. Concentration of Education and Health by market income quintiles



Source: World Bank estimates based on HBS 2014.

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

Since 2014, the government has implemented changes to the tax and transfer system, with the recent introduction of the Family 500+ program being the most important. Going forward, proposals to reform the tax system are being considered, aiming to make it more progressive. This section presents simulations for these changes, with a focus on the overall impact on poverty and inequality. Although we present initial estimates of the fiscal cost of each of these measures, it is important to note that the sustainability and labor incentive effects are not considered in this paper, although they could be substantial, and should be carefully considered in conjunction with the results presented below.

Family 500+ Program

Facing one of the lowest fertility rates in the EU, the Government of Poland has recently introduced a new Family benefit program with two formal objectives: (i) to encourage fertility, and (ii) to reduce child poverty. The Family 500+ program was rolled out in April 2016 and consists of a monthly payment of PLN 500 (€115) for every second and subsequent child until the age of 18. The benefit is also extended to the first child in families with income per capita below PLN 800, or below PLN 1,200 (€274) if there is a disabled child in the family. The program does not include an income threshold for high income earners, and payments are to be administered by municipal social assistance units based on the funding from the State Budget.

Since this benefit was extended to all children, not just those born after the program began, this represents a relatively large increase in transfers to households in Poland. Importantly, the Family 500+ benefit is designed to be on top of any other existing social assistance benefit received by the household (such as family benefits, housing allowance, other social assistance, or payments from the alimony fund) and will not influence the eligibility to these aforementioned programs. Eligibility into the program for farming households, will depend on the amount of land owned by the family and the standardized income per hectare announced by the Polish Central Statistical Office.

In order to simulate the distributional impacts of the Family 500+ program, we classify household members into families using the program eligibility rules.[17] As described earlier for the analysis presented above, sampling weights from the HBS were calibrated as in Myck & Najsztub (2015) in order to account for differences on the number of children between the HBS and the census. Moreover, since the survey reports income at the household level, in order to obtain family per

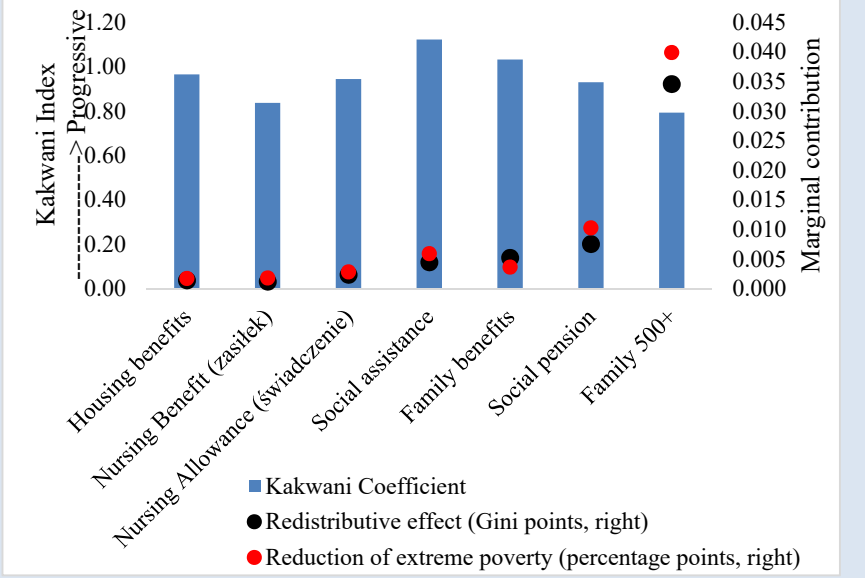
[17] A family includes the parents of the children, the spouse of the parent, caregiver of the child, and children up to 25 who reside with the parents and who are economically dependent on the parents. A family may also include children older than 25 provided that these are disabled and due to their disability are eligible for caregiver allowance. Children will not be considered as a part of the family if the child is married, or if the child is older than 18 and already has a child of his/her own.

capita income we first determine individual incomes, allocating general household income evenly among all household members. Additionally, for farming households, their reported income is ignored in order to determine eligibility to receive the allowance for the first child and the predicted income is based on the amount of land belonging to the household is evenly distributed among all family members.[18] We therefore construct an income per capita measure in line with the eligibility criteria that will be used in order to qualify for the benefit for the first child, including income from wages, income from capital, income from pensions, and income from transfers categorized as alimony. This measure of income is then used to estimate monthly payments to be delivered across the distribution as part of the Family 500+. Finally, since households are expected to increase their spending, we also compute the likely increase in VAT and excise spending due to the Family 500+ program.

Since Family 500+ is not targeted to low-income households for families with 2 or more children, 13 percent of benefits are expected to benefit the top 40 percent of the distribution, pointing to potential efficiency gains if it were to be better targeted. However, since low-income households have more children, 44.5 percent of benefits will go to the bottom 20 percent of the distribution. Although the Family 500+ program is less progressive than the social assistance and family benefit program, it is more redistributive and has a greater impact on extreme poverty than either of those programs given its relative size (Figure 8).

Poverty and inequality are therefore expected to fall after the introduction of the Family 500+ program. Indirect taxes are also expected to increase, but assuming households spend on similar goods, the net effect on consumable income is still estimated to be positive, with extreme poverty declining from 8.9 to 5.9 percent relative to the situation in 2014 (Table 7).

Figure 8. Progressivity and Marginal Contribution – Family 500+



Source: World Bank estimates based on HBS 2014.

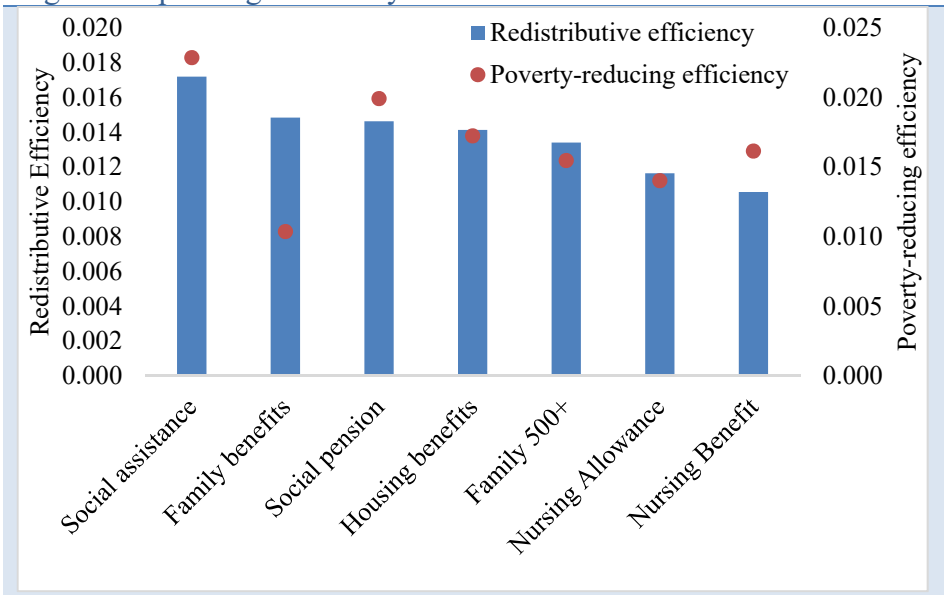
The cost of the program is expected to amount to PLN 25.7 million per year (1.5 percent of GDP). However, when we take into account the likely increase in VAT and excise tax collections (assuming that households will consume a similar basket of goods after the program is put in

[18] It is ignored only for the eligibility for all income concepts presented later the reported income is utilized. The value per hectare considered is PLN 2,506 per annum.

place), the net cost of the program is expected to amount to PLN 22.2 million per year (1.3 percent of GDP).

To compare the efficiency of the new program relative to other existing programs, we calculate the change in poverty and extreme poverty per zloty spent for each program. We find that the change in poverty and inequality per zloty spent is lower for the Family 500+ program compared to social assistance, family benefits, social pension and housing benefits, as these are more targeted, but it is more cost efficient than nursing allowance and nursing benefit (Figure 9). However, it must be kept in mind that last two benefits are not means-tested or targeted to the poor as their aim is to support persons suffering from disability.

Figure 9. Spending Efficiency



Source: World Bank estimates based on HBS 2014.

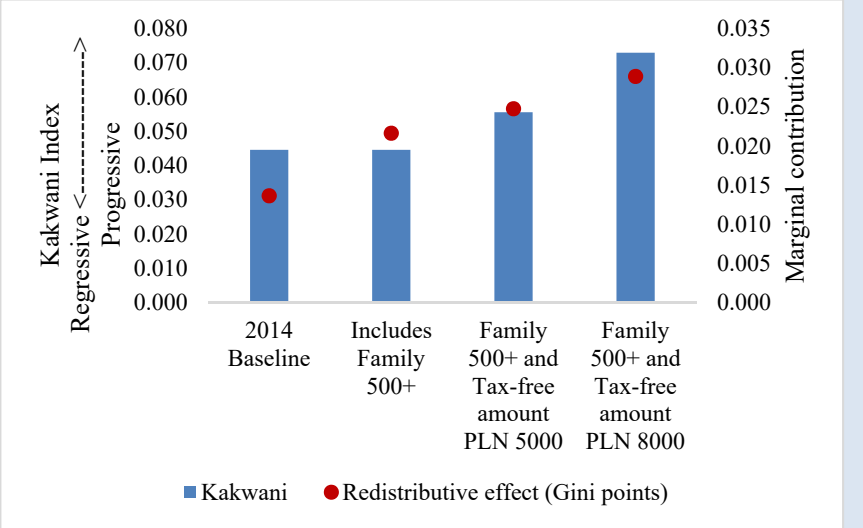
Increasing the tax-free allowance for Personal Income Taxes

In addition to the Family 500+, the new government campaigned on a promise to increase the tax-free allowance for PIT from PLN 3,000 to PLN 8,000. However, the plans have not yet been detailed, and the size of the increase might end up being lower, potentially to be implemented in several steps. The simulations below present two scenarios, one in which the tax-free allowance increases to PLN 5,000, and the other where it increases to PLN 8,000. We present the impact on poverty and inequality, along with the estimated fiscal cost of these measures. Given the introduction of the Family 500+, we also show the impacts of these alternative reforms in combination with the Family 500+ program.

Increasing the value of the tax-free allowance leads to more progressive personal income tax and health insurance contributions (since health contributions partly depend on the amount paid in PIT), resulting in an overall more progressive and redistributive direct tax system (Figure 10). The increase in disposable income as a result of the tax-free allowance is assumed to slightly increase the burden of indirect taxes. However, the net effect is a net gain for all households.

Combining the effect of the Family 500+ and the increase in the change in the tax-free allowance leads to a further reduction in poverty and inequality. Most of the change results from the introduction of the Family 500+ program, as shown in Table 7, with inequality declining by an additional 0.2 to 0.5 Gini points and extreme poverty by 0.3 to 0.6 percentage points, depending on the size of the allowance. The cost of these programs ranges from an additional PLN 7.5 (0.4 percent of GDP) to PLN 19 million (1.1 percent of GDP) relative to the cost of Family 500+ program alone. This estimate takes into account an expected increase in consumption and therefore in indirect taxes (under the assumption that households consume a similar basket of goods).

Figure 10. Progressivity and impact of direct taxes and contributions under alternative reforms



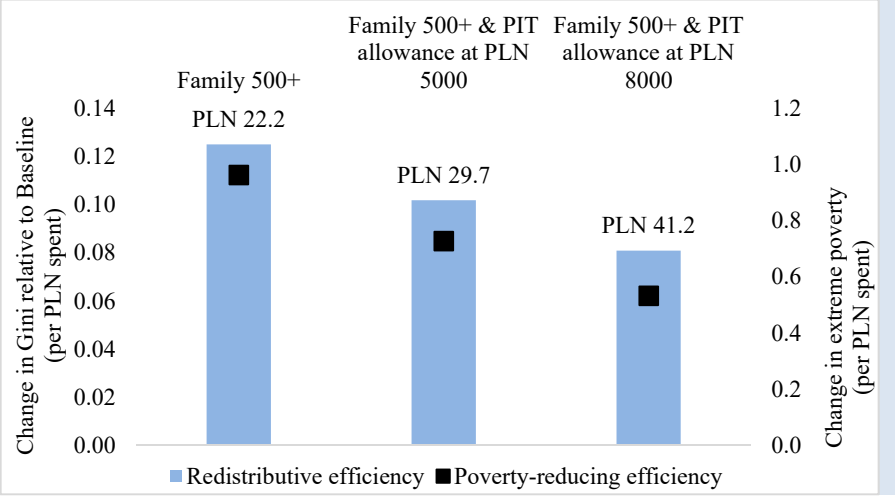
Source: World Bank estimates based on HBS 2014.

Table 7. Impact of Family 500+ and Alternative Tax Allowance Reforms

	Market Income	Market income + contributory pensions	Disposable Income	Consumable Income	Final Income	Estimated Fiscal Cost	
	(1)	(2) = (1) + contributory pensions	(3) = (2) - direct taxes - contributions + direct transfers	(4) = (3) - indirect taxes	(5) = (4) + inkind transfers	(million PLN per year)	(percent of GDP)
Gini							
2014 Baseline	0.5265	0.3759	0.3428	0.3547	0.2821		
1) Family 500+			0.3133	0.3270	0.2704	22,181	1.3%
2) PIT allowance at PLN 5000			0.3397	0.3517	0.2799	8,873	0.5%
3) PIT allowance at PLN 8000			0.3356	0.3477	0.2768	22,582	1.3%
4) Family 500+ & PIT allowance at PLN 5000			0.3107	0.3245	0.2682	29,702	1.7%
5) Family 500+ & PIT allowance at PLN 8000			0.3076	0.3214	0.2652	41,172	2.4%
Extreme Poverty (percent of population)							
2014 Baseline	27.2%	6.0%	5.5%	8.9%			
1) Family 500+			3.4%	5.9%			
2) PIT allowance at PLN 5000			5.1%	8.5%			
3) PIT allowance at PLN 8000			4.8%	7.9%			
4) Family 500+ & PIT allowance at PLN 5000			3.2%	5.6%			
5) Family 500+ & PIT allowance at PLN 8000			3.1%	5.3%			

Source: Own estimates based on HBS 2014.

Figure 11. Inequality and Poverty-reducing efficiency Family 500+ and Tax-free allowance

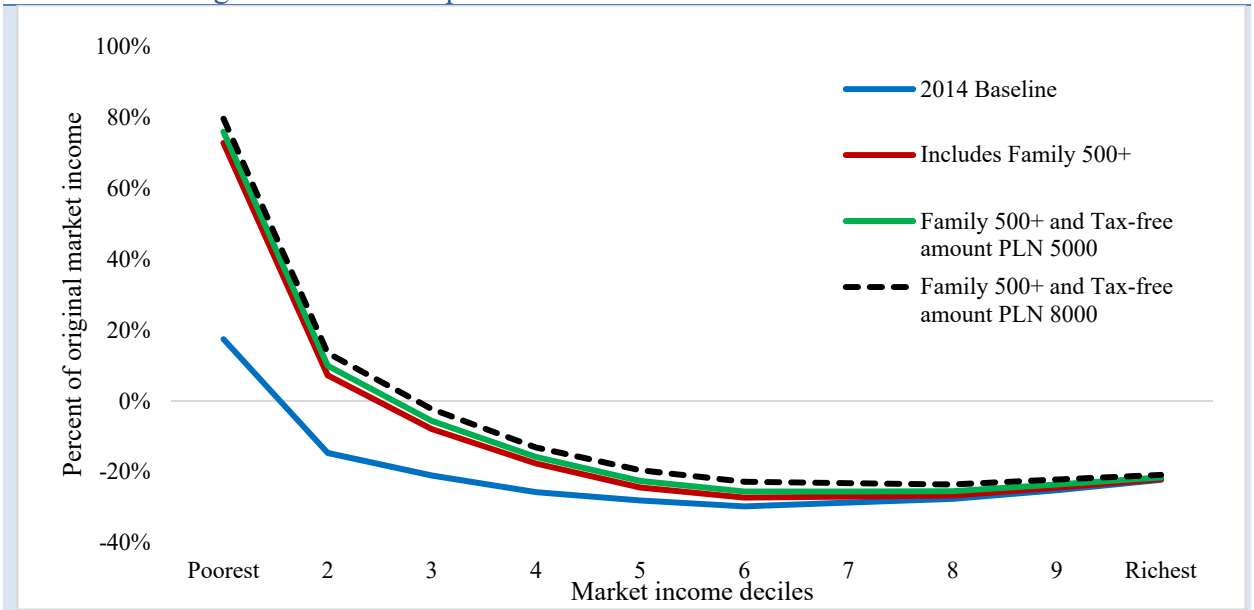


Source: World Bank estimates based on HBS 2014.

Since the proposed tax-free amounts will apply to all taxable incomes, a larger share of the benefits are expected to benefit households at the top of the distribution, pointing to efficiency gains that could be possible if the proposed tax break were better targeted. As shown in Figure 11, the poverty and inequality reducing impact per zloty spent is lower for scenarios that include the tax-free allowance compared to the Family 500+ program alone. About 48 percent of the foregone revenue will benefit households in the top 40 percent of the distribution, while only 30 percent will benefit the bottom 40 percent. In relative terms, the tax break represents 4 to 7 percent of disposable income for the poorest 40 percent, but only 2 to 4 percent for the top of the distribution. These results point to potential efficiency gains by restricting the program to households at the bottom of the distribution.

How do the changes above affect the net cash position of households before and after the reforms? Households in the second decile will now receive more in transfers than they pay into the system through direct and indirect taxes and contributions largely due to the Family 500+ program, although all households will have a net gain (Figure 12). Going forward, it will be important to consider how these initiatives will be financed, and the potential distributional impact of measures needed to ensure that the government is able to keep to its deficit rule.

Figure 12. Net cash position of households under alternative reforms



Source: World Bank estimates based on HBS 2014.

VII. Conclusions

The analysis presented in this paper is complementary to existing work analyzing the distributional impact of taxes and benefits. As previous work has shown (Paulus, 2015; Myck and Najsztub, forthcoming), the combined effect of taxes and social spending helps to substantially reduce inequality in Poland, in line with other EU countries, with most of the reduction in inequality largely being achieved by pensions. This paper also shows the important role of in-kind transfers in the form of education and health. Moreover, we find that the combination of taxes and social spending also leads to an important decline in extreme poverty. 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.

In terms of the specific fiscal interventions, we find that most direct taxes are progressive and equalizing with the exception of agricultural taxes and farmer contributions, which depend on land size rather than on the income generation capacity of households. In addition, although direct taxes and contributions are progressive, they are also poverty increasing as they pose a significant burden on the bottom of the distribution given that contributions do not have a minimum threshold. Even when old-age pensions are assumed to be deferred income, we find that the personal income taxes and health insurance contributions are poverty increasing. Moreover, indirect taxes are found to be regressive in line with previous work (Myck, 2015b). However, the paper notes that the burden of indirect taxes contributes to poverty and inequality increases, more so than what is observed in many developing countries. Both the results on direct and indirect taxes point as of 2014 to potential areas where Poland could improve, even if it were only to minimize the impact on

extreme poverty, particularly for households with children. On the spending side, the paper shows that direct transfers are progressive and equalizing, particularly the family benefit and social assistance programs, which are pro-poor. In line with existing research, we find that contributory benefit programs made up a large share of the incomes of the poor, and had strong poverty reducing and equalizing effects, although they were not pro-poor. Finally, spending on health and education is progressive and equalizing.

Overall, the Polish fiscal system in 2014 had the capacity to redistribute, but a relatively weak capacity to reduce poverty given the resources at its disposal, particularly for families with children. Simulations show that the recent introduction of the Family 500+ program has already made an important change in this respect, strongly reducing the impact of taxes and transfers on extreme poverty and improving the redistributive impact of the system as a whole. The new program is redistributive even if not very well targeted, pointing to potential efficiency gains by restricting the program to households at the bottom of the distribution. Similarly, proposals to extend the tax-free amount in personal income tax legislation are expected to further improve the redistributive impact of fiscal policy. However, a larger share of foregone revenue would benefit the top of the distribution, pointing to potential efficiency gains by restricting the program to households at the bottom of the distribution.

More generally, going forward it will be important to consider how these initiatives will be financed, and the potential distributional impact of measures needed to ensure that the government is able to keep to its deficit rule. Having a comprehensive framework to further analyze alternative reforms is expected to be useful going forward.

References

Bucheli, Marisa, Nora Lustig, Máximo Rossi, and Florencia Amábile. 2014. "Social Spending, Taxes and Income Redistribution in Uruguay." In Lustig, Nora, Carola Pessino and John Scott. 2014. Editors. *The Redistributive Impact of Taxes and Social Spending in Latin America. Special Issue. Public Finance Review,* May, Volume 42, Issue 3.

Brzezinski, Michal (2015). "Income dynamics of the bottom 40% (B40) income group in Poland during the Great Recession and Recovery: Role of Fiscal and Social Policies." Background paper, *Shared Prosperity in the EU Project*, World Bank, Washington, DC.

De Agostini, P., M. Myck, and M. Kundera (2015). Poland 2011-2015. EUROMOD Country Report, University of Essex. Available at: https://www.euromod.ac.uk

Duclos, Jean-Yves and Abdelkrim Araar. 2006. Poverty and Equity: Measurement, Policy, and Estimation with DAD. New York: Springer and International Development Research Centre.

_____ and Martin Tabi. 1996. The measurement of progressivity, with an application to Canada. The Canadian Journal of Economics. Volume 1, Special Issue (Part 1), April, pp. S165-S170.

Foster, J., J. Greer, and E. Thorbecke. 1984. A class of decomposable poverty measures. Econometrica 52: 761-766.

Higgins, Sean and Nora Lustig. 2015. Can a Poverty-Reducing and Progressive Tax and Transfer System Hurt the Poor? CEQ Working Paper No. 33, Center for Inter-American Policy and Research and Department of Economics, Tulane University and Inter-American Dialogue, April.

Higgins, Sean and Claudiney Pereira. 2014. "The Effects of Brazil's Taxation and Social Spending on the Distribution of Household Income." In Lustig, Nora, Carola Pessino and John Scott. 2014. Editors. *The Redistributive Impact of Taxes and Social Spending in Latin America. Special Issue. Public Finance Review,* May, Volume 42, Issue 3.

Inchauste, Gabriela; Lustig, Nora; Maboshe, Mashekwa; Purfield, Catriona; Woolard, Ingrid. (2015). The distributional impact of fiscal policy in South Africa. Policy Research working paper; no. WPS 7194. Washington, DC: World Bank Group. Available at: https://hubs.worldbank.org/docs/imagebank/pages/docprofile.aspx?nodeid=23984236

Jaramillo, Miguel. 2014. "The Incidence of Social Spending and Taxes in Peru." In Lustig, Nora, Carola Pessino and John Scott. 2014. Editors. *The Redistributive Impact of Taxes and Social Spending in Latin America. Special Issue. Public Finance Review*, May, Volume 42, Issue 3.

Kakwani, N. 1993. Statistical inference in the measurement of poverty. *Review of Economics and Statistics* 75 (4): 632-639.

Lambert, Peter. 2002. The Distribution and Redistribution of Income. Third Edition. Manchester United Kingdom: Manchester University Press.

Lustig, Nora, editor. 2016. *Commitment to Equity Handbook: Estimating the Redistributive Impact of Fiscal Policy,* Tulane University and the World Bank.

Lustig, Nora. and Sean Higgins. 2013. *Commitment to Equity Assessment (CEQ): Estimating the Incidence of Social Spending, Subsidies and Taxes. Handbook*. CEQ Working Paper No. 1, Center for Inter-American Policy and Research and Department of Economics, Tulane University and Inter-American Dialogue, September.

Lustig, Nora and Sean Higgins. 2012. "Fiscal Incidence, Fiscal Mobility and the Poor: a New Approach," CEQ Working Paper No. 4, September. Available at: http://stonecenter.tulane.edu/uploads/Lustig.Fiscal_Incidence,_Fiscal_Mobility_and_the_Poor-_A_New_Approach._April2012-1344004195.pdf

Lustig, Nora, Carola Pessino, and John Scott. 2014. "The Impact of Taxes and Social Spending on Inequality and Poverty in Latin America: Argentina, Bolivia, Brazil, Mexico, Peru and Uruguay. Introduction to Special Issue," in Public Finance Review, May 2014, Volume 42, Issue 3, published online November 20, 2013

Morawski, L. and M. Myck (2010). 'Klin'-ing up: Effects of Polish tax reforms on those in and on those out. *Labour Economics* 17(3), 556 – 566.

Myck, M. (2015). "VAT in Poland: distribution, recent changes and single rate scenarios" CenEA Centre for Economic Analysis mimeo.

Myck, M. (2015). "Reforming support for families with children in Poland – old issues, recent reforms and further policy options" CenEA Centre for Economic Analysis mimeo.

Myck, M., Najsztub, M. (2015). Data and Model Cross-validation to Improve Accuracy of Microsimulation Results: Estimates for the Polish Household Budget Survey. *International Journal of Microsimulation*, Volume 8(1) Spring 2015: 33–66.

Rokicka and Sztanderska (2013). "Cechy społeczno-ekonomiczne rodziny a ponoszenie wydatków na prywatne dobra i usługi edukacyjne" *Edukacja*, Volume 1 (121): 7-23. Available at: http://www.edukacja.ibe.edu.pl/images/numery/2013/1-1-rokicka-sztanderska-cechy-spoleczno-ekonomiczne-rodziny.pdf

Scott, John. 2014. "Redistributive Impact and Efficiency of Mexico's Fiscal System." In Lustig, Nora, Carola Pessino and John Scott. 2014. Editors. *The Redistributive Impact of Taxes and Social Spending in Latin America. Special Issue. Public Finance Review*, May, Volume 42, Issue 3.

World Bank. 2015. "Spending Review in Poland: Support to Low-Income Families".

Appendix 1. Methodological Assumptions

This appendix details the assumptions for the Commitment to Equity analysis for Poland based on the Polish Household Budget Survey (HBS) data 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. Employment income net of social security contributions is evaluated for health insurance and PIT. PIT is also paid from capital income, pensions, or unemployment benefit. Income net of social security contributions and taxes can later be supplemented with public transfers that are exempted from tax payment.

Social Security Insurance

Table A1. Rates of contributions to ZUS (as % of gross wage).

Contributions	2014		2015		2016	
	Employee	Employer	Employee	Employer	Employee	Employer
Old-age	9.76	9.76	9.76	9.76	9.76	9.76
Disability	1.5	6.5	1.5	6.5	1.5	6.5
Accident	0	0.67 – 3.86	0	0.4 – 3.619	0	0.4 – 3.6
Sickness	2.45	0	2.45	0	2.45	0
LF	0	2.45	0	2.45	0	2.45
FGEB	0	0.1	0	0.1	0	0.1
Source: ZUS, available at: http://www.zus.pl/default.asp?p=1&id=35, http://www.zus.pl/pliki/poradniki/2352_15_Zabezp_Spo%C5%82_w_polska_interaktywny.pdf						

Workers that have **Labor Code contracts** have the contributions paid from the total amount of their *gross wage* according to rates presented in Table A1. The situation is different in case of **Civil Code contracts.** Persons working **on commission contracts** by definition may have the contribution paid exactly like people on labor code contracts. However, contributions were mandatory only for the first contract and were voluntary for subsequent contracts. Recent changes in the law that became effective in January 2016 aimed to limit abuse, and according to the new rules contributions are obligatory as long as contributions from other contracts do not reach the value of contributions from the minimum wage. Sickness insurance contributions continue to be voluntary. In case of **contracts for results** there is no social security insurance, so any of the contributions mentioned in Table 1 are not paid for such contracts. Recent changes in the law did not cover those contracts. The summary of these rules is provided in Table A2.

[19] The contribution rate change happened in March 2015, thus the rate up to 31.03.3015 equals the one from 2014, and only from 01.04.2015 it has the value reported in the table.

Table A2. Payment of contributions from different contracts

Contributions	Labor Code contract	Civil Law contracts		
		Commission contracts		Contracts for result
	2014-2016	2014-2015	2016	2014-2016
Old-age	Yes	Yes, first contract mandatory, other voluntary	Yes, at least based on minimum wage, later voluntary	No
Disability				
Accident				
Sickness		Voluntary for the first contract, then impossible	Voluntary	
LF		Yes, first contract mandatory, other voluntary	Yes, at least based on minimum wage, later voluntary	
FGEB				
Source: ZUS, available at: http://www.zus.pl/files/porad23.pdf, http://www.zus.pl/pliki/poradniki/Poradnik_umowy_cywilnoprawne_01.01.2016.pdf				

Assumptions made when calculating contributions for different contracts:

1. Workers who report to have permanent contract are assumed to have Labor Code contract and calculate the contributions accordingly (standard approach).
2. Workers who report to be temporary workers are assumed to have Civil Code commission contract and pay the contributions from the total amount of their earnings. This is equivalent to assuming that the workers have fixed-term labor contract, as the payment of contributions will be the same in such case. However, when PIT is calculated there will be differences between fixed-term Labor Code contracts and commission contracts, so then the rules for commission contracts are followed.
3. Finally, the value that applies to firms up to 9 employees (1.93% in 2014) are assumed for accident contributions.

Self-Employment

For self-employed the contribution types and rates (if we sum up the rates for employee and employer) are as in Table 1. However, the obligation is to pay them just from the value that equals 60% of the average wage in the given year. Moreover, there are no contributions on Fund for Guaranteed Employees' Benefits, and sickness contributions are voluntary. Firms that are in operation for less than 2 years have a right to pay lower contributions, and in such cases it is obligatory to pay them from the value of 30% of minimum wage. The Social Insurance Institution publishes the minimum values of contributions for self-employed every year, and those are summarized in Table A3.

Assumptions made when calculating contributions for self-employed:

1. The self-employed pay the minimum obligatory values as in Table 3.
2. The self-employed do not pay sickness contribution which is voluntary.
3. As there seem to be no easy way to recognize which firms operate less than 2 years, all self-employed are assumed to pay standard rates.
4. Finally, the value that applies to firms up to 9 employees (1.93% in 2014) are assumed for accident contributions.

Table A3. Minimum obligatory contribution values for self-employed

Contributions	Obligatory	2014		2015		2016	
		More than 2 years	Up to 2 years	More than 2 years	Up to 2 years	More than 2 years	Up to 2 years
Old-age	Yes	438.73	98.38	463.68	102.48	474.92	108.34
Disability	Yes	179.81	40.32	190.03	42.00	194.64	44.40
Accident[20]	Yes	43.38	9.73	45.85 (42.7621)	10.13 (9.4522)	43.79	9.99
Sickness	Voluntary	55.07	12.35	58.20	12.86	59.61	13.60
LF	Yes	55.07	0	58.20	0	59.61	0
FGEB	No	-	-	-	-	-	-

Source: ZUS, available at: http://www.zus.pl/default.asp?p=1&id=1&idk=2219, http://zus.pox.pl/skladki-zus-za-grudzien-2014.htm, http://zus.pox.pl/zus_skladki_historyczne.htm, http://zus.pox.pl/skladki-preferencyjne-zus-archiwum-skladek-od-2005-roku.htm, http://www.zus.pl/files/minimalna_podstawa.pdf

Farmers

Farmers in Poland are insured in special Social Security Institution for Farmers (KRUS).[23] They do not pay contributions based on their income, but according to size of their land. If the land is less than 1ha, it is not considered a farm, and in such cases insurance in KRUS is possible only under special conditions and to limited extent. If the land is above 1ha it is considered a farm and people from this household who do not have social security insurance from other sources (the cases of overlapping titles are described below), and do not receive pension or other benefits from ZUS, are eligible for insurance in KRUS. KRUS distinguishes *farmer*s and *inmates*, and differentiates their contributions. Farmers are people above the age of 18 that are engaged in farming activity in the farm that they own. Inmates are farmer relatives, living in the farm household or close to it, and regularly working on the farm while not having other contract for this work.[24] Farmers and inmates pay just two types of contributions:

- Contribution for jointly accident, sickness, and maternity insurance, which is always the same per person,
- Contribution for jointly old-age and disability insurance, which is higher for farmers with bigger land, but constant for inmates.

The values of contributions are presented in Table A4. Joint old-age and disability insurance varies for farmers depending on the size of farm. The value of this insurance for farmers with a farm below 50 ha or

[20] For accident contribution we assume rate for firms with up to 9 employees.

[21] The rates has changed in March 2015, so the value in brackets is for period IV-XII 2015.

[22] The rates has changed in March 2015, so the value in brackets is for period IV-XII 2015.

[23] http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnik, http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnikow/przepisy-ogolne/, http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnikow/przepisy-o-ubezpieczeniu-spolecznym-rolnikow-cd-2/

[24] http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnikow/przepisy-o-ubezpieczeniu-spolecznym-rolnikow-cd-1/

inmate is the basic value, and for farmers with bigger farms the value is topped-up by certain number and the final values are presented in the table. For farmers who also have a firm (rules that apply here are described later), pay higher contributions as the basic value is doubled for them.

Table A4. Values of monthly contributions of farmers and inmates

	Farm size	VII 2013-III 2014		IV 2014-III 2015		IV 2015-III 2016	
		Old-age, disability	**Accident, sickness**	**Old-age, disability**	**Accident, sickness**	**Old-age, disability**	**Accident, sickness**
Farmer	Up to 50 ha	83.00	42.00	84.00	42.00	88.00	42.00
	50-100	183.00	42.00	185.00	42.00	194.00	42.00
	100-150	282.00	42.00	287.00	42.00	299.00	42.00
	150-300	382.00	42.00	388.00	42.00	405.00	42.00
	300+	482.00	42.00	489.00	42.00	511.00	42.00
Inmate	any	83.00	42.00	84.00	42.00	88.00	42.00
Farmer that has other firm	Up to 50 ha	166.00	42.00	168.00	42.00	176.00	42.00
	50-100	266.00	42.00	269.00	42.00	282.00	42.00
	100-150	365.00	42.00	371.00	42.00	387.00	42.00
	150-300	465.00	42.00	472.00	42.00	493.00	42.00
	300+	565.00	42.00	573.00	42.00	599.00	42.00
Inmate that has firm	any	166.00	42.00	168.00	42.00	176.00	42.00
Source: ZUS, available at: http://www.krus.gov.pl/krus/krus-w-liczbach/wymiar-kwartalnych-skladek-na-ubezpieczenie-spoleczne-rolnikow/							

Assumptions made when calculating contributions for farmers for CEQ Poland based on PHBS 2014:

1. Farmers are identified following Myck and Najsztub (2015). Contributions are assigned according to values in Table 4 for farmers above the age of 18 in farm household with land of at least 1ha.
2. The rates in 2014 are assumed to equal those for IV.2014-III.2015

Maximum values of contributions and overlap of insurance titles

The annual values for old-age and disability contribution to ZUS are capped at a maximum announced every year by ZUS. This value was PLN 121,650 in 2016, PLN 118,770 in 2015, and PLN 112,380 in 2014.[25] This limit was introduced given that it is a Defined Contribution system, so extremely high values of contributions would translate into extremely high pensions.

Regarding the overlap of insurance titles the major rules are as follows[26]:

- *More than one Labor Law contract:* contributions are mandatory from each contract.
- *More than one Civil Law contract:* in 2014 and 2015 the contributions were mandatory only from the first contract regardless of its value. From next contracts they were voluntary. In 2016 the

[25] http://www.zus.pl/default.asp?p=1&id=1017

[26] http://www.zus.pl/default.asp?p=3&id=117

contributions are mandatory also from next contracts if previous ones do not cover the contribution at the level from minimum wage.

- *Labor Code contract and Civil Law contract:* the contributions are mandatory only if Labor Code contract contributions are lower than those from Minimum Wage, otherwise voluntary. However, if the contracts are with the same employer they are mandatory also from the total value of Civil Law contract.
- *Labor Code contract and self-employment:* the contributions are mandatory only if Labor Code contract contributions are lower than those from Minimum Wage, otherwise voluntary.
- *Self-employment and Civil Law contracts:* contributions from either civil law contracts or self-employment are voluntary.
- *Farmers and Labor Code contract:* person is insured just in ZUS and cannot join KRUS.
- *Farmers and Civil Law contract:* person can be insured both in ZUS and KRUS only if the earnings from Civil Law contract do not exceed half of the minimum wage.[27]
- *Farmers and self-employment:* person can be insured both in ZUS and KRUS only if the PIT from self-employment does not exceed critical value that is defined every year by KRUS[28], and equals PLN3,204 in 2015, and PLN3,166 in 2014.[29]

Assumptions made when controlling for overlap of insurance titles and maximum value:

1. The values of contributions from temporary dependent employment are set to zero if a person has contribution from permanent dependent employment at least at the level of minimum wage.
2. The values of contributions from self-employment are set to zero if a person has contribution from dependent employment at least at the level of minimum wage.
3. The values of contributions from farming are set to zero if a person has positive contributions from permanent dependent employment or temporary dependent employment higher than half the minimum wage; or if a person exceeds the maximum PIT from self-employment.
4. If the old-age and disability contributions from dependent employment and self-employment exceed the contributions from 1/12 of yearly maximum income threshold, then they are set at the level of contributions from 1/12 of yearly maximum income threshold.

Health Insurance and Personal Income Tax (PIT)

One would intuitively describe health insurance contributions along other insurance contributions. However, in the Polish system, part of this contribution can be subtracted from PIT, and thus it is worth describing health insurance together with PIT. For tax calculation purposes we do not concentrate on individuals, as it was in the case of social security contributions), but rather on families that can be perceived

[27] http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnikow/ubezpieczenie-spoleczne-rolnikow-dla-osob-wykonujacych-umowy-agencyjne-umowy-zlecenia-lub-inne-umowy-o-swiadczenie-uslug-do-ktorych-stosuje-sie-przepisy-dotyczace-zlecenia-oraz-powolanych-do-skladu-rad-nadzorczych/

[28] http://www.krus.gov.pl/zadania-krus/ubezpieczenie-spoleczne-rolnikow/ubezpieczenie-spoleczne-dla-rolnikow-prowadzacych-dodatkowo-dzialalnosc-pozarolnicza/

[29] http://www.krus.gov.pl/krus/krus-w-liczbach/roczne-kwoty-graniczne-naleznego-podatku-dochodowego-w-latach-2004-2014/

as tax unit in the Polish system. Therefore as a first step we identify families within the household following Myck and Najsztub (2015).

Health Insurance

While social security contributions are not necessarily paid in the case of overlapping insurance titles, health insurance contributions must be paid from every employment income for which health insurance applies. In case of dependent employment, health insurance is calculated as 9% of gross wage minus social security contributions paid by the employee. Such rate of contribution applies to every labor contract, as well as to Civil Law commission contract. Persons working on Civil Law contract for results are not covered by health insurance. The self-employed have to pay the contributions of specified values that can be found in Table A5. In case of health insurance there are no lower values for newly established companies. To determine the value of health insurance contribution paid by a person we sum up all the health contributions paid from different employment income sources. Farmers have separate rules for health insurance contributions. Those with farms below 6ha have their contributions covered from the national budget, and those with bigger farms pay 1PLN per ha.[30]

Assumptions made when calculating health insurance contributions:

1. Workers who report to have permanent contract are assumed to have a Labor Code contract and the HI contributions are calculated accordingly (standard approach).
2. Workers who report to be temporary workers are assumed to have a Civil Code commission contract and pay the HI contributions from the total amount of their earnings.
3. Workers who report positive self-employment income are assigned values of HI contributions accordingly.
4. Health insurance contributions from different employment income sources are added up.

[30] http://www.krus.gov.pl/zadania-krus/ubezpieczenia-zdrowotne/, http://praca.gazetaprawna.pl/artykuly/748058,ubezpieczenia-w-krus-zlotowka-od-hektara-na-leczenie.html

Table A5. Parameters related to HI contributions and PIT (2014-2016)

Parameters	Labor Code contract	Civil Law contract		Self-employment	
		Commission contract	Contract for result		
Base value	Gross wage minus social security contributions paid by employee			75% of average wage in economy	
HI rate	9%	9%	Does not apply	Minimum values:[31] 2014 – 270.40 2015 – 279.41 2016 – 288.95	
HI deductible	7.75%	7.75%	Does not apply	Minimum values: 2014 – 232.85 2015 – 240.60 2016 – 248.82	
Deductible cost	111.25 (or 139.06 if commuting to work) from each labor contract, but cannot exceed yearly 2002.05 (or 2502.56)	20% or 50% (if copyrights transferred)	20% or 50% (if copyrights transferred)	The costs were already deducted from revenues as self-employed report income	
Monthly tax allowance	PLN 46.33				
PIT first rate	18%			18%	19%
PIT second rate	32%			32%	
Yearly threshold	PLN 85,528				
Source: Ministry of Finance. Available at: http://www.finanse.mf.gov.pl/pit/informacje-podstawowe					

Personal Income Tax

Assumptions to calculate PIT:

1. Self-employment income as well as income from renting property is included in *global income* and taxed accordingly.
2. To estimate global income, the following income sources are added: gross wages from permanent and temporary employment, gross self-employment income, gross unemployment benefit, gross maternity leave benefit, gross disability pension, gross family pension, gross pre-retirement benefit, gross social pension, monthly equivalent of received gross severance pay, gross rehabilitation benefit, gross retirement pension, gross income from renting property.
3. All social security contributions paid by the person are subtracted.
4. Persons that report permanent employment income are assumed to have one labor code contract, and that they do not commute to work, such that the PLN 111.25 can be deduced.

[31] http://zus.pox.pl/zus_skladki_historyczne.htm, http://zus.pox.pl/skladki-preferencyjne-zus-archiwum-skladek-od-2005-roku.htm, http://www.zus.pl/files/minimalna_podstawa.pdf

5. People that report temporary employment income are assumed to have Civil Law commission contract, so can receive a deduction equal to 20% of income as cost of obtaining it.
6. For married couples, the income bases are added and each spouse is assigned half of it, thus assuming that all married couples follow joint taxation scheme.
7. For single parents the income base is divided by two, and after tax calculation PIT is doubled.
8. For each person taxes are calculated according to rates of 18% and 32%.
9. Tax allowances are subtracted.
10. If the health insurance contribution is higher than calculated PIT it is decreased to the value of PIT.
11. The values of health insurance that can be subtracted from PIT is calculated by adding fixed value from self-employment (if there is positive self-employment income), and the income base corresponding to the 7.75% for health insurance contribution from dependent employment.
12. If calculated PIT is smaller than HI deduction then PIT is set to zero. If not, then HI deduction is subtracted from PIT.
13. For each parent from a married couple, half of child tax credit is subtracted (if there is just one child yearly income base of each parent cannot exceed PLN 56,000). For a single parent, the full child tax credit is subtracted (if there is just one child yearly income base of single parent cannot exceed PLN 112,000). Situations when there is unmarried, non-single parent are not considered. See Table A6.
14. If PIT is negative, then its absolute value is compared to the sum of social security contributions and HI contributions paid by employee. If it is higher, PIT is reduced accordingly.

Table A6. Child tax credit.

Family type	Monthly child tax credit	Yearly income threshold
Family with one child	PLN 92.67	If there is married couple their joint income exceed PLN 112,000, if there is single parent it is also PLN 112,000, and if there is non-married parent that is not single and will use part of CTC the income cannot exceed PLN 56,000.
Family with more than one child	For the first child – PLN 92.67 For the second child – PLN 92.67 For the third child – PLN 166.67 For the fourth and subsequent child – PLN 225	No threshold

Source: Ministry of Finance. Available at: http://www.finanse.mf.gov.pl/pit/ulgi/odliczenia-od-podatku/-/asset_publisher/j25S/content/ulga-na-dzieci?redirect=http%3A%2F%2Fwww.finanse.mf.gov.pl%2Fpit%2Fulgi%2Fodliczenia-od-podatku%3Fp_p_id%3D101_INSTANCE_j25S%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-2%26p_p_col_count%3D1#p_p_id_101_INSTANCE_j25S_

Capital tax and farm tax

To calculate the farm income per farmer we firstly need to determine her share of the land. Thus the number of farmers in the household is summed, and each farmer get equal share in the farm. Then the farmer pays the tax as 173.2 (farm tax per 1 ha per year) multiplied by the number of ha she owns, and divided by 12 to get monthly equivalent.

Capital tax is calculated with the flat rate of 19% on capital income.

Indirect taxes

Value Added Tax

We calculate VAT paid by households by applying statutory VAT rates to the reported households' consumption. Statutory VAT rates are defined for the products and services from the Polish Classification of Goods and Services 2008 (PKWiU 2008), while in the HBS households report consumption according to COICOP categories (Classification of Individual Consumption According to Purpose). Thus, applying the VAT rates to HBS expenditure categories required mapping between COICOP and PKWiU categories.

After matching VAT rates to expenditure items, we calculate VAT paid by household *j* per expenditure item *i* using the following formula:

$$vat(j,i)=spending(j,i)*vat\_rate(i)/(1+vat\_rate(i)),$$

as the VAT rate applies to net value of goods and spending is reported for gross values of goods. For each household *j* we sum VAT paid for all items *i* and we divide this value by the number household members to get per capita VAT paid.

Note that households likely underreport consumption in HBS. Total consumption of households in HBS using the weights provided by Polish CSO equals 49% of total households' consumption reported in National Accounts. On the other hand, we are applying statutory VAT rates to all the goods consumed by the households, while in fact prices of part of those goods may not contain VAT to the extent they come from the informal market. As a result, the amount of VAT calculated using HBS equals 61 billion which constitutes 67% of the 83 billion VAT that we estimate is being paid by households.

Excise tax

Estimating the value of excise tax paid by the households based on HBS is challenging. Firstly, households underreport consumption of goods to which excises taxes apply even more than they underreport consumption of other goods. Secondly, products to which excises apply, are often used as intermediate goods for the production of final goods. Unlike VAT, excise taxes are paid at the intermediate stage, and cannot be directly assigned to the final good. Thus in order to calculate excise taxes paid by households we also use the Input-Output tables to try to estimate the values of excise taxes that applied to intermediate goods and thus indirectly affected prices of final goods. Moreover, it is important to bear in mind that VAT rates apply on top of excise taxes.

Calculating excise taxes that apply directly to the goods reported by the households

We use the information on excise taxes announced by the Ministry of Finance for 2014 and match the categories used by MoF to COICOP categories in HBS whenever possible. We also recalculate the value of excise taxes in order to match the units reported in HBS. Matched categories, assumptions made while recalculating the values of excise taxes, and the final values of excise taxes applied to HBS expenditure categories are presented in Table A7. In all cases except automobiles excise taxes apply per unit. In case of automobiles the excise taxes are defined as excise tax rate applied to the value of automobiles without the VAT and excise tax:

$$excise=(spending-(spending*vat\_rate/(1+vat\_rate)))*excise\_rate/(1+excise\_rate)$$

We use the information on the units consumed by the households (and in case of automobiles, the value of spending) in order to calculate the value of excise per expenditure item per household. However, many households report the value of money spent, and do not report the number of units consumed. To go around this problem, we use information on households that report both units consumed and money spent on those expenditure items, assign excise values to units, and calculate the average share of excise in the spending for those items. Thus, we are able to calculate excise rates that can be applied to reported spending rather than to units consumed. We use those derived excise rates to calculate excise taxes also for households that report spending on goods to which excise taxes apply, but do not report the number of units consumed.

Calculating excise taxes on intermediate goods

We use the most recent (from 2010) Input-Output table at basic prices for Poland to calculate the second-round effects of excises on intermediate products (mostly fuel). We map the goods and services categories in the HBS to categories available in Input-Output tables. For each household we calculate the budget shares of each I/O table category. We introduce the change in prices of I/O sectors that include products with excise taxes, and calculate pass-through for prices of all I/O sectors using the Leontieff coefficients from the I/O matrix and a cost-push model. Next, we calculate the indirect real income effect by multiplying the price increase by household budget shares. Finally, we multiply the vector of indirect income effect by the vector of households' total spending on mapped HBS expenditure categories, and we treat this value as the estimate of the excise tax on intermediate goods.

In order to make a decision about the change in prices in selected I/O sectors we use information on final households' consumption. There are excise taxes in five I/O sectors: fuels, beverages, tobacco, cars, and electricity. Multiple HBS expenditure items were mapped to each of this sectors, and among those products there are some that do not contain excise tax, and moreover multiple excise rates may apply to the others. Assuming that in the absence of excise taxes, prices would be smaller exactly by the value of the excise tax, we calculate the drop in prices that would occur (and the subsequent increase in purchasing power of households). We add up the total value of excise taxes, as well as the value of VAT that was calculated on the excise taxes in final goods mapped to each of four I/O sectors and divide it by total household expenditures on final goods mapped to each sector. The total value of excise on products categorized as fuels as a share total spending on fuels is 10.7%. We assume that this is equivalent to the drop in prices of the "fuels" sector in the I/O matrix in the absence of excise taxes. Using the same procedure we calculate the drop in beverages prices to equal 31.1%, the drop in tobacco prices to equal 65.2%, and the drop in

automobile prices to equal 0.8%. The indirect effect on the overall distribution is mostly important in case of fuels since these are most often used as intermediate goods and indirectly affect prices of almost all other sectors.

Table A7. Excise taxes: matching of Ministry of Finance and HBS expenditure items

Ministry of Finance information			HBS Expenditure information			
Name	Excise tax in PLN	COI-COP code	Name	Unit	Comment	Excise per HBS item
Coal and coke	1.28	45411	Coal	KG	The tax is per GJ, and we assume 1000kg of coal equals 27.864GJ. When coal is used for heating of households, there is tax exemption, which we are currently not including	
Motor gasoline	1565	72221	Petrol	l	1565 PLN/ 1000 l	1.565
Diesel	1196	72211	Diesel fuel	l	1196 PLN/ 1000 l	1.196
Light heating oil	232	45301	Liquid fuels	l	232 PLN/1000 l	0.23
Lubricating oils	1180	72241	Lubricants, oils, fluids	l	1180 PLN/ 1000 l	1.18
Gaseous fuels for combustion engines - liquefied	695	45221	Liquid gas	l	The tax is 695 per 1000kg, and 1kg is 1.72 liter	0.39
Gaseous fuels for combustion engines - in the gaseous state	11.04	45211	Natural gas	m3	We assume 1GJ=26.33m3	0.42
Other motor fuels	1822	72231	Other fuels for private vehicles	l	1822 PLN/ 1000 l	1.82
Other heating fuel with a density of > = 890kg / m3	64	45414	Other solid fuels	kg	64 PLN/ 1000 KG	0.064
Electricity	20	45101	Electric energy	kWh	20 PLN per MWh divided by 1000	0.02
Ethanol	5704	21111	Spirits and liquors	l	5704,00 PLN / 1 hectoliter of 100 % vol. ethyl alcohol (=pure alcohol) contained in the finished product = 22.82 PLN/l (we assume that spirits contain 40% of alcohol)	22.82
Beer	7.79	21311	Lager beer	l	7.79 PLN / 1 hectoliter for each Plato degree of finished product. We	1.58
		21321	Other alcoholic beers	l		1.58

		21331	Low-alcohol and non-alcoholic beers	l	assume that beer has 4.8% which corresponds to 12 Plato degrees.	1.58
		21341	Beer-based beverages	l		1.58
Wine	158	21211	Grape wine	l	158 PLN per hectoliter divided by 100	1.58
		21221	Other fruit wines	l		1.58
		21231	Fortified wines	l		1.58
		21241	Wine-based beverages	l		1.58
Cigarettes	206.76 + 31.41%	22011	Cigarettes	1 cigarette	We apply minimum allowed excise per cigarette that equals 206.76pln plus 31.41% of 644.42pln (average retail price per 1000 cigarettes) per 1000 cigarettes	0.41
Smoking tobacco	141.29 + 31.41%	22031	Other tobacco products	-	Here we calculate the excise rate as the percentage of the average retail price, as no unit is specified in HBS and only spending is reported. We get the rate by calculating minimum excise that equals 141.29 per kg plus 31.41% of average retail price of 462.42 and getting the ratio of excise to average retail price.	62%
Cigars and cigarillos	280.25	22021	Cigars	1 cigar	280.25 PLN divided by 1000 units	0.28
Other cars	0.031	71111	New cars		We assume the engine displacement is lower than 2000 cm3.	3.1% on base value (gross price minus VAT and excise)

Social Spending

Family Benefits, Social Assistance, Nursing Allowance, Nursing Benefit

Direct transfers are directly identified in the survey. Moreover, those benefit are free from any taxes, and thus the reported net value can be directly used in calculating the income concepts. Going forward, and in order to have a complete microsimulation model, it will be necessary to simulate those benefits based on households' characteristics which is planned as an extension to the current work.

Education

In order to calculate education subsidy per pupil in schools financed from local governments in a way that takes into account regional differences, and distinguishes between types of schools we have following strategy:

1. For each of the following levels:
    a. kindergartens,

b. primary schools,
c. primary schools for children with disabilities,
d. gymnasiums,
e. gymnasiums for children with disabilities,
f. high schools
g. high schools for students with disabilities
h. Vocational schools
i. Vocational schools for students with disabilities.

2. Collect from GUS information on the number of pupils per school type in each voivodship, also including private/public distinction.
3. Make assumption on the relation between subsidy per pupil to private school and spending per pupil in public school based on Act on Educational System[32]
    a. 75% in kindergartens, which is minimum ratio between subsidy to private and public kindergarten,
    b. 50% in other school types, which is minimum ratio between subsidy to private and public schools for adults, while for other schools currently the subsidy is calculated for each poviat based on special algorithm which we cannot replicate here. However, before this algorithm was introduced the 50% ratio was applied also to other school types.
4. Divide the expenditure per voivodship and school type per number of students (number of private schools students adjusted downwards) to get the spending in PLN per student in public school of each type per voivodship.
5. Use HBS data on household expenditures to distinguish whether the child is in public or private school, and assign the full benefit or part of it (75% in case of kindergartens and 50% in case of other schools) accordingly. Following Rokicka and Sztanderska (2013) we assume that if household is spending more than 100pln for educational fees, then the child in school age is attending private school. In case of kindergartens we apply the value of 350pln as the threshold. This value allows to keep similar ratio between average spending per child in kindergarten and the threshold, as the ratio between average spending per pupil in schools and the threshold of 100pln which taken from literature.[33]
6. Multiply the subsidy per pupil by the following ratio: (57732621900.93+3510656000)/edu_exp_t, where 57732621900.93pln is the value of education spending reported in the budget report for local governments, 3510656000pln is the education spending reported in the budget report for central government, and edu_exp_t is the total value of education spending reported in the database on local governments spending per purpose.

Subsidy for tertiary schools students:

1. Financed from central budget
2. No data available to distinguish between voivodships or studies by level.
3. Strategy:

[32] *Ustawa z dnia 7 września 1991 r. o systemie oświaty (Dz. U. z 2004 r. Nr 256, poz. 2572, z późn.zm.)*

[33] See http://eduentuzjasci.pl/publikacje-ee-lista/inne-publikacje/962-koszty-edukacji-od-przedszkola-do-gimnazjum.html for details about educational spending per pupil at different education level.

a. Take the aggregate value on subsidies to public universities (14 477 200 000 PLN in 2014) and divide by the number of stationary students (929 502).[34]
b. Assign the benefit to students that are assumed to attend public university based on HBS expenditure data. We assume that person is attending private university if reported expenditures on tertiary schooling are bigger than 150pln. Note that at universities there are one-off payments for the start of the year at the public schools that are around 100pln.

Health

In order to assign the values of health benefit to persons we adopted following strategy:

1. Take the total budget spending of National Health Fund on health services (63,198,606,000 PLN in 2014) and divide by total weighted population in HBS.
2. Look at the shares of spending for different services (Table A8) and make the benefit smaller if someone opts-out from particular services → this is derived based on HBS data on spending.
3. Opting out possible for: primary care, dental services, outpatient specialist care, in-patient curative care, rehabilitation services, health resorts.
4. Assumptions:
    - if someone reports private insurance it means opting out from primary care, dental services, outpatient specialist care, rehabilitation
    - if someone reports paying for particular service it means opting-out from this service

Table A8. Share in Spending from the National Health Fund

Service type	**Share total in spending**
Primary care	12.19
Outpatient specialist care	8.59
In-patient curative care	49.39
Psychiatric care and addiction treatment	3.67
Rehabilitative care	3.32
Long-term care	1.74
dental services	2.74
Health resort treatment	0.95
First aid and sanitary transport	0.07
Preventive programs	0.25
Other services	2.75
Supply of equipment	1.27
Refunding of price of medicines	11.95

[34] Both values are taken from Polish Central Statistical Office reports.

Appendix 2. Results for Alternative Scenario: Old-age contributory pensions treated as deferred income

Table A2.1 Alternative Scenario: Changes in Poverty on account of taxes and transfers

	Market Income	Market income + contributory pensions	Disposable Income	Consumable Income
		(1)	(2) = (1) - direct taxes - contributions + direct transfers	(3) = (2) - indirect taxes
Poverty headcount				
National legal	29.2%	12.3%	6.7%	9.5%
National extreme	27.3%	10.5%	4.5%	6.8%
US $5PPP a day	27.3%	10.7%	4.7%	6.9%
US $2.5PPP a day	19.0%	6.4%	1.7%	2.5%
Poverty gap				
National legal	20.5%	7.2%	2.6%	3.7%
National extreme	19.6%	6.5%	2.0%	3.0%
US $5PPP a day	19.1%	6.5%	2.1%	3.0%
US $2.5PPP a day	14.4%	4.6%	1.3%	1.7%
Poverty severity				
National legal	17.1%	5.7%	1.7%	2.5%
National extreme	16.5%	5.3%	1.5%	2.1%
US $5PPP a day	16.0%	5.2%	6.7%	1.0%
US $2.5PPP a day	12.5%	4.0%	1.1%	1.5%

Source: Own estimates based on HBS 2014.

Table A2.2 Alternative Scenario: Kakwani Indices and Marginal Contributions, 2014

	Size	Concentration Coefficient	Kakwani Coefficient	Marginal Contributions		
				Redistributive effect	Poverty reduction effect US$5	Poverty reduction effect National Extreme
Total from Market income (including old-age pensions) to Consumable Income						
Direct transfers (excluding old-age pensions)	8.0%	-0.5047	0.9168	0.0813	0.1025	0.1022
Housing benefits	0.1%	-0.5655	0.9776	0.0014	0.0022	0.0023
Nursing Benefit (zasiłek)	0.1%	-0.4541	0.8662	0.0012	0.0015	0.0024
Nursing Allowance (świadczenie)	0.3%	-0.5366	0.9487	0.0024	0.0038	0.0041
Social assistance	0.3%	-0.6935	1.1056	0.0043	0.0082	0.0075
Family benefits	0.4%	-0.5938	1.0059	0.0055	0.0104	0.0102
Social pension	0.7%	-0.5212	0.9332	0.0069	0.0109	0.0097
Other contributory benefits	0.1%	-0.1519	0.5640	0.0004	0.0005	0.0007
Pre-retirement pension	0.3%	-0.4409	0.8530	0.0027	0.0035	0.0036
Family pension	2.1%	-0.6509	1.0630	0.0212	0.0230	0.0228
Disability pension	2.0%	-0.4708	0.8829	0.0194	0.0252	0.0253
Maternity benefit	0.9%	-0.1675	0.5796	0.0049	0.0051	0.0040
Unemployment benefit	0.5%	-0.4609	0.8730	0.0047	0.0072	0.0069
Structural farmer pension	0.2%	-0.4740	0.8861	0.0017	0.0022	0.0021
Direct taxes and contributions	20.8%	0.4159	0.0038	0.0134	-0.0189	-0.0195
Health insurance contributions	6.8%	0.3612	-0.0509	0.0018	-0.0071	-0.0079
Capital taxes	0.0%	0.5790	0.1669	0.0000	0.0000	0.0000
Farm taxes	0.3%	-0.0434	-0.4554	-0.0018	-0.0019	-0.0021
Personal income tax	5.2%	0.5295	0.1175	0.0126	0.0009	-0.0010
Disability pension contributions	4.5%	0.4141	0.0020	0.0022	-0.0048	-0.0053
Accident insurance contributions	1.1%	0.4409	0.0288	0.0007	-0.0007	-0.0009
Sickness insurance contributions	1.2%	0.4534	0.0413	0.0010	-0.0007	-0.0010
Labor Fund	1.4%	0.4409	0.0288	0.0009	-0.0008	-0.0010
Fund of Employee Benefits	0.1%	0.4534	0.0413	0.0000	0.0000	0.0000
Pension contributions - farmers	0.2%	-0.2109	-0.6230	-0.0015	-0.0014	-0.0014
Other contrib - farmers	0.1%	-0.2407	-0.6528	-0.0008	-0.0009	-0.0008
Indirect taxes	9.4%	0.2455	-0.1666	-0.0120	-0.0227	-0.0238
Value-added tax	7.0%	0.2518	-0.1602	-0.0089	-0.0176	-0.0184
Excise taxes	2.4%	0.2270	-0.1851	-0.0044	-0.0076	-0.0081
Total from Market to Final Income						
Direct taxes and contributions	20.83%	0.4159	0.0038	0.0177	-0.0054	-0.0059
Direct transfers (excluding old-age pensions)	8.01%	-0.5047	0.9168	0.0608	0.0597	0.0598
Indirect taxes	9.40%	0.2455	-0.1666	-0.0062	-0.0076	-0.0080
In-kind transfers	20.40%	-0.0579	0.4700	0.0662		
Education	12.32%	-0.0922	0.5043	0.0321		
Kindergarten benefits	0.86%	0.1199	0.2922	0.0012		
Primary school benefits	4.20%	-0.1374	0.5495	0.0147		
Gymnasium benefits	2.14%	-0.1887	0.6008	0.0079		
High school benefits	0.68%	-0.0467	0.4588	0.0014		
Vocational school benefits	0.97%	-0.2691	0.6812	0.0043		
Tertiary school benefits	2.48%	0.1847	0.2274	0.0000		
Health	8.07%	-0.0055	0.4176	0.0266		

Source: own estimates based on 2014 HBS.

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

2. Redistributive effect equals the difference in the Gini before and after the intervention.

3. By definition, the sum of the marginal contributions does not fulfill the adding-up principle so it will not be equal to the redistributive/overall poverty effect unless by coincidence.