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Abstract

This paper aims to study the income distribution and redistribution in Turkey by using a microsimulation analysis. Developing a Turkish tax and benefit microsimulation model allows the analysis of the Turkish public revenue system by using national SILC data. In this research, TR-SILC input data have been transformed into a EUROMOD input dataset and included in the EUROMOD model, such that we can test the effectiveness of the Turkish tax and benefit system on data representative for Turkish private households. The aim of this study is to be able to compare the Turkish tax-benefit system with those of other European countries by implementing the same methodology. As a pioneering model, TURKMOD can be essential to assess the impact of the tax and benefit system on income inequality in Turkey.

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Introduction

The tax and benefit system plays a crucial role in financing economic growth and reducing income inequality in developing countries. Since the main input of the model is the micro-data of households about living conditions, there is a need for harmonized and comparative micro datasets in those countries. Moreover, the comparability and robustness of the models that are constructed for developing countries depend on the quality of surveys and microdata.

In contrast to other developing countries, Turkey has a long economic and political relationship with the EU which started officially in 1961 and has some advantages in developing microsimulation models. Turkish public revenue system has changed in an economic integration process after the full membership application to the EU in 2004. From this perspective, developing the Turkish microsimulation model is also important for analyzing the economic and social impacts of Turkey's compliance to EU's legal acts. Additionally, some improvements in the taxation chapter of Turkey's full membership negotiations converged the Turkish tax system to the EU standards, however, these improvements also need to be tested by analytical models such as microsimulation modeling.

Although constructing a microsimulation model for Turkey has some difficulties about implementing high-quality surveys and collecting harmonious data, like many other developing countries, in recent years Turkish National Statistics Institution (TURKSTAT) has improved the data collecting process of income and living conditions in cooperation with Eurostat. Developing a Turkish tax and benefit microsimulation model allows us to analyze the public revenue system of Turkey from an inequality perspective by using national Statistics on Income and Living Conditions (TR-SILC) data.

Household Budget Survey is also used in microsimulation models, even some of the income variables are missing in this survey data. Albayrak *et al.* (2016) assessed the effectiveness of tax policy in Turkey from an inequality perspective by using a self-developed dynamic microsimulation model. To our best knowledge, the recent study can be the first microsimulation model that uses the EUROMOD interface and TR-SILC input data in the same model. Another microsimulation model of Cakar (2010) develops TRMOD by using the EUROMOD system and the data are imported from the Household Budget Survey (2004) of Turkstat. Ballini *et al.* (2009) have developed a conversion method between gross and net forms of household income and The Siena Microsimulation Model (SM2) has been adopted for Turkey by using TR-SILC data.

Since EUROMOD uses similar micro data sets (EU_SILC) and a standardized user interface, I have constructed my model on the EUROMOD platform. Developed for 27 EU member states and the United Kingdom, the European Union Tax–Benefit Microsimulation Model (EUROMOD) (Sutherland and Figari, 2013), (Sutherland, 2018) is capable of measuring social and economic effects of tax and benefit systems with a cross-country microsimulation model. This model is also useful for calculating effective tax rates on individuals and households from different income levels. The output of this microsimulation model is also used in general equilibrium models in order to analyze fiscal policy evaluation (Barrios *et. Al.*, 2017). Limited data availability in

developing countries is still a restriction to improve comparable and trustworthy microsimulation models for countries such as Turkey.

In addition to advances in Turkish national statistics, I took advantage of analyzing many good examples of microsimulation models that are developed for new EU member states such as Hungary, Bulgaria, and Serbia. Limited data availability in Central and Eastern European countries makes data analysis for these countries difficult. But these countries that became members of the EU after 2004, have transformed their economy from central planning to a liberal market economy and this transformation also affected the public revenue system and national statistical infrastructure positively.

In this paper, I used TR-SILC input data and assessed the effectiveness of the Turkish tax and benefit system by using the EUROMOD interface from an inequality perspective. The main aim of this study is to increase the comparability of the Turkish tax system with other European countries by implementing the same methodology that all EU-28 countries use and to maintain the TURKMOD infrastructure by updating the model regularly. Moreover, I also tested the availability and capacity of TR-SILC. As a pioneering model, TURKMOD could be essential to analyze tax policy in Turkey simultaneously with other European countries.

The rest of the paper unfolds as follows: section one presents the tax and benefit system of Turkey. In section two, I discuss national statistics, TR-SILC as an input of the model and methodology of the study. Then the recoding process of Turkish tax policy rules is summarized in section three. In section four, the methodology that is used in the model to impute net to gross income is explained. Finally, section five discusses the first results of the TURKMOD tax and benefit model and concludes with policy recommendations.

1- Turkish Tax and Benefit System

Taxation

The Turkish tax system is a yearly-based, unified, national system that covers all types of incomes of individuals and corporations. According to OECD statistics, tax revenues consist of 23 % of GDP in 2015. Turkish Revenue Administration calculates tax to GDP ratio of 19,8 % in 2015 (see Table 1). This ratio is lower than OECD and EU member states' average. The biggest share of total tax revenues comes from consumption-based taxes such as Value Added Tax (VAT) and excise taxes. In Turkey, the share of indirect taxes has increased from 3.84 percent in 1980 to 13.98 percent in 2013, direct taxes such as corporation and income tax revenues remained low relative to consumption tax burdens.

According to OECD Revenue Statistics (2019), relative to the OECD average, the tax structure in Turkey is characterized by substantially higher revenues from goods & services taxes such as VAT and excise tax, and higher public revenues from the social security system. Secondly, a lower proportion of revenues from taxes on personal income, corporate income, and gains. Finally, tax collections from wages and salaries are the main resources of Turkish income tax revenues. Table 1 shows the structure of Turkish tax revenues from the year 2015 to 2019.

Table 1: Tax Structure of Turkey (2015-2019)

YEARS	Total tax revenues as % of GDP	As a share of total tax revenues			
	Total Tax/ GDP	Income Tax	Corporate Tax	Value Added Tax	Other Tax Revenues
2015	19,8	22,7	8	33,1	36,2
2016	20,2	23,4	8,9	31,9	35,8
2017	20,0	23	9,2	33	34,8
2018	19,6	23,8	11,4	34	30,8
2019	19,0	25,3	10,7	32,9	31,1

Resource: Turkish Revenue Administration Statistics

Moreover, social security contributions have a significant revenue for Turkey in the 2000s and the share of those revenues to GDP ratio rises to 8.04 percent in 2013. Higher indirect tax burden and increasing social security payments of employees mean higher effective tax rates on labor income in Turkey. That type of public revenue system not only creates less equal income distribution but also causes distortions in the functioning of the market economy.

Though the Turkish tax system is more oriented towards indirect taxes, the tax policy seems to move towards a higher weight for income taxation, which might make the system more progressive. Reducing social security deficits and maintaining equitable social security contributions could help to decrease the social impact of regressive indirect taxation. Progressive income taxation, supported by effective social aid programs, may reduce income inequality in Turkey.

According to Turkish Income Tax Law (Code:193), income tax is paid individually upon the earnings from commercial and agricultural incomes, wages and salaries, independent professional services, real estate properties income, dividend and interest income and all other income after deducting tax exemption allowances. Income tax is not differentiated according to the type of income apart from the employment income; currently from 15% to 40% tax rates are applied as progressive taxation.

The main taxation method for salaries and wages is withholding by the employers. Only a high level of wage earners should declare their salaries with a tax form. The calculation of income tax burden on minimum wages is shown in Table 2 with social security contributions in the year 2015. Since the latest micro dataset which I could access belongs to the year 2015 I have used 2015 policy rules to construct TURKMOD.

Table 2: Income Tax Calculation (Minimum wage)

(01.01.2015 - 30.06.2015)	
MINIMUM WAGE	1.201,50-Turkish Lira (TL)
SOCIAL SECURITY (EMPLOYEE) % 14	-168,21-TL
UNEMPLOYMENT INSURANCE % 1	-12,02-TL
INCOME TAX %15	**-63,08-TL** (=153,19-90,11)
MINIMUM LIVING ALLOWANCE(*)	90,11-TL
STAMP TAX % 07,59	-9,12-TL
TOTAL DEDUCTIONS	(252,43-TL)
NET MINIMUM WAGE	949,07-TL

Indirect taxes such as VAT and excise tax generate other main sources of tax revenue in Turkey. Especially excise tax on petroleum, alcoholic beverages, tobacco, and luxury goods comprises a significant part of total indirect tax revenues. Goods and Services are subject to VAT at rates from 1%, 8%, and 18 %.

Property taxes are paid annually at rates ranging from 0.1% to 0.3% on the value of property and building taxes. In the case of real estate sales, 1.65% of property tax is accumulated and paid separately by the buyer and seller at the sale value. If the property is contributed as capital-in-kind, the rate is 0%.

Items acquired in the form of donations are taxable between 10% and 30%. Property, money, or real estate transactions may be subject to a transition tax. The inherited estate is subject to inheritance tax, but they have been exempted by the last amendment of the law.

Car owners pay the vehicle tax on two equal payments each year, depending on the year of production of the car and the size of the engine. Transactions of banks and licensed insurance companies are generally exempt from VAT but are subject to a 5% tax on banking and insurance transactions (BIIT) for foreign exchange transactions and non-physical gold transactions. Purchases of goods and services by banks and insurance companies are subject to VAT, but this is considered an item of expense or cost.

According to stamp duty regulations, for agreements signed in Turkey, a taxable event occurs when the documents are signed. In agreements signed abroad, there is no stamp duty until the agreement is presented to Turkey to be submitted to official agencies or the terms of the document are not used in Turkey.

Social Security System

There were three different institutions in the Turkish social security system until 2008 These institutions, namely the Social Security Institution, the Pension Fund, and the Bag-Kur, were pension funds for private employees, government officials, and self-employees respectively before 2008. These three institutions merged into one in 2008, which is called the Social Security Institution (SGK). Social Security premium contributions cover sickness, disability, and retirement schemes payments. Currently, office-based employees pay 14% and employers pay 20.5 % on gross wages and salaries.

SGK also provides for the self-employed a social insurance system and an optional retirement system. Social insurance for the self-employed is different from social security payments for wages and salaries. It is an insurance application that allows people to be subject to a long-term insurance system and general health insurance by paying premiums on demand. Individuals who register to this social system, if they meet certain conditions in the long term, could be able to benefit from all insurance benefits provided by the long-term insurance branches of compulsory social insurance through on-demand insurance.

The optional insurance premium is 32% of the prime principal earnings determined by the insured between the lower limit and the upper limit of the self-employment income. Of this, 20% is for early incapacity to work, old age, and death insurance and 12% is the general health insurance premium. Beneficiaries of this system, optionally, may choose the 20% percent premium only, without general health insurance.

In addition to the SGK system, there is also a voluntary individual pension system (IPS) in Turkey which started in 2003. IPS aims to direct pension funds to investments, increasing the saving behavior of individuals and creating long-term financing for the government. Although this system is relatively new, the total number of participants amounted to 7 million in 2019. IPS is also called a private pension scheme and it is preferred by self-employed citizens due to its advantage of government subsidy which consists of%25 additional payments to the system by the government.

Early retirement ages until the 2000s have caused financial problems in the system. But social security system reforms such as retirement age, reducing the size of the informal sector and increasing the effectiveness of social security contributions may solve the financial problems not in the near future but in the long run by diminishing social security deficits significantly. Turkish social security system SGK has usually deficits that are financed by general taxation.

Benefits

Social expenditure of government comprises payments and in-kind benefits for families and individuals who live in poverty and low-income conditions. This spending covers education and health expenditures and social protection payments of government. According to the OECD social expenditure database, Turkish social spending consists of 12% of GDP, which is below the OECD average (20%). Considering in-kind benefits, total in-kind benefits consist of around 4% of GDP in Turkey and this ratio is still below the OECD average (8%).

Although social aids for different income groups are old and traditional in Turkey, systematic social benefits have increased recently with the establishment of the Ministry of Family and Social Policies in 2011. General health insurance is the main means-tested social benefit for eligible persons with earnings below a certain threshold. Conditional education and health benefits, maternity benefit, disability and old-age benefits are the main social spending of the Turkish government.

Minimum living allowance

Minimum Living allowance is shaped by the determination of the monthly minimum wage. It differs depending on the marital status of the employees. Minimum Living Allowance (MLA), is an exempt amount of salary from taxation for the livelihood of paid employees who are over 16 years of age, deducting them from the total income tax base. This deduction is calculated over gross minimum wage and according to the marital status of the individual. Since the MLA is calculated by the employer, the employer deducts this amount from the income tax (withholding) that must be paid, since it is made on behalf of the state.

MLA is not a mean tested benefit in Turkey which means that it is not calculated according to individuals' income levels. MLA is a constant value that is exempt from tax and calculated according to the marital status of wage and salary earners. MLA calculation changes according to statutory minimum wage every year. MLA amounts for the year 2015 are listed below for each marital status.

Table 3: Minimum Living Allowance (MLA),2015

Marital Status	**MLA (TL)**
Single	90.11
Married and working spouse	90.11
Married, working spouse and one child	103.63
Married, working spouse and two children	117.15
Married, working spouse and three children	126.16
Married and working spouse and four children	135.17
Married and working spouse and five children	144.18
Married and working spouse and six children	153.19
Married and no additional income from spouse (one child)	108.14
Married and no additional income from spouse (two children)	121.65
Married and no additional income from spouse (three children)	135.17
Married and no additional income from spouse (four children)	144.18
Married and no additional income from spouse (five children)	153.19

Unemployment benefit

The unemployment benefit is the payment made to an unemployed person for a certain period in which they are unemployed if they meet the requirements specified in the law. In order to benefit from unemployment payment, employees should meet the following criteria.

- To be involuntarily unemployed,
- To be subject to the employment contract for the last 120 days before the end of the service contract,
- To have paid unemployment insurance premiums for at least 600 days in the last three years before the termination of the service contract.

Unemployment benefits are recorded in the Turkish SILC survey data and are part of disposable income. In order to simulate unemployment benefits, the working history of individuals and the reason for leaving work must be known, as this affects eligibility for unemployment payment.

Social assistance

The Ministry of Family, Labour and Social Services conducts many social assistance programs such as maternity benefit, regular cash assistance program for women whose spouse has passed away, orphanage aid, regular cash assistance program for families of soldiers in need, elderly pension and disability benefits. Some in-kind benefits such as food aids, housing support and fuel support are available for people who are at risk of poverty.

To receive social assistance, it is necessary to apply to the Social Assistance and Solidarity Foundation (SASF) of the local government and declare the necessity certificate with the result of the income test. According to government statistics, 85% of aid in Turkey is received by SASF and 15% by applying to municipalities. The application of social assistance is made directly to municipalities; however, the amount of the payment is met by the central budget.

As a part of social assistance, government meets the basic needs of low-income families such as food and clothing, assistance is provided every year through the SASF. In 2015, 251 million liras of food and clothing aid were provided to 681,364 households. Residents living in uninhabitable old, neglected and unhealthy homes receive in-kind and cash assistance for the maintenance and repair of their homes, the purchase of household goods and rent. At least 500 kilograms of coal have been distributed to needy families every year since 2003.

The income test determines how much General Health Insurance contribution people who do not have the status of labor, civil servants and tradesmen will pay. The premiums of those with a per capita income of fewer than 546 liras are paid by the Treasury. To receive free healthcare services from state hospitals, it is necessary to take an income test. To get an income test, social assistance and solidarity foundations are applied in the province and district where the residence is located. When performing the income test, items such as wages, alimony, salaries, housing conditions, land ownership and interest income belonging to one of the family members are taken into account.

In 2015, education benefits(bed), unemployment benefits(bun), health benefits(bhl) already exist in TR-SILC dataset. However, social assistance, family and some in-kind benefits should be simulated to reach disposable income.

2- Data and Methodology

2.1 Data

The EU statistics on income and living conditions (EU-SILC) database cover Turkey after 2006 but these data have limited availability and have harmonization problems with the EU statistics. My project targets to eliminate the data problem of the Turkish micro-simulation model by comparing Turkish statistics of income and living conditions (TR-SILC) with EU-SILC. After eliminating data issues, I intend to calculate the effective tax burden on different represented households from different income levels. The advantage of microsimulation analysis over macroeconomic average effective tax rates is that microsimulation models allow assessing the income distribution effect of taxation for different income levels.

Since the latest micro dataset which I could obtain belongs to the year 2015, I have used 2015 policy rules to construct the model. I plan to develop future versions of TURKMOD which contain more recent years' policy rules and datasets. Although uprating factors may be used in the model, I prefer to use the same year dataset and policy rules to construct an elementary model.

TR-SILC database which I use as an input for TURKMOD covers households from 26 sub-regions of Turkey according to an address-based registration system. The number of total sample households was 24.355 in 2016 in the Income and Living Conditions survey. 22.441 of the households were interviewed and the interview could not be implemented with the rest of 1914 households due to various reasons. TR-SILC uses survey data methodology and questionnaires are designed to explain the economic situation, social exclusion, education, health and labor status of participants as well as living conditions of households.

TR-SILC data do not include information about financial capital and most of the sub-sector expenditure variables are not available. For these reasons, TR-SILC needs Household and Budget Survey (HBS) integration to analyze indirect tax policy effects. Another drawback of the data is that respondents usually declare their net income after tax and social security deductions.

During the first phase of the model, I analyzed TR-SILC data and discussed the sampling method of the database. In order to prepare input data for EUROMOD, I converted the TR-SILC data to input data within the EUROMOD framework. Summary statistics of the Turkish SILC personal and household database have been examined. Determining income concepts on EUROMOD plays a crucial role in set-up the microsimulation model. Before recoding policy rules, different income concepts in TR_SILC is explained briefly. The distribution of equivalized household disposable annual income by type of income and quintiles ordered by equivalized household disposable income is presented in Table (4).

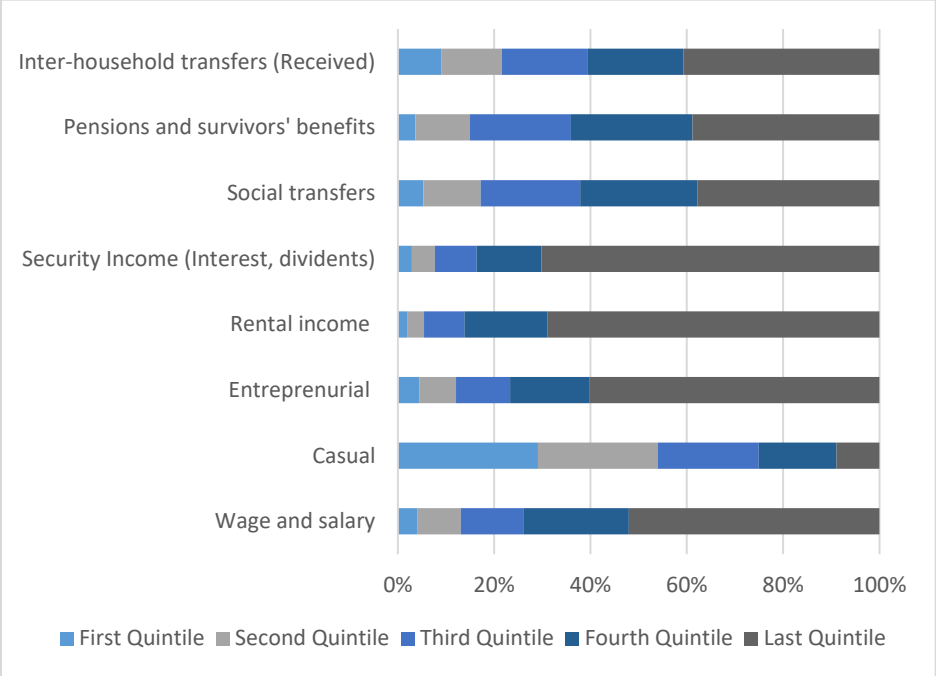
Table 4: Distribution of income sources

	As a percentage of disposable income	
Type of income	**2015**	**2016**
Wage and salary	49.7	49.7
Casual	2.8	2.5
Entrepreneurial	18.8	19.8
Rental income	3.3	3.1
Property income (capital gains)	2.6	2.5
Social transfers	20.0	19.6
Inter-household transfers (Received)	2.6	2.5
Other incomes	0.2	0.2

According to Table (4), almost half of the disposable income comes from wages and salaries. Casual income means extraordinary earnings of an individual such as profit from selling an immovable property or car. These earnings are different from commercial earnings or regular earnings such as wages and salaries since casual income has an irregular structure. The second important component of disposable income is social transfers which cover benefits and social assistance payments. Another income component, entrepreneurial income covers commercial and professional earning which is shown as self-employment income in TURKMOD.

Figure (1) displays the sectoral distribution on income concepts simulated by TURKMOD. As shown in Figure (1) the last quintile of the population has a high share of income in different income components. Especially, the share of last quintile income earners in inter-household transfers and social transfers is surprisingly high. Although the design of the survey questionnaire may cause biases on summary statistics, even income concepts such as wage and salaries in the last quintile earn more than other remaining parts of the population.

Figure (1): Sectoral Distribution of Income Components



Source: TURKSTAT- TR-SILC micro database

From Figure (1), we may also conclude that casual income, which has an irregular and temporary characteristic, is an important source of income for the first quintile of the population. This means that there is a high risk of the grey economy which is not declared to the government regularly because of the temporal feature of casual income. Most of the security income (over 70%) such as interest and dividend are earned by the last quintile which is not included in our microsimulation model.

As a result of analyzing TR-SILC, I found some preliminary results about the input data. Most of the sub-sector expenditure variables are not available in TR-SILC. For this reason, in order to integrate indirect taxation to EUROMOD, we need an additional database such as Household Budget Survey. Since citizenship information and data about the migration background of the sample are not available in TR SILC, making research about immigration by using TR-SILC is not possible for now. Another weakness of Turkish SILC data is that income tax and social security contributions are not included and must be imputed by using the EUROMOD net to gross estimation method.

First, I prepared the TURKMOD input data by recoding TR-SILC variables according to EUROMOD terminology. 2016 TR-SILC micro dataset based on 2015 policy rules are used in our model. After harmonizing national data and converting it to EUROMOD-ready form, I simulated the first results of the TURKMOD tax and benefit model and create a standard model for Turkish tax policy analysis.

2.2 Recoding Policy Rules in EUROMOD

The second part of my research is to transform the Turkish tax and benefit rules into the EUROMOD platform. Our policy recoding process is primarily focused on income taxation, the social security system, benefits such as unemployment, and social assistance. As a part of income taxation, MLA plays an important role to reduce the tax burden on larger families. Most of the social benefits are not simulated but calculated from TR-SILC data. All tax and benefit policies and their positions in the model are listed in the table (7).

Most of the income variables of TR-SILC are answered by the sample population in net values which means that survey respondents answer questions according to their net earnings after tax deductions. On the other hand, the EUROMOD platform requires gross income variables instead of net values. In the Turkish model, I use EUROMOD to impute gross income from net earnings and then simulate pre-tax and after-tax income inequality. The fourth section of the model explains how to calculate gross income lists from net values in detail.

Wages and salaries are the income components in cash or in-kind which are obtained by an employee. According to TR-SILC data, these income lists are net values, which individuals earn in a certain year. Wages and salaries are the main income lists in our microsimulation model. The second important income list includes self-employment earnings which cover net income from working as an entrepreneur or at his/her own business. This income component is also net value after deducting all expenditures, taxes and social contributions.

The third income component is rental income, which covers earnings from hiring land, property or apartment. Since the rental income of corporations or business owners is a part of commercial income, in this segment of TR-SILC rental income includes individuals' income from real property.

Interest-dividend income (capital gains) is the income obtained from the interest of deposits, the share of profits from limited liability or stock joint companies. This type of income is also called property income in the TR-SILC data dictionary. I use capital gains instead of property income in this paper.

In the Turkish tax system, individual earnings consist of seven components according to the resource of income. Some of these components' net values exist in TR-SILC and are simulated to reach gross income. In TR-SILC, self-employment income covers commercial and agricultural income, and this unified income component was simulated under the income taxation module (tinwh_tr). Before aggregation of all income modules, I should simulate rental income taxation (tinrt_tr) and wage/salaries (tinwhtb_tr). Personal wage and rental income tax withholdings are deducted from unified income tax revenues. All income components are listed and their rules of taxation are summarized in table 5, which are part of the country report for Turkey.

Table 5: Income Taxation (Policy Rules)

Income Components of Turkish Tax Code						
Wage and Salaries	**Self-Emp. (Professional Income)**	**Rental Income from real estate**	**Capital Gains (interest, dividend)**	**Agricultural Income**	**Commercial Income**	**Incidental Income (Casual)**
It is included in TR- SILC data. There is no need to file if it is earned from one employer.	TR-SILC also covers self-employment income and business income. Tax filing is mandatory	Separate filing system. If someone is filing self-employment income rental income should be added.	No need to file if it is under a certain amount. But if someone is filing because of other earnings must also add capital gains.	No tax filing is only deducted by buyers if it is not part of a business income.	It is similar to self-employment income. TR-SILC covers both in a single head.	Irregular income, earning once a year or more but not repeated every year.
Simulation (tinwhtb_tr)	Simulation (tinwh_tr)	Simulation (tinrt_tr)	TR-SILC	Aggregated in self-employment(tinwh_tr)	Aggregated in self-employment (tinwh_tr)	n/a TR-SILC

Although each resource of income has a different exemption and deduction rules, the tax filing system is unified except rental (residential unit) income taxation. Self-employment income which consists of commercial earnings and from professional job revenues has a different filing procedure and other income components must be added in a final single declaration form. Wages and salaries are subject to withholding tax and it is simulated before the unified income tax unit.

In TURKMOD, income tax rates are applied to the net value of wages and salaries after social security deductions. To simulate social security payments, I calculated the social security premium base by imputing wages plus simulated income tax. Social security contributions are applied to gross income before tax and MLA. There are three parts of social security payments of employees and self-employees which are shown below.

Table 6: Social Security Contributions

Type of payment	EM code	Rate
Old-age, Disability and Survivor	$tsceepi	0.09
Common Health Insurance	$tsceesi	0.05
Unemployment insurance	$tsceeui	0.01

Since TR-SILC survey data include only net income variables, gross income (original income before tax and benefits) must be imputed. EUROMOD uses the gross income to simulate pre-tax and after-tax estimation. Table 7 shows the prototype of TURKMOD that covers possible policy rules of Turkey in 2015.

Table 7: TURKMOD Policy Spine

Policy/ Simulation	SILC Data	Simulated	Non-simulated	Explanation
Tax				
Witholding income tax (wage and salaries)		✓		tinwhtb_s
Income tax (self employed)		✓		tinwh_s
Income tax (rental income)	✓	✓		tinrt_s
Capital tax			✓	capital income is not available
Income tax total		✓		tinwh_s
Social Security				
SSC (employee)		✓		tscee_s
SSC (self-employed)		✓		tscse_s
Pensions				
Old age pension	✓			poa
Survivors' pension	✓			psu
Disability pension	✓			pdi
Benefits				
Minimum living allowances	✓			Part of net income
Unemployment benefits	✓			bun
Social assistance			✓	bsa_s
Education benefit	✓			bed

Most of the benefits are not simulated but rather taken from survey data. Although it is possible to simulate income tests for social assistance, a crucial part of the social benefits is in-kind benefits such as food aids, housing support and fuel support included in disposable income. General health insurance premiums of low-income families are paid by Treasury and this policy is an important part of the social assistance program of the Turkish government. 546 Turkish Lira and lower-income per family limit the support for general health insurance which is 5% of gross income in 2015. Families whose yearly income is less than equal to 546 Turkish Liras may benefit from social assistance such as free health services and in-kind benefits.

4- Net to Gross Conversion of Income Components

The calculation of net disposable income is shown in Annex (1) in detail. Withholding tax is applied to wages, salaries and income from tangible assets and these withholding taxes may be deducted from declared total income tax. Since reported income in TR-SILC survey data from these resources is after withholding taxes and social contributions, I assumed that individual income components from wage, salaries and household-level income from tangible assets are reported as net income. Therefore, gross income from these components should be imputed by using the TURKMOD tax and benefit model.

As explained earlier, TR-SILC includes only net components for most income variables. We now explain for which variables this is the case, and how gross incomes have been imputed. A detailed calculation of net disposable income is shown in Annex (I) for different income components. To reach gross wage and salaries I simulated wage tax, social security contributions and cash benefits which are not listed in the survey. Simulating gross wage and salaries by using the EUROMOD interface helps to compare pre-tax and after-tax income.

TR-SILC data cover household and individual level net income variables which do not include taxes, deduction of retirement and social insurance contributions paid by employees. In TR-SILC, net employee and self-employment cash or near cash income are collected at the individual level; the same applies to old-age benefits and unemployment benefits. Income received from rental assets or lands and capital gains is listed in a survey at household levels. Since wages and salaries received by individuals are usually collected after deductions such as income tax, unemployment insurance, and social security contributions, income lists at the individual level are assumed to be net income except for self-employed income. Self-employees such as professional workers or individual commercial entities should declare their gross income on a yearly tax form.

Rental income from assets is subject to a separate tax filing system in Turkey at the end of the year. Therefore, I assume that rental income from land and real estate that is declared in the survey is gross income. On the contrary, income from tangible assets is net income after withholding tax that is applied by banks and financial institutions. This type of taxation is also called *"tax retention at source"* (Ballini *et. al*, 2009) and in order to reach gross income, all withholding taxes must be added to net income.

Different methods have been used in the literature to impute gross income from net income. One of the most suitable methods for the imputation is the iterative approach which is based on an approximation of actual gross income (Immervoll and O'Donoghue, 2001). The main idea behind the iterative method is to apply tax and benefit rules to the net amount of income to estimate the gross income of individuals and households.

The difference between reported actual gross income and corrected by imputed gross income is useful for calculating redistribution of income. Decoster et al. (2016) tested the re-calibration of income for Belgium by using an iterative approach to compare administrative data with SILC data that includes reported gross income. Decoster et al. (2016) imputed gross income for each net income component separately by adding withholding tax and social contributions in Belgium.

Since income tax rates are progressive in Turkey, estimating gross income from net income with a single formula is not a convenient approach for Turkish income lists. Instead of calculating a single rate for all income levels, calculating average tax rates for different household types is the approach for the estimation of gross labor income. In this model, I have used net income lists plus flat rates for social security contributions and average effective tax rate for income tax revenue to calculate gross income.

5- Base Results

Mean household income by decile groups and income components are shown in table 8. According to the main results, high decile groups still benefit from social transfers and MLA and this type of fiscal policy increases income inequality in Turkey since MLA is not calculated according to the level of income and public pensions are important components of high decile groups.

Table 8: Mean household income by decile groups and income components

Results for Turkey 2015						
	Disposable Income	*Original Income*	*...of which earnings*	*Benefits incl. Pub. Pen.*	*Taxes*	*Social Ins. Contrib.*
Decile 1	620,04	657,36	491,18	67,26	90,79	71,85
Decile 2	1.382,97	1.555,17	1.178,17	109,47	206,51	172,09
Decile 3	1.774,63	1.928,03	1.449,22	169,32	266,13	213,37
Decile 4	2.177,06	2.113,93	1.568,31	310,57	316,38	226,17
Decile 5	2.555,39	2.149,15	1.572,27	494,29	350,69	221,68
Decile 6	2.930,21	2.310,42	1.668,32	630,08	396,27	232,42
Decile 7	3.271,11	2.507,51	1.776,93	733,63	454,64	242,48
Decile 8	3.917,39	3.063,42	2.167,10	857,26	571,78	282,68
Decile 9	4.867,81	3.934,76	2.717,63	1.035,20	780,23	352,08
Decile 10	9.282,54	9.659,38	6.398,26	1.213,99	2.088,19	753,78
All	3.494,78	3.192,44	2.230,19	599,02	600,29	291,44
Poor	1.085,49	1.209,15	911,59	91,23	162,51	133,58

Source: Own calculations based on TURKMOD

As shown in table (8), the social security system of Turkey does not support the first decile of the population enough and the redistributive impact of pension funds is limited for the low-income population. Although public pensions reduce the Gini coefficient significantly when we consider S80/S20 ratio both public pensions and the tax system increase income inequality especially creating a gap between the first and the last quintile of the population.

There are three probable causes of this limited impact of tax and benefit policy in a low-income population. First, the lowest income quintile of the population takes advantage of in-kind benefits such as food aids, housing support and fuel support which are not included in the TURKMOD microsimulation model. Secondly, many benefits like social assistance and general health insurance support are not simulated by our model. There are still non-take-up benefits that are not included in TR-SILC data. Finally, the shadow economy is more common in lower-income quintiles since the minimum wage is relatively high in Turkey. This kind of policy choice, high minimum wage standards, also changes labor market structure and causes a high degree of minimum wage-earners such as 43% of the working force who works at minimum wage conditions.

In addition to these reasons, direct taxation in Turkey is still not progressive and the public pension system increases the gap between the income of the top and last quintile of the population.

Although social assistance and in-kind benefits are not simulated, when they are well-designed, these types of benefits are crucial for reducing income inequality. In order to increase the equalization effect of the tax and benefit system, the government should focus on means-tested benefits instead of direct payments such as MLA that are independent of the level of income.

Income inequality indices for Turkey in 2015 are measured by the TURKMOD model for original income and net income. Base results of the model are shown in table 9 as Gini coefficient.

Table 9: Income Inequality in Turkey (2015)

Basic Inequality Indices	
	Gini
Original Income	0,5173
Original Income after Taxes/SIC	0,5249
Original Income incl. Public Pensions after Taxes/SIC	0,4204
Disposable Income	0,4037

Source: Own calculations based on TURKMOD

The main drivers of the redistributive impact of fiscal policy in Turkey are pensions and benefits reduce the volume of unequal income distribution significantly. On the other hand, income tax policy has an opposite effect on inequality in contrast to social expenditures which means that income taxation is not progressive enough to reduce income inequality. Taxes and social security contributions are not progressive and increase the Gini coefficient by two points.

When we consider poverty indices, there is a high risk of poverty for children and the poverty line is around minimum wage which shows that minimum wage earners with a family with children are under the poverty line in Turkey. Table 10 shows the poverty indicators which are calculated by the TURKMOD microsimulation model.

Table 10: Poverty Indicators

Basic Poverty Indices	*Poverty Risk*
Population	24,0%
Children	31,72%
Working Age	23,41%
Working Age Economically Active	20,45%
Elderly	16,83%
Poverty Line	**911,12**
Poverty Gap	30,81%

Source: Own calculations based on TURKMOD

Comparing the results of the Turkish model with other EUROMOD countries helps to understand the fiscal impact volume of Turkey's fiscal policy. The average Gini coefficient of original income is around 0.495 in EU-28, while the average Gini coefficient of disposable income is around 0.29 in 2017. The fiscal policy reduces the average Gini coefficient in the EU by around 20.5 points in 2017 which means that fiscal policy in the EU cuts down income inequality significantly. Comparatively, the impact of fiscal policy in Turkey is much lower than it is in the

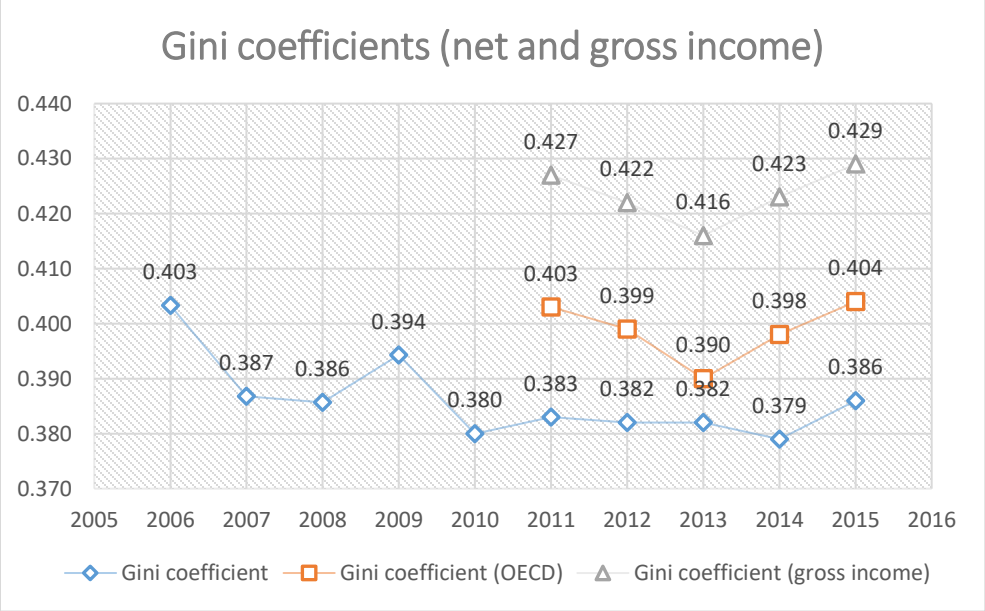
EU. The reduction rate of income inequality is around 11 points in Turkey. Some part of this lower impact comes from omitted in-kind benefits and not simulated benefits such as social assistance.

Another observation from the results of European countries and Turkey's base results is that the redistributive impact of the Turkish tax and benefit system is much smaller than other European countries' systems, showing poor redistributive effect especially in low-income quintiles of the population.

6- Discussion

The results of the TURKMOD microsimulation model are validated by macro statistics like the OECD database and compared with other academic papers' estimations. Figure 2 shows OECD estimations of Gini coefficients for net and gross income. TR-SILC base results that are shown with diamonds which are based on net income in Figure (2), before the microsimulation model is applied.

Figure (2): Gini Coefficients (net and gross income)



Source: OECD and TURKSTAT

Figure (2) shows two different Gini coefficients (0.404 and 0.429) for net and gross income respectively which are calculated by OECD. The third Gini coefficient in 2015 is around 0.386 which is calculated by TURKSTAT based on the TR-SILC database. As explained in previous sections of this paper, most of the income concepts of the TR-SILC database are assumed to be net values after tax and social security deductions.

According to TURKMOD microsimulation model results, the Gini coefficient for original income is 0.517 and for disposable income, it is 0.404 which is shown in table 8. Gini coefficient of original income including public pensions after taxes and social contributions is around 0.420 and these results match OECD statistics for income inequality.

In addition to OECD and TURKSTAT calculations, Başlevent (2014) calculates the redistributive effect of social assistance on household income and finds that the redistributive impact of pensions and benefits such as unemployment is limited since beneficiaries are not lower-income individuals. According to a decomposition analysis, social transfers such as social assistance payments and disability income do not reduce income inequality significantly (Başlevent, 2014).

Tekgüç (2018), investigates the effect of social assistance on income inequality in Turkey. Based on household survey data, the volume of social assistance is relatively small considering the size of pension transfers. However, overall tax and benefit policy reduce income inequality and direct taxes and transfers have an equalizing effect on income distribution (Tekgüç, 2018).

Another study, calculating Gini coefficients for gross and net income and redistributive effects of social transfers and income tax, finds that the decline in inequality is around 4 percentage points after redistribution of income in 2014. Using SILC data between 2006 and 2014, the study shows that the effect of fiscal policy on the distribution of income is limited and Turkey has a less progressive tax and social spending system when it is compared to other OECD member states (Yılmaz and Sefil-Tansever, 2019).

TURKMOD microsimulation model analyzes direct taxes and benefits, however, indirect taxation is not included in the model due to limitations of TR-SILC data. Analyzing the impact of both direct taxes and indirect taxes, Cuetas *et. Al.* (2020) use the Commitment to Equity (CEQ) assessment[1] for analyzing redistributive effect in Turkey. The main driver of equalizing effect of fiscal policy is social spending on education and health rather than indirect taxes. Direct taxes and transfers reduce the regressive effect of indirect taxation.

This paper contributes to the existing literature by developing a comparable and standard microsimulation model which will be useful to understand fiscal policy results in Turkey. TURKMOD model decomposes the effect of direct taxation and gives the opportunity to analyze different dimensions of income inequality such as spatial differences, the progressivity of taxation, family structure and migration.

Parallel to other studies, preliminary results of the microsimulation model show that the overall direct tax and transfer system has an equalizing effect on income distribution. However, direct taxation and social security contributions have an inequality increasing impact on income distribution from the Gini coefficient perspective. Therefore, changing income tax ratios and increasing progressivity by reducing the tax burden on minimum wages may mitigate the harmful impact of taxes on low-income citizens.

The main driver of equalizing effect comes from pensions and old-age benefits which are important sources of income in Turkey. The social assistance system is not accountable due to a variety of in-kind benefits and MLA are not distributed according to the level of income. Besides

[1] Led by Nora Lustig since 2008, the Commitment to Equity (CEQ) project is an initiative of the Center for Inter-American Policy and Research (CIPR) and the Department of Economics, Tulane University, the Center for Global Development and the Inter-American Dialogue. The CEQ project is housed in the Commitment to Equity Institute at Tulane. For more details visit www.commitmentoequity.org.

these drawbacks, the social assistance of Turkey plays a crucial role in the redistribution of income. Redesigning social assistance programs and increasing the weight of means-tested benefits may also give rise to equalizing effect of social benefits besides pensions.

7- Conclusion

Due to early retirement regulations and insufficient health system Turkish social security system causes huge deficits and it was a burden on the budget. In addition to the weak social security system, social benefits were not means-tested which means that the rules of distributing the system of benefits were not precise and transparent. The Turkish government has implemented many reforms after 2004 such as excise tax regulation in parallel with EU accession talks. Finally, restriction of second retirement bonus for Turkish migrants who work and live in the EU is another policy to improve the efficacy of the social security system. Moreover, the income taxation system has changed, and more progressive tax rates have come into force in 2020.

Some of these policy changes such as more progressive income taxation and social benefits can be analyzed by the TURKMOD microsimulation model. The coverage and sampling methodology of TR-SILC is developed and updated by TURKSTAT until the base year of 2020. These new developments will enable our model to simulate new policy reforms by using updated datasets.

TURKMOD microsimulation model provides us gross income imputation from TR-SILC micro dataset. The difference between original and disposable income illustrates the impact of the tax and benefit system on household income. Preliminary results of the model demonstrate that the direct tax system is not redistributive in Turkey when we consider the Gini coefficient of after-tax and pre-tax income. On the other hand, public pensions have an equalizing impact on income distribution as well as social benefits. Overall Turkish tax and benefit system reduces income inequality by around 11 percent and this ratio is lower than the EU-28 average which is around 20.6 percent in 2020.

Our preliminary simulation results of income taxation show that although new tax reform increases progressivity, there is still a high tax burden on minimum wages. The high tax burden (15 %) on minimum wage, minimum income allowances based on marital status and number of children rather than income level make this system inefficient from an income inequality perspective. Considering the share of minimum wage workers in the total labor force (43 % in 2019), to reduce income inequality and poverty in Turkey, the income taxation system should be redesigned.

An analytical public policy tool, the TURKMOD microsimulation model has the potential to analyze a variety of policy swaps like increasing progressivity of income tax rates, changing structure of MLA and social assistance system. In addition, further analyses are possible such as spatial distribution of pre-tax and after-tax income, living conditions of vulnerable social groups, gender studies and the possible effects of migration on different segments of the population with future extensions of the model.

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Annex -I-

CALCULATION OF THE HOUSEHOLDS ANNUAL DISPOSSIBLE NET INCOME	
1	Net income in cash in the form of wage, salary, payment or per diem
2	Net income in kind in the form of wage, salary, payment or per diem
3	**Net total income in the form of salary, payment or per diem (1)+(2)**
4	Net income in cash of entrepreneur (Agriculture / Out of Agriculture)
5	Net income in-kind of entrepreneur (Agriculture / Out of Agriculture)
6	**Net total income of entrepreneur (Agriculture / Out of Agriculture) (4)+(5)**
7	Net income in cash from assets (rental income)
8	Net income in-kind from assets (rental income)
9	**Net total income from assets (rental income) (7)+(8)**
10	**Property income (capital gains)**
11	Unemployment benefit
12	Old age pension
13	Old age benefit
14	Voluntary pension
15	Survivor benefits
16	Death benefit
17	Sickness benefits
18	Disability pension
19	Occupational disability pension
20	Ghazi salary
21	Unrequited grant and schoolership for education
22	Family/children benefit
23	Housing benefit
24	Other social benefits
25	**Social transfers (11+12+13+14+15+16+17+ 18+19+20+21+22+23+24)**
26	**Incomes of the individuals less than 15 years old**
27	**Inter-household transfers (received) (including alimony)**
28	**Value of the products household produced for their consumption**
29	**Imputed rent income (Yearly)**
30	**Inter-household transfers (paid) (including alimony)**
31	**Paid taxes (assets, rent, motor vehicle etc.)**
32	**Household net annual disposable income (3+6+9+10+25+26+27+28+29)-(30+31)**

Annex -II-

Summary Statistics - Mean Income							
Results for Turkey 2015							
Mean equivalised income by decile groups and income components							
	Disposable Income	*Original Income*	*...of which earnings*	*Benefits incl. pub. Pen.*	*Taxes*	*Social Ins. Contrib.*	*Simulated Taxes*
Decile 1	357,82	389,89	292,34	34,49	53,12	42,77	93,16%
Decile 2	702,63	790,95	598,18	55,27	105,16	87,29	94,82%
Decile 3	936,22	1.017,17	763,62	89,19	140,72	112,16	95,15%
Decile 4	1.167,06	1.139,47	844,82	163,99	170,52	121,54	94,74%
Decile 5	1.401,61	1.199,85	877,59	262,79	194,86	123,39	95,06%
Decile 6	1.641,95	1.334,12	963,66	337,84	227,17	133,92	94,97%
Decile 7	1.912,82	1.512,36	1.073,64	411,69	272,55	146,18	94,86%
Decile 8	2.300,87	1.846,13	1.308,43	485,13	341,99	169,73	95,30%
Decile 9	2.993,13	2.453,65	1.696,41	622,27	484,10	217,61	95,24%
Decile 10	6.038,95	6.355,52	4.221,70	760,77	1.365,77	496,38	96,28%
All	1.945,02	1.803,64	1.263,86	322,30	335,54	165,07	95,54%
Poor	585,92	657,48	495,46	47,24	88,16	72,53	94,55%

Summary Statistics – Share of Income

Results for Turkey 2015

received/paid by each Decile Group

	Disposable Income	*Original Income*	*of which Cur. Earned Inc.*	*Benefits incl. Pub. Pen.*	*Taxes*	*Social Ins. Contrib.*
Decile 1	1,73%	2,01%	2,15%	1,09%	1,47%	2,40%
Decile 2	3,36%	4,14%	4,49%	1,55%	2,92%	5,02%
Decile 3	4,52%	5,37%	5,78%	2,51%	3,94%	6,51%
Decile 4	5,69%	6,05%	6,42%	4,73%	4,81%	7,08%
Decile 5	6,98%	6,42%	6,73%	7,87%	5,58%	7,26%
Decile 6	8,26%	7,13%	7,37%	10,37%	6,51%	7,86%
Decile 7	9,79%	8,21%	8,33%	12,81%	7,92%	8,70%
Decile 8	11,77%	10,08%	10,20%	15,03%	10,0%	10,18%
Decile 9	15,66%	13,85%	13,70%	19,42%	14,61%	13,58%
Decile 10	32,25%	36,74%	34,84%	24,61%	42,24%	31,40%
Poor	6,76%	8,24%	8,89%	3,31%	5,89%	9,97%