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Redistributive Impact of Public Policies in Turkey

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Abstract

The aim of this paper is to analyse the redistributive impacts of publicly provided services and tax policies in Turkey to see if government policies are designed to help increase welfare level of the society. We use 2003 Household Budget Survey and apply the fiscal incidence analysis. The results of the redistributive analysis demonstrate that primary/secondary education is absolute progressive. Although health spending seems also progressive, it is less progressive than primary/secondary education as expected. As for higher education, it is regressive and the third and fourth expenditure quintiles receive the largest share from the redistributive impacts of public spending on higher education. Public infrastructure services and transfers are also progressive, however, middle-classes are mostly the users of the services. Although social services are progressive, the share from redistribution obtained by low-expenditure groups is considerably low, particularly for health care services. Hence we can conclude that the poor is not well targeted in Turkey and middle income classes benefit from public facilities more than low-income groups. The results for regional level analysis also provide the evidence that the poor is not well targeted in Turkey.

In the second part of the paper, we examine if Turkish tax system helps improve income inequalities by applying the tax incidence analysis. Since 1990s, indirect taxes have become the main tax revenue source in Turkey with 70% of Total Tax Revenues. Indirect taxes are known to be regressive as low-income groups have higher consumption tendency. The first contribution of the paper is concerning high informal economy and tax evasion in Turkey. We take into account informal economy and tax evasion behaviours with reasonable incidence assumptions and offer a sensitivity analysis. The second contribution of the paper is to apply welfare dominance analysis using concentration curves with statistical tests. The third contribution of the paper is to use Input-Output Tables to calculate effective tax rates for indirect taxes and present another sensitivity analysis. The findings suggest that the whole indirect tax system is progressive.

## 1. INTRODUCTION

Since 1994, the Turkish economy experienced two serious financial crises (1994, 2000/2001) accompanied by enormous public imbalances and a drastic reduction of domestic income. In the aftermath of the last crisis, Turkey implemented a structural adjustment program under the supervision and technical support of the International Monetary Fund and the World Bank<sup>1</sup>.

A direct effect of these two successive crises was a drastic reduction on real side of the economy. As can be seen from Table 1, after both the 1994 and the 2000/2001 crises the Turkish economy shrunk very drastically. The growth rate of 1994 and 2001 are -6.1% and -9.5 % respectively. However, after each crisis, the Turkish economy achieved rapidly very

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<sup>1</sup> For detail information for Turkish experience with IMF, see., Yeldan (2002), On the IMF-Directed Disinflation Programme in Turkey: A Programme for Stabilization and Austerity or a Recipe for Impoverishment and Financial Chaos?, Neşecan, B & Savran, S (edt.,) *Economy, Society and Gender in Turkey*, Nova Publisher, New York).

high growth rates - 8% in 1995 and 7.9 in 2002. Despite these high growth rates, negative effects of crisis on poverty and income distribution couldn't improve and the unemployment rate has increased rather than declined<sup>2</sup>.

**Table 1. Some Basic Indicators of Turkish Economy**

	1994	1995	2001	2002	2003	2004
<b>Gini Coefficient</b>	0.49		0.46	0.44	0.42	0.40
<b>Growth Rate</b>	-6.1	8	-9.5	7.9	5.9	9.9
<b>GDP per capita*</b>	2159	2784	2110	2634	3390	4172
<b>Unemployment rate</b>	8.6	7.6	8.4	10.3	10.5	10.3

\*US Dollar

Source: State Planning Organisation (SPO)

The major part of fiscal adjustment programs demand fiscal contraction and tax revenue increase to improve public imbalances. As a result of the fiscal adjustment programs implemented in Turkey, Turkish tax system has seen some changes and these changes have impacts on households' welfare and income distribution of the country. Total Tax Revenue's share in GDP increased from 11% in 1990 to 24% in 2003 and indirect taxes' share in Total Tax Revenue rose from 48% in 1990 to 67% in 2003. Government expenditure on education and health decreased. The aim of this paper is to examine distributional impacts of government revenue and expenditure policies in Turkey in 2003 with the help of tax and benefit incidence analysis.

To date, apart from Pinar (2004) and World Bank (2005) no analysis has looked at the distributive impacts of Turkey's tax and expenditure policies using micro data. However, both studies have important deficiencies in terms of the statistical reliability of the results. The main contribution of this paper is threefold. The first contribution of the paper is to fill that gap by applying the welfare dominance analysis. The second contribution is to consider the impact of tax evasion and informal employment on the incidence of government policies. Turkey is a typical developing country with the high share of indirect taxes in Total Tax Revenue (TTR). The third contribution of the paper is to estimate effective indirect tax rates by using input-output tables to include the effects of taxation on inputs and imported goods in the incidence analysis, which is ignored by standard tax incidence analysis.

The plan of the paper is as following. In the second section, the general framework of benefit and incidence analyses is summarised and Turkish taxation system and the structure of government expenditures on social services is explained to draw a general picture. The following section presents the data used, basic calculations and the main theoretical methodology. While the fourth section provides the results, the final section offers the concluding remarks.

## **2. GENERAL FRAMEWORK OF BENEFIT AND TAX INCIDENCE ANALYSIS**

We apply benefit incidence and tax incidence approaches to assess if government revenue and expenditure policies have progressive effects to decrease high income inequality. While tax incidence is the analysis of who ultimately bears the burden of government taxes in the economy, the main goal of benefit incidence analysis is to identify who benefits from public spending and by how much (Demery, 2000; Lanjouw and Ravallion, 1999; Martinez-Vazquez, 2001: 31; Sahn and Younger, 2000; Sahn and Younger, 2003). The usual practice of incidence studies is to see how the initial 'preintervention' position of individuals is altered as a result of public spending (tax burden). This 'preintervention' position is generally called the counterfactual and based on a welfare indicator (e.g. per capita or household

<sup>2</sup> See World Bank (2003, 2005) for detailed analysis of poverty and income inequality in Turkey after the crises period.

income/expenditure), which does not include the monetary value of the benefits (taxes paid) secured from publicly provided goods (Van de Walle, 1995 and 1998).

## **2. a) Benefit Incidence**

Measuring welfare effects of publicly provided services and taxes has been an important empirical issue in the welfare and public economics literature. The interest in benefit incidence studies is based on generally the need to assess the welfare impacts of publicly provided goods on the poor, since it is seen that public spending is a potentially powerful instrument for fighting poverty (Selden and Wasylenko, 1992: 1; Van de Walle, 1998: 365; Martinez-Vazquez, 2001: 28-29).

Three kinds of information are needed for the calculation of the incidence of government spending on public services. These are government expenditures on a service, public utilization of the service and the socioeconomic characteristics of the population using the service. Household budget and consumption surveys are the general data set to obtain the information on the households' or individuals' standard of living, social status and beneficiaries of the social services of the government (Davoodi et. al. 2003: 5).

Benefit incidence approach is conducted in three steps. In the first step, we rank individuals or households into groups such as income/expenditure quintiles, location (urban/rural or geographical location), race and gender, by some chosen measure of current welfare. In the second step, the information on individual utilization or participation in the publicly provided program is drawn from the surveys to count the numbers of beneficiaries in each group. In the last step, the unit cost or subsidy of the publicly provided goods is estimated by generally using public expenditure accounts of the country in question. After obtaining unit cost of provision, we multiply the unit cost by the numbers of the beneficiaries in each group to arrive at estimates of the distribution of benefits (Davoodi et. al. 2003: 7-10; Martinez-Vazquez, 2001: 32; Van de Walle, 1998: 367-368).

In order to put into effect the benefit incidence approach, some assumptions are accepted in the literature due to the data restrictions. The main assumption of the approach is that the benefit derived by consumers can be approximated by the cost to the government of providing the service. Other assumptions of benefit incidence analysis are that all relative prices and real incomes are fixed, benefits are not shifted, that is benefits go to people who are intended, and marginal benefits are equal to average benefits (Selden and Wasylenko, 1992).

We examine benefit incidence of public expenditures for public education, health and infrastructure services and cash transfers in 2003. Government subsidies for services vary significantly by region. Apart from the public health expenditures, The Ministry of Education's annual spending and public spending on infrastructure at regional level enables us to take into account regional disparities in providing public services. Cash transfers are provided by HICES by individual.

We classify public education services as primary, secondary, and higher education, which includes both university and non-university (vocational) higher education. MONE's annual spending is used for the spending on primary and secondary education, and the spending by the Higher Education Council and public universities for higher education. The annual spending of MONE, HEC and public universities were taken from the Turkish Ministry of Public Finance.

In Turkey, infrastructure services are provided by variety of government institutions. In addition, municipalities and Special Provincial Administrations (SPA) are responsible to supply infrastructure services such as sewerage, clean water, electricity, and city roads in their territory. We use the total spending of four government institutions<sup>3</sup> responsible for different

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<sup>3</sup> While the General Directorate of State Hydraulic Works find and produce clean water resources, the General Directorate of Highways is responsible to build highways in Turkey. The Ministry of Transport is responsible to organise all kind of transportation services. For rural infrastructure, there is

infrastructure services and the tax share of each municipality and the Special Provincial Administration from general budget tax revenues for each province for total government spending of infrastructure services in Turkey. We sum total spending of those four government institutions and the tax share of municipalities and SPAs to attain total public spending on infrastructure in 2003. The total spending of four government institutions are taken from the Ministry of Finance, while the spending of municipalities and SPAs Final Accounts Municipalities and Special Provincial Administrations 2003.

We divide total regional government expenditure in each service by the total number of beneficiaries in each region to obtain per capita average cost of the service to the government. Hence, we assume that the benefit derived by consumers can be approximated by the average cost to the government of providing the service and all beneficiaries in each region receive the same average benefits.

The per capita student spending has been allocated to the households according to the number of students. A similar computation has been done for health spending, and allocated to the households covered by a social security system. State Planning Institution provides annual public health expenditure. The government spending aimed at physical infrastructure such as roads, street lightening, and water supply has been allocated according to the value of the house for homeowners and to the rents for renters. Cash transfers come from the HICES. They are mainly pensions.

## **2. b) Tax incidence**

Tax incidence is the analysis of who ultimately bears the burden of government taxes in the economy. Tax incidence analysis has been performed for developing countries recently (Sahn and Younger, 200; Rajemison and Younger, 2003; Younger, et.al., 1999; Sahn and Younger 1998). Those works generally capture the effects of both direct and indirect taxes. Direct taxes include income and business taxes (like corporation taxes), while indirect taxes encompass excise, import tariffs, and value added taxes (VAT)<sup>4</sup>. In this study, we will also cover both taxes.

The major components of government tax revenue in Turkey are personal income tax and indirect taxes. The former is considered a progressive tax and is expected to be pro-poor. The latter is usually levied at a standard rate, which may result in a pro-rich redistribution. In order to prevent such an effect, some differential/lower rates are applied to some goods, such as basic needs and luxury goods. This is also the case for Turkey.

Turkish direct taxation system consists of three main taxes: personal income tax, corporation tax and property tax. We exclude the corporation tax due to the data restrictions and examine personal income tax, property tax and payroll tax. The personal income tax, the most important direct tax in Turkey comprising 20% of TTR, is followed by the corporation tax with 10%. The personal income tax has a progressive schedule<sup>5</sup>.

There are three main social security institutions in Turkey: Firstly, the Social Insurance Organisation (*Turkish acronym, SSK*), which is the pension fund for workers in the private sector and the public sector and is the second largest provider of health care in Turkey. Secondly, there is the Social Insurance Agency of Merchants, Artisans and the Self-employed (*Turkish acronym, Bag-Kur*); and thirdly, the Government Employees' Retirement Fund for civil servants (the GERF) (*Turkish acronym, ES*). Social security premiums are deducted automatically when the salary is paid to wage earners in the public sector. However, in the private sector, the payroll tax bill is based on the declared amount of wage level as given by the employer.

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the General Directorate of Rural Services which works for only rural areas. We take total spending of these four institutions from the Ministry of Finance. [www.muhasabat.gov.tr](http://www.muhasabat.gov.tr)

<sup>4</sup> See Gemmill and Morrissey (2003) for detailed survey on developing countries' tax systems and tax incidence analysis.

<sup>5</sup> Income tax schedule is given in Appendix.

After the introduction of VAT in 1985, the share of indirect taxes in the total tax revenue started increasing in Turkey (Table 2) and in 2003 indirect taxes accounted for 67% of TTR.

**Table 2. The share of Direct and Indirect Taxes in TTR in Turkey, 1975-2004**

	<b>Direct taxes</b>	<b>Indirect Taxes</b>
<b>1975</b>	46.7	53.3
<b>1980</b>	62.8	37.2
<b>1985</b>	47.7	52.3
<b>1990</b>	52.1	47.9
<b>1995</b>	42.5	57.5
<b>2000</b>	40.9	59.1
<b>2001</b>	40.5	59.5
<b>2002</b>	33.7	66.3
<b>2003</b>	33.0	67.0
<b>2004</b>	29.7	70.3

*Source: State Planning Organisation, Economic and Social Indicators 1950-2006*

The common sales tax is the Value-Added Tax (VAT) in Turkey. VAT is applied to various components of household spending at different rates: 1% on raw food, 8% on processed food, and 18 % as the standard rate. There is an excise tax for luxury goods called Private Consumption Tax (PCT), issued in various rates on different products such as durable goods, cigarettes and tobacco products, alcoholic drinks, petroleum goods and motor vehicles. PCT rates range from 6.7% to 275% percent. Even if PCT is not levied as widely as VAT, the share total indirect tax revenue is higher than that of VAT. Private Communication Tax (PCOT) is another excise tax: all types of installation, transfer and telecommunication services given by mobile phone operators are subject to 25% PCOT. The tax base for PCOT is the same as the VAT base. Additionally, trade taxes are another important part of indirect taxes. Import tariffs and VAT on imported products are the main trade taxes.

The studies done on indirect tax incidence in recent years make use of nationally representative household survey data. Survey data is used to attain households' pattern of demand to determine the tax paid by each household. However, these studies (standard indirect tax incidence analysis) generally capture tax incidence only on final domestic goods with statutory tax rates in question; and either ignore taxes on inputs and imported goods or make some strong assumptions to include these issues in the analysis.

In the standard indirect tax incidence analysis, we calculate each household's tax paid by multiplying the statutory tax rate times the amount of the good consumed by the household. This method is taken as an accurate first-order approximation of the incidence for taxes on final consumption (Rajemison et al., 2003). We assume that indirect taxes (general sales and excise taxes) are borne on consumers of the taxed commodities.

In this paper, we apply a relatively new method for assessing the incidence of indirect taxes that captures incidence of taxes not only on final goods but also intermediate inputs and imported goods. We calculate "effective tax rates" by using Input-Output (I-O) tables in order to attain the incidence of taxes on intermediate inputs and imports. Moreover, since I-O tables include actual numbers of supply, demand and tax revenues in each sector, it covers tax evasion in the economy to any significant degree. Therefore, effective tax rates estimated by using I-O tables also include the potential impact of tax evasion on distribution of tax burdens. We apply both the standard indirect tax incidence analysis and the new methodology

with effective tax rate. We compare the results from the standard analysis with the new methodology.

### 2. c) *Effective Tax Rate Estimation*

After Ahmad and Stern (1991)'s pioneer work, rather than making use of statutory tax rates on final goods, estimating effective tax rates using Input-Output (IO) Table for each I-O sector allows researchers to take into account not only taxation on final consumption goods, but also taxation on intermediary goods. Rajemison et al. (2003) is the first work to make use of effective tax rates to allocate tax burdens to the households. They overcome an important drawback of standard incidence analysis in terms of excluding taxes on imports and inputs from the analysis.

Rajemison et al (2003) examines indirect tax incidence in Madagascar by estimating effective tax rates using I-O tables. This enables the authors to trace an indirect tax levied on intermediate products through the I-O table to consumers. However, effective tax rates estimated by this work are marginal rates, which show the marginal impact of a change in tax rate on the distribution of welfare. Since we focus on average tax incidence, we use a simpler model to calculate effective tax rates. We have input-output tables including the tax payments of the each sector for import duties, purely domestic taxes, VAT on domestic goods and VAT on imported goods. Hence we calculate four effective tax rates using input-output tables. Formula in matrix form for the effective tax rates are given below:

$$\begin{aligned} VAT\_D^{e'} &= VAT\_D' + VAT\_D' * A \\ VAT\_M^{e'} &= VAT\_M' + VAT\_M' * M2 \\ S^{e'} &= S' + S' * A \\ D^{e'} &= D' + D' * M1 \end{aligned}$$

where  $e$  indicates effective rate and prime indicates row vectors.  $VAT\_D$ ,  $VAT\_M$ ,  $S$  and  $D$  are the nominal tax rates for VAT on domestic goods, VAT on imported goods, domestic taxes and import duties respectively.  $A$  is technical coefficient matrix for domestic inputs from industry  $i$  to industry  $j$  ( $a_{ij}$ ); and  $M$  ( $m_{ij}$ ) is the technical coefficient for imported inputs. In Turkey, VAT on imported goods is applied to the post-duty price. Therefore, to obtain an effective tax rate for VAT on imported goods, we use the technical coefficient matrix ( $M2$ ) attained from Input-Output Table for imported goods at after duty prices instead of the table at *cif* prices ( $M1$ ). Calculations for nominal tax rates are given in Appendix.

We use 1998 Turkey I-O Tables, the most recent I-O table available to estimate effective tax rates for each industry to examine the indirect tax incidence in Turkey, in 2003. Hence, we have to assume that from 1998 to 2003 no structural change had happened in Turkish economy. 1998 I-O table has 97 sectors. We have to aggregate some I-O sectors to match the sectors in I-O tables and the consumption goods 2003 HICES. After this aggregation process we end up having 88 sectors to estimate effective tax rates.

### 2. d) *Informal economy, tax evasion and taxation*

Estimations show that the size of the informal economy in Turkey is around 35% of actual GDP (Schneider and Savaşan, 2006). The effect of the informal economy on taxation is even higher. Table 3 reveals the extent of tax evasion with two different indicators. According to the table, the rate of non-taxed incomes to the potential tax base is 42% in 2003 and the rate of non-taxed incomes to declared tax base (as a rate of difference between declared tax base and potential tax to inspected declared tax base) is 214% in 2003 reflecting negative impacts of 2001 financial crisis on tax attitudes of citizens. Despite high growth rates in recent years, the rate of non-taxed incomes to the potential tax base is prone to increase instead of decreasing. Pinar (2002) estimated that due to the inability of including all incomes in the economy into the taxable income, Turkey loses 31% of potential tax revenue. The

revenue loss forces governments to levy more taxes or increase rates of existing taxes, encouraging people to locate in the informal economy.

The proportion of people who are not covered by any social security system to the total labour force can also be used as an indicator of informal economy and tax evasion. The 2003 HICES data displays that this rate is 42%, which is higher than the estimated size of informal economy in Turkey.

**Table 3. The indicators of tax evasion in Turkey**

	<b>The rate of non- taxed incomes to potential tax base in Turkey, 1985-2004(%)</b>	<b>The rate of non-taxed incomes to declared tax base, 2002-2006 (%)</b>
1985	50	-
1990	39	-
1995	30	-
2000	35	-
2001	65	-
2002	37	173
2003	42	214
2004	46	147
2005	-	66
2006	-	47

Sources: 9th Development Plan, Tax Report 2006

Ministry of Finance, Tax Inspectors Board

In tax incidence analysis, informal economy and tax evasion is generally ignored due to the data restrictions. However, the results of tax incidence analysis for a country with big informal economy are not reliable (Emran and Stiglitz 2007), since the informal economy also effects the distribution of income in the society. Given the extent of informal economy and tax evasion in Turkey, these two facts need to be included in our analysis. However, we do not have any precise information about who actually evades taxes and to what extent, but we can make assumptions regarding the tax evasion and informal economy. The methods of tax evasion vary with the certain tax type. Some well-known facts will be considered to draw a more realistic picture in terms of tax evasion. However, when no information on the behaviour of taxpayers to any type of tax incidence is available, it will be assumed that taxpayers do not declare 50% of their potential tax base.

## **2. e) Incidence Assumptions**

Two different sets of incidence assumptions are used in this study. The first set is called standard tax incidence assumptions reflecting the statutory incidence of taxes in question. For the first set (*Variant 1*), personal income tax is assumed to be borne by those who pay it; indirect taxes (general sales and excise taxes), by consumers of the taxed commodities. Personal income tax on rent incomes (residencies, commercial and industrial buildings and land) is borne by who owns properties. Payroll tax is assumed to fall on both employees and employers. This assumption is valid for the public sector. However, for the private sector, it is known that employer's share of payroll tax is also paid by employees, which will be taken into account in the second set of assumptions. Property taxes are assumed to fall on the individuals who own them.

For the second set of incidence assumptions (*Variant 2*), shifting assumptions on payroll tax, property taxes and personal income tax on rent are changed. It is assumed that employer's share of payroll tax is paid by employees who work for a private company. It is

assumed that 50% of personal income tax on rental incomes on residences is shifted to the tenants and 50% of it is paid by owners of the residences. However, there is no information to identify the tenants of the rental houses to shift the tax to the actual tenants, but the data provides the information on households who live in a rental residence. To calculate the personal income tax for the tenants, it is assumed that households, who are in the same expenditure quintile, are in a relationship of tenant and landlady. For commercial and industrial buildings and land, it is assumed that the tax is fully shifted to tenants. Since the data does not identify who are the tenants of commercial buildings, the tax bill for the owners is not calculated and the tax bill is not allocated to any agent (household or individual) in the data. Table A1 and A2 in Appendix summarise incidence the assumptions and the assumptions made to include tax evasion in our analysis.

The personal income tax bill (IT) is calculated for wage earners, self-employed and employers and the taxpayers who earn interest income and rental income. As mentioned in the previous section that estimated tax evasion is almost 42%, following assumptions are accepted to consider tax evasion and informal economy.

Firstly, it is assumed that individual wage earners who are not covered by any social security institution pay neither personal income tax nor payroll tax. It is known that Turkish governments pay some extra amounts to civil servants whose job demands skilled labour and high responsibility, such as professors, doctors and chiefs. However, these extra amounts are exempted from the personal income tax, since the governments want to keep those civil servants' salaries higher as a subsidy. Therefore, the higher the salary of a civil servant the lower the share of the salary paid as the personal income tax. In order to take into account this fact, it is presumed that civil servants' tax base is equal to the minimum salary in public institutions (*Informal*). For the taxpayers working for private companies, in an extreme case, it is assumed that employers only declare the minimum wage, irrespective of actual income, so we assume that private employees only pay personal income tax on the minimum wage (*Informal*).

However, there is a problem with self-employed and employer incomes in terms of taking into account the tax evasion for these groups apart from agricultural incomes. Although it is known that the rate of tax evasion among self-employed and employers is high, we do not have exact numbers by sources of income or income classes. If those estimations were available, some assumptions based on these estimations would be accepted. Despite this fact, it is assumed in this study that the employers and self-employed persons do not declare 50% of their potential tax base (*Informal*).

The extent of tax evasion is very high for personal income tax on rent in Turkey. The Turkish tax authorities plan to introduce a new measure in 2008 to collect tax from rental income. The measure includes forcing landlords to open a bank account for their tenants and charging banks to collect the tax to decrease high evasion rates. It is assumed that personal income tax on rental incomes on residencies are paid by the owner of the house (*Variant 1*). However, General Directorate of Revenue Policies have found that people living only on rental incomes and having only one rented house do not declare either their rent incomes at all or do not declare the real value of the rent. The second tax bill (*Informal*) for rental incomes uses assumptions based on this information<sup>6</sup>.

It is believed that the owners of commercial and industrial buildings shift the tax burden to tenants. Hence, we assume that the owners of commercial buildings do not pay personal income tax on rent incomes (*Variant 2*).

The last source of income is interest. Banks automatically apply two stoppage rates for interest incomes: 5% for the publicly traded company and 15% for other private companies. The data does not give the legal status of companies that households get interest incomes from. So the 5% stoppage rate is taken to calculate the tax bill by assuming that in Turkey by 2003, banks are largely publicly traded companies. There is another source of income, which is subject to the stoppage too, namely interest incomes from dividends. There is 10% stoppage for these incomes.

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<sup>6</sup> [http://www.lifeinbursa.com/haberx/11852/6/kira\\_vergisi\\_yuzde\\_15\\_stopaja\\_donusuyor.htm](http://www.lifeinbursa.com/haberx/11852/6/kira_vergisi_yuzde_15_stopaja_donusuyor.htm)



Agricultural incomes are subject to the usual personal income tax too, with three stoppage rates. The average stoppage rate is used (2.5%) to calculate the tax bill for agricultural incomes and no evasion is assumed.

In order to include informal economy and tax evasion in the analysis for standard indirect tax incidence analysis, two assumptions are made. First, rural households do not pay any indirect tax on food goods. Secondly, only goods coming from markets are included in the analysis.

### 3. DATA, CALCULATIONS AND METHOD

The basic data are from Household Income and Consumption Expenditure Surveys (HICES), 2003, conducted by Turkish Statistical Institute (Turksat). The HICES data were collected for 1994, 2002, 2003 and 2004. The sample of HICES was designed to be representative of the population of Turkey and two of them, 1994 and 2003 are also regionally representative. Moreover, all of them provide reliable information needed for an urban-rural<sup>7</sup> breakdown and they have information at both individual and household level. HICES are detailed consumption and income surveys that provide a very wide range of information about households' consumption patterns and households' income sources. HICES 2003 has 25,690 households and has individual income information.

We use total adult equivalent monthly<sup>8</sup> household expenditures as a measure of the living standard taking into account household size, composition and economies of scale in households. To measure the effects of economies of scale and the different consumption needs by different household members, household size is converted into adult equivalent (AE) using the following formula for the household  $i$ :

$$AE_i = (A_i + \alpha C_i)^\theta$$

Where  $A_i$  is the number of adults in the household,  $C_i$  is the number of children, and  $\alpha$  and  $\theta$  are parameters. Children are individuals aged 14 and below. World Bank (2005) adopted a value of  $\theta=0.6$  and  $\alpha=0.9$  which we use. We applied adjusted adult equivalent size (Deaton and Zaidi, 2002).

Adjusted adult equivalent size of the household  $i$  ( $AE^*_i$ ) is defined as

$$AE^*_i = \frac{A_0 + C_0}{(A_0 + \alpha C_0)^\theta} AE_i$$

where  $A_0$  and  $C_0$  are the number of adults and children in the "pivotal" households and  $A_i$  and  $C_i$  are the number of adults and children in the  $i$ th household. The modal or pivotal household in Turkey is a 4-member household with 2 adults and 2 children.

#### 3.a) Calculations

The survey includes households' after-tax income and expenditure. Given the tax regimes on various income components, the income tax bill ( $IT$ ) for each household has been computed as follows:

$$ATI = (1 - t) * PTI$$

$$IT = \frac{t * ATI}{(1 - t)}$$

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<sup>7</sup> The provinces whose population is at least 20,001 is called urban whereas provinces whose population is equal or lower than 20,000 are called rural.

<sup>8</sup> HICES give both total income and expenditure of households and individuals. While total income was collected annually, total expenditure was collected monthly, As expenditure reporting is generally believed to be more reliable than income reporting, and recall over a month should be reasonable, we use the expenditure measure.

where  $IT$  = income tax bill,  $t$ =income tax rate,  $ATI$ = after-tax income.

Pre-tax income ( $PTI$ ) is equal to the total tax bill paid by each household plus after-income tax.

Since, the personal income tax is subject to a progressive taxation, we need to take into account the income tax schedule while calculating  $PTI$ . In order to do this, we estimate maximum amount of income to create  $PTI$  borders for each income band. Then we use these borders to calculate maximum amount of  $ATI$  and put individuals in those ranges according to their  $ATI$ <sup>9</sup>.

We calculate three different tax bills for the incidence of indirect taxes:  $VAT$ ,  $PCT$  and  $PCOT$ . The data gives us consumption expenditures at the household level. There is a point we need to make clear before starting with the calculation of the indirect tax bill for each household. If a good is subject to both  $VAT$  (or  $PCOT$ ) and  $PCT$ , we need to calculate  $PCT$  bill first and add this amount to pre-tax spending in order to get the tax base for  $VAT$  and  $PCOT$ . Since household expenditures on each good in the data shows the after-tax spending that each household has made on goods, we firstly need to compute pre-tax spending ( $PTS$ ) of households as follows:

$$ATS_{ij} = (1 + t_j) * PTS_{ij}$$

where  $ATS$  is after-tax spending,  $i$  presents households,  $j$  presents commodities that each household consumes, and  $t_j$  is a composite of various commodity-specific taxes. If we write the formula by including the different indirect taxes, we have the following:

$$PTS = \frac{ATS}{(1 + t_{VAT} + t_{PCOT}) * (1 + t_{PCT})}$$

where  $t_{PCT}$  is the rate of PCT,  $t_{VAT}$  is the rate of VAT and  $t_{PCOT}$  is the rate of PCOT.

After calculating  $PTS$ , we can compute tax bill for those three taxes as follows:

$$TB_{PCT} = t_{PCT} * PTS$$

$$TB_j = t_j * (PTS + TB_{PCT}), j: VAT and PCOT$$

where  $TB$  is tax bill for these three taxes calculated for different commodities.

While we do not have any serious matching problem between VAT rates and categories of household expenditure data either in food goods or non-food goods, we have some problems with PCT. PCT on oil spending is not ad valorem, but 6.750 TL per litre. The data includes the car owners and their total oil spending, so we calculate how much litre a household has consumed by taking an average oil price.

### 3. b) Welfare Dominance Analysis

We wish to analyse tax and benefit incidence by applying concentration curves and statistical dominance test methodology. A general method for comparing the incidence of public expenditures and tax burdens is to test for welfare dominance. Yitzhaki and Slemrod (1991) introduced concentration curves similar to Lorenz curves in that they plot households from the poorest to the wealthiest on the horizontal axis against the cumulative proportion of benefits (tax burdens) received for all households from the poorest to the richest. Public

<sup>9</sup> Calculation is presented in a table in the appendix.

services whose benefits are more concentrated among the poor will have higher (more convex) concentration curves, and vice versa. We follow Sahn and Younger (2000) to compare the distributions. We call a public service absolute progressive (or per capita progressive) if its concentration curve is above the 45-degree line (concave rather than convex); progressive if its concentration curve is above the Lorenz curve but below the 45-degree line, and regressive if its concentration curve is below the Lorenz curve. For taxes, if the concentration curve of a tax is above (below) the Lorenz curve, the tax is regressive (progressive).

In order to decide whether one tax or transfer dominates to another or if it is progressive or regressive, we need to test if there is statistically significant difference between two concentration curves or between a concentration curve and the Lorenz curve of the welfare indicator. Davidson and Duclos (1997) derived the distribution free standard errors for the difference between two concentration curves that may be dependent. The null hypothesis of the test is that the ordinates of two concentration curves are all the same. There are two decision rules to reject the null hypothesis in the literature. In the first criterion, which is common in the literature, the null hypothesis can be rejected in favor of dominance if the difference between any one pair of ordinates is statistically significant and none of the pairs of ordinates is significant in the opposite direction (which implies crossing and no dominance) (Demery 2003). As for the second criterion, we can reject the null hypothesis in favor of dominance if the ordinates of one curve are all above the other, or in favor of crossing concentration curves if at one point the ordinates of one distribution are greater than the other but at another point the reverse is true. We will apply both decision rules to assess progressivity of concentration curves.

We need to decide how many ordinates we should take to apply the test. The common practice in the literature is to take 20 or 10 equally spaced ordinates and exclude the top and bottom percentiles (Younger, 1999; Sahn and Younger, 2000)<sup>10</sup>. The reason for excluding the top and bottom percentiles is that the differences between ordinates at the extremes of the distribution are accepted rarely statistically different. DAD (Software for Distributive Analysis) by Araar and Duclos (2006) and Distributive Analyse Stata Package (DASP) by Abdelkrim (2006) are employed to produce the difference between the ordinates of the concentration curves and the difference between the ordinates of a concentration curve and the Lorenz curve with standard errors. After calculating the differences between concentration curves, a two-sided hypothesis test of whether these differences are equal to zero or not with DAD is made. DASP gives us a curve, which plots the statistical difference between two curves with confidence intervals that can be provided if required.

### 3. c) *Progressivity*

We also provide a cardinal measure for the progressivity of the taxes and benefits. There are two approaches for progressivity, namely Tax-Redistribution (TR) and Income-Redistribution. Globally, TR involves comparing the Lorenz curve for per capita expenditures,  $L(p)$ , and the concentration curves  $C(p)$ , for taxes or benefits. On the other hand, IR approach takes into account the difference between the concentration curves of net income and the Lorenz curve. We call a tax or a benefit system progressive if the following conditions are met (Duclos and Araar, 2006):

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<sup>10</sup> We took both 20 and 10 equally spaced ordinates. Since we obtained the same result, we reported here the results of the test with 20 ordinates.

**Table 4. TR and IR Progressivity Rules for Tax and Transfers**

	A Tax or Transfer is TR(IR) Progressive	If
<b>TR Progressivity</b>	<b>Tax (T)</b>	$C_T(p) < L_X(p)$ for all $p \in [0,1]$ ( $L_X$ dominates $C_T$ )
	<b>Transfer (B)</b>	$C_B(p) > L_X(p)$ for all $p$ ( $C_B$ dominates $L_X$ )
	<b>Tax(T1)-Tax(T2)</b>	$C_{T(1)}(p) < C_{T(2)}$ for all $p$
	<b>Transfer(B1)-Transfer(B2)</b>	$C_{B(1)}(p) > C_{B(2)}$ for all $p$
	<b>Tax-Transfer</b>	$L_X(p) - C_T(p) > C_B(p) - L_X(p)$ for all $p$
<b>IR Progressivity</b>	<b>Tax</b>	$C_{X-T}(p) > L_X(p)$ for all $p$
	<b>Benefit</b>	$C_{X+B}(p) > L_X(p)$ for all $p$
	<b>Tax(T1)-Tax(T2)</b>	$C_{X-T_1}(p) > C_{X-T_2}(p)$ for all $p$
	<b>Transfer(B1)-Transfer(B2)</b>	$C_{X+B_1}(p) > C_{X+B_2}$ for all $p$
	<b>Tax-Transfer</b>	$C_{X-T}(p) > C_{X+B}(p)$

In the table, X is the gross welfare indicator (income or expenditure), T is tax, B is benefit and p is the ordinate.

#### 4. RESULTS

##### 4. a) *Benefit Incidence*

TR-Progressivity of the public services with standard errors are given in the Table 5. As can be seen from the table, the most progressive public service is the primary education, which is followed by the secondary education. However, if we look at the numbers closely, we see that the progressivity increases when we move to the higher expenditure deciles and it is the highest for middle-income classes. Higher education is regressive for the lower deciles (the poorest households), but progressive after the 6<sup>th</sup> decile. The high progressivity of the primary education comes from the fact that poorer households tend to have more children<sup>11</sup> than do the richer households. However, the decline in progressivity for the secondary education suggests that poorer households are not able to send their children to the school after the compulsory primary education.

Public health and infrastructure services are progressive for all deciles, and highest for middle-classes. We have two definitions for public social cash transfers. For the *Transfer 1* we include pensions, where as for *Transfer 2*, we aggregate total cash public transfers received by household without pensions. The picture we obtain from this differentiation is quite interesting. Public cash transfers are generally found progressive in benefit incidence analysis. However, in Turkey because of the high informal employment rate<sup>12</sup> in the poorer deciles, employees in the poorer deciles do not have the chance to retire and be involved in the pension system, so public cash transfers including pensions are regressive for the lower deciles. When we exclude pensions, transfers become progressive. However, we see once again that the progressivity is low for the poor who are supposed to be targeted by the public cash transfers. Despite the progressive character of the total benefits, the poorest deciles are not well targeted.

<sup>11</sup> The number of children households have by quintiles and enrolment rate are given in the appendix.

<sup>12</sup> The informal employment rates by deciles can be seen in the table in Appendix.

**Table 5: Tax-Progressivity of Benefits**

Expenditure Deciles	Education			Transfers		Health	Infrastructure	Total Benefits	
	Primary	Secondary	Higher	Transfer 1	Transfer 2			Total Benefits1	Total Benefits2
<b>1</b>	0.126	0.064	-0.009	-0.006	0.015	0.033	0.004	0.017	0.031
<i>std</i>	<i>0.004</i>	<i>0.005</i>	<i>0.003</i>	<i>0.001</i>	<i>0.003</i>	<i>0.002</i>	<i>0.000</i>	<i>0.001</i>	<i>0.001</i>
<b>2</b>	0.231	0.137	-0.017	-0.006	0.029	0.080	0.008	0.038	0.065
<i>std</i>	<i>0.005</i>	<i>0.008</i>	<i>0.006</i>	<i>0.002</i>	<i>0.005</i>	<i>0.003</i>	<i>0.001</i>	<i>0.001</i>	<i>0.002</i>
<b>3</b>	0.306	0.190	-0.027	0.003	0.047	0.125	0.010	0.059	0.093
<i>std</i>	<i>0.005</i>	<i>0.009</i>	<i>0.007</i>	<i>0.003</i>	<i>0.007</i>	<i>0.003</i>	<i>0.001</i>	<i>0.002</i>	<i>0.002</i>
<b>4</b>	0.352	0.240	-0.022	0.015	0.063	0.171	0.013	0.081	0.119
<i>std</i>	<i>0.005</i>	<i>0.009</i>	<i>0.010</i>	<i>0.004</i>	<i>0.009</i>	<i>0.003</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>
<b>5</b>	0.388	0.275	0.000	0.032	0.079	0.212	0.015	0.102	0.143
<i>std</i>	<i>0.006</i>	<i>0.009</i>	<i>0.012</i>	<i>0.005</i>	<i>0.011</i>	<i>0.003</i>	<i>0.002</i>	<i>0.003</i>	<i>0.003</i>
<b>6</b>	0.398	0.298	0.014	0.042	0.085	0.243	0.013	0.114	0.156
<i>std</i>	<i>0.006</i>	<i>0.009</i>	<i>0.014</i>	<i>0.006</i>	<i>0.012</i>	<i>0.004</i>	<i>0.003</i>	<i>0.003</i>	<i>0.003</i>
<b>7</b>	0.389	0.313	0.052	0.057	0.089	0.260	0.011	0.126	0.165
<i>std</i>	<i>0.006</i>	<i>0.009</i>	<i>0.015</i>	<i>0.007</i>	<i>0.013</i>	<i>0.004</i>	<i>0.004</i>	<i>0.004</i>	<i>0.004</i>
<b>8</b>	0.353	0.305	0.070	0.072	0.095	0.256	0.009	0.129	0.160
<i>std</i>	<i>0.006</i>	<i>0.008</i>	<i>0.015</i>	<i>0.008</i>	<i>0.015</i>	<i>0.005</i>	<i>0.004</i>	<i>0.005</i>	<i>0.004</i>
<b>9</b>	0.269	0.251	0.100	0.087	0.121	0.217	0.009	0.120	0.142
<i>std</i>	<i>0.006</i>	<i>0.007</i>	<i>0.014</i>	<i>0.008</i>	<i>0.014</i>	<i>0.005</i>	<i>0.005</i>	<i>0.005</i>	<i>0.005</i>
<b>10</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>std</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>

\*std: Standard deviation; Transfer1: including pensions; Transfer2: excluding pensions

Total Benefits1: Total benefits with Transfer1; Total Benefits2: Total benefits with Transfer2

For further examination on education incidence, following Demery (2000), we use the number of primary and secondary school age children in each quintile and higher education age persons as an indicator of primary, secondary and higher education need for each quintile<sup>13</sup>. Table 6 reports results. When we compare percentage shares for education needs with percentage shares of education benefits, we see that for primary education all except the poorest quintile receive public benefits more than they need. The poorest quintile receives 29.4% of total primary level benefits whereas the share of number of primary age children for the poorest quintile is 33.9%. This pattern is very similar for secondary and higher education, although the difference between needs for secondary and higher education services and actual government expenditure is greater. While the poorest quintile receives 20% (4.7%) of total secondary (higher) level benefits, 29% (22.5%) percent of secondary (higher) level age group are included in this quintile. However, when we take into account children without primary and secondary level diploma in calculating secondary and higher education needs, the difference between service needs and publicly provided benefits decrease. The numbers in parentheses in table 6 show the percentage of secondary (higher education) age group who had primary (secondary) level diploma in each quintile. Even if the difference between education needs and benefits decrease with this new definition, the first two quintiles still do not receive enough benefits to cover their needs for both secondary and higher education. Despite the progressive character of primary and secondary education, we

<sup>13</sup> School age for primary and secondary education is between 6 and 17, for higher education is between 18 and 23.

may conclude that the poorest quintile is not well targeted and higher education is regressive for the poor.

**Table 6. Social Service Needs and Benefits, Turkey, 2003 (AE)\*, by quintile % shares**

Quintiles	Primary	Secondary education	Higher education
	Education Benefits	Benefits	Benefits
1	29.43	19.99	4.69
2	22.85	21.10	10.21
3	19.56	20.70	18.52
4	16.51	21.76	26.60
5	11.66	16.44	39.99

**Quintiles Number of Primary Number of Secondary Education Number of Higher Education**

Quintiles	Age Children	Age People	Age People
	1	33.86	28.9 (25.81)
2	22.29	22.67 (22.39)	21.71 (18.26)
3	18.01	18.92 (19.57)	20.15 (21.01)
4	15.08	16.89 (18.19)	19.61 (24.53)
5	10.77	12.62 (14.05)	16.02 (24.49)

\*Households were ranked by per adult equivalent total household expenditure. The numbers in bracket show the percentage of secondary (higher education) age people who had primary (secondary) level diploma in each quintile.

#### 4. a. 1) Dominance Test Results

We want to report welfare dominance analysis to test whether benefits are progressive or not statistically. Based on z-tests for the difference between ordinates of two concentration curves<sup>14</sup> and the first decision rule, we find that primary and secondary education are per capita progressive, that is, we reject the null that the differences between 45-degree line and concentration curves of primary and secondary education are zero (Table 7 and 8). On the other hand, we found that the difference between 45-degree line and concentration curve of higher education benefits is also statistically significant and 45-degree line dominates the concentration curve of higher education benefits. When we looked at the difference between concentration curves of each education level and the Lorenz curve, we saw that concentration curves of all education level benefits dominate the Lorenz curve.

On the other hand, when we apply the second decision rule, dominance results are changed for secondary and higher education benefits. For secondary education, we cannot reject the null hypothesis in favor of dominance, since we cannot reject the null hypothesis for every ordinate tested. This is also true for higher education benefits, when we compare the concentration curve of higher education benefits with both Lorenz curve and the 45-degree line. Therefore, we can conclude that while primary education benefits are per capita progressive for both decision rules, secondary education is per capita progressive only if we adopt first decision rule. According to the first decision rule, higher education is only progressive but not per capita progressive; to the second decision rule, when we compare the concentration curve with 45-degree line, 45-degree line dominates higher education concentration curve, however, when we compare it with Lorenz curve, second decision rule tells us two curves cross so we can not reject the null hypothesis.

<sup>14</sup> Concentration curves are given in the Appendix.

**Table 7. Dominance Results for Public Education Services,  
Relative to the Lorenz Curve and the 45-Degree Line**

	Per Adult Equivalent Benefits					
	Primary Education		Secondary Education		Higher Education	
	1	2	1	2	1	2
<b>Decision rule 1</b>	+	+	+	+	+	-
<b>Decision Rule 2</b>	+	+	+	nd*	nd	-

**Notes:**

1) compares the column's concentration curve with the Lorenz curve for per adult equivalent household expenditures

2) compares the column's concentration curve with the 45-degree line

'+' indicates that the benefits from the column's service are more concentrated among the poor than per adult equivalent expenditures (for (1)) or an equal per adult equivalent distribution (for (2))

'-' indicates that the service is less concentrated among the poor

'x' indicates that the concentration curves cross

\*nd: non dominance: we cannot reject the null hypothesis

**Table 8. Dominance Results for Public Services,  
Relative to the Lorenz Curve and the 45-Degree Line**

	Health		Transfer 1		Transfer 2	
	1	2	1	2	1	2
<b>Decision rule 1</b>	+	-	+	-	+	-
<b>Decision Rule 2</b>	+	-	nd	-	+	-

**4. b) Tax Incidence**

**4. b.1) Direct Tax Incidence**

Tables 9 and 10 present tax-progressivity of direct taxes under the different assumptions on tax evasion and informal economy. According to the tables, direct taxes are progressive and the most progressive tax is the property tax. If the tables are examined closely, one may see that progressivity increases with the expenditure deciles. Payroll tax is also progressive, but it is more progressive under *Variante 1* which states that employees pay only employees' share of the payroll tax. As seen from the tables, direct taxes are generally more progressive under *Variante 1* than do they under *Variante 2*. This comes from mainly the fact that under *Variante 2*, the owners of the property shift 50% of the income tax on rent to the tenants and employees pay employers' share of payroll tax too.

When we consider informal economy and tax evasion assumptions, we see that personal income tax and property taxes become more progressive. The reason for this result comes from the high informal employment in the lower deciles. Therefore, informal employment works in favor of the poor. However, the payroll tax becomes less progressive, even regressive for some middle-expenditure deciles, which suggests that the concentration curve of the payroll tax under informal employment and evasion assumptions cross Lorenz curve of per adult equivalent expenditure.

**Table 9. Tax Progressivity of Direct Taxes**

Deciles	Income Tax		Property Tax		Payroll Tax	
	Variant 1	Variant 2	Variant 1	Variant 2	Variant 1	Variant 2
<b>1</b>	0.008	0.007	0.020	0.023	0.017	0.015
<i>std</i>	<i>0.001</i>	<i>0.001</i>	<i>0.000</i>	<i>0.000</i>	<i>0.001</i>	<i>0.001</i>
<b>2</b>	0.017	0.015	0.052	0.057	0.028	0.024
<i>std</i>	<i>0.002</i>	<i>0.002</i>	<i>0.001</i>	<i>0.001</i>	<i>0.002</i>	<i>0.002</i>
<b>3</b>	0.026	0.022	0.090	0.098	0.039	0.030
<i>std</i>	<i>0.003</i>	<i>0.003</i>	<i>0.001</i>	<i>0.001</i>	<i>0.003</i>	<i>0.003</i>
<b>4</b>	0.038	0.031	0.136	0.146	0.045	0.031
<i>std</i>	<i>0.004</i>	<i>0.004</i>	<i>0.001</i>	<i>0.001</i>	<i>0.004</i>	<i>0.004</i>
<b>5</b>	0.049	0.041	0.177	0.190	0.048	0.031
<i>std</i>	<i>0.006</i>	<i>0.006</i>	<i>0.002</i>	<i>0.002</i>	<i>0.005</i>	<i>0.006</i>
<b>6</b>	0.058	0.049	0.225	0.240	0.038	0.014
<i>Std</i>	<i>0.007</i>	<i>0.008</i>	<i>0.003</i>	<i>0.003</i>	<i>0.006</i>	<i>0.007</i>
<b>7</b>	0.074	0.064	0.234	0.250	0.029	0.008
<i>Std</i>	<i>0.009</i>	<i>0.009</i>	<i>0.005</i>	<i>0.005</i>	<i>0.008</i>	<i>0.009</i>
<b>8</b>	0.090	0.079	0.247	0.262	0.021	0.007
<i>Std</i>	<i>0.011</i>	<i>0.011</i>	<i>0.006</i>	<i>0.006</i>	<i>0.009</i>	<i>0.011</i>
<b>9</b>	0.096	0.080	0.145	0.155	0.001	0.002
<i>Std</i>	<i>0.014</i>	<i>0.014</i>	<i>0.008</i>	<i>0.008</i>	<i>0.011</i>	<i>0.013</i>
<b>10</b>	0.003	0.000	-0.007	-0.007	-0.004	-0.001
<i>Std</i>	<i>0.014</i>	<i>0.016</i>	<i>0.004</i>	<i>0.004</i>	<i>0.008</i>	<i>0.010</i>

**Table 10. Tax Progressivity of Direct Taxes under Informal and Evasion Assumptions**

Deciles	Income Tax		Property Tax		Payroll Tax	
	Variant 1	Variant 2	Variant 1	Variant 2	Variant 1	Variant 2
<b>1</b>	0.011	0.010	0.024	0.024	0.014	0.010
<i>std</i>	<i>0.001</i>	<i>0.001</i>	<i>0.000</i>	<i>0.000</i>	<i>0.001</i>	<i>0.001</i>
<b>2</b>	0.020	0.018	0.061	0.061	0.019	0.006
<i>Std</i>	<i>0.002</i>	<i>0.002</i>	<i>0.001</i>	<i>0.001</i>	<i>0.002</i>	<i>0.002</i>
<b>3</b>	0.028	0.023	0.104	0.104	0.021	-0.003
<i>Std</i>	<i>0.004</i>	<i>0.004</i>	<i>0.001</i>	<i>0.001</i>	<i>0.003</i>	<i>0.003</i>
<b>4</b>	0.036	0.028	0.156	0.156	0.016	-0.021
<i>Std</i>	<i>0.005</i>	<i>0.005</i>	<i>0.001</i>	<i>0.001</i>	<i>0.004</i>	<i>0.004</i>
<b>5</b>	0.042	0.034	0.203	0.203	0.006	-0.039
<i>Std</i>	<i>0.007</i>	<i>0.007</i>	<i>0.002</i>	<i>0.002</i>	<i>0.005</i>	<i>0.005</i>
<b>6</b>	0.046	0.039	0.255	0.255	-0.015	-0.072
<i>Std</i>	<i>0.009</i>	<i>0.009</i>	<i>0.003</i>	<i>0.003</i>	<i>0.006</i>	<i>0.006</i>
<b>7</b>	0.057	0.049	0.268	0.268	-0.038	-0.095
<i>Std</i>	<i>0.011</i>	<i>0.011</i>	<i>0.005</i>	<i>0.005</i>	<i>0.007</i>	<i>0.006</i>
<b>8</b>	0.067	0.060	0.280	0.280	-0.059	-0.111
<i>Std</i>	<i>0.014</i>	<i>0.014</i>	<i>0.006</i>	<i>0.006</i>	<i>0.008</i>	<i>0.007</i>
<b>9</b>	0.069	0.057	0.163	0.163	-0.090	-0.123
<i>Std</i>	<i>0.017</i>	<i>0.017</i>	<i>0.008</i>	<i>0.008</i>	<i>0.009</i>	<i>0.007</i>
<b>10</b>	0.005	0.004	-0.007	-0.007	-0.015	-0.015
<i>Std</i>	<i>0.015</i>	<i>0.015</i>	<i>0.005</i>	<i>0.005</i>	<i>0.003</i>	<i>0.003</i>



In this section, concentration curves<sup>15</sup> are used to examine redistributive impacts of direct taxation. Since concentration curves for the per adult equivalent household tax burden for income and property taxes is located under the Lorenz curve of per adult equivalent household expenditure, both of them are progressive under both assumptions. However, it is clear that *Variant 2* is less progressive than *Variant 1* for personal income taxes due to the assumption of rent incomes on residencies. On the other hand, the concentration curves for the payroll tax are crossing the Lorenz curve at the high expenditure quintiles, which means that it is not possible to reach a conclusion on the redistributive direction of the tax without statistical tests. Nonetheless, for the payroll tax *Variant 1* seems to be more progressive than *Variant 2*. From the figure, it can be concluded that the most progressive tax is property tax and the least progressive one is the payroll tax. We also tested statistically the differences between concentration curves and Lorenz curve (Table 11). According to the first criteria, we can reject the null hypothesis in favour of the progressivity of the direct taxes. However, under the second decision rule, we are not able to reject the null hypothesis for the payroll tax.

**Table 11. Dominance Results for Direct Taxes**

**Relative to the Lorenz Curve**

	Per Adult Equivalent Taxes					
	Income Tax		Property Tax		Payroll Tax	
	Variant 1	Variant 2	Variant 1	Variant 2	Variant 1	Variant 2
<b>Decision rule 1</b>	+	+	+	+	+	+
<b>Decision Rule 2</b>	+	+	+	+	x	x

#### 4. b.2) Indirect Taxes

Indirect taxes are the most important revenue source of Turkish revenue system. Therefore, the redistributive impact of indirect taxes are more important than that of direct taxes. In this section we will give the incidence analysis of indirect tax system by using both statutory tax rates and effective tax rates. As emphasized before, the most common sale tax is VAT in Turkey. The table 12 presents the TR-progressivity rates of VAT with different tax rates. VAT1, VAT8 and VAT18 indicate the VAT with 1 and 8 and 18% and VAT is the total tax burden of three different rates by households. As seen from the table, since VAT1 and VAT8 on food goods and the share of food spending in the total consumption spending of households is more than 40% among the poorer households, VAT1 and VAT8 are regressive. However, VAT18 is progressive. PCOT and PCT are progressive taxes as expected and the PCOT seems to be the most progressive indirect tax (Table 13). When we look at the incidence of total indirect taxes, thanks to the differential rate of VAT and higher tax rates on luxury goods, the Turkish indirect tax system is progressive. If we consider the tax evasion assumption that rural households do not pay indirect tax on food goods, VAT1 and VAT8 becomes progressive for the lower deciles and the progressivity of the whole indirect tax system increases (Table 14).

<sup>15</sup> Concentration curves are given in the appendix.

**Table 12. Tax-Progressivity of VAT (with statutory rates)**

<b>Deciles</b>	<b>VAT</b>	<b>VAT1</b>	<b>VAT8</b>	<b>VAT18</b>
<b>1</b>	0.0048	-0.0109	-0.0170	0.0079
<i>std</i>	<i>0.0002</i>	<i>0.0007</i>	<i>0.0006</i>	<i>0.0003</i>
<b>2</b>	0.0101	-0.0287	-0.0362	0.0167
<i>std</i>	<i>0.0005</i>	<i>0.0014</i>	<i>0.0013</i>	<i>0.0006</i>
<b>3</b>	0.0160	-0.0456	-0.0560	0.0263
<i>std</i>	<i>0.0008</i>	<i>0.0022</i>	<i>0.0020</i>	<i>0.0009</i>
<b>4</b>	0.0226	-0.0637	-0.0741	0.0365
<i>std</i>	<i>0.0012</i>	<i>0.0030</i>	<i>0.0029</i>	<i>0.0014</i>
<b>5</b>	0.0272	-0.0794	-0.0908	0.0442
<i>std</i>	<i>0.0017</i>	<i>0.0040</i>	<i>0.0038</i>	<i>0.0019</i>
<b>6</b>	0.0320	-0.0981	-0.1025	0.0515
<i>std</i>	<i>0.0023</i>	<i>0.0050</i>	<i>0.0047</i>	<i>0.0026</i>
<b>7</b>	0.0351	-0.1125	-0.1117	0.0565
<i>std</i>	<i>0.0030</i>	<i>0.0061</i>	<i>0.0059</i>	<i>0.0035</i>
<b>8</b>	0.0380	-0.1224	-0.1135	0.0602
<i>std</i>	<i>0.0038</i>	<i>0.0073</i>	<i>0.0071</i>	<i>0.0045</i>
<b>9</b>	0.0387	-0.1162	-0.1004	0.0590
<i>std</i>	<i>0.0049</i>	<i>0.0083</i>	<i>0.0085</i>	<i>0.0058</i>
<b>10</b>	0.0063	-0.0113	0.0050	0.0066
<i>Std</i>	<i>0.0059</i>	<i>0.0036</i>	<i>0.0096</i>	<i>0.0073</i>

**Table 13. Tax-Progressivity of Indirect Taxes (with statutory rates)**

Deciles	VAT	PCT	PCOT	Total Indirect Taxes
<b>1</b>	0.0048	0.0058	0.0191	0.0056
<i>std</i>	<i>0.0002</i>	<i>0.0007</i>	<i>0.0006</i>	<i>0.0004</i>
<b>2</b>	0.0101	0.0120	0.0382	0.0116
<i>std</i>	<i>0.0005</i>	<i>0.0018</i>	<i>0.0012</i>	<i>0.0010</i>
<b>3</b>	0.0160	0.0223	0.0591	0.0198
<i>std</i>	<i>0.0008</i>	<i>0.0027</i>	<i>0.0018</i>	<i>0.0016</i>
<b>4</b>	0.0226	0.0347	0.0753	0.0291
<i>Std</i>	<i>0.0012</i>	<i>0.0038</i>	<i>0.0025</i>	<i>0.0023</i>
<b>5</b>	0.0272	0.0426	0.0838	0.0353
<i>std</i>	<i>0.0017</i>	<i>0.0053</i>	<i>0.0033</i>	<i>0.0032</i>
<b>6</b>	0.0320	0.0531	0.0905	0.0426
<i>std</i>	<i>0.0023</i>	<i>0.0071</i>	<i>0.0041</i>	<i>0.0043</i>
<b>7</b>	0.0351	0.0636	0.0912	0.0489
<i>std</i>	<i>0.0030</i>	<i>0.0091</i>	<i>0.0049</i>	<i>0.0055</i>
<b>8</b>	0.0380	0.0765	0.0826	0.0558
<i>std</i>	<i>0.0038</i>	<i>0.0114</i>	<i>0.0057</i>	<i>0.0070</i>
<b>9</b>	0.0387	0.0897	0.0560	0.0611
<i>std</i>	<i>0.0049</i>	<i>0.0140</i>	<i>0.0065</i>	<i>0.0087</i>
<b>10</b>	0.0063	0.0132	-0.0090	0.0089
<i>std</i>	<i>0.0059</i>	<i>0.0176</i>	<i>0.0056</i>	<i>0.0107</i>

**Table 14. Tax-Progressivity of Indirect Taxes (with statutory rates under tax evasion assumption)**

Deciles	VAT1	VAT8	VAT18	VAT	PCT	Total Indirect Taxes
<b>1</b>	0.004	0.004	0.009	0.0081	0.0059	0.0074
<i>std</i>	<i>0.001</i>	<i>0.001</i>	<i>0.000</i>	<i>0.0002</i>	<i>0.0007</i>	<i>0.0004</i>
<b>2</b>	0.003	0.007	0.018	0.0170	0.0122	0.0154
<i>std</i>	<i>0.002</i>	<i>0.001</i>	<i>0.001</i>	<i>0.0005</i>	<i>0.0018</i>	<i>0.0010</i>
<b>3</b>	0.001	0.006	0.029	0.0264	0.0226	0.0256
<i>std</i>	<i>0.002</i>	<i>0.002</i>	<i>0.001</i>	<i>0.0008</i>	<i>0.0027</i>	<i>0.0016</i>
<b>4</b>	-0.005	-0.001	0.040	0.0357	0.0352	0.0365
<i>std</i>	<i>0.003</i>	<i>0.003</i>	<i>0.001</i>	<i>0.0012</i>	<i>0.0038</i>	<i>0.0022</i>
<b>5</b>	-0.009	-0.006	0.048	0.0429	0.0433	0.0441
<i>std</i>	<i>0.005</i>	<i>0.004</i>	<i>0.002</i>	<i>0.0017</i>	<i>0.0053</i>	<i>0.0032</i>
<b>6</b>	-0.021	-0.015	0.056	0.0494	0.0539	0.0525
<i>std</i>	<i>0.006</i>	<i>0.006</i>	<i>0.003</i>	<i>0.0023</i>	<i>0.0071</i>	<i>0.0043</i>
<b>7</b>	-0.033	-0.023	0.062	0.0535	0.0645	0.0594
<i>std</i>	<i>0.007</i>	<i>0.007</i>	<i>0.003</i>	<i>0.0030</i>	<i>0.0091</i>	<i>0.0055</i>
<b>8</b>	-0.050	-0.031	0.065	0.0562	0.0774	0.0663
<i>std</i>	<i>0.009</i>	<i>0.009</i>	<i>0.005</i>	<i>0.0039</i>	<i>0.0114</i>	<i>0.0070</i>
<b>9</b>	-0.062	-0.040	0.064	0.0536	0.0905	0.0700
<i>std</i>	<i>0.011</i>	<i>0.011</i>	<i>0.006</i>	<i>0.0051</i>	<i>0.0140</i>	<i>0.0088</i>
<b>10</b>	-0.009	0.014	0.007	0.0076	0.0133	0.0097
<i>std</i>	<i>0.004</i>	<i>0.013</i>	<i>0.008</i>	<i>0.0063</i>	<i>0.0176</i>	<i>0.0111</i>

However, we attain a different picture when we use effective tax rates instead of statutory tax rates. Estimated effective tax rates are given in Appendix. Effective tax rates are higher than normal tax rates since they include the taxes on inputs. The table 15 provides the TR-progressivity of indirect taxes with effective tax rates. As seen from the table, VAT on domestic goods becomes regressive under the effective VAT rate. Domestic taxes consists of the excise taxes such as PCT and are progressive as they are under statutory tax rates. VAT on imported goods is also progressive even if its progressivity is very low. However, custom duties seem to be regressive. This arises from the fact that Turkey does not impose any import duty on very wide range of goods after the Custom Union with European Union which is the most important trade partner of Turkey apart from food goods. If the table giving the effective tax rates by I-O sectors is checked, one can see that the rates for custom duties are higher for agricultural sectors. However, the regressivity of VAT and import duties do not change the progressivity of the whole indirect tax system, although the progressivity is lower than that of standard tax incidence analysis. Concentration curves and the statistical tests also confirm the results that we have achieved with the TR-progressivity rates (Table 16).

**Table 15. Tax-Progressivity of Indirect Taxes (with effective rates)**

Deciles	Domestic VAT	Domestic Taxes	Import VAT	Import Duty	Total Indirect Taxes
<b>1</b>	-0.002	0.006	0.004	-0.007	0.001
<i>std</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>2</b>	-0.004	0.012	0.009	-0.016	0.002
<i>std</i>	<i>0.000</i>	<i>0.001</i>	<i>0.000</i>	<i>0.001</i>	<i>0.000</i>
<b>3</b>	-0.007	0.020	0.014	-0.026	0.004
<i>std</i>	<i>0.001</i>	<i>0.002</i>	<i>0.000</i>	<i>0.001</i>	<i>0.001</i>
<b>4</b>	-0.008	0.029	0.019	-0.036	0.006
<i>std</i>	<i>0.001</i>	<i>0.003</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>
<b>5</b>	-0.011	0.036	0.023	-0.047	0.006
<i>std</i>	<i>0.001</i>	<i>0.004</i>	<i>0.001</i>	<i>0.002</i>	<i>0.001</i>
<b>6</b>	-0.013	0.045	0.026	-0.057	0.008
<i>std</i>	<i>0.001</i>	<i>0.006</i>	<i>0.001</i>	<i>0.002</i>	<i>0.002</i>
<b>7</b>	-0.016	0.054	0.026	-0.068	0.007
<i>std</i>	<i>0.002</i>	<i>0.007</i>	<i>0.001</i>	<i>0.002</i>	<i>0.002</i>
<b>8</b>	-0.017	0.065	0.026	-0.078	0.008
<i>std</i>	<i>0.002</i>	<i>0.009</i>	<i>0.002</i>	<i>0.003</i>	<i>0.003</i>
<b>9</b>	-0.015	0.075	0.022	-0.081	0.009
<i>std</i>	<i>0.002</i>	<i>0.012</i>	<i>0.002</i>	<i>0.004</i>	<i>0.003</i>
<b>10</b>	0.000	0.000	0.000	0.000	0.000
<i>std</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>

**Table 16. Dominance Results for Indirect Taxes**

**Relative to the Lorenz Curve**

	Per Adult Equivalent Tax Burdens						
	Indirect Taxes		VAT		PCT		PCOT
	Variant 1	Informal	Variant 1	Informal	Variant 1	Informal	Variant 1
<b>Decision rule 1</b>	+	+	+	+	+	+	+
<b>Decision Rule 2</b>	+	+	+	+	+	+	+

**Notes:**

'+' indicates that the tax is progressive and the concentration tax of the tax is below the Lorenz curve

'nd' indicates that the difference between the curves are zero statistically for some ordinates

'x' indicates that the concentration curve crosses to the Lorenz curve, so no dominance

#### **4. b. 3) Total tax system**

In this section we assess the direct and indirect tax incidence together. Tax-Progressivity tables (Table 17-18) below suggest that the whole tax system is progressive, although its progressivity either increases or decreases with different assumptions and methods. When we apply effective tax rates estimated from I-O tables, the tax system becomes less progressive which arises from the regressive domestic VAT and import duties. As aforementioned, I-O tables include actual taxes paid by each sector suggesting that I-O method includes the impact of tax evasion naturally. It is worth recalling that in the standard tax incidence analysis we have assumed that households living in rural areas do not pay any indirect tax on food products. This assumption is reasonable in the sense that in rural areas local and small markets are more common than supermarkets in which tax evasion can be said to be zero. This assumption makes VAT and total indirect taxes with statutory rates more progressive. However, the analysis with effective tax rate showed that domestic VAT is regressive. Therefore, we think the assumption on food products is not reasonable and rural households are not able to avoid paying indirect taxes on food goods. The argument that they don't pay taxes is based on the observation that they purchase locally produced food locally (from farmers or small traders), or consume own-produced food. However, if they purchase food from traders who have purchased from wholesalers (or regional markets), then VAT paid by the wholesalers may be incorporated in the price. This could explain why the results suggest that they appear to pay food taxes with effective tax rates. However, the results from effective tax rates suggest that the progressivity of indirect taxes under statutory tax incidence may be lower than we estimated.

**Table 17. Tax Progressivity of Total Taxes  
(with Standard Indirect Tax Incidence)**

Deciles	Total Taxes		Total Taxes (Informal)	
	Variant 1	Variant 2	Variant 1	Variant 2
<b>1</b>	0.010	0.010	0.012	0.011
<i>std</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>2</b>	0.021	0.021	0.024	0.021
<i>Std</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>
<b>3</b>	0.035	0.032	0.038	0.031
<i>std</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>
<b>4</b>	0.049	0.044	0.052	0.041
<i>std</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>
<b>5</b>	0.062	0.055	0.063	0.049
<i>std</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>
<b>6</b>	0.073	0.061	0.074	0.055
<i>std</i>	<i>0.003</i>	<i>0.003</i>	<i>0.003</i>	<i>0.003</i>
<b>7</b>	0.081	0.068	0.079	0.059
<i>std</i>	<i>0.004</i>	<i>0.004</i>	<i>0.004</i>	<i>0.004</i>
<b>8</b>	0.090	0.076	0.084	0.063
<i>std</i>	<i>0.005</i>	<i>0.005</i>	<i>0.005</i>	<i>0.005</i>
<b>9</b>	0.077	0.064	0.064	0.045
<i>std</i>	<i>0.006</i>	<i>0.006</i>	<i>0.006</i>	<i>0.006</i>
<b>10</b>	0.003	0.002	0.003	0.001
<i>std</i>	<i>0.005</i>	<i>0.006</i>	<i>0.004</i>	<i>0.004</i>

**Table 18. Tax Progressivity of Total Taxes  
(with I-O Method Indirect Tax Incidence)**

Deciles	Total Taxes	
	Variant 1	Variant 2
<b>1</b>	0.009	0.009
<i>std</i>	<i>0.000</i>	<i>0.000</i>
<b>2</b>	0.018	0.018
<i>std</i>	<i>0.001</i>	<i>0.001</i>
<b>3</b>	0.029	0.028
<i>std</i>	<i>0.001</i>	<i>0.001</i>
<b>4</b>	0.042	0.037
<i>std</i>	<i>0.002</i>	<i>0.002</i>
<b>5</b>	0.052	0.046
<i>std</i>	<i>0.002</i>	<i>0.002</i>
<b>6</b>	0.062	0.051
<i>std</i>	<i>0.003</i>	<i>0.003</i>
<b>7</b>	0.067	0.055
<i>std</i>	<i>0.004</i>	<i>0.004</i>
<b>8</b>	0.074	0.061
<i>std</i>	<i>0.005</i>	<i>0.005</i>
<b>9</b>	0.059	0.047
<i>std</i>	<i>0.006</i>	<i>0.006</i>
<b>10</b>	0.001	0.000
<i>std</i>	<i>0.006</i>	<i>0.007</i>

**Table 19. Dominance Results for Overall Tax System  
Relative to the Lorenz Curve**

	Overall Taxes					
	Variant 1			Variant 2		
	Variant 1	Informal 1	Informal 2	Variant 2	Informal 1	Informal 2
<b>Decision rule 1</b>	+	+	+	+	+	+
<b>Decision Rule 2</b>	+	+	+	+	+	+

## 5. CONCLUSION

In this paper, the main target was to examine the redistributive impact of government revenue and expenditure policies in Turkey. In order to do this, the tax incidence and benefit incidence analyses have been applied.

Although public expenditures on social services, namely education, health, infrastructure and cash transfers, are progressive, apart from the public spending on the primary education, none of them are really pro-poor. Middle-classes seem to have more chances to utilise public services effectively. Even if we do not report here, regional analysis for also suggest that the poorer regions do not achieve adequately public services to meet their needs.

As for the tax incidence, the standard tax incidence analysis has been applied for direct taxes with which tax burdens of households/individuals are calculated with the actual statutory tax rates. As for indirect taxes, in addition to the estimations of tax burdens with actual tax rates, effective tax rates have been estimated by using input-output tables. Using input-output tables have allowed the analysis to take into account the taxes on intermediary, imported goods and tax evasion.

According to the results, the whole tax system is progressive. We have tried to overcome the deficiencies in the tax incidence analysis due to the data restrictions by offering the sensitivity tests to different incidence, informal employment and tax evasion assumptions and by using effective tax rates for indirect incidence.

The personal income tax, property taxes and the payroll tax are progressive in Turkey. Under the assumptions on informal economy, the progressivity of the personal income and payroll tax rise, since informal employment are concentrated on the poorest part of Turkey. Payroll tax is the least progressive direct tax.

For indirect taxation, the results from actual indirect tax rates and effective tax rates are similar. The whole indirect taxation is progressive under both methodologies. However, Domestic VAT is regressive with the effective tax rates in contrast with the statutory rates. Even if the regressivity of VAT decrease the progressivity of the indirect taxes, it does not change the direction of the redistribution. The most progressive tax is PCT under both methodologies, which indicates that indirect taxes on luxury consumption goods help decrease the inequality in the society.

**APPENDIX**

**Concentration Curves for Social Benefits**

**Figure 1. Concentration Curves for Education Benefits**

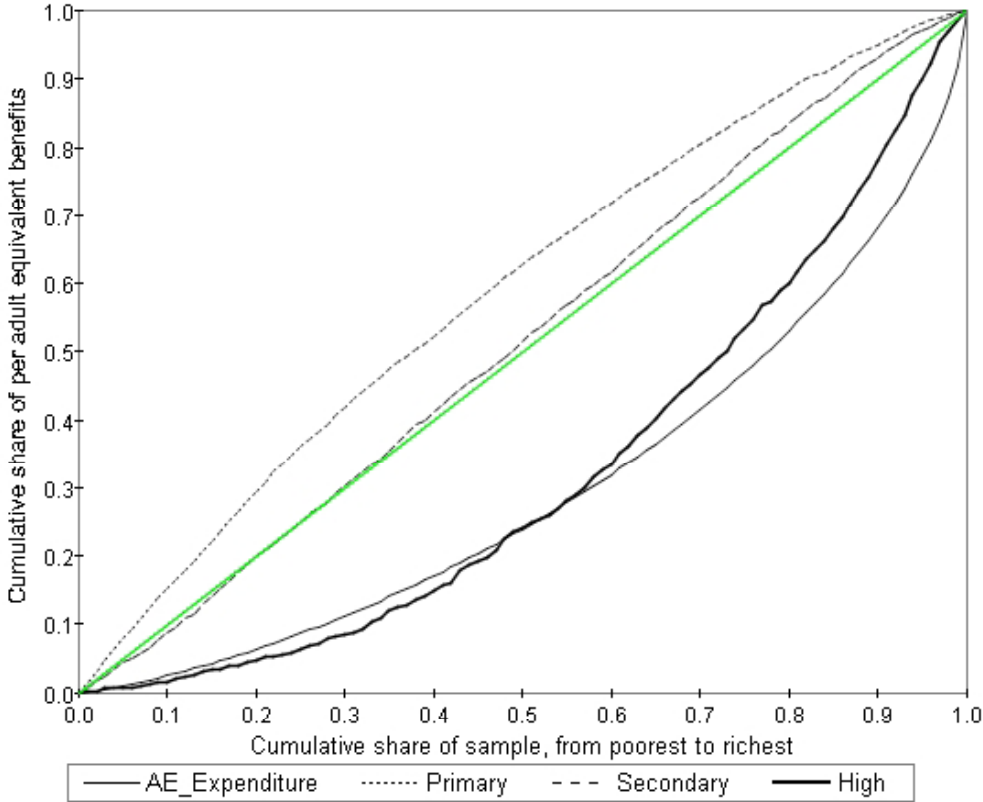




Figure 2: Concentration Curves for Benefits

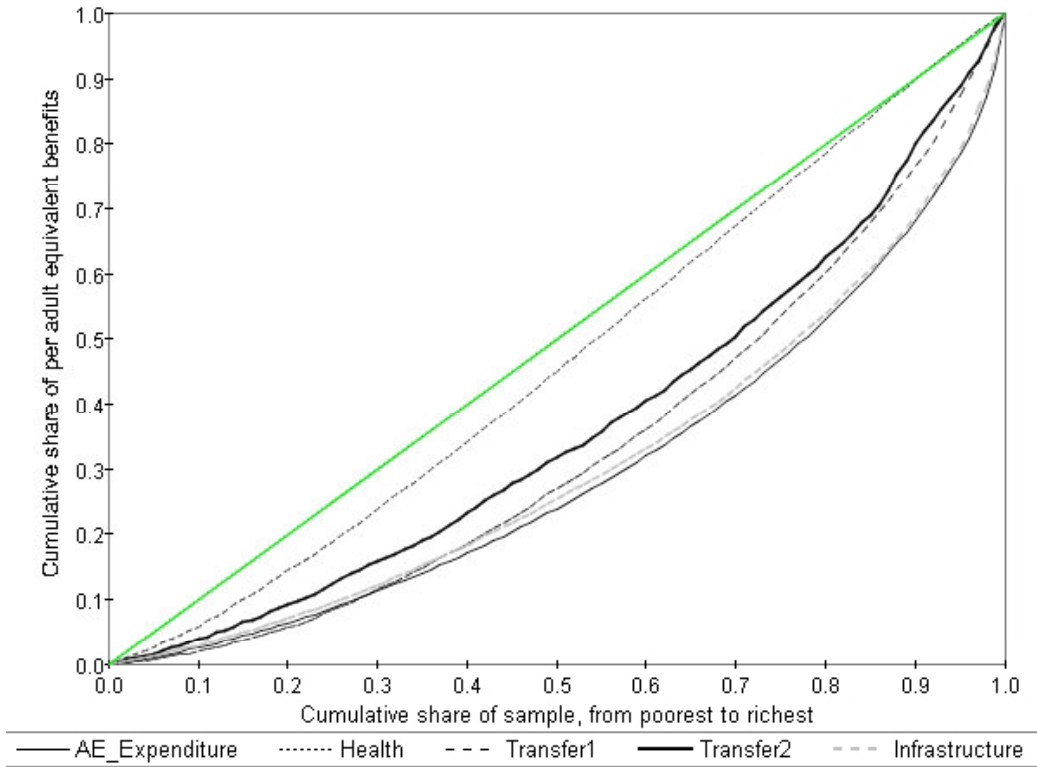
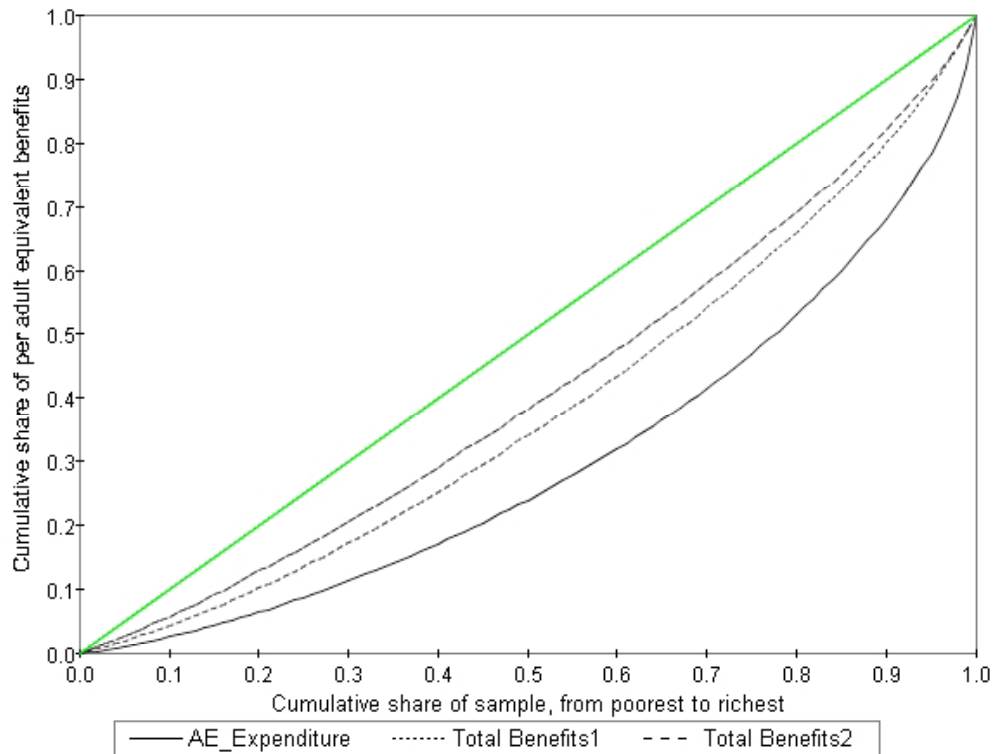
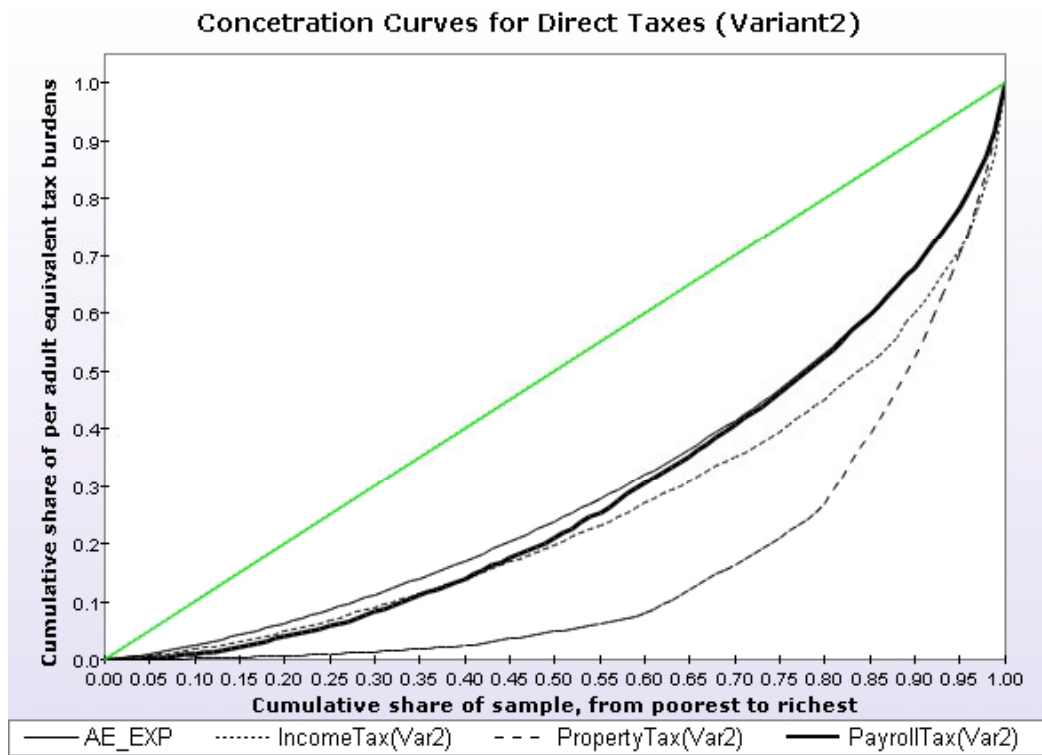
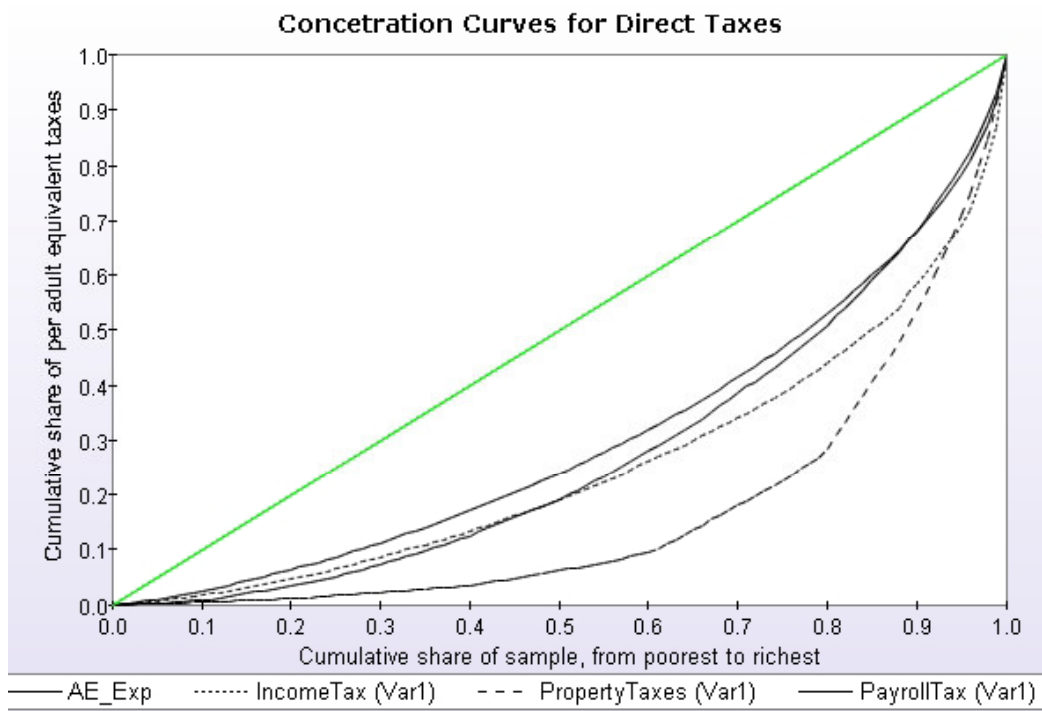


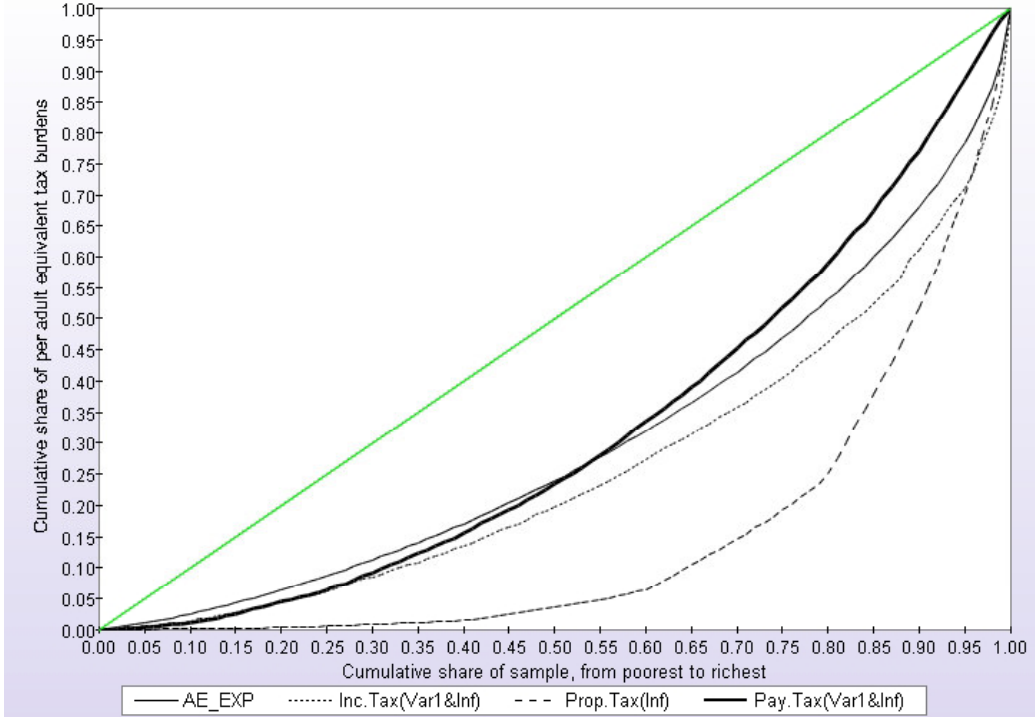
Figure 3: Concentration Curves for Total Benefits



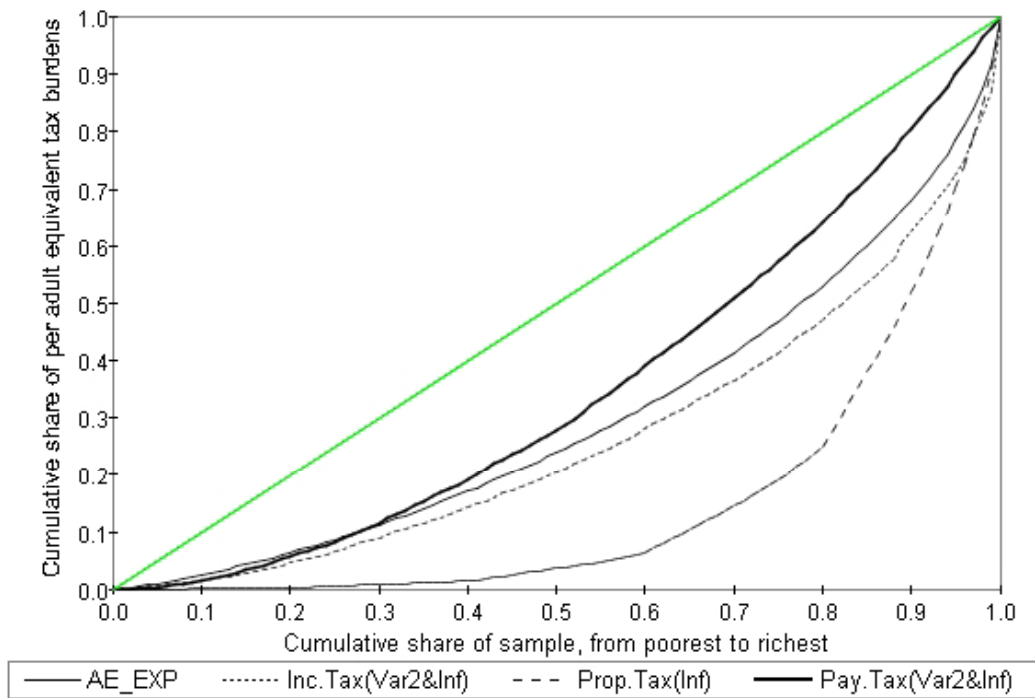
## Concentration Curves for Direct Taxes



**Concentration Curves for Direct Taxes Under Informal Economy and Tax Evasion Assumptions**

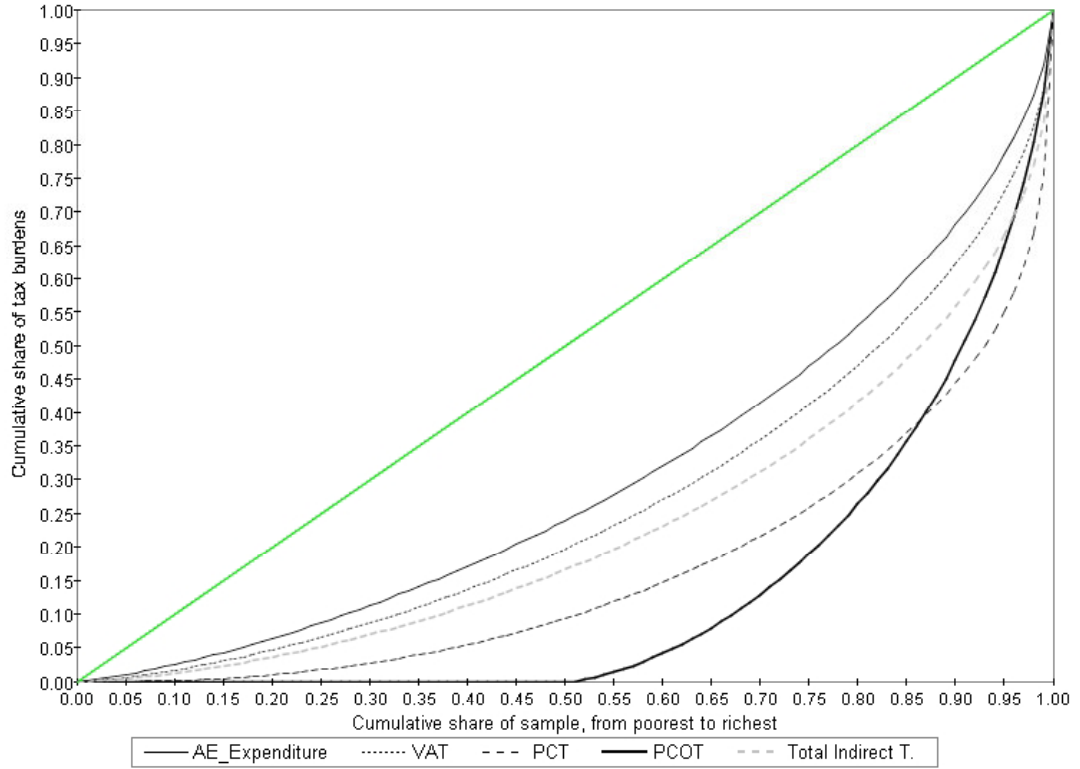


**Concentration Curves for Direct Taxes (Variant2&Informal)**

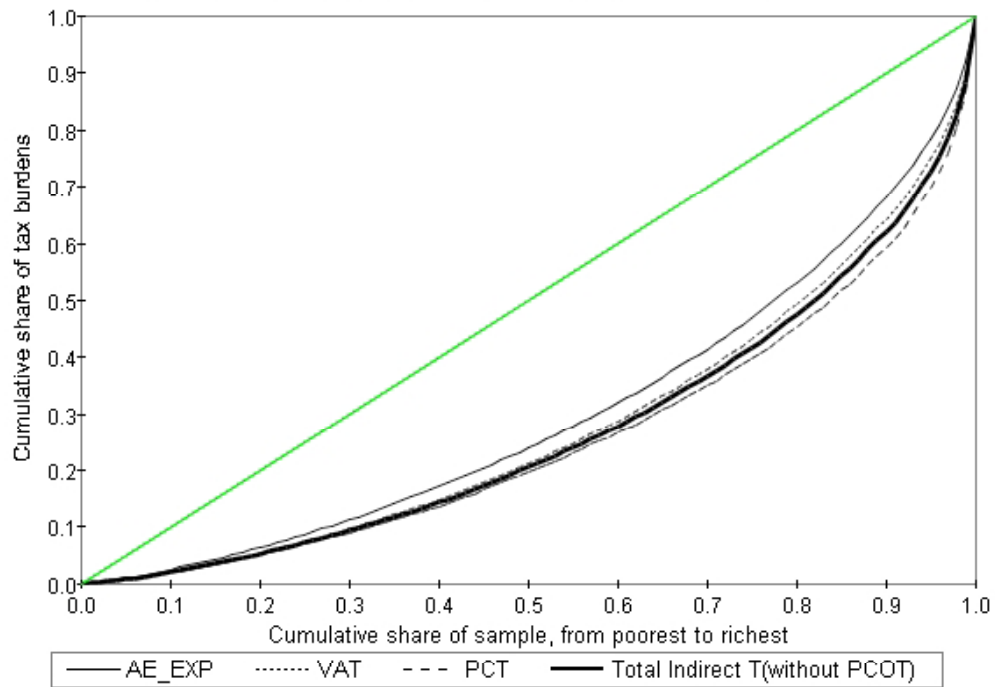


**Concentration Curves for Indirect Taxes**

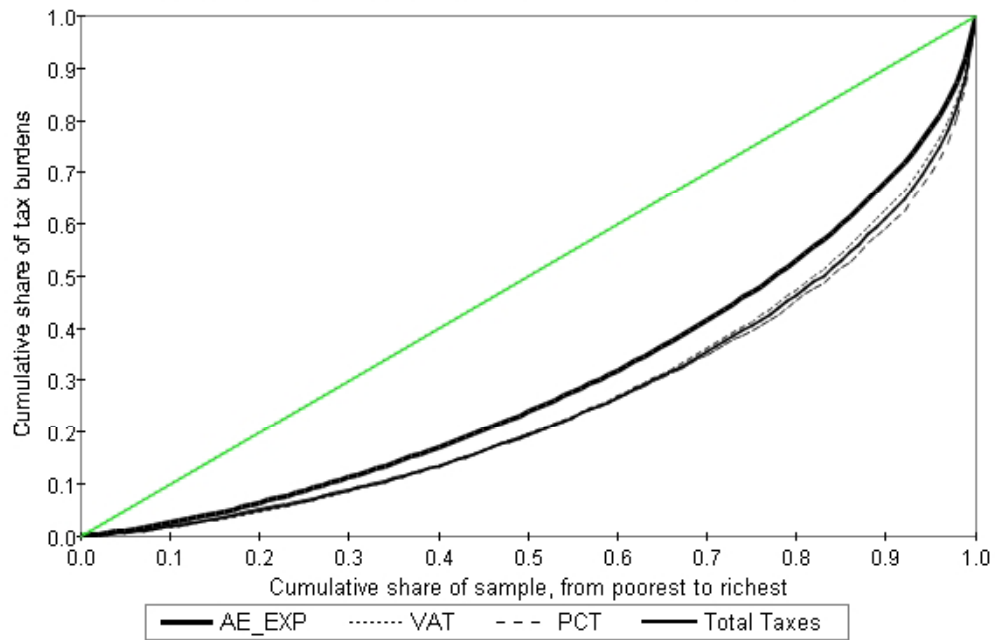
Lorenz Curves for Indirect Taxes with statutory rates



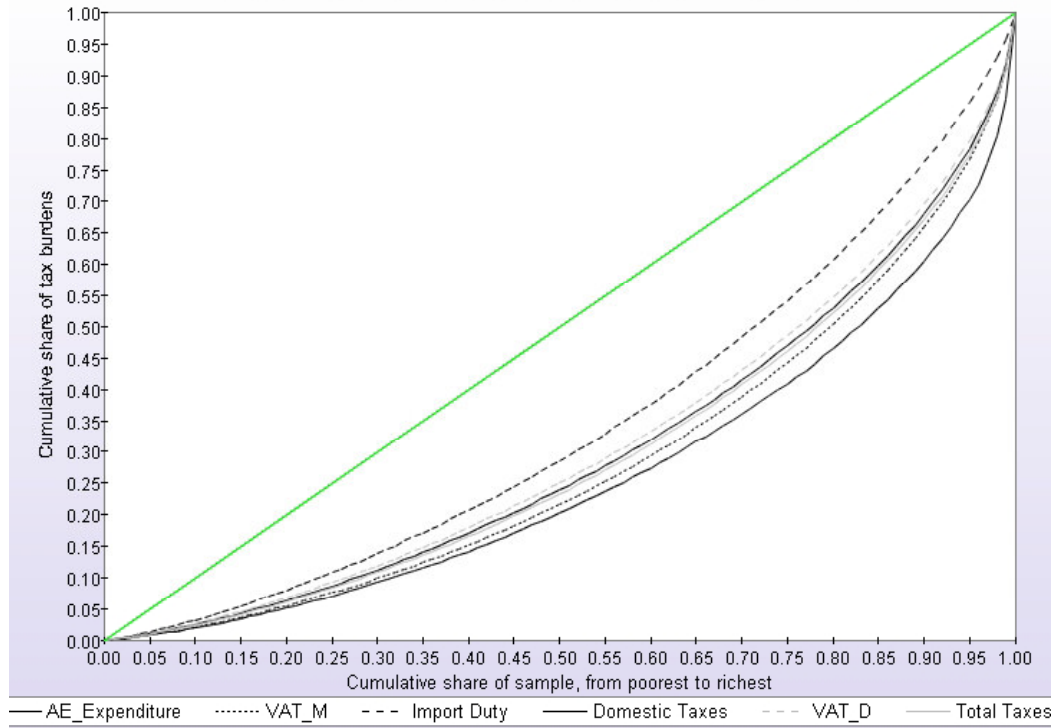
Concentration Curves for Indirect Taxes (without PCOT)



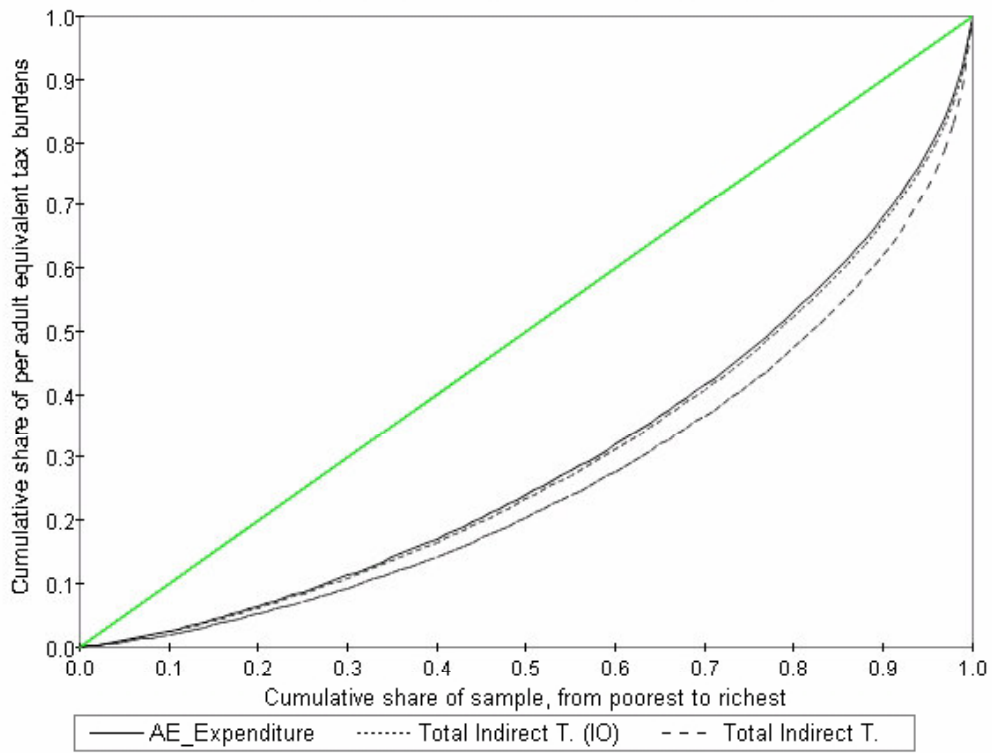
**Concentration Curves for Indirect Taxes under evasion assumption**



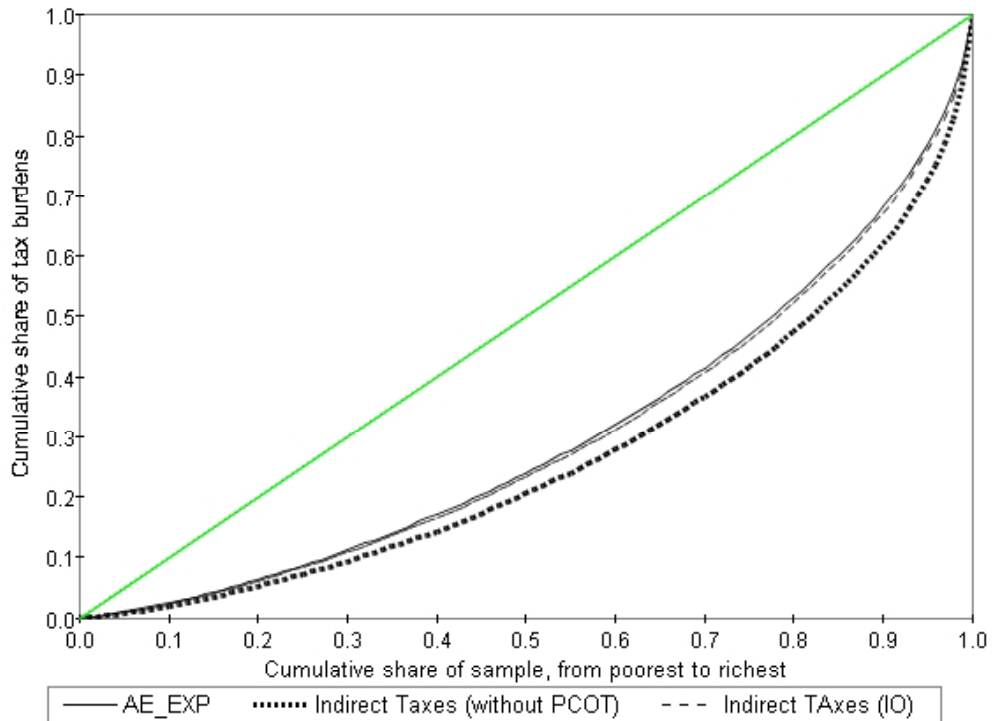
**Concentration Curves for Indirect Taxes with effective rates**

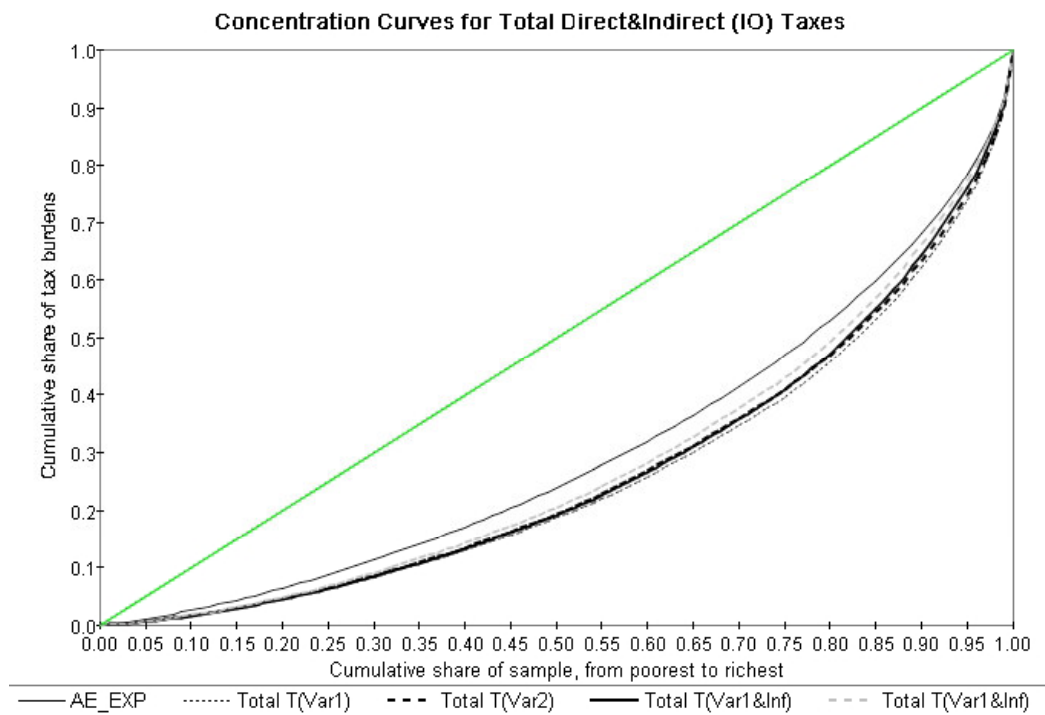
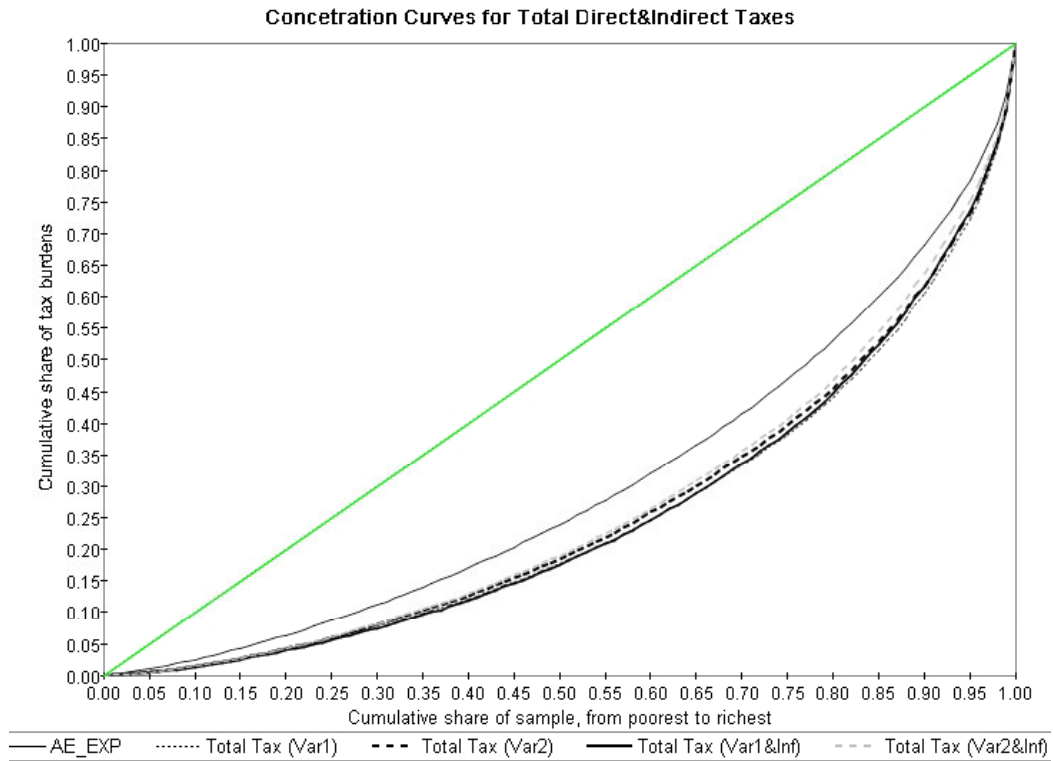


**Concentration Curves for Total Indirect Taxes**



**Concentration Curves for Indirect Taxes: Comparison of Standard and IO Method**





<b>Table A1. Incidence Assumptions</b>		
	Variant 1	Variant 2
<b>PERSONAL INCOME TAX</b>		
<b>on Wages</b>	The owner of the factor	The owner of the factor
<b>on Capital Incomes</b>	The owner of the factor	The owner of the factor
<b>on Interest Incomes</b>	The owner of the factor	The owner of the factor
<b>on Rental Incomes</b>		
<b>on Residences</b>	The owner of the property	50% tenants/50% the owner of the property
<b>on Land</b>	The owner of the property	The owner of the property
<b>on Commercial Buildings</b>	The owner of the property	Tenants
<b>On Agricultural Incomes</b>	The owner of the factor (2.5% stoppage)	The owner of the factor (2.5% stoppage)
<b>PROPERTY TAX</b>		
<b>on Residences</b>	The owner of the property	
<b>on Land</b>	The owner of the property	Agricultural land is not taxed
<b>on Commercial Buildings</b>	The owner of the property	The owner of the property
<b>Motor Vehicles Tax</b>	The owner of the property	The owner of the property
<b>PAYROLL TAX</b>	Both employer and employee	Employer in private sector
<b>INDIRECT TAXES</b>	Consumers	Consumers



<b>Table A2. Tax Evasion Assumptions</b>	
	<b>Assumptions</b>
<b>on Wages</b>	
<b>ES members</b>	The proportional share of tax bill in salary decreases when salary increases
<b>SSK members</b>	
<b>Public sector (SSK)</b>	no evasion
<b>Private sector (SSK)</b>	tax base is equal to the minimum gross wage level for payroll tax if individuals' wage is higher than this amount
<b>on Capital Incomes</b>	50% of gross income is declared
<b>on Interest Incomes</b>	5% stoppage
<b>on Rental Incomes</b>	
<b>on Residences</b>	households having only one house do not declare rental income
<b>on Land</b>	Agricultural land is not taxed
<b>on Commercial Buildings</b>	No tax
<b>On Agricultural Incomes</b>	No evasion
<b>PROPERT TAX</b>	
<b>On Residences</b>	If there is more than one property, 50% of the value of the property is declared
<b>On Land</b>	Agricultural land is not taxed
<b>On Commercial Buildings</b>	If there is more than one property, 50% of the value of the property is declared
<b>Motor Vehicles Tax</b>	no evasion
<b>PAYROLL TAX</b>	
<b>ES members</b>	tax base adjusted according to the assumption on income tax
<b>SSK members</b>	
<b>Public sector (SSK)</b>	no evasion
<b>Private sector(SSK)</b>	tax base adjusted according to the assumption on income tax
<b>Indirect Taxes</b>	Rural households do not pay indirect taxes on food goods

**Table A3. Total number of students by quintile**

<b>Expenditure Quintiles</b>	<b>Primary</b>	<b>Secondary</b>	<b>Primary and Secondary</b>	<b>Higher Education</b>
<b>1</b>	38.80	22.99	35.27	6.53
<b>2</b>	23.04	22.22	22.86	12.53
<b>3</b>	17.47	21.85	18.45	19.71
<b>4</b>	12.64	19.70	14.22	24.97
<b>5</b>	8.04	13.24	9.21	36.27

**Table A4. Informal Employment by Deciles**

Expenditure Deciles	Informal Employment (%)
1	19.40
2	15.70
3	13.12
4	11.07
5	9.57
6	8.44
7	7.33
8	6.19
9	5.05
10	4.12
Turkey	100

**Table A5. Income Tax Schedule 1**

If taxable income is over	But not over	Tax Liability	Tax Rate
0	5000*	20%	20%
5,000	12,000	1,000 plus 25% of the amount over 5,000	25%
12,000	24,000	2,750 plus 30% of the amount over 12,000	30%
24,000	60,000	6,350 plus 35% of the amount over 24,000	35%
60,000	120,000	18,950 plus 40% of the amount over 60,000	40%
120,000	No limit	42,950 plus 45% of the amount over 120,000	45%

**Income Tax Schedule 2 for Earned Income**

If taxable income is over	But not over	Tax Liability	Tax Rate
0	5,000	15%	15%
5,000	12,000	750 plus 20% of the amount over 5,000	20%
12,000	24,000	2,150 plus 25% of the amount over 12,000	25%
24,000	60,000	5,150 plus 30% of the amount over 24,000	30%
60,000	120,000	15,950 plus 35% of the amount over 60,000	35%
120,000	No limit	36,950 plus 40% of the amount over 120,000	40%

\*Million TL

**Table A6. Calculation for Income Tax Ranges**

	A	B	C	D	
	Maximum gross income	Tax bill up to the next range	Tax bill over the previous range	Maximum net income	
1. range	5000	750		4250	D=A-B-C
2. range	12000	750	1400	9850	D=A-B-C
3. range	24000	2150	3000	18850	D=A-B-C
4. range	60000	5150	10800	44050	D=A-B-C
5. range	120000	15950	21000	83050	D=A-B-C
6. range	no limit	36950			

### Nominal Tax Rate Calculation from I-O Tables

$$VAT_D = \frac{TPC_{VAT\_D}}{TGVA}$$

$$VAT_M = \frac{TPC_{VAT\_M}}{TPC_{M2}}$$

$$D = \frac{TPC_{TD}}{TPC_{M1}}$$

$$S = \frac{TPC_{TS}}{TPC_D}$$

TPC presents total private consumption of tax and other I-O tables.  $TPC_{VAT}$  is the total private consumption of VAT matrix for domestic (D) and imported (M) goods;  $TPC_{TD}$  that of import tax matrix;  $TPC_{TS}$  is that of domestic tax matrix. Moreover, subscripts M and D illustrate import and domestic IO tables. TGVA is total gross value added for each sector from Turkey I-O Table.

Table A7. Nominal and Effective Tax Rates, 1998 Turkey IO Table								
	Effective	Nominal	Effective	Nominal	Effective	Nominal	Effective	Nominal
Industries	VAT_D	VAT_D	S	S	VAT_M	VAT_M	D	D
Cereals and other crops n.e.c.	0.046	0.036	0.024	0.000	0.086	0.081	0.048	0.046
Vegetables, horticultural specialties and nursery products	0.101	0.094	0.007	0.000	0.082	0.080	0.028	0.028
Fruit, nuts, beverage and spice crops	0.059	0.055	0.004	0.000	0.082	0.081	0.108	0.107
Animals&agricultural&animal husbandry service activities (excl. veterinary act.)	0.086	0.064	0.001	0.000	0.044	0.042	0.046	0.045
Forestry, logging and related service activities	0.025	0.022	0.004	0.000	0.082	0.082	0.000	0.000
Mining of coal and lignite	0.032	0.023	0.034	0.002	0.081	0.079	0.027	0.026
Crude petroleum and natural gas	0.006	0.000	0.006	0.000	0.001	0.000	0.000	0.000
Mining of metal ores	0.012	0.000	0.026	0.000	0.003	0.000	0.000	0.000
Quarrying of stone, sand and clay	0.008	0.000	0.036	0.000	0.004	0.000	0.001	0.000
Mining and quarrying n.e.c.	0.008	0.000	0.013	0.000	0.001	0.000	0.000	0.000
Processed meat and meat products	0.146	0.106	0.003	0.000	0.101	0.097	0.004	0.003
Fishing&Processed fish	0.094	0.082	0.019	0.000	0.091	0.090	0.148	0.147
Processed fruit and vegetables	0.141	0.108	0.005	0.000	0.097	0.094	0.033	0.032
Vegetable and animal oils and fats	0.319	0.243	0.003	0.000	0.105	0.094	0.084	0.078
Dairy products	0.234	0.202	0.002	0.000	0.086	0.083	0.149	0.148
Grain mill products, starches& starch products	0.037	0.016	0.008	0.000	0.028	0.022	0.056	0.054
Prepared animal feeds	0.113	0.067	0.003	0.000	0.109	0.101	0.017	0.013
Bakery products	0.097	0.071	0.016	0.000	0.027	0.023	0.002	0.000
Sugar	0.334	0.308	0.006	0.000	0.106	0.100	0.044	0.041
Cocoa, chocolate, sugar confertionery and other food n.e.c.	0.189	0.139	0.005	0.000	0.106	0.102	0.014	0.013
Alcoholic beverages	0.162	0.137	0.478	0.442	0.141	0.138	0.005	0.004
Soft drinks&mineral waters	0.245	0.163	0.217	0.213	0.099	0.095	0.001	0.000
Tobacco products	0.412	0.366	0.217	0.202	0.141	0.130	0.036	0.033
Other textiles	0.058	0.034	0.007	0.000	0.134	0.107	0.023	0.020
Textiles	0.098	0.072	0.008	0.000	0.252	0.228	0.017	0.015
Leather; manufac.of luggage, handbags& saddlery	0.053	0.025	0.005	0.000	0.109	0.087	0.021	0.019
Footwear	0.403	0.367	0.015	0.000	0.360	0.342	0.021	0.019
Publishing and Printing	0.068	0.043	0.005	0.000	0.058	0.042	0.013	0.011
Sawmilling and planing of wood	0.014	0.000	0.003	0.000	0.006	0.000	0.001	0.000
Coke, refined petroleum products	0.043	0.041	0.403	0.397	0.163	0.157	0.040	0.040
Basic chemicals, plastics in primary forms and os synthetics rubber	0.041	0.027	0.020	0.000	0.144	0.111	0.025	0.019
Fertilizers and nitrogen compounds	0.009	0.000	0.007	0.000	0.013	0.000	0.002	0.000
Pesticides, other agro-chemicals and paints, varnishes	0.078	0.060	0.031	0.000	0.143	0.115	0.007	0.003
Pharmaceuticals, medicinal chemicals and botanical products	0.222	0.185	0.003	0.000	0.145	0.128	0.001	0.000
Cleaning materials, cosmetics&other chemicals&man-made fibres	0.137	0.109	0.014	0.000	0.137	0.115	0.019	0.015
Household Textiles	0.125	0.104	0.008	0.000	0.142	0.120	0.022	0.019
Glass&glass products and ceramic products	0.068	0.054	0.012	0.000	0.129	0.122	0.016	0.014
Manufacture of cement, lime and plaster related articles these items	0.009	0.000	0.018	0.000	0.002	0.000	0.000	0.000
Finishing of stone and man. of other non-metallic mineral products n.e.c.	0.030	0.016	0.012	0.000	0.128	0.122	0.005	0.004
Basic iron and steel	0.006	0.000	0.007	0.000	0.009	0.000	0.001	0.000
Basic precious and non-ferrous metals	0.007	0.000	0.010	0.000	0.003	0.000	0.000	0.000

	Effective	Nominal	Effective	Nominal	Effective	Nominal	Effective	Nominal
Industries	VAT_D	VAT_D	S	S	VAT_M	VAT_M	D	D
Casting of metals	0.008	0.000	0.010	0.000	0.002	0.000	0.000	0.000
Fabricated metal products, tanks, reservoirs and steam generators	0.011	0.003	0.006	0.000	0.006	0.000	0.000	0.000
Other fabricated metal products; metal working service activities	0.102	0.088	0.006	0.000	0.133	0.126	0.018	0.017
General purpose machinery	0.042	0.029	0.006	0.000	0.133	0.122	0.010	0.009
Special purpose machinery	0.038	0.024	0.006	0.000	0.051	0.042	0.014	0.013
Domestic appliances n.e.c.	0.217	0.200	0.004	0.000	0.138	0.131	0.008	0.007
Office, accounting and computing machinery	0.081	0.067	0.003	0.000	0.136	0.120	0.004	0.003
Electrical machinery and apparatus n.e.c.	0.118	0.100	0.006	0.000	0.139	0.126	0.009	0.008
Radio, television and communication equipment and apparatus	0.087	0.072	0.004	0.000	0.160	0.131	0.021	0.018
Medical, precision and optical instruments, watches and clocks	0.040	0.028	0.006	0.000	0.135	0.113	0.011	0.009
Motor vehicles, trailers&semi-trailers	0.175	0.150	0.312	0.292	0.164	0.147	0.004	0.003
Transport equipment n.e.c.	0.242	0.217	0.006	0.000	0.142	0.131	0.012	0.011
Furniture	0.265	0.236	0.003	0.000	0.128	0.117	0.003	0.002
Paper and paper products and nec	0.175	0.155	0.006	0.000	0.152	0.144	0.020	0.018
Manufacturing n.e.c.	0.213	0.199	0.003	0.000	0.147	0.146	0.020	0.020
Production, collection and distribution of electricity	0.041	0.035	0.012	0.000	0.106	0.100	0.000	0.000
Gas; distribution of gaseous fuels through mains	0.076	0.074	0.002	0.000	0.080	0.080	0.000	0.000
Collection, purification and distribution of water	0.024	0.019	0.003	0.000	0.002	0.000	0.000	0.000
Sale, maintenance and repair of motor vehicles, motorcycles; retail sale of fuel	0.013	0.007	0.010	0.000	0.019	0.018	0.000	0.000
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.014	0.010	0.009	0.000	0.006	0.000	0.000	0.000
Retail trade and repair of personal & household goods, exc. motor vehicles and motorcycles	0.007	0.003	0.009	0.000	0.005	0.004	0.000	0.000
Hotels; camping sites and other provision of short-stay accommodatin	0.073	0.042	0.021	0.000	0.138	0.135	0.000	0.000
Restaurants, bars and canteens	0.118	0.084	0.022	0.000	0.111	0.107	0.001	0.000
Transport via railways	0.154	0.134	0.052	0.000	0.089	0.079	0.001	0.000
Land transport; transport via pipelines	0.036	0.024	0.059	0.003	0.042	0.035	0.001	0.000
Water transport	0.053	0.038	0.038	0.000	0.755	0.686	0.001	0.000
Air transport	0.024	0.013	0.034	0.000	0.031	0.022	0.001	0.000
Supporting and auxiliary transport activities; activities of travel agencies	0.076	0.042	0.009	0.000	0.068	0.066	0.000	0.000
Post and telecommunications	0.023	0.020	0.002	0.000	0.077	0.076	0.000	0.000
Financial intermediation, except insurance and pension funding	0.010	0.000	0.104	0.092	0.004	0.001	0.000	0.000
Insurance and pension funding, except compulsory social security	0.013	0.000	0.079	0.067	0.003	0.000	0.000	0.000
Renting of machinery and equip. without operator&of personal&household goods	0.021	0.006	0.014	0.000	0.088	0.082	0.000	0.000
Computer and related activities	0.025	0.007	0.012	0.000	0.053	0.043	0.000	0.000
Research and development	0.038	0.020	0.009	0.000	0.011	0.000	0.001	0.000
Other business activities	0.066	0.051	0.013	0.006	0.091	0.088	0.020	0.019

	Effective	Nominal	Effective	Nominal	Effective	Nominal	Effective	Nominal
Industries	VAT_D	VAT_D	S	S	VAT_M	VAT_M	D	D
Education	0.115	0.102	0.022	0.000	0.077	0.074	0.000	0.000
Health and social work	0.126	0.117	0.008	0.000	0.098	0.093	0.000	0.000
Recreational,cultural and sporting activities	0.065	0.053	0.015	0.000	0.122	0.105	0.001	0.000
Other service activities	0.131	0.117	0.018	0.000	0.092	0.090	0.000	0.000

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