Abstract

The Redistributive Effects of Fiscal Policies in Turkey, 2003

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This thesis investigates redistributive impacts of fiscal policies at household level in a middle income developing country, Turkey, in 2003.

It utilizes the benefit and tax incidence methodologies and applies the welfare dominance analysis and summary indices of progressivity to assess the distributional impacts of the fiscal policies. The 2003 Household Income and Consumption Expenditures Survey from the Turkish Statistical Institute is used for this purpose.

. Chapter 2 reviews the theoretical and empirical literature for measuring inequality and progressivity. The aim of the chapter is to review and discuss the measures used in the thesis. This is followed by the three empirical studies that form the core of the thesis.

Chapter 3 and 4 examine redistributive impacts of publicly provided education, health, infrastructure services and social cash and in kind transfers. The key findings show that apart from primary education, none of the social services in question are well targeted to the poor, although the incidence of the services is progressive.

In Chapter 5, attention is paid to direct and indirect tax policies in Turkey. Indirect taxes dominate tax revenues in Turkey. The results of the standard tax incidence analysis show that direct taxes are progressive thanks to personal income tax and property taxes. In the context of indirect taxes, redistributive power of indirect taxes is limited. The incidence of indirect taxes is sensitive to the welfare indicator chosen. While the indirect taxes reduce expenditure inequality, they increase income inequality. Effective indirect tax rates estimated by using input-output tables prove the importance of taxation on imported goods and intermediate goods, which are ignored by the standard tax incidence analysis. The incidence with effective indirect taxes is less progressive in the case of expenditure as the welfare indicator and more regressive in the case of income. The net fiscal incidence indicates that the fiscal policies have a positive redistributive impact on both expenditure and income inequality, and this positive impact is mainly driven by the public benefits.

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CHAPTER 1: INTRODUCTION

The economics literature recognizes three main functions of the public sector (Stiglitz, 2000: 20; Musgrave, 1959): allocation, stabilisation and redistribution. With the allocation function, the aim of the public sector is to allocate its economic resources efficiently to different sectors. It can be done by direct interventions to the economy such as production through public firms or indirect interventions through taxes and subsidies. The second function requires the public sector to apply macro economic policies to keep the economy stable at full employment. The final function is based on equity concerns of societies and requires redistributive policies to create more equitable distribution of welfare, depending the societies' preferences. In the last two decades there has been an important scientific debate in the public finance literature on the role of the public sector, mainly regarding concerns that public interventions may be distortionary and inefficient with the reference to first two functions of the public sector. Economic growth has been seen as the most important dynamic in fighting against income inequality and poverty from which most developing countries suffer. For the developing countries the main aim has been to enhance growth. To achieve this, the economic policies have focussed mostly on stabilisation, adjustment and market liberalisation.

In line with these policies, there has been a huge literature discussing if growth or redistributive policies should be chosen to fight against poverty and inequality. While Alesina and Rodrik (1994) argue that redistribution slows economic growth, Aghion and Bolton (1997) see redistribution as a growth enhancing factor. Although there is no common concensus on this issue, it has been shown that inequality has a negative impact on growth by decreasing investment in human capital, increasing populist public expenditures, corruption, and political instability (Barro, 2000; World Bank, 2001). On the other hand, empirical studies have shown that high growth rates don't necessarily cause any reduction in poverty and income distribution. In other words, there is not any systematic (negative or positive) relationship between growth and inequality and it depends on the initial conditions of countries (Fields, 1980:181-248; Fields, 2000)[1]. Furthermore, the inequality literature has shown the negative relationship between inequality and social welfare theoretically under a social welfare function with high inequality aversion (Atkinson, 1970; Sen, 1997; Shorrocks, 1983).

Despite all these discussions on the role of the public sector and on determining the best policy to increase the well-being of individuals and decrease inequality and poverty, public policies have inevitable effects on inequality of income distribution and need to be examined in this respect. Since in the last three decades there has been a rising trend in inequalities all over the world (Gottschalk and Smeeding, 1997; Mitra and Yemtsov, 2007; OECD, 2008), researchers' focus has been turned to investigate the sources of income inequality and the ways to reduce it. Reflecting these efforts, since the 1990s a huge body of empirical literature has been produced on the redistributive impacts of government revenue and expenditure policies, particularly in developing countries, to find out if government policies have been one of the sources contributing to rising inequalities (regressivity of the policies) as well as if government policies can be used as an effective instrument to mitigate inequalities and poverty (redistributive impacts, or progressivity in policies).

This thesis addresses the measurement of redistributive effects of fiscal policies in a middle income country, Turkey, where high inequality has been a persistent problem for a long time. The thesis does not attempt to investigate the causes of inequality[2], neither does it discuss the role of the public sector directly. The starting point of this work is that fiscal policies have important effects on inequality and poverty in direct and indirect ways and

[1] See Dollar and Kraay (2002), Bruno, Ravallion Square (1999) for the relationship between equality or poverty and growth.
[2] For the sources of high inequality in Turkey, see Kose and Karahanogullari (2005), Silber and Özmucur (2000) and Baslevent and Dayioglu, (2005).

regardless of the main aims for these policies these effects should be examined, given the concerns for inequality. It is an important task to measure and discuss these impacts of fiscal policies to find out the possible obstacles against fighting inequality and poverty. In this framework, the main contribution of the thesis is empirical and it will attempt to see how the existing fiscal policies of Turkey affect redistribution and inequality in 2003.

Turkish Case

Since 1994, the Turkish economy experienced two serious financial crises (1994 and 2000/2001) accompanied by enormous public imbalances and a drastic reduction of domestic income. In the aftermath of the last crises, Turkey implemented a structural adjustment program to overcome the economic problems caused by the crises under the supervision and technical support of the International Monetary Fund and the World Bank[3]. It is well known that fiscal discipline, namely attaining primary fiscal surpluses, has been a major component of these types of programs (Taylor, 2004). The negative effects of these fiscal policies have been twofold: on the expenditure side, the direct result is reduction of public welfare spending such as on education, health and infrastructure. On the income side, the change in the composition of tax structure (increases in the share of indirect taxes) has also created direct and indirect redistributive effects on different household groups via price and income changes. Empirical studies concerning the effects of structural adjustment programs on growth, inequality and poverty in developing countries have different conclusions and implications and the results vary according to countries' initial conditions (Crisp and Kelly, 1999; Sahn and Younger, 1999).

A direct effect of these two successive crises has been a drastic reduction in the real economy. As can be seen from Table 1.1, after both the 1994 and 2000/2001 crises, the Turkish economy shrank. The growth rates of 1994 and 2001 are -6.1% and –9.5 % respectively. However, after each crisis, the Turkish economy rapidly achieved very high

[3] For detailed information for Turkish experience with IMF, see., Yeldan (2002)

growth rates, of 8% in 1995 and 2002. Despite these high growth rates, the negative effects of the crises on already high inequality in income distribution are still felt and the unemployment rate has increased rather than declined, implying a persistent effect on income inequality (Table 1.1 and Table 1.2). The tables indicate some improvements in income inequality and poverty but the rates are still above international averages for a middle income country, which highlights a need for further attention to distributional issues.

Table 1.1: Some Basic Indicators of Turkish Economy over time

	1994	1995	2001	2002	2003	2004	2005
Gini Coefficient (income)	0.49		0.46	0.44	0.42	0.4	0.38
Growth Rate (at 1987 prices)	-7.8	6.1	-11.1	6.4	4.2	8.2	7.2
GDP per capita*	1768	1874	1842	1962	2049	2222	2362
Unemployment rate (Age over 15)	8.6	7.6	8.4	10.3	10.5	10.3	10.3
Unemployment rate (Age between 15-24)	16	15.5	16.2	19.2	20.5	19.7	19.3
Inflation (Consumer Price Index)**	125.5	78.9	68.5	29.7	18.5	9.3	10.5

**US Dollar, at 1987 real prices. **Base year is 1987 for 1994, 1994 for the other years*
Source: SPO and Turksat

Table 1.2: Individual Poverty Rates, 2002-2003-2006*

Methodologies	Individual Poverty Rate (%)								
	Turkey			Urban			Rural		
	2002	2003	2006	2002	2003	2006	2002	2003	2006
Food poverty (famine)	1.35	1.29	0.74	0.92	0.74	0.04	2.01	2.15	1.91
Poverty (food+non-food)	26.96	28.12	17.81	21.95	22.3	9.31	34.48	37.13	31.98
$1 per person per day poverty	0.2	0.01	0	0.03	0.01	0	0.46	0.01	0
$2.15per person per day poverty	3.04	2.39	1.41	2.37	1.54	0.24	4.06	3.71	3.36
$4.3 per person per day poverty	30.3	23.75	13.33	24.62	18.31	6.13	38.82	32.18	25.35

**Headcount Rate*
Source: Turksat

The objectives of government expenditure policies are twofold: 1) to increase efficiency in the allocation of resources by providing goods and services that private markets fail to provide, or fail to provide at an optimal level; 2) to improve equity in the distribution of income. The second objective is achieved through social transfers and provision of goods and services that may benefit the poor in particular. It is commonly believed that redistribution through tax policies is limited and this limitation is particularly significant in developing countries whose tax effort as a percentage of Gross National Product is especially small due to the limited tax base, arising from the size of the informal economy and tax evasion. Given this, the expenditure side of government budgets appears to be a potentially more effective tool to redistribute incomes for developing countries. The first studies in this area examined the distributional impact of the whole government budget. However, the recent empirical literature for developing countries focuses on public spending programs that have the explicit goal of improving distributional equity and confer personal benefit upon users, such as education, health, infrastructure services and social transfers. These services are important in terms of their positive impact on growth and development as well as their redistributive power and it has been shown that public expenditures on these services narrow inequalities significantly (OECD, 2008: Chapter 9).

Table 1.3 provides percentage shares of public services in the consolidated budget in Turkey over time. The share of public spending on social services is negatively affected by the financial crisis in 2001, it dropped to 22%, yet there has been a rising trend since then. The total expenditures on social services (education, health, infrastructure and social transfers) account for about 27% of the total consolidated budget in 2003, whereas interest payments and the expenditures on general public services (expenditures on general administration, law and order and defence) account for 73% of the consolidated budget. The share of debt interest payments increased in time and it is around 50% for the 2000s. As these expenditures go to higher income households who have savings to lend to the government by buying government bonds, they are expected to have a widening impact on the distribution of income. This thesis concentrates on the distributional impacts of social services, which are supposed to have positive redistributive impacts, to see if those expenditures help to reduce inequality and target the poor, thus the thesis examines just over a quarter of the consolidated budget.

Table 1.3: The Composition of the Consolidated Budget by services, Turkey, 1995-2003

	1995	1998	1999	2000	2001	2002	2003
General Public Services	37.5	32.0	32.9	31.7	26.7	27.2	26.7
Education (Primary and Secondary)	8.0	8.8	8.5	6.9	5.9	6.6	7.2
Higher Education	3.1	3.0	2.9	2.5	2.2	2.5	2.7
Health*	10.1	9.0	8.8	8.7	8.8	10.7	11.7
Infrastructure	7.0	5.7	5.7	5.5	5.4	5.5	5.2
Total Expenditure on Social Services**	28.2	26.6	25.9	23.7	22.2	25.3	26.7
Interest Payments	34.3	41.4	41.2	44.6	51.1	47.5	46.6
Consolidated Budget	100	100	100	100	100	100	100

*Notes: *Total health expenditures include social transfers to social security institutions too as pensions and other social cash transfers are paid by the social security organisations*

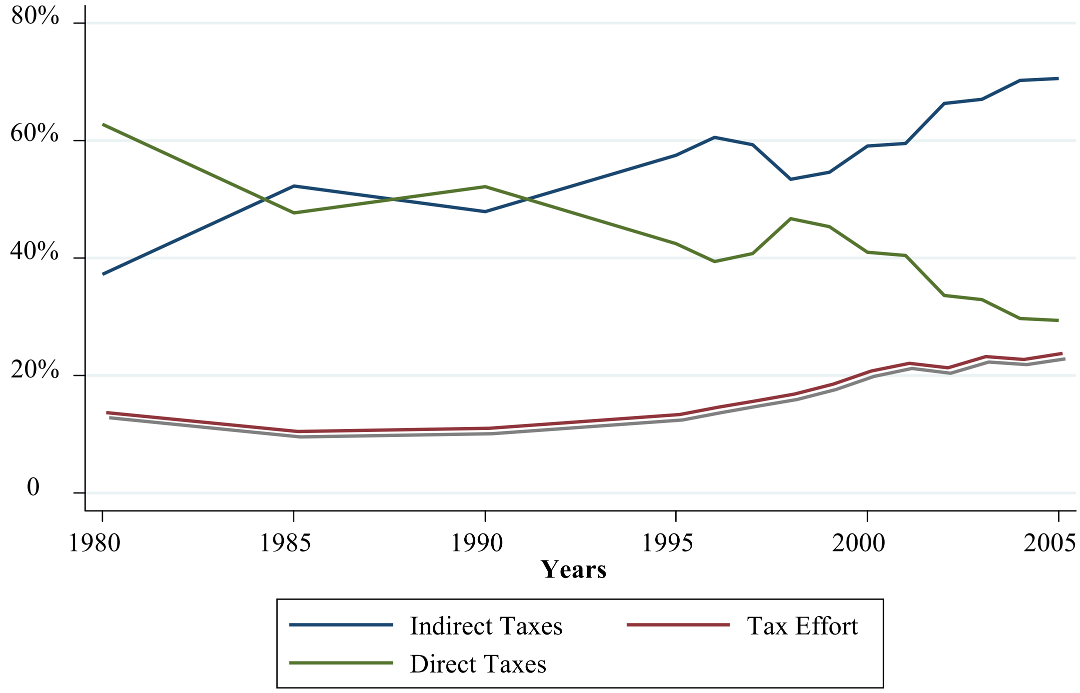
Health, Education, Infrastructure and Social Transfers

Source: SPO and Ministry of Public Finance

Despite the common belief that the role of taxes is limited as a redistributive instrument, government revenue policies are very important for both equity concerns and creating revenues for government expenditures in developing countries. Developing countries have changed their tax structure since the 1980s to increase their tax revenues. They have decreased the share of trade taxes in total tax revenues and generated more revenue from domestic indirect taxes. Value Added Tax (VAT) has been introduced by most developing countries and indirect taxes have become the most important revenue source. These structural changes in the revenue side of government budgets naturally have impacts on income distribution, given the general perception that indirect taxes generate generally disequalising impacts on income distribution (Gemmell and Morrissey, 2003). Given these developments, examining distributional impacts of changes in tax structures of governments has been an important empirical area. Tax incidence analysis has been performed for developing countries recently. These studies generally deal with the impacts of recent tax policy changes in developing countries and capture the effects of both direct and indirect taxes depending on data available.

The existing tax structure of the Turkish economy is representative of a typical developing country. As can be seen from Figure 1.1, since 1985, in which VAT was introduced, indirect taxes have increased as a share of total tax revenues and today are the most important source for tax revenues - 70% of total tax revenues in 2005. As lower income households have higher propensity to consume, indirect taxes are perceived to increase inequalities. In order to prevent such an impact, VAT is applied with differential rates (which is the case for Turkey).

Figure 1.1: The Trend of Direct and Indirect Taxes and Tax Effort in Turkey



Although Turkey has been suffering from high income inequality, to date there has been only one study investigating the redistributive effects of public policies in Turkey. Pinar (2004) examined both tax and expenditure policies of Turkey for 1994 and 2002. The author applied the fiscal incidence method by comparing quintiles' share of household incomes before and after tax and expenditure policies. However Pinar (2004) ignores the statistical robustness of the results, which may cause one to question the reliability of the results[4]. Pinar showed that public expenditures on education and health redistribute incomes

[4] In addition to this, the data sets Pinar used have some important drawbacks. The 1994 HICES do not have any question to identify students in households. Pinar used the question to identify students,

towards low income groups, however, the poor receive a smaller share of health services than of basic education services. Moreover, Pinar concluded that infrastructure services have a positive impact on income inequality. Pinar found that VAT has almost no impact on income inequality, but it has small negative impact on lower income groups, whereas personal income tax redistributes incomes towards lower income groups, but the poorest get the smallest share from redistribution.

The first contribution of the thesis is to investigate distributional impacts of fiscal policies for Turkey in 2003. Secondly, the thesis considers the statistical robustness of the results which was ignored by the only study for Turkey, Pinar (2004). Thirdly, both income and expenditure measures are used as welfare indicators to test the sensitivity of the results to the chosen welfare indicator, which was also ignored by Pinar (2004). Finally, in addition to the stantard tax incidence analysis for indirect taxes, we estimate effective tax rates by making use of input-output tables to include the impacts of taxation on imported and intermediate goods.

The basic data used is the Household Income and Consumption Expenditure Surveys (HICES), conducted by the Turkish Statistical Institute (Turksat) to measure households' living standards and utilization of public services. The HICES data were collected for 1994, 2002, 2003, 2004, and 2006. The sample of HICES was designed to be representative of the population of Turkey, and two of the surveys - 1994 and 2003 - are also regionally representative. Moreover, all of them provide reliable information needed for an urban-rural breakdown and they have information at both individual and household level. In the thesis, the HICES 2003 with 25,920 households is used. The reason for utilising only 2003 survey is that the 2003 HICES is the most recent, comprehensive and regionally representative household survey. As the surveys conducted after 2003 have smaller sample size (8,640 households), they are not regionally representative and they are not as comprehensive as the

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which seeks to find out the reasons of unemployed individuals for not seeking job and asked to the individuals over 10 year-old in households. This gives rise to drop individuals under the age of 10 from the analysis that makes impossible to investigate the incidence of primary education.

2003 HICES, particularly in terms of consumption data. Furthermore, we need regional disaggregation to take into account variations in the quality of the public services examined, which is captured by disaggregated public spending on publicly provided services.

The Outline of The Thesis

In this framework, the thesis aims to investigate tax and expenditure policies for Turkey in 2003. The thesis comprises five more chapters. Chapter 2 reviews the theoretical and empirical literature for measuring inequality and progressivity. The aim of the chapter is to review and discuss the measures used in the thesis. This is followed by the three empirical studies that form the core of the thesis.

Chapters 3 and 4 focus on measuring the redistributive impacts of publicly provided services which are accepted to be effective instruments to mitigate inequality and poverty. The non-behavioural benefit incidence analysis is applied in both for one year of cross-sectional micro data. It is assumed that the benefit derived by consumers can be approximated by the unit cost to the government of providing the services. Thus we estimate how average benefits are distributed across households by assuming that average benefits are equal to marginal benefits. We also focus on the direct incidence of the benefits, as it is very difficult to estimate the indirect incidence (externalities) of the services. Chapter 3 investigates if public education services decrease high inequality in Turkey and if the services go to households in need. Education has been seen as an effective instrument against poverty and, despite widening private provision of education services in developing countries, the public sector is still the main provider for these services.

Chapter 4 examines distributional impacts of public health and infrastructure services and public social transfers to compliment measuring redistributive impacts of social expenditures. This chapter suffers from lack of information on the users of health and infrastructure services. To overcome this problem indicators as approximations for the users of the services are created. The analysis of social transfers may provide more robust estimations than the analsysis of health and infrastructure services as the data provide information on public cash and in kind transfers to individuals.

Chapter 5 focuses on the revenue side of the goverment budget and investigates progressivity and the redistributive role of direct and indirect taxes. Tax incidence analysis is conducted and both direct and indirect taxes are investigated by applying statutory tax rates to households/individuals' expenditure and income sources to calculate tax burdens. In additon to the indirect tax incidence with statutory tax rates, the effective indirect tax rates are estimated by making use of input-output tables which allow consideration of the redistributive impacts of taxation on imported and intermediary goods. After estimating tax and benefit incidence, the results of the three empirical chapters are combined to examine the net fiscal incidence of both public tax and expenditure policies.

It has been emphasized by several empirical studies on Turkey that regional disparities are an important component of income inequality and poverty (World Bank, 2003, 2005; Başlevent and Dayıoğlu, 2005). Earlier studies showed that living in certain areas considerably affects the likelihood of being poor. Thus, regional level analysis is also conducted for all three empirical chapters to see if public policies reduce regional disparities. Finally the main findings of the thesis are summarised and some conclusions are drawn in Chapter 6.

CHAPTER 2: MEASURING PROGRESSIVITY AND REDISTRIBUTIVE IMPACTS OF PUBLIC POLICIES

2.1 Introduction

The impacts of public policies (tax and transfer policies) on income distribution are assessed by the notion of progressivity. Progressivity (regressivity) is defined as a measure of the deviation of a tax or benefit system from proportionality in favour of the poorer (richer) (Kakwani, 1986: 73)[1]. Also, any progressive policy instrument (tax or benefit) is supposed to improve the distribution of welfare in the society, so it is expected to have positive redistributive impacts. In other words, progressive policies are supposed to make inequality of net incomes (after tax and/or transfer incomes) lower than that of gross incomes. The reason for focusing on progressivity comes, as noted before, from the role of governments in reducing discrepancies in the well-being of individuals (equity) as well as increasing welfare (efficiency). As will be seen in this chapter, depending on the presence of inequality-averse social welfare functions, it has been shown that progressive tax policies are also welfare improving[2].

There are two equity principles in the public finance and inequality literature: horizontal and vertical equity. The first - “the equal treatment of equals” - requires that people in equal positions should be treated equally. The second one is based on the principle of “the ability-to-pay” which leads to the principle of “the unequal treatment of unequals”. It necessitates that people with greater ability should pay more taxes. The empirical fiscal incidence literature generally deals with the issues of vertical equity since it seeks to

[1] The notion of progressivity and measures of it have been developed in the tax context and extended to public benefits. Thus, throughout this chapter we also discuss progressivity generally in the tax context. Generally speaking, the progressivity of public benefits is defined in the opposite way to taxes, and benefits are defined as negative taxes (Duclos 2000).

[2] For the discussion on efficiency and equity aims of governments, see Chapter 3.

determine whether public policies are inequality reducing or not. A public policy (tax or transfer) will be horizontally equitable if the ranking of individuals based on pre-tax or transfer welfare are not altered as a result of public intervention. However, as we will discuss later, reranking occurs for several reasons and may decrease the redistributive power of progressive policies. Because of this, horizontal equity is also relevant in examining progressivity of public policies (Kakwani, 1986:72-86; Lambert 1993:140).

Specifically, a tax is called progressive (regressive, proportional) if (average) tax rate increases (decreases, stays same) with pre-tax income and also is expected to have an equalizing impact on income distribution. The definition of progressivity for a benefit is the reverse of the tax case. A benefit (public service) is called progressive (regressive, proportional) if the utilization share of that benefit by individuals decreases (increase, stays same) with incomes of individuals (Kakwani, 1986:72-86; Lambert 1993: 139-201).

The aim of this chapter is to examine methodologies for measuring inequality and progressivity and for comparing different income distributions theoretically. Thus Section 3.2 examines the measures of inequality, the criteria for inequality comparisons and the method of welfare dominance; Section 3.3 reviews the most common progressivity indices theoretically; Section 3.4 discusses the statistical inference of comparisons of distributions and progressivity indices; and finally some conclusions are drawn in Section 3.5.

2.2 The Measures of Inequality: Gini Index and Lorenz Curves

The first necessary step to understand how public policies may affect inequality of a given income distribution (before tax or benefit distribution) is to choose a method to measure inequality. We do not go into the whole range of inequality measures here; instead we prefer to focus on the most commonly used inequality measures, namely Lorenz curves and S-Gini inequality indices, and the corresponding progressivity measures. These are the measures commonly used in the fiscal incidence literature and we will also use them in our analysis.

The main functions and notations used in this chapter are given below, before starting with the measures of inequality and progressivity. In the inequality literature, there are three main functions to explain measures of inequality and to understand the features of a distribution. The first is the cumulative distribution function (*cdf*), formulated as $p=F(y)$, where p is the proportion of individuals in the population who receive a level of income that is less than or equal to y, y is a welfare indicator which can be income or consumption, F is a non-decreasing function of y and takes values between 0 and 1[3]. We assume that $F(y)$ is continuously differentiable and strictly increasing in y. The second function is the density function ($f(y)$) that is the first derivative of the *cdf* and strictly positive when $F(y)$ is assumed to be strictly increasing in y. The third useful function is the quantile function [Q(p)], which can be formulated as $F(Q(P)) = p$. $Q(p)$ is the income or expenditure level of an individual whose percentile in the distribution is p. The quantile function is particularly helpful to define Lorenz curve and other Lorenz curve related measures (Duclos and Araar (2006).

The most widely used index of inequality in empirical analysis is the Gini index due to the direct relation of the index with the Lorenz curve. The Lorenz curve provides complete information on the whole distribution of incomes relative to the mean. It draws the percentages of the population arranged from the poorest to the richest on the horizontal axis against the percentages of income enjoyed by the bottom x% of the population on the vertical axis.

[3] So the population size is normalised to 1, which refers also to the population or replication invariance principle. See Appendix 2.1 for the main principles of good inequality measures which have been introduced in the literature.

Thus the mathematical form of Lorenz curves for a continuous distribution can be defined as follows: $L(p) = \frac{\int_0^p Q(p)dp}{\int_0^1 Q\ (p)dp} = \frac{1}{\mu}\int_0^p Q(p)dp$

$$\mu = \int_0^1 Q\ (p)dp$$

where μ is the mean level of y.

Analogous to the Lorenz curve, the concentration curve was introduced as a descriptive and normative tool for assessing the impact of tax and transfer policies[4]. Concentration curves plot households from the poorest to the richest, ranked by a chosen welfare indicator (e.g. gross incomes or expenditures), on the horizontal axis against the cumulative proportion of taxes (benefits) paid (received) by households.

Therefore, the concentration curve for a tax is defined as follows:

$$C_T(p) = \frac{\int_0^p T(q)dq}{\int_0^1 Q_T(p)dp} = \frac{1}{\mu_T}\int_0^p T(q)dq$$

where μ_T is average tax liabilities and *q* is the proportion of tax liabilities of the sample ranked by pre-incomes. The function *T(q)* represents the quantile function for tax liabilities which are ranked by *y*.

The Gini coefficient as a summary measure is directly computed from the Lorenz curve by measuring the extent to which the Lorenz curve departs from the perfectly equal distribution whose Lorenz curve lies along the 45-degree (perfect equality) line. Hence, the Gini index is defined as the ratio of the area between the Lorenz curve and the 45-degree line to the total area of the triangle. This relationship ensures that the value of the Gini coefficient

[4] Kakwani (1977) thinks that the Lorenz curve is a special case of concentration curves for income.

lies between "0" (for complete equality) and "1" (for extreme inequality). The Gini coefficient (G) can be defined mathematically as follows:

$$G = 2\int_0^1 (p - L(p))dp$$

It is worth noting that the Lorenz curve provides partial ordering when we use it to compare different distributions, since it shows inequality along the overall income distribution. However, by providing a single summary number, the Gini index is able to present a complete ordering among different distributions. Because of this feature, and because the Gini index is Lorenz consistent, it is very popular to compare distributions in empirical analyses. The Gini index also satisfies *the Pigou-Dalton principle*, but it tends to be most sensitive to transfers around the middle of the distribution and least sensitive to transfers among the very rich or the very poor; in other words it does not satisfy the *principle of diminishing transfers*[5]. The Gini coefficient gives equal weight to all incomes regardless of whether they are received by the rich or the poor. As a result of this, it computes the average distance between cumulated population shares and cumulated income shares. Moreover, the Gini index satisfies principles of *replication (population) invariance* and *scale invariance* and thus the Gini index depends only on relative incomes, not on absolute values of incomes (Shorrocks, 1988).

Following Atkinson (1970), which introduced an inequality aversion parameter into the measurement of inequalities, different ethical weights have been introduced to determine to which side of a distribution researchers want to give more importance while estimating inequality. These percentile-dependent weights are used to aggregate the distance *p-L(p).* Using the Lorenz curve and these weights, S-Gini inequality indices (Single-Parameter Gini

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[5] See Allison (1978), Atkinson (1970), Creedy (1998), Jenkins (1991), Sen (1997) and Shorrocks (1988) for the assessments of different inequality measures and principles of inequality indices. The principle of diminishing transfers demands that an inequality index be more sensitive to the transfers taking place at the lower income levels. We will discuss the importance of this principle in the section on inequality comparisons.

inequality indices) can be computed. If we take the general formula below for ethical weights suggested by Yitzhaki (1983):

$$\kappa(p;\rho) = \rho(\rho-1)(1-p)^{(\rho-2)}$$

where ρ is the value of a single "ethical" parameter indicating inequality aversion. ρ must be greater than 1 to make the weights, $\kappa(p;\rho)$, positive everywhere. The larger the value of ρ is, the larger the value of $\kappa(p;\rho)$ for small p, in other words for lower parts of the distribution. Using this weighting function we can define S-Gini Indices[6] of inequality:

$$I(\rho) = \int_0^1 (p - L(p))\kappa(p;\rho)dp$$

As $\rho=2$ makes $\kappa(p;\rho=2)$ take the value, *2*, $I(2)$ gives the Gini index, which gives equal weight to all distances, $p\text{-}L(p)$. When $\rho>2$ relatively more weight is given to the distances found at lower values of p and vice versa. By using these percentile-dependent weights, higher order dominance can be tested when there is any ambiguity on ranking distributions. As put by Lambert (1993:119), therefore, S-Gini Indices of inequality provide the analyst with the opportunity to select a range of values of ρ to check the robustness of the implied inequality ranking of different distributional judgements.

As in the case of S-Gini inequality indices, the general formula for S-Gini indices of concentration can be written in the following form:

$$\mathrm{IC}(\rho) = \int_0^1 (p - C(p))\kappa(p;\rho)dp$$

In the empirical fiscal incidence literature, some researchers have applied S-Gini Indices of inequality and concentration when they were not able to rank taxes or benefits in

[6] S-Gini Indices of inequality were suggested by Yitzhaki (1983). They are also named the extended or generalised Gini coefficient. With this generalisation, Gini is thought to have most of the features of Atkinson (1970)'s inequality measure, which first considered including value judgements into the inequality measurement.

terms of progressivity or when they faced the problem of ranking before and after fiscal policies distributions to see the redistributive characteristics of the policies. This practice is called the extended-Gini test and will be examined later in the chapter (Sahn and Younger, 1999; Sahn, Younger and Simler, 2000).

2.2.1 Decomposing Income by Sources of Income

An S-Gini inequality index for a welfare indicator can easily be decomposed as a sum of the concentration indices of the different income sources, which add up to that welfare indicator. The decomposition method is used to assess the contributions of different sources of income or expenditure to inequality.

We can write concentration indices for different sources of income:

$$\mathrm{IC}_{\mathrm{X_i}}(\rho) = \int_0^1 (p - C(p))\kappa(p;\rho)dp$$

where X is the total income and i denotes different sources of income (such as wages, transfers, agricultural incomes). Hence, we can define S-Gini index of inequality in the total income as a weighted sum of the concentration indices of each source of income:

$$I_X(\rho) = \sum_1^i \pi_i \, IC_{X_i}(\rho)$$

$$\pi_i = \mu_{X_i} / \mu_X$$

where μ_{x_i} illustrates average income from the ith source and, μ_X is average total income, thus π_i is the share of income source i in total income. We can rewrite the above definition so as to see the contributions of each income source to inequality (Duclos and Araar 2006).

$$\sum_1^i \pi_i \left[IC_{X_i}(\rho) - I_{X_i}(\rho) \right] = 0$$

The decomposition comprises of two impacts: the share of the income source in the total income and the contributions of the sources of income to the inequality index. The product of the coefficient of concentration and the share of income source will give us the absolute contribution of the source of income to inequality. If the coefficient of concentration is negative, it means that the source of income contributes to the equality instead of inequality.

2.2.2 Inequality Comparisons and Welfare Dominance Analysis

If we wish to compare two different distributions which might be before and after fiscal policies, we can use measures of inequality rankings. The Lorenz curve is an important instrument not only to measure inequality but also to compare different distributions. If Lorenz curves of two distributions (say *x* and *y*) don't intersect, it can be shown that *x* is more equally distributed than *y* if *x* lies entirely inside of *y* and then it can be said that *x* Lorenz dominates *y*. By using the normative approach, Atkinson (1970) proved Lorenz dominance which provides welfare interpretations on the distributions. Suppose that social welfare (*W*) is the sum of individual utility (*U*) functions which have strictly diminishing marginal utility; in other words utility functions are strictly concave functions of income y_i:

$$W(y)= \sum_{i=1}^{n} U(y_i)$$

$$U'(y) > 0 \text{ and } U''(y) < 0 \text{ for all } y>0$$

If the Lorenz curve of distribution *x* lies strictly inside that of *y*, and the mean income is the same for both distributions, we can write the following:

$$L_X(p) \geq L_Y(p) \text{ for all p, } p \in [0,1] \Leftrightarrow \sum_{j=1}^{m} U(x_j) \geq \sum_{i=1}^{n} U(y_i)$$

$$\mu_X = \mu_Y$$

Then according to the theory of Lorenz dominance, it can be said that *W(x)* is greater than *W(y)*. Concavity of utility functions guarantees inequality aversion in the sense that the Lorenz-dominating distribution is the one which has lower inequality than the other distribution, when both distributions have the same mean income and non-intersecting Lorenz curves. The value judgement behind this idea is the transfer principle of Pigou-Dalton, which states that an income transfer from a richer to a poorer person that doesn't change the mean income and the rank of the individuals is an improvement. Such a transfer shifts the Lorenz curve inwards towards 45-degree line which means that the criterion of first-degree Lorenz dominance is consistent with the Pigou-Dalton principle of transfers (Sen, 1997; Lambert 1993). Atkinson borrows the notion of inequality aversion from the finance literature and defines inequality aversion as equivalent to risk aversion in the theory of choice under uncertainty[7].

However, Atkinson's approach can only be used for distributions which have the same mean and where the Lorenz curves of the distributions do not cross. When they intersect, it is impossible to conclude which distribution has higher inequality and which distribution produces higher welfare. Shorrocks (1983) introduced generalized Lorenz curves which make it possible to compare distributions with different means and in some cases it also allows us to rank distributions even when their Lorenz curves intersect. In order to compare distributions with different means, the author offered the notion of the "generalized Lorenz curve" *GL(y, p)*, which is simply the ordinary Lorenz curve times the mean of the distribution:

$$GL(y, p) = \mu L(y, p)$$

Generalised Lorenz curves satisfy the scale independence principle which states that if all incomes are multiplied by the same number then the new distribution is just as unequal

[7] In the finance literature, second-degree stochastic dominance refers to situations such that a portfolio, *x*, dominates another portfolio *y*, if *x* has less risk than *y* does. This requires a risk-averse utility function. Thus, Atkinson (1970) showed that Lorenz dominance and the second-degree stochastic dominance in the finance literature have the same requirements.

as the old distribution. Shorrocks also presumes that society cares about efficiency (higher real incomes) as well as equity under *GL* (Blackwood and Lynch, 1994). As Lambert stated (1993: 54-66), for equal-mean comparisons, the result is identical with Atkinson's. But if the distributions have different mean incomes, the distribution with the higher mean income and dominating Lorenz curve (much closer Lorenz curve to the 45-degree line) will have higher social welfare. Thus if $L_X(p) \geq L_Y(p)$ for all p, $p \in [0,1]$ and , $\mu_X > \mu_Y$ we can state that the distribution *X* generalized Lorenz dominates the distribution *Y*. However, Generalised Lorenz Curves may also cross or may cause some cases in which a distribution with higher inequality and also with a higher mean looks better (Lambert 1993: 61; Kakwani 1984).

Since generalised Lorenz curves may intersect as well, in order to rank Lorenz curves intersecting unambiguously, higher order Lorenz dominance methods[8] have been offered which have weaker criteria than first-degree Lorenz dominance requires. The higher degree of dominance gives more importance to movements at the bottom part of the distribution. These higher-degree dominance criteria are obtained by strengthening the Pigou-Dalton principle of transfers. Although the Pigou-Dalton principle captures inequality aversion, it is not sensitive to the position of equalising transfers in the income distribution.

The principle of diminishing transfers "ensures that more weight in the inequality assessment is attached to transfers taking place lower down in the distribution" (Shorrocks and Foster, 1987: 485)[9]. With the principle of diminishing transfers, Shorrocks and Foster (1987) try to prevent such regressive transfers that take place in the higher part of the distribution (from a less rich individual to a much richer individual) to increase inequality. Davies and Hoy (1995) also use the principle under the name of aversion to downside inequality (ADI) and prove that even if Lorenz curves intersect, distributions can still be ranked if we have a social utility function which holds ADI. In other words they show that in comparing two Lorenz curves intersecting once, the distribution with less downside

[8] First-degree Lorenz dominance means that the higher of two non-intersecting Lorenz curves is preferred. Please see Aaberge (2008) for the definitions of different degrees of Lorenz dominance.
[9] Shorrocks and Foster (1987) call the principle of transfer sensitivity "relative transfer sensitivity".

inequality dominates the other distribution. Aaberge (2008) uses more general definitions of the second degree Lorenz dominance. They define second-degree downward and upward dominance to make their point. The terms upward and downward refer to the direction of the aggregation of the Lorenz curve. When income shares are aggregated below with weights linearly decreasing with increasing rank of income unit in the distribution, then we obtain second-degree upward Lorenz dominance. With second-degree upward Lorenz dominance we have "a social decision-maker (who) pays more attention to inequality in the lower than in the upper part of the income" (Aaberge, 2008: 8). Thus, for second-degree downward dominance we have a social decision-maker who pays more attention to inequality in the upper than in the lower part of the income.

In the fiscal incidence literature, when researchers face the difficulty of ranking distributions before and after government intervention, S-Gini Indices are used for higher-degree dominance by changing the ethical parameter. This gives the opportunity to see how the distributions can be ranked with different social welfare functions. We will discuss this issue later in the chapter under the heading of extended Gini test.

2.2.3 Welfare Dominance Analysis in the Public Finance Context

As concentration curves draw the distribution of tax liabilities or benefits, it has been used to compare progressivity of different taxes and benefits. The welfare dominance analysis[10] suggested by Yitzhaki and Slemrod (1991) has been used to rank public transfers and taxes in terms of their progressivity by using concentration curves. Following Atkinson (1970), they borrow the methodology of stochastic dominance from the finance literature, which is employed to rank portfolios. They establish that for any social welfare function that favors an equitable distribution of income, if the concentration curve of one commodity (say

[10] For the full development of the methodology with different country cases, see Yitzhaki and Thirsk (1990), Mayshar and Yitzhaki (1995) and Yitzhaki and Lewis (1996). The full name of the method is 'marginal conditional welfare dominance'.

food) is everywhere above another commodity's (say luxury goods) concentration curve, changing the tax structure marginally by reducing taxes on food and increasing those on luxury goods by just enough to keep total revenues constant will improve social welfare when the concentration curve for food is everywhere above that of luxury goods. For the benefit case, if the concentration curve of a benefit is everywhere above another benefit's concentration curve, marginally raising the subsidy of the first benefit while reducing that of the second will improve social welfare (Yitzhaki and Slemrod, 1991; Sahn and Younger, 2000).

By using this approach, we could rank benefits/taxes by just comparing the locations of the concentration curves of the public policies. However, concentration curves provide only partial ranking since they may intersect so that the ranking concentration curves suggest can be only partial (Kakwani, 1986: 72-85). Therefore, single summary measures for progressivity have been offered to reach complete ranking. Those measures will be studied below.

2.3 Progressivity Measures

Before we start with measures of progressivity, it would be worth showing the welfare improving role of progressivity. Jacobsson (1976) and Fellman (1976) showed that if tax liabilities are distributed more unequally than pre-tax incomes, in other words, if the tax is progressive, then the after-tax distribution is less unequal than the pre-tax distribution if there is no reranking. Lambert (1993:152-153) proves that an inequality reducing progressive tax system is also welfare improving by using Shorrocks' theory of generalised Lorenz dominance. If income taxation is proportional, then the Lorenz curve for post-tax income coincides with the Lorenz curve for pre-tax incomes since proportional income tax does not change the distribution of incomes.

$$L_{prop}(p) = L_Y(p) \quad \text{for all } p \in [0,1]$$

where L_{prop} indicates the Lorenz curve for post-tax incomes in the case of proportional income tax. Therefore, we can write the following, which indicates that in the case of progressive tax, taxation reduces social welfare[11] less than equal-yield[12] proportional tax:

$$GL_{Y-T}(p) = \mu(1-t)L_{Y-T}(p) \geq \mu(1-t)L_Y(p) = \mu(1-t)L_{prop}(p) = GL_{prop}(p)$$

for all $p \in [0,1]$

where L_{Y-T} is the Lorenz curve for the post-tax incomes after progressive taxation and t is average tax burden. Since post-tax incomes for progressive taxation are more equally distributed than that for proportional tax as proved by Jacobsson and Fellman theorem, *"the impact of progression on a given income distribution is favourable compared with that of proportional taxation*" (Lambert, 1993:153).

After showing the welfare enhancing role of progressive taxation, we may discuss measures of progressivity. There are four local progressivity measures:

1. Liability progression (LP) (elasticity of tax liability with respect to pre-tax income).

$$LP(y) = e^{t(y),y} = \frac{yt'(y)}{t(y)} = \frac{m(y)}{a(y)} > 1$$

2. Residual income progression (RP) (elasticity of post-tax income with respect to pre-tax income, measure for redistribution)

$$RP(y) = e^{y-t(y),y} = \frac{y[1-t'(y)]}{y-t(y)} = \frac{1-m(y)}{1-a(y)} < 1$$

3. Average rate progression (ARP) (derivative of average tax rate with respect to pre-tax income)

[11] This theorem is valid under individualistic, symmetric, additively separable and inequality averse (concave utility functions) social welfare functions.

[12] Equal-yield taxation means that regardless of the distribution of liabilities of different tax systems, tax systems in question yield the equal amount of total tax revenue.

$$ARP(x) = \frac{d[t(y)/y]}{dy} = \frac{yt'(y) - t(y)}{y^2} = \frac{m(y) - a(y)}{y} > 0$$

4. Marginal rate progression (MRP) (derivative of marginal tax rate with respect to pre-tax income);

$$MRP(y) = t''(y) = m'(y) \geq 0$$

(Lambert, 1993: 160-162; Liu, 1985)

where *m(y)* and *a(y)* are marginal and average tax rates experienced by an income *y* respectively and t(y) is tax schedule. So for strict progression m(y)>a(y) should hold for all y. There are two preliminary requirements for progressivity (Lambert, 1993: 148: 1): Tax liabilities are distributed more unequally than pre-tax incomes- the rich have an even greater share of taxes than of pre-tax income; 2) post-tax incomes are distributed more equally than pre-tax incomes. The second requirement refers to the redistributive power of public policies and demands that if a tax system does not produce less unequal post-tax or benefit incomes, that tax or benefit system cannot be called progressive. Of the local progressivity measures, the liability progression deals with the issue of departure from proportionality, whereas the residual progression is related to the redistributive impacts of the taxes on post-tax income distribution. Therefore, the local measures of progressivity are capable of detecting these requirements over examined income ranges but they do not give information about the whole distribution. On the other hand, local measures may not guarantee to detect the second requirement; if there is reranking as a result of taxes or transfers and since the actual redistributive impact depends on the interaction of the local progression with the distribution of gross incomes.

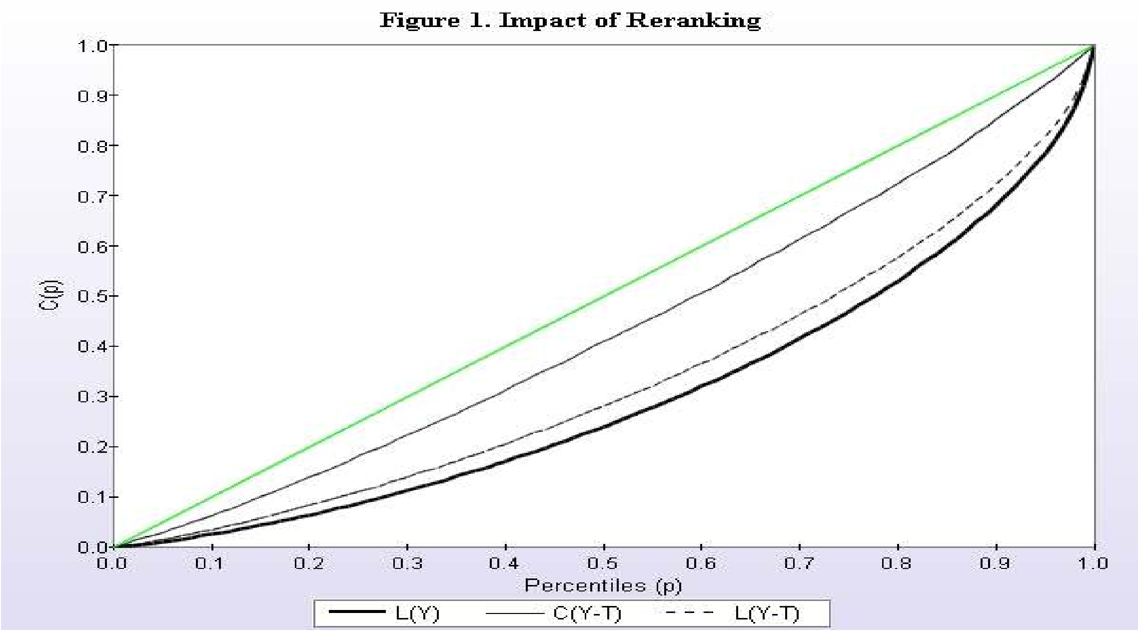
Progressive public policies may not produce less unequal post-tax or transfer distribution if there is reranking[13]. Reranking occurs when the tax schedule does not depend only on income level but also on non-income characteristics of the tax unit (e.g. different tax

[13] Redistributive impacts of a tax or benefit may also be limited due to the small share of tax or benefit in the individual/household incomes.

rates for single and married households even if their income level is the same). Moreover, reranking occurs if the tax schedule makes the marginal tax rate be over 1. Reranking is an issue related to horizontal inequity. If a tax or benefit creates reranking, therefore it is also horizontally inequitable. This may create a problem to determine the progressivity of taxes or public transfers if we only consider some local progressivity indices but not pay attention to the distributional impact of the taxation on gross incomes.

If the tax causes reranking of income units, then concentration curves for post-tax income ranked by pre-tax incomes and Lorenz curve for post-tax income do not coincide, implying smaller inequality reducing impacts than no-reranking would produce. This can be seen clearly in Figure 2.1. The redistributive impact is measured by the difference between before and after tax Lorenz curves [*L(Y)* and *L(Y-T)* respectively in the figure]. Since the concentration curve for post-tax income *[C(Y-T)]* differs from *L(Y-T)*, there is reranking. As we see, if there was no reranking, *L(Y-T)* would lie along *C(Y-T)*, and the redistributive impact would be equal to the difference between *L(Y) - C(Y-T)* which is higher than the difference of *L(Y) - L(Y-T)* (Duclos and Araar, 2006; Lambert 1993).

Figure 2.1



We can see if a tax or benefit is progressive by comparing concentration curves to two benchmarks, namely, a 45-degree line and the Lorenz curve. If the concentration curve of a benefit (tax) is everywhere above (below) the Lorenz curve, the benefit (tax) is called progressive. Since the principle of departure from proportionality requires that concentration curves for taxes should be distributed more unequally than gross incomes, the closer the concentration curve for a tax to 45-degree line the more regressive it is. The opposite is true for public transfers. Thus, we can write the following conditions for progressive taxes and benefits (satisfying the first requirement of the progressivity) respectively:

$$L_Y(p) \geq C_T(p) \text{ for all } p \in [0,1]$$

$$L_Y(p) \leq C_B(p) \text{ for all } p \in [0,1]$$

where C_T and C_B are concentration curves for a tax and a benefit respectively ranked by gross incomes (y).

Sahn and Younger (2000) introduced the second definition of progressivity for public services by using concentration curves: *absolute (or per capita) progressivity*. The absolute progressivity requires a benefit's concentration curve to lie above the 45-degree line; in other words, to be concave rather than convex. If a benefit is absolute progressive it means that it is utilised by the poor disproportionately and thus we can call the benefit pro-poor. It is worth noting that the above conditions on progressivity are focussing on the first requirement of progressive public policies. For the second requirement, we need to take into account the relationship between concentration curves of post-tax incomes ranked by pre-tax incomes and Lorenz curve of pre-tax incomes. We will discuss this second approach below.

The global measures of progressivity which focus on the relationship between the local measures of progressivity and the distribution of gross incomes and which are capable to give information on the whole distribution have been introduced. However, these global measures should also be consistent with local measures of progressivity. Jacobsson (1976) and Kakwani (1977) established the link between two local measures of progressivity, residual progression and liability progression, and changes in the distribution of the tax burden which can be seen with the help of concentration curves.

According to the theorem of Jacobsson-Kakwani, if one tax is more LP progressive than another tax for all income levels, then the concentration curve of the first tax lies below that of the second one. More formally:

$LP^2(y) \geq LP^1(y)$ for all y $\Leftrightarrow C_T{}^2 \leq C_T{}^1$ for every pre-tax income distribution *F(y)*.

For the redistributive impacts, we look at the link between residual progression and the distributions of post-tax incomes.

$LP^2(y) \geq LP^1(y)$ for all y $\Leftrightarrow C_{Y-T}{}^2 \geq C_{Y-T}{}^1$ for every pre-tax income distribution *F(y)*.

By using the conditions explained above we can define the global progressivity measures. There are two approaches to attaining global summary measures of progressivity, namely Tax-Redistribution (TR) and Income-Redistribution (IR). Globally, TR involves comparing the Lorenz curve for gross income (pre-tax income), $L_X(p)$, and the concentration curves ,*C(p)*, for taxes or benefits, so it is related to the liability progression. Therefore, the TR approach deals with the first distributive feature of progressivity, namely departure from proportionality. On the other hand, the IR approach takes into account the difference between the concentration curves of net income and the Lorenz curve for gross income. Hence, the IR approach measures redistributive impacts. If there is no reranking, TR and IR approaches give the same ranking of public policies, since concentration curves for post-tax incomes and the Lorenz curve for post-tax incomes coincide.

Thus, S-Gini Indices of TR ($IT(\rho)$) and IR ($IV(\rho)$) progressivity, reranking (*RR*) and redistribution (*IR*) are given by following equations respectively:

$$IT(\rho) = \int_0^1 (L_Y(p) - C_T(p))\kappa(p;\rho)dp$$

$$IV(\rho) = \int_0^1 (C_{Y-T}(p) - L_Y(p))\kappa(p;\rho)dp$$

$$RR(\rho) = \int_0^1 (C_{Y-T}(p) - L_{Y-T}(p))\kappa(p;\rho)dp$$

$$IR(\rho) = \int_0^1 (L_{Y-T}(p) - L_Y(p))\kappa(p;\rho)dp$$

IT(ρ=2), *IV(ρ=2)* and *RR(ρ=2)* are known as the Kakwani index of TR progressivity, Reynolds-Smolensky of IR progressivity and Atkinson-Plotnick index or reranking (Duclos and Araar, 2006)[14]. These two approaches carry different information on the progressivity of public policies. The Kakwani index measures the difference between the Gini coefficient of gross expenditures/incomes and concentration coefficients of benefits. Hence, it does not really give information on the redistributive impact of taxes and benefits in reducing inequality in net expenditures. On the other hand, the Reynolds-Smolensky index is thought to be a better tool to see not only the progressiveness of taxes and benefits but also their redistributive impacts since it takes into account the importance of the average rate of taxation in the redistribution of welfare.

We can write the total redistributive impact, that is, the difference between the Lorenz curve of net and gross incomes in a way including both IR-progressivity and horizontal inequity. This would indicate the extent of the redistribution caused by public policies.

$$L_{Y+B}(p) - L_Y(p) = \left[C_{Y+B}(p) - L_Y(p)\right] - \left[C_{Y+B}(p) - L_{Y+B}(p)\right]$$

[14] Please see Table 2.1 in Appendix 2.2 for the general conditions of progressivity under TR and IR approaches.

where, $L_{Y+B}(p)$ is the Lorenz curve for post-benefit (net) incomes and $C_{Y+B}(p)$ is the concentration curve for post-benefit (net) incomes ranked by pre-benefit (gross) incomes (Y). The first term on the left hand side gives us IR-progressivity (vertical equity) caused by the benefit, B, and the second term is the horizontal inequity or reranking, which apparently decreases the progressive impact of the benefit (Duclos and Araar, 2006; Kakwani 1986:82-83).

2.4 Statistical Inference

Since Lorenz and concentration curves (similarly inequality and progressivity indices) are computed by a sample, not from the whole population, statistical robustness should be checked. In order to decide if one transfer is progressive or if one transfer dominates another, we need to test if there is a statistically significant difference between two concentration curves or a concentration curve and Lorenz curve or 45-degree line. Davidson and Duclos (1997) derived the distribution-free[15] 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, in other words there is no dominance. 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 favour 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 (Howes 1993), we can reject the null hypothesis in favour of dominance if the ordinates of one curve are all above the other, or in favour 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.

[15] By distribution-free standard errors, the authors mean that their results do not require a specification of the population distributions from which the samples are drawn.

Howes (1993) supports the second decision rule[16], since this procedure makes sure that the probability of type I errors is never greater than 5%. We will apply both decision rules to assess the 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 ordinates (Younger, 1999; Sahn and Younger, 2000)[17]. The reason for excluding the top and bottom percentiles is that the differences between ordinates at the extremes of the distribution are accepted as statistically different. Software for Distributive Analysis (DAD) by Duclos and Arrar (2006) is employed to produce the differences between the ordinates of curves with asymptotic standard errors; also Distributive Analysis Stata Package (DASP) by Abdelkrim and Duclos (2007) provides graphically the differences between the ordinates of the curves with confidence intervals.

2.4.1 Extended Gini Test

Despite the advantages of the dominance testing methodology, it is very likely not to reject the null hypothesis, which leaves us with ambiguous results on the progressivity and redistributive impacts of public policies. Sahn, Younger and Simler (2000), Sahn and Younger (2000), Younger, et.al, (1999) and Rajemison et al. (2003) used the extended or generalised Gini and concentration indices (Yitzhaki 1983) as a cardinal measure to reach robust conclusions. Sahn, Younger and Simler (2000) thinks that Yitzhaki (1983) "*provides a middle ground between the normative generality (and consequent indeterminacy) of the welfare dominance approach and the precision (and lack of normative generality) of a cardinal measure of social welfare*". The common practice of the extended Gini test is to calculate coefficients for increasing inequality aversion parameter, ρ, which offers a sense of how a more progressive social welfare function ranks the value of a given public service

[16] We will call the dominance test under the second decision rule Howes' criterion/test, following the literature.
[17] We took both 20 and 10 equally spaced ordinates. Since we obtain the same result, we will report in this study the results of the test with 20 ordinates.

or tax policy. Coefficients are estimated for different ρ values from 1.01 to 4 or 5[18] in steps of 0.5 for gross income or expenditure and for the transfers and taxes. The higher the parameter, the greater the emphasis on the bottom of the distribution; in other words on the poorer. If we find that for all parameter values one tax is more concentrated among the poor than another,- in other words, if the extended concentration coefficient of a tax is higher than that of another tax - we say that the first tax is dominated by the second one[19]. The extended Gini test can also be employed by using S-Gini indices of TR-Progressivity by different inequality aversion parameters, as TR-Progressivity gives the difference between Gini index for gross income/expenditure and the concentration coefficient for a tax or benefit. It is also possible to compare extended Gini coefficients for gross incomes and net incomes to see the redistributive impacts of public policies under different inequality aversion parameters.

2.5 Conclusions

Progressivity (regressivity) is defined as a measure of the deviation of a tax or benefit system from proportionality in favour of the poorer (richer). Also any progressive policy instrument (tax or benefit) is supposed to improve the distribution of welfare in the society, so it is expected to have positive redistributive impacts. Theoretically, it is also confirmed that progressive public policies may be welfare improving. The aim of this chapter was to theoretically review the main features and also advantages and disadvantages of the measurement methodologies of inequality and progressivity.

The Lorenz curve and the Gini index are the most common statistical tools to measure disparities in the distributions of incomes and to compare different distributions. Progressivity indices derived by using concentration curves and Lorenz curves have also been commonly used in the empirical public finance literature. In this study, we will also use

[18] "4" is the upper limit suggested by Duclos (2000) in most of the empirical studies cited above.

[19] For public transfers, if the extended concentration coefficient of a transfer is lower (more concentrated among the poor) than that of another one, the first one dominates the second one according to the extended Gini test.

the methods and indices based on Lorenz curves and the Gini index. Since our focus is mainly on the progressivity of taxes and benefits and the final redistributive impacts of these public instruments, we will use the analysis of welfare dominance to compare distributions of incomes before and after government intervention, as well as employing the most common progressivity indices to detect the progressiveness of a single public policy and also to rank the progressiveness of different policies. Namely, we will report the TR-Progressivity of Kakwani, IR-Progressivity of Reynolds-Smolensky, redistribution of Atkinson-Plotnic and horizontal inequity indices to capture both progressivity and redistributive impacts. Statistical inference based on Davidson and Duclos' (1997) approach will also be run. We will use DAD Software to estimate asymptotic standard errors to test the robustness of the analysis statistically. However, when results are inconclusive in ranking different public policies in terms of their redistributive impacts, we utilize the extended-Gini test which allows us to consider different ethical values to assess the public policies. Additionally, we will report S-Gini progressivity indices for a wide range of inequality aversion parameters to assess if progressivity or redistributive power of a fiscal policy varies when we give more weight to different parts of the society. This will allow us to examine if fiscal policies target the poor effectively.

Appendix 2

Appendix 2.1: Principles of Good Inequality Measures

1) Symmetry: If one income distribution is derived from another by a permutation of incomes, then two distributions are identical (the inequality measure remains unchanged).

2) Replication invariance: If an income distribution y is obtained from another distribution x by the replication of the population k times (with all the incomes correspondingly replicated), this must leave the poverty and the inequality measure unchanged.

3) Scale invariance: if one distribution is obtained from another by multiplication of a constant, the two distributions are identical.

4) Pigou-Dalton principle of transfers: Any mean-preserving transfer from a poorer person to a richer one, other things remaining the same, always increases inequality and poverty.

5) Principle of diminishing transfers: an inequality index should be more sensitive to the progressive mean-preserving transfer taking place at the lower part of the distribution than the one taking place at the upper part of the distribution. Thus, the index should decrease more when the progressive mean-preserving transfer takes place at the lower incomes (Blackwood and Lynch, 1994; Fields and Fei 1978; Sen, 1997; Zheng, 1997).

Appendix 2.2: Conditions for Global Progressivity

We call a tax or a benefit system progressive if the following conditions are met (Duclos and Araar, 2006):

Table 2.1. TR and IR Progressivity Rules for Tax and Transfers

	A Tax or Transfer is TR(IR) Progressive	If
TR Progressivity	**Tax (T)**	$C_T(p)<L_Y(p)$ for all p [0,1] (L_Y dominates C_T)
	Transfer (B)	$C_B(p)>L_Y(p)$ for all p (C_B dominates L_Y)
	Tax(T1)-Tax(T2)	$C_{T(1)}(p)<C_{T(2)}$ for all p
	Transfer(B1)-Transfer(B2)	$C_{B(1)}(p)>C_{B(2)}$ for all p
	Tax-Transfer	$L_Y(p)-C_T(p)>C_B(p)-L_X(p)$ for all p
IR Progressivity	**Tax**	$C_{Y-T}(p)>L_Y(p)$ for all p
	Benefit	$C_{Y+B}(p)>L_X(p)$ for all p
	Tax(T1)-Tax(T2)	$C_{Y-T1}(p)>C_{Y-T2}(p)$ for all p
	Transfer(B1)-Transfer(B2)	$C_{Y+B1}(p)>C_{Y+B2}$ for all p
	Tax-Transfer	$C_{Y-T}(p)> C_{Y+B}(p)$

where $C_T(p)$ and $C_B(p)$ are concentration curves for a tax and a benefit respectively;. $L_Y(p)$ is Lorenz curve for gross income or expenditure; B1 is the first public transfer and B2 is the second one; T1 is the first tax and T2 is the second tax.

CHAPTER 3: THE DISTRIBUTIONAL IMPACTS OF PUBLIC EDUCATION SERVICES IN TURKEY, 2003

3.1 Introduction

Education has been widely accepted as an effective tool in enhancing growth and development (both individual and social) and also in improving poverty and income disparities (Becker 1993; Schultz, 1988; Sylwester, 2002). The positive relationship between education and growth/development depends on the role of education in increasing factor productivity and rates of return (individual and social) from educational investments[1]. The role of education in developing countries is particularly important as a development instrument.

Due to the positive impact of education in development and growth, the redistributive role of education has become an important empirical question. Since it has been found that for most of the countries examined the total education expenditures have a progressive impact on income distribution, the policy recommendation for developing countries with high inequalities is to extend their educational services. Public primary and secondary education services have been found to be progressive whereas higher education services have tended to be regressive for developing countries. Additionally, the progressivity of education services decrease with the education level, in other words, primary education is the most progressive level followed by secondary and tertiary levels[2].

Turkey, as a middle-income country, has an institutionalised, wide coverage education system. It has been shown that education has positive impacts on labour force participation and earnings in Turkey. Education increases labour force participation, and this

[1] See Psacharopoulos and Patrinos (2002) for a recent review of the empirical literature on returns to investment in education. They emphasize that the average rate of return to another year of schooling is 10 percent and the highest returns are recorded in low and middle-income countries such as Turkey.
[2] Please see the benefit incidence studies for several developing countries such as Castro-Leal et.al (1999), Chu et al., (2000), Glick and Razakamanantsoa (2002), Healtberg et. Al. (2003), Lanjouw et al. (2002), Sahn and Younger (2000), Younger (2002), Selden and Wasylenko (1992) among others.

effect and the returns to education increase with the level of education in Turkey. The income share of workers with a low level of education in total incomes has reduced over time in Turkey, whereas earnings of people with university degree have significantly increased in recent years (Table A 3.1 in Appendix 3.1). This provides further supporting evidence that education plays an important role in inequality in Turkey (Duman, 2008; Tansel, 1994, 2004). The distributional effects of public education services in Turkey were investigated by Pinar (2004) for 1994 and 2002. He found that primary and secondary education is pro-poor, but this pro-poor impact declines when private expenditures on education is included into the analysis. As noted in Chapter 1, Pinar (2004) does not apply the methodologies we apply here and ignore the statistical robustness of the results. Therefore, the aim of this chapter is to investigate the redistributive impacts of public education services for 2003 to see if Pinar's results are valid for 2003 with the welfare dominance analysis and S-Gini progressivity indices, and check the robustness of the results statistically.

The structure of the paper is as follows. Section 2 discusses the benefit incidence method and the theoretical issues regarding choosing the welfare indicator. Section 2 also explains the data used and the method of calculating unit costs of the services and determining the users of the services. Section 3 presents an overview of the Turkish education system with the enrolment rates by education level. The results are given in Section 4 and Section 5 summarises the main conclusions.

3.2 Method: Benefit Incidence Analysis

Measuring the welfare effects of publicly provided services has been an important empirical issue in the welfare and public economics literature. The interest in benefit incidence studies is generally based on 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 and inequality (Davoodi et. al. 2003; Demery, 2003: 43;

Selden and Wasylenko, 1992: 1; Van de Walle, 1998: 365; Martinez-Vazquez, 2001: 28-29). The first studies in the literature were done by Selowsky (1979) and Meerman (1979) for two developing countries: Colombia and Malaysia respectively.

The main goal of benefit incidence[3] analysis is to identify who benefits from public spending and by how much (Martinez-Vazquez, 2001: 31). The usual practice of incidence studies is to see how the initial, 'pre-intervention' position of individuals is altered as a result of public spending. In other words, the researcher's aim in using benefit incidence analysis is to compare the distribution of welfare with and without public expenditures. This 'pre-intervention' position is generally called the counterfactual and based on a welfare indicator (e.g. per capita household income/expenditure), which does not include the monetary value of the benefits secured from publicly provided goods.

Two general approaches[4] have been widely used in the estimation of public expenditure incidence: Benefit incidence (or non-behavioural benefit incidence) and behavioural benefit incidence. The former has been the most frequently applied methodology and will be applied in this study. We will first elaborate the non-behavioural benefit incidence and discuss the main advantages and disadvantages of the method. We then summarise the behavioural benefit incidence and compare the two methods.

Three kinds of information are needed for the calculation of the incidence of government spending on services. These are government expenditures on a service (net of any cost recovery fees, out of pocket expenses by users of the service, or user fees), public

[3] Assessing the distributional impacts of public spending is called expenditure or benefit incidence. The application procedure of both is the same, the only difference comes from the assumption of the benefit incidence which states that the unit cost of a public service to a government can be taken as per user benefit that public service produces for the intended users. We will follow the benefit incidence approach.

[4] The theoretical discussion on how public expenditures benefits individuals has been provided by Aaron and McGuire (1970) and Brennan (1976). Aaron and McGuire argued that the value of a publicly provided good or service should be determined by the individual's own valuation of the good. This approach requires estimating the individual preferences for the publicly provided goods and services which is data demanding. Brennan (1976) offered the second approach in which public services and goods are valued at their marginal cost. While the former approach provides a theoretical ground for the behavioural benefit incidence analysis, the second one leads to the non-behavioural benefit incidence approach. See Cornes (1995) for an assessment of the two approaches.

utilization of the service and the socioeconomic characteristics of the population using the service. Household budget surveys are used to attain the information on households' or individuals' standard of living, social statue and beneficiaries of the social services of the government. Government spending data are typically obtained from budget execution data as reported by the ministry of finance, the relevant line ministry, or the central statistical agency (Davoodi et. al. 2003: 5).

The non-behavioural benefit incidence approach is conducted in three steps. In the first step, we rank individuals or households in 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; Demery, 2003; Martinez-Vazquez, 2001: 32; Van de Walle, 1998: 367-368).

In order to put into effect the non-behavioural benefit incidence approach, some assumptions are accepted in the literature due to the data restrictions. The main assumption of the non-behavioural approach is that the benefit derived by consumers can be approximated by the cost to the government of providing the service. However, it is thought that the unit cost of provision may have little relation to the value of the benefits to the individual. A well-known example to support this criticism is that the unit cost of education service cannot include the lifetime benefits of education. Another strong assumption is that the government expenditure is efficient. In the literature, it is seen that this assumption is one of the most important drawbacks of the approach and instead some researchers recommend the behavioural approach, which estimates the benefits of social services drawn from each individual by using some micro econometric methodologies[5]. 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 the people who are intended, and marginal benefits are equal to average benefits (Selden and Wasylenko, 1992).

Given these assumptions, the methodology has faced numerous criticisms[6]. The first concerns the omission of indirect transfer impacts; the non-behavioural benefit incidence takes into account only direct transfer impacts. Indirect impacts may be of considerable consequence to the distributional outcome due to benefit shifting. Although the general empirical result of the benefit incidence studies is that university education is not pro-poor, the indirect benefits, (good governance, the increase in service quality, the existence of a class of technocrats) may be helpful for the poor. However, indirect benefits and externalities are difficult to estimate.

The second important point is that it presents results on the distribution of average benefits, even if marginal benefits may be of greater interest in assessing public policy reform. Incidence analysis at one point in time attempts to estimate how average benefits are distributed. In order to overcome this drawback, comparisons over time have been recommended by using cross-section data and panel data or pseudo-panel data. However, some researchers argue that marginal incidence is more important for policy makers, since policy makers need to know who is going to benefit from public services if they make some changes in public expenditures. Panel data was thought necessary to examine marginal incidence, until Lanjouw and Ravallion (1999) introduced a methodology to investigate marginal incidence of public spending using single cross-section data. They used a simple political economy model to show the importance of marginal changes. They worked with India's National Sample Survey for 1993-1994 that includes data on public service (or

5 For the comparison of the behavioural and non-behavioural approaches with advantages and disadvantages of these two approaches, see Van de Walle, 1998.

6 Davoodi et. al. (2003), Van de Walle, (1998) and Selden and Wasylenko, (1992) have been used to discuss the limitations of the benefit incidence approach.

program) participation across geographic regions. They calculate the average participation rate for a given public service for each quintile and each region. They use the common information that the participation rate for a given quintile varies across regions according to the level of spending on the public service in each region. Using this they regress the quintile-specific participation rates across regions on the state's average participation rate (for all quintiles and all regions) for each public service. The basic regression that Lanjouw and Ravallion (1999) estimate is as follows:

$$p_{i,k,q} = a_q + \beta_q p_k + u_q \qquad (1)$$

where i indexes a small geographical unit (62 regions in their case), k indexes a larger one (19 states in their case) which contains small geographical units, and q indexes the welfare quintile. The technique requires some information on service participation at the household level and sufficient regional disaggregation and variance in participation for estimation to be possible. They found that expansion of primary schooling would be pro-poor in contrast to average incidence figures that suggest the opposite.

One of the most serious critiques of benefit incidence studies concerns their assumptions about the counterfactual or the pre-intervention world. As mentioned before, it is assumed that the counterfactual is the welfare indicator chosen. It has been argued that public policies affect individual behaviour, including labour supply, consumption, savings and investment decisions. However, non-behavioural benefit incidence studies ignore behavioural responses.

The behavioural incidence approach (or estimation based approach) uses econometric techniques to estimate the individual preferences (willingness to pay) for publicly provided goods to value the individual benefits that publicly provided goods and services produce (Gertler and Glewwe 1989; Gertler and der Gaag, 1990; Van de Walle, 1998; Younger, 1999; Van de Walle 2003). So it tries to solve the criticisms that the benefit incidence studies faced over determining the pre-intervention welfare indicator and the value of benefits. The behavioural methodology has been applied more often in recent years as data and techniques have become more available to overcome some important drawbacks of the non-behavioural approach. The main focus of behavioural incidence studies was to study if user fees alter the demand for publicly provided services. The method requires estimating econometrically the effects of public expenditures on welfare while controlling for other factors which could also be influencing outcomes. Although it is thought to be a better way of examining the redistributive impacts of public spending policies since it has stronger theoretical grounds, the method is more data demanding (particularly information on price or/and fee of services) than the non-behavioural benefit incidence which makes it less possible to apply for most of the developing countries (including Turkey). The estimation based approaches are also criticised on the fact that they require strong assumptions about the functional form for household decisionmaking and about the distribution of the error term (Selden Wasylenko, 1993; Van de Walle, 1998; 2003). Additionally, it is warned that "the private willingness to pay of the household decisionmaker may not be a good indicator of the social benefit derived from -a public service- in the presence of externalities or intrahousehold inequity" (Selden Wasylenko, 1993: 180).

Despite their limitations, it is thought that benefit incidence studies provide a useful first look at the allocation of government expenditure among households. The advantage of benefit incidence analysis is that it allows us to focus on the important issues of how effectively public expenditure programmes target the poor by focusing on different rates of usage of publicly provided goods and services. Additionally, it is worth seeing how specific components of public spending are distributed across key socio-economic groups of interest. We cannot apply the behavioural benefit incidence approach in the thesis mainly because of the data limitations for Turkey. We do not have any information on fees for public services which is compulsory information to estimate demand for the public services with the behavioural benefit incidence. Moreover, there is evidence that the two methods may not lead to substantially different conclusions. Younger (1999 and 2002), applying both methods for education and health services in Ecuador and Peru, found that they gave consistent results and concluded that *"if one's main interest is to order public services by their progressivity, it does not matter which method one uses to value public services"* (Younger 1999: 339). So this also makes us less worried about the reliability of our results.

3.2.1 Choosing the Welfare Indicator

Before discussing the indicator of welfare, it is necessary to discuss which unit of analysis should be used. The main concern of theoretical welfare economics and measurement methodologies is the well-being of individuals. However, from the empirical point of view, households become much more appropriate units to focus on, particularly for developing countries. The family unit[7] is typically viewed as the most appropriate unit of measure because of the income or consumption-sharing phenomena (economies of scale) that occur within families. Moreover, as opposed to income, the data on consumption is collected generally at the household level as it is too difficult to identify the consumption of each household member. However, there are three problems with using family units. The first problem concerns the heterogeneity of household units in terms of size and demographic indicators. The second problem is the fact that household expenditure rises with household size, but not as rapidly. It is found that large households are overrepresented among the poor. The third problem is an unsolved issue in empirical micro studies, namely intra household allocation. Even if it is known that inequalities in the intra-household allocation of household welfare are very common in every society, particularly in developing countries, it cannot be identified empirically by the data researchers generally use. Hence, if we pay attention only to household total welfare, we can easily conclude that inequalities in the income distribution of the society in question and poverty are lower than they are in fact. Moreover, because of the variations between households in terms of household size, the direct comparison of the

[7] The definition of household or family unit varies across different surveys. The 2003 HICES defines household as a unit in which individuals live and eat together; share their incomes and attain the administration of the household together regardless if they have any "blood relation" or not.

welfare levels of households might give unreasonable conclusions. In order to make welfare comparisons among families with different sizes and demographic indicators, the common practice is to convert each family into a certain number of “equivalent adults” by the use of some “equivalence scale” (Deaton, 2000: Chapter 3 and 4). Nevertheless, data restrictions and targets also determine which unit will be chosen. We are using household as a unit of analysis to capture two related facts about Turkish society: first income-consumption sharing phenomena in households is still valid even for households in urban areas; second – related to the first - family relations are culturally important in Turkey[8].

In the literature, there are two main theoretical approaches in defining welfare or living standard of an individual: 1) the welfarist approach and 2) the non-welfarist approach. The welfarist approach is based on the utility level of an individual who is able to assess her/his utility level rationally. On the other hand, the non-welfarist approach may pay little or no regard to information on utilities. For example a non-welfarist poverty assessment may thus deem that the poor are better off even if the poor do not agree (Ravallion, 1992). In that sense, A. K. Sen’s capability approach is the most important, non-welfarist alternative way in assessing individual well-being. According to this approach, the well-being of an individual cannot be reduced to having some commodities. Sen (1984, 1985) argues that this approach is “commodity fetishism” and people should have what they need to be capable to protect them from deprivation. In other words the living standard should cover also the right of being able to live long, being well-nourished, being healthy, being literate, and taking part in the life of the community. Sen has argued that poverty should be defined in terms of a fixed set of "capabilities"-the activities a person is able to perform. By this view, the commodities needed to attain those capabilities may vary, but the capabilities do not. This approach is also called the human development approach and is accepted by United Nations

[8] Households with individuals living alone or living with housemates account for only 4 percent of total households. Indviduals over 18 years old tend to live with their parents until they get married if they live in the same city. 43% of total households have at least one family member over 18.

Development Programme[9]. This method is also known as a non-money metric, in contrast with money metric methods, which use only consumption and income as welfare indicators.

There are two main, widely used, welfare indicators in the money metric method, namely total expenditure on consumption and total income. It is thought in the literature that consumption is superior to income. Two reasons can be put forward to support this view. The first relies on Friedman's (1957) permanent income hypothesis. Consumption is seen as a better measure of lifetime welfare than is current income, because of the consumption smoothing behaviour of individuals. Jorgenson (1998)[10] argued that consumption is an excellent proxy for household resources since the transitory component of consumption is relatively small. In the absence of reliable data on lifetime income, it has been generally thought that current consumption is a better indicator of permanent income (Fields, 1980: 140-142). The second reason is based on data quality. Although measurement difficulties such as imputations (for such as in-kind incomes and own-productions), recall bias, seasonality, and long questionnaires apply to both income and expenditure, it is commonly accepted that income is more sensitive than consumption in most respects. As Deaton (2000: 29) puts it: *accurate estimates of income also require knowledge of assets and their returns, a topic that is always likely to be difficult, and where respondents often have incentives to underestimate.* This is a more serious problem for families engaged in agricultural activities since they are required to have proper accounting systems to obtain profits over agricultural activities, which is not the case for small-scale farmers in most developing countries.

Despite of advantages of using consumption, this choice is criticized on the grounds that it does not consider the impact of saving behaviours and the accumulation of wealth, which is a very important element affecting inequality. It is known from empirical work that consumption generates lower inequality than income does; and this is the case for Turkey too. The impact of wealth accumulation and high savings of rich households are thought to

[9] See Anand and Ravallion (1993) for discussion on reflections and difficulties of the capability approach.

[10] Jorgenson (1998) was cited in Liberati (2001:84)

lead to consumption measures' underestimating inequality. However, it is also widely accepted that rich households tend to underreport their incomes to hide their true income for a number of reasons. Properly working credit markets are crucial for individuals to smooth their income. Another important criticism against using consumption as an indicator of permanent income argues that in developing countries credit market imperfections prevail, so individuals are not as successful as developed country counterparts to smooth their consumption. This criticism can be answered by the existence of informal or nonmarket borrowing opportunities[11] in developing countries. In light of all these advantages and disadvantages of both indicators, it appears that the choice of welfare indicator should not be made only on the basis of theoretical considerations, the data quality and country facts should also be taken into account. In order to decide which welfare indicator should be used; we therefore need to explain the data we will use in this study.

3.2.2 The 2003 HICES Data

The basic data are the Household Income and Consumption Expenditure Surveys (HICES), conducted by the Turkish Statistical Institute (Turksat) to measure households' living standards and utilization of public services. The HICES data were collected for 1994, 2002, 2003, 2004, 2005 and 2006. The sample of HICES was designed to be representative of the population of Turkey, and two of the surveys - 1994 and 2003 - are also regionally representative. Moreover, all of them provide reliable information needed for an urban-rural[12] breakdown and they have information at both individual and household level. The HICES are detailed consumption and income surveys that provide a very wide range of information about households' consumption patterns and individuals' income and wealth sources. Income (consumption) data provide both cash and in-kind income (consumption), which is particularly important to measure the welfare of households/individuals who live in

[11] See Besley (1995) for an analysis of informal or nonmarket credit institutions in developing countries.

[12] The provinces whose population are at least 20,001 are called urban whereas provinces whose population is equal to or lower than 20,000 are called rural.

rural areas. Individual income data (both monthly and annual) is provided by sources of income such as wages and salaries, public and private transfers, entrepreneurial, agricultural and rental income. The data also provide reliable information about the social status of individuals/ households.

In this study, we are only using the HICES 2003. The HICES is the latest regionally representative household survey and we especially need regional representativeness to use regionally disaggregated government expenditures to capture variations in the quality of the public services examined. It may be useful to explain the data collection methodology of the HICES 2003. The HICES was applied monthly to about 2160 households, differing every month between January 1st and December 31st in 2003, yielding a total sample size of about 25,920 households. The households in the survey were visited four times in a month. This data collection methodology may cause some problems in consumption data (particularly when price differences are important across months in a year), since we do not know which households were interviewed in which month[13]. The quality of the survey data are, however, “ambiguous” according to the OECD standards—the total disposable income data gathered through the surveys were about 50-60% of the national income for the corresponding years (Yükseler and Zafer 2008; Duygan and Güner, 2006).

The HICES have both income and consumption data. Income data shows both monthly and annual incomes. For monthly incomes, individuals were asked how much their monthly salary or earnings (net of taxes) were in the month they were interviewed, whereas for annual incomes, individuals were asked how much they had earned in the last 12 months (net of taxes). Since the households interviewed were different for every month, and Turkey has a high rate of inflation[14] the data provides a price index to bring the annual incomes of households interviewed in 12 months to a comparable level at the end of year 2003. We think that annual income is much more comprehensive than monthly income as monthly

[13] See Yükseler and Türkan (2008) for more information on the HICES.
[14] Consumer Price Index was 29.7 and 18.9% in 2002 and 2003 respectively.

income does not have information on some sources of income such as premiums for wage earners. Another important point worth mentioning is that although individuals may have been unemployed in the month they were interviewed, so that they may have reported zero monthly income, this does not mean necessarily that that household is poor[15].

The 2003 HICES data have very detailed consumption data at the household level. Household food and non-food consumption is recorded only monthly. The consumption data have records on 1,408 food items and 537 non-food items with information on whether the items were obtained from markets, own-production, or individuals/public institutions as a gift or transfer. The consumption data was gathered together from a recording book in which each household had to record their consumption over the month. The households were visited four times during the month to check recordings. Because of this data collection method for consumtion data, we think the consumption data have fewer recall problems – and so are more reliable - than annual income data.

We use one year cross-sectional data and aim at attaining not only the trends in redistributive impacts of public policies in 2003 but a general trend valid for today's Turkey. Therefore, for the reasons we explained above and in accordance with our aims in this study we use household expenditures as a welfare indicator. However, to consider the effects of economies of scale and the different consumption needs of different household members, household size is converted into adult equivalent (AE) using the following formula for the household *i*:

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

where A_i is the number of adults in the household, C_i is the number of children, and α and θ are parameters. Children are individuals aged 14 and below. We apply a value of θ=0.6 and

[15] For these reasons, we use annual disposable incomes (including imputed rent in addition to earnings of individuals) in the tax incidence chapter to estimate tax liabilities for direct taxes.

α=0.9 following World Bank (2005). Adjusted adult equivalent size of the household *i* (AE^*_i) following Deaton and Zaidi (2002) is defined as:

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

where A_0 and C_0 are the number of adults and children in the "pivotal" households (average number of adults and children in Turkey) 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. As can be seen from Table 3.3, mean household size is 4.13 for Turkey.

3.2.3 Determining User of the Services and Unit Cost of the Services

Government expenditures on education are classified into three categories: Primary, secondary, and higher education, which includes both university and non-university (vocational) higher education. The Ministry of National Education (MONE)'s annual spending is used for the spending on primary and secondary education, and the spending by the Higher Education Council (HEC) and public universities for higher education. The data on annul spending of MONE, HEC and public universities were obtained from the Turkish Ministry of Public Finance.

Government subsidies for services vary significantly by region. MONE's annual spending at regional level enables us to take into account regional disparities in providing public education services. Table 3.1 below presents MONE's spending by program in 2003[16]. The largest share (65 percent) of the total spending by MONE goes to primary education. By ignoring MONE's spending on higher education (only 0.46 percent), we allocate the rest of the MONE spending to secondary education (35.5 percent).

[16] To attain this table, we allocate MONE spending on general administration to primary and secondary education equally.

As for higher education services, we have the total spending of HEC and that of each public university. We aggregate total expenditures of public universities regionally and then allocate the total spending of HEC to each region according to percentage share of each region's public universities in total expenditure of public universities. Since we do not know which university higher education students in the survey are enrolled in, we assume that they are going to local universities. This assumption enables us to allocate the total higher education spending of each region to higher education students who are assumed to go to universities in that region. The calculated regional monthly average government expenditure per student on primary, secondary and higher education are given in Table 3.2.

Table 3.1: MONE Expenditures by Program, 2003

Trillion TL	**2003**	**%**
Basic Education[1]	6,926,980	65.42
Secondary Education[2]	3,612,531	34.12
Higher Education[3]	48,836	0.46
Total	10,588,348	100

Source: MONE, 2003-2004 Statistics

Notes: [1]Includes pre-school education and half of the spending on general administration
[2]General and Vocational-Technical High Schools and Non-Formal Education and half of the spending on general administration
[3]Expenditures on Higher Education made by the MONE, additional to that by universities

Table 3.2: Average Per Student Monthly Government Spending on Education, by Region, Turkey, 2003 (Million TL)

Regions	Primary	Secondary	Higher Education
Istanbul	41	63	152
West Marmara	71	107	218
Aegean	63	104	257
East Marmara	66	87	354
West Anatolia	65	106	303
Mediterranean	54	101	194
Central Anatolia	57	105	281
West Black Sea	73	136	193
East Black Sea	61	102	139
North East Anatolia	55	123	370
Central East Anatolia	47	96	275
South East Anatolia	36	154	195
Turkey	57	107	233

In order to apply the benefit incidence methodology, we first rank households into welfare deciles by total per adult equivalent monthly household expenditure. In the second step, we draw on information on household level participation from 2003 HICES to check numbers of beneficiaries in each decile and each region.

We calculate average unit costs for primary, secondary and higher education. For primary and secondary education, we divide total regional government expenditure on education services by the total number of beneficiaries (enrolled students) in each region to obtain per student 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 that all beneficiaries in each region receive the same average benefits. The general formula for calculating unit cost of primary, secondary and higher education and the value of the total primary, secondary and higher education is given below. The subsidy imputed to group *j* (S_j) depends on *s,* the unit cost of education services, *E,* total government expenditure, and N, the total number of beneficiaries for each education service.

$$s_i = \frac{E_{ik}}{N_{ik}},$$

$$S_j \equiv \sum_{k=1}^{8} \sum_{i=1}^{3} s_i * N_{ijk}$$

where *i* indexes education levels: primary, secondary education and higher education; *k*, 12 geographical regions of Turkey.

An important deficiency of HICES is that we do not have information on which students are going to private schools. Households are asked only if they have any child in a private school, not how many are enrolled in a private school (if the family has more than one child going to school). Therefore, we assume that students in households saying “yes” to this question are private school students and we exclude them from benefits of public education services[17].

After determining who attends public school, we multiply the government's unit cost of provision (average cost of the service in each region) by the number of beneficiaries in each household to impute how much each household receive from publicly provided education. We then divide this total household benefit by the equivalent adult household size to acquire per adult equivalent household benefits. In the last step, we add these per adult equivalent household benefits to household per adult equivalent (AE) monthly expenditures to obtain the distribution after education spending. The formula for after government spending allocation to the households is given below for per adult equivalent incidence. W^i is per adult equivalent monthly household expenditure after education benefits, W is the initial per adult equivalent monthly household expenditure[18], AE^* is equivalence scale and c_i is per student monthly benefit (i.e. unit cost) and b_i is the number of beneficiaries in each household.

$$W^i = W + \frac{(c_i \times b_i)}{AE_i^*} \quad i = \text{primary, secondary and higher education.}$$

These calculations provide monetary values for the education benefits received by households. The per student regional student spending was allocated to the households according to the number of students they have. Table 3.3 presents quintile shares of per capita (adult equivalent-AE) total expenditures and mean household size, mean number of primary, secondary and higher education students per household. This table gives an idea of who benefits from public education services. While per adult equivalent mean household expenditure, mean household size and mean number of primary and secondary students

[17] In HICES 2003, only 253 of 25, 920 households answered "yes" to the question of whether they have a child going to private schools. With sample weights, this number accounts for 337,726. According to MONE 231,351 primary and secondary education students were enrolled in private schools. Thus even if we do not know exactly which child in a family goes to private school, this number shows that our assumption is reasonable.

[18] In the thesis we generally use AE_EXP to refer to per adult equivalent household expenditure.

decline, mean number of higher education students increase as household per adult equivalent expenditure increases.

Table 3.3: The Distribution of Per Capita (Per AE) Monthly Total Household Expenditure and Average Numbers of Students by quintile, Turkey, 2003

Expenditure and Region	1	2	3	4	5	Turkey
Per capita expenditure as % of total	5.31	9.55	13.90	20.67	50.57	100
AE_EXP as a percentage of total	6.37	10.70	14.88	21.04	47.00	100
Mean Household per capita expenditure*	58	105	153	227	556	220
Mean AE_EXP*	65	107	147	206	452	195
Mean Household Size	5.83	4.54	3.98	3.45	2.86	4.13
Mean number of primary student per household	1.25	0.74	0.56	0.41	0.26	0.64
Mean number of secondary student per household	0.21	0.21	0.20	0.18	0.12	0.19
Mean Number of higher education student per household	0.03	0.05	0.09	0.11	0.16	0.09
% Distribution of Primary Level Student by quintile	38.8	23.0	17.5	12.6	8.0	100
% Distribution of Secondary Level Student by quintile	23.0	22.2	21.8	19.7	13.2	100
% Distribution of Higher Education Student by quintile	6.5	12.5	19.7	25.0	36.3	100

**Million Turkish Lira. Ranked by per adult equivalent household expenditure (AE_EXP)*

3.3 Education System

The Ministry of National Education (MONE) and the Higher Education Council (HEC) are the two entities responsible for determining education policies and financing and organizing the education sector in Turkey. The Public Expenditure and Institutional Review (PEIR) in Turkey carried out by the World Bank (2001) highlighted that, in 1999, about 72 percent of the allocation of public expenditures on education is directed to MONE programs, about 20 percent to higher education programs, and the residual to other institutions. Local governments also finance education in Turkey. However, since their share in total education spending is less than 1 percent in 2002 Table 3.4, we ignore total expenditures of local governments on education and utilize the total spending of MONE for primary and secondary education[19] and the total spending of HEC and public universities for higher education to calculate per student education benefits.

In Turkey, public schools for basic and higher education are the main service providers. More than 98 percent of all primary schools and 90 percent of secondary schools are public, while more than 98 percent and 97 percent of all students are enrolled in public primary and secondary schools respectively[20].

Table 3.4: Education Expenditures in Turkey, in 2002 by source

	%
Central Government Revenue	61.4
Household Funds	33.4
Foundations, Associations, Firms	1.9
International Resources	0.1
Local Government Revenue	0.9
Other Sources	2.3

Source: Chawla (2005:23)

The current structure of the Turkish education system was established during the 1997-1998 school year, with the increase in compulsory schooling from 5 years to 8 years for children aged 6-14. Upon completion of the 8-year primary school education, students may enroll in general or vocational secondary schools, usually for three years[21]. Tertiary schooling is provided by universities and by specialized vocational training academies that are either two or four years in duration, depending on the programme (Mete, 2006).

There are four different types of secondary level public schools in Turkey: general public high schools, Anatolian High Schools, Science High Schools and lower-prestige vocational schools. All children who have a primary education degree can go to a public high school (either general or vocational) without paying any fee. However, children who want to enroll in the high quality Anatolia and Science High Schools have to pass the

[19] Primary education includes both pre-primary school education and primary school education. Secondary education includes both general high schools and vocational and technical high schools.
[20] See Table A 3.2 in Appendix 3.1.
[21] In some both general and vocational secondary schools, there is an additional year to 3-year duration of secondary education in which one foreign language is thought.

Secondary School Student Selection and Placement Examination (Turkish acronym OKS). Even though these schools are also free, this exam is highly competitive and students need high scores. Entrance to university is also primarily based on a centrally administered examination, the Student Selection Exam (Turkish acronym, OSS). Grades in secondary school are the other factor that determines the overall score. This exam is extremely competitive due to the high demand for university education. The high demand for education is driven by the high young population of the country, the higher possibility of being employed and getting well-paid jobs and the prestige of being with university degree in the society. Because of this central entrance exam, private tutoring cram schools (*dershane*) are thought necessary to achieve high scores and thus enter high-quality universities. About 78 % of all undergraduate students report receiving preparatory courses in private tutoring centers in 1997. The main reason for not participating in private tutoring is generally lack of money, since they are very expensive (World Bank, 2006). Research on the economic profile of university students in Turkey showed too that in 1997, students from high-income families are much more likely to be enrolled in private universities, and they are more likely to be enrolled in "well-established" and "new and developing" public universities (World Bank, 2006).

Tansel and Bircan (2008) also examined the determinants of receiving private tutoring and getting placed in a university program by using 2002 survey of the applicants to the university entrance examination and their performance in *OSS*. The survey was conducted by the Student Selection and Placement Center (OSYM) of Turkey. According to the survey, applicants of *OSS* who receive private tutoring accounted for 45% of the total applicants and even at the low level of incomes the applicants tend to have private tutoring courses[22]. The findings of the paper shows that parents' education level, employment status and income level affect positively the possibility to receive private tutoring and also to get

[22] Tansel and Bircan (2008) reports that the percentage of the applicants who attended *dersane* was 31 % of the applicants with the lowest level of income. This rate rises to 47% for the second category of income level in the survey, which correspondes to about 225 US Dolars per month.

placed in a university program. Applicants' gender is another important factor; female applicants are less likely to access to the private tutoring. Additionally graduating from high school with high honors, honors or satisfactory degrees increase the probability of receiving private tutoring; suggesting students with higher motivation are more likely to receive private tutoring.

Although public education services dominate the education system in Turkey, out-of pocket expenditures on education may still create barriers to utilising public education services for people with low-income groups, which we have seen clearly for higher education services above. Even if the tuition fees for public universities are nominal in Turkey, getting placed in a public university requires household private expenditures on education. Household private expenditures on education by deciles and regions are reported in Table 3.5 below and Table A 3.3 in Appendix 3.1.

Before moving onto the analysis, it is worth noting that reported education expenditures in HICES include only direct expenditures on education such as tuition fees (for public higher education institutions and private schools) and grants by households. For example, transportation and school clothes are not included in the households' spending on education, since they are recorded in general transportation or clothes expenditures. Hence, unfortunately, the data do not allow us assess the real impact of out-of-pocket expenditures. However, we can interpret these tables in the way that they present school fees for either private or public schools[23].

Household private expenditures for all education levels increase steadily with income for all deciles. According to Table 3.5, 70% of total household expenditures on primary and secondary education come from the richest decile, suggesting that the rich prefer largely to use private education services rather than public or their children are

[23] For public primary and secondary schools there is no legal fee. However, due to the financial problems schools face, they ask for grants/donations from households. For universities and non-university higher education institutions there is a legal tution fee, whose amount changes according to the department.

enrolled in high quality city public schools which demand high grants from households. The second part of the table includes percentage shares of household expenditures on each education level in total household education expenditures by deciles. Households' higher education expenditures are higher than their expenditures on primary and secondary levels. The national university entrance exam is the main reason behind this. When we look at household expenditures on education regionally, we see that rural Turkey, especially households living in East Anatolia and South East Anatolia are the most dependent on public education services in the sense that they have the smallest shares in the total private expenditures on education despite of the high student numbers in these regions (Table A 3.3 and Table A 3.4).

Table 3.5: Monthly Household per Adult Equivalent Expenditure (AE) on Education As a percentage of total , by decile, Turkey, 2003

Expenditure &Deciles	1	2	3	4	5	6	7	8	9	10	Turkey
Primary Education	0.2	0.3	0.7	1.4	1.8	5.7	3.9	7.1	8.8	70.2	100
Secondary Education	0.3	0.5	1.3	0.7	2.8	2.8	4	6.9	10.8	69.9	100
University Education	0	0	0.2	0.8	1.1	1.6	2.2	3.2	10	80.9	100
Non-University Higher Education	0.3	0.3	1.1	3.2	3.6	5.8	9.5	13.4	22.2	40.6	100
Higher Education*	0.2	0.1	0.6	1.9	2.3	3.6	5.6	8	15.7	61.9	100
Education Materials	3.7	5.5	6	7.9	7	8.7	9.8	11.4	13.5	26.5	100
Pre-School Education	0	0	1.1	0	0	0	5.3	7.5	3.7	82.4	100
Other Education	0.1	0.3	1.1	1.7	2.8	2.9	3	5.6	15.5	67.1	100
Total Education Expenditure	0.4	0.6	1.2	2.1	2.7	4.1	5.2	7.8	13.7	62.2	100
% of Expenditures in Total Education Expenditure											
Primary Education	5.2	6.7	8.7	9.4	9.8	19.8	10.6	12.8	9.1	16	14.2
Secondary Education	9.2	12.2	17.1	4.8	15.8	10.3	11.3	13.3	11.9	16.9	15
Primary&Secondary Education	14.3	18.9	25.8	14.2	25.7	30.1	21.9	26.1	20.9	32.9	29.2
Higher Education	21.5	13.1	29.9	52.1	47.9	49.6	60.2	57.9	64.3	56	56.2

**University+Non-University Higher Education*
Ranked by per adult equivalent household expenditure

3.3.1 Enrolment Rates and the Quality of the Services

Tansel (2002), Hoşgör and Smits (2006) and Bakis et. al. (2009) studied the determinants of educational attainment in Turkey for the years 1994 and 2003 at the primary and secondary levels. They have found that parents' education and income level, gender and regional differences are the most important factors affecting the schooling trends in Turkey. In this section, we will examine enrolment rates in Turkey by considering these factors to draw a map on the characteristics of the users of public education services.

Although average years of schooling have been increasing in Turkey (Table A 3.5 in Appendix 3.1), there are still inequalities among regions and gender. It seems that economic conditions affect the quality of education and the likelihood of access to education at every level of education. Poor children who have little chance to access high quality primary schools and are unable to afford expensive private tutoring for the central exams have a much lower likelihood of passing the OKS and the OSS. Household income seems to play a large role in determining access to all levels of post-compulsory education. In this section, we present enrollment rates by several socio-economic indicators such as welfare level (by per adult equivalent expenditure quintiles), parental schooling, gender and region. These factors seem to affect enrolment conditions of children.

Enrolment rates (percentage of relevant age group declared as enrolled) for each education level were calculated using the following formula:

$$e_{ijk} = \frac{S_{ijk}}{C_{ijk}} \times 100$$

, i= *primary, secondary, primary+secondary and higher education*

j*: quintiles from 1 to 5*

k: female and male

where e is the enrolment rate, S is the total number of female/male students in each quintile for each education level, and C is the total number of children whose age corresponds to the education level in question. For primary education, the school age is 6 to 14 years, while for secondary and higher education the ages are 15 to 17 and 18 to 23 years respectively. We calculate a second enrolment rate for secondary and higher education levels by excluding children who do not have a primary (secondary) level diploma from the secondary (higher education) school age group.

We calculated a summary statistic (GDR) to see the level of gender differences in enrolment rates:

$$GDR = \left(\frac{\text{Percentage of female students who are not enrolled}}{\text{Percentage of male students who are not enrolled}} \right)_{ij} = \left(\frac{1 - f_{ij}}{1 - m_{ij}} \right)$$

where f_{ij}, (m_{ij}) is percentage of female (male) enrollment at level *i* in quintile *j*.

Therefore, if *GDR* is equal to one, there are no differences in enrollment rates by gender. However, if GDR is larger than one, GDR shows the extent of the gap between female and male enrolment rates.

Table A 3.6 and Table A 3.7 in Appendix 3.1 present the number of students and school age groups as a percentage of the total by deciles and education level. These tables indicate that lower deciles have more school age children, for all levels of education, which would affect the distributional impacts of education benefits. However, as we will see with the enrolment rates, Table A 3.6 shows that households in the lower deciles are less likely to send their children to higher level school after 8-year compulsory primary education, even if we exclude individuals without primary (secondary) education from secondary (higher) education age group (4th and 5th Columns in Table A 3.7).

Enrolment rates are provided in Table 3.6 and Table 3.7 by expenditure quintiles, education level and gender. Enrolment rates for primary, secondary and higher education in Turkey are 96%, 72% (86%)[24] and 24% (48%). When we look at expenditure quintiles, we

[24] Enrolment rates according to the second definition in parentheses, i.e. percentage of eligible age group enrolled.

see that enrolment rates in the first quintile are lower than the average enrolment rate and the difference between the poorest and richest quintile is high for all levels of education. As expected, secondary education enrolment rate is lower than that of primary education. Although public schools at primary and secondary levels are free for all citizens and public higher education institutions demand low tuition fees, these rates reflect the fact that the welfare level of households is still an important factor affecting access to public education services.

Another important observation we can make from these two tables is that the differences in enrolment rates between genders are still a problem for poorer parts of Turkey. While 88% of female primary school age children in the first quintile go to school, this rate is 95% for male primary school age children. This difference increases with education level, but the enrolment rate difference between sexes declines with income. The female enrolment rate for higher education is 4.5 percent for the poorest quintile, whereas the female enrolment rate for higher education is 49 percent for the richest quintile.

For the richest quintile, some enrolment rates are more than 100 percent. The reason for this is that higher quality secondary schools, that are Anatolia and Science High Schools, and private secondary schools last 4 years instead of 3 years and private primary schools also last 9 years instead of 8 years, as those have an extra class for foreign language education. Therefore, since we did not include 15 year old children in the primary school age group and 18 year old children in secondary school age group, in the richest quintile we had more than 100 percentage enrolment rates.

Table 3.6: Enrolment Rates, by quintiles

Education Level		1	2	3	4	5	Turkey
Primary		91.6	97.0	98.0	97.4	99.5	95.7
	Female	88.2	94.4	98.1	96.9	99.7	93.9
	Male	94.9	99.6	97.9	97.9	99.3	97.4
	GDR	**2.3**	**12.6**	**0.9**	**1.4**	**0.4**	**2.4**
Secondary		49.1	65.8	76.4	91.0	102.3	71.8
	Female	38.0	57.1	70.4	85.6	101.1	63.7
	Male	62.7	74.9	82.6	96.6	103.5	80.6
	GDR	**1.7**	**1.7**	**1.7**	**4.2**	**0.3**	**1.9**
Prim./Sec.		80.1	86.7	90.1	92.9	96.8	87.3
	Female	74.0	82.3	87.5	91.5	95.9	83.4
	Male	86.3	90.9	92.6	94.2	97.7	91.1
	GDR	**1.9**	**1.9**	**1.7**	**1.5**	**1.8**	**1.9**
Higher Education		5.7	11.6	20.9	30.7	60.3	23.7
	Female	4.5	7.8	15.6	24.9	48.8	18.2
	Male	7.3	16.7	28.5	38.0	74.3	31.2
	GDR	**1.0**	**1.1**	**1.2**	**1.2**	**2.0**	**1.2**

Notes: Ranked by per adult equivalent household expenditure

Table 3.7:Enrolment Rates with only the children who have primary (secondary) degree, by quintiles

Education Level		1	2	3	4	5	Turkey
Secondary		65.52	79.41	88.10	100.85	109.59	85.66
	Female	53.21	71.17	82.73	96.48	109.08	78.36
	Male	79.16	87.54	93.45	105.16	110.09	93.10
	GDR	**2.2**	**2.3**	**2.6**	**-0.7**	**0.9**	**3.1**
Higher Education		22.03	27.89	40.76	49.72	79.93	48.01
	Female	22.88	23.02	33.60	42.77	68.12	41.70
	Male	21.30	32.20	48.85	57.58	92.93	54.57
	GDR	**1.0**	**1.1**	**1.3**	**1.3**	**4.5**	**1.3**

Notes: Ranked by per adult equivalent household expenditure

We know from the literature that there is a close relationship between the education level of parents and that of children. Table 3.8 shows percentage of children of the household head and his/her partner who are not students classified by education of the household head and his/her partner[25]. According to this table, more than half of the population has only a primary level diploma. The illiteracy rate is 6.3% for household heads and 18.5% for their

[25] In HICES 2003, the person who earns the highest income is called the household head. In Turkey, the household head is generally also the father of the family.

partners (mostly women). Table 3.9 shows the importance of parental schooling: Illiterate household heads are not sending 27 percent of their children to primary school, and this rises to 68 percent for secondary school. As education level of parents increase, percentage of children not enrolled decreases very sharply. Parents' education level and welfare level are also in close relationship. Almost 60% of illiterate people are in the poorest first three deciles, whereas 50% of people with higher education is in the richest 10th decile.

Gender discrimination is also very clear for uneducated families. While 38 percent of male children of illiterate household head are not enrolled in primary school, this percentage rises to 71 percent for female children for primary school. For secondary school the rates become much higher: 67% of children of illiterate household heads are not enrolled and this is 76 and 56 percent for female and male children. Education level of mothers follow very similar pattern. However it seems that gender discrimination is less intense for households with educated mothers than with educated fathers.

Regional disparities are another important issue. As can be seen from Table 3.10, while enrolment rates are above the national average in Istanbul, Marmara, Aegean, Central Anatolia, Black Sea and Mediterranean regions for primary and secondary education; East and South East Anatolia, the poorest regions of the country, have the lowest enrolment rates for all educational levels. We also see from the table that female children living in East and South East Anatolia seem to have less chance to go to school than female children in other regions; GDR is higher in those regions for primary education than the average for Turkey. However, for secondary and higher education, East and South East Anatolia have GDR ratios below the national mean. We can interpret these numbers as showing that in those poorer regions only educated and relatively richer households can send their children to secondary and higher level schools and they do not exercise gender discrimination. What these descriptive statistics confirm, as would be expected, is that school attendance is low and the difference in enrolment rates between sexes is high for children in poor, uneducated households.

Table 3.8:School Attendance by Parental Schooling

			Primary Education				Secondary Education			
		Household Size	Percentage of Children Aged 6-14, Who Are Not Students				Percentage of Children Aged 15-17, Who Are Not Students			
Education Level of Household Head	**%**	**Mean**	**Both Genders**	**Male**	**Female**	**GDR**	**B. Genders**	**Male**	**Female**	**GDR**
Illiterate	6.3	4.72	11.81	9.57	13.84	**1.45**	13.4	12.72	13.83	**1.09**
Literate without diploma	5.35	4.38	5.79	5.08	6.42	**1.26**	9.88	9.71	9.99	**1.03**
Primary	62.31	4.31	64.81	67.34	62.52	**0.93**	69.94	70.77	69.41	**0.98**
Secondary	16.49	3.81	13.55	14.11	13.04	**0.92**	5.58	5.51	5.63	**1.02**
Vocational Higher Education	1.91	3.5	1.12	1.38	0.88	**0.64**	0.15	0.23	0.1	**0.43**
Higher Education	7.65	3.4	2.92	2.51	3.29	**1.31**	1.05	1.06	1.04	**0.98**
Turkey		4.13								
Ed. Level of Household Head's Partner	**%**		**Both Genders**	**Male**	**Female**	**GDR**	**B. Genders**	**Male**	**Female**	**GDR**
Illiterate	18.54		33.14	27.95	37.91	**1.36**	40.14	38.87	40.92	**1.05**
Literate without diploma	7.39		8.09	8.29	7.91	**0.95**	9.68	8.36	10.5	**1.26**
Primary	59.19		50.72	56.29	45.61	**0.81**	48.7	51.12	47.2	**0.92**
Secondary	10.47		6.47	5.74	7.15	**1.25**	1.36	1.53	1.26	**0.82**
Vocational Higher Education	1.13		0.43	0.68	0.21	**0.31**	0.01	0.03	0	**0.00**
Higher Education	3.28		1.14	1.05	1.22	**1.16**	0.1	0.09	0.11	**1.22**

Table 3.9: School Attendance by Parental Schooling

			Primary Education				Secondary Education			
		Household Size	**% of Non-enrolled Children of Parents**				**% of Non-enrolled Children of Parents**			
Education Level of Household Head	**%**	**Mean**	**Both Genders**	**Male**	**Female**	**GDR**	**B. Genders**	**Male**	**Female**	**GDR**
Illiterate	6.3	4.72	26.67	38.2	71.37	**1.87**	67.82	56.69	76.46	**1.35**
Literate without diploma	5.35	4.38	18.32	34.17	60.48	**1.77**	60.01	44.86	75.54	**1.68**
Primary	62.31	4.31	15.57	26.65	34.79	**1.31**	38.97	31.87	45.43	**1.43**
Secondary	16.49	3.81	14.51	17.38	22.7	**1.31**	15.88	12.07	19.69	**1.63**
Vocational Higher Education	1.91	3.5	13.02	16.97	12.13	**0.71**	4.82	6.27	3.64	**0.58**
Higher Education	7.65	3.4	9.71	10.51	15.14	**1.44**	8.26	6.38	10.16	**1.59**
Ed.Level of Household Head's Partner	**%**		**Both Genders**	**Male**	**Female**	**GDR**	**B. Genders**	**Male**	**Female**	**GDR**
Illiterate	18.54		22.45	34.12	59.28	**1.74**	57.46	44.25	69.73	**1.58**
Literate without diploma	7.39		18.76	29.45	46.79	**1.59**	47.45	36.72	55.80	**1.52**
Primary	59.19		13.89	23.60	27.23	**1.15**	31.19	25.74	36.38	**1.41**
Secondary	10.47		13.66	12.98	20.09	**1.55**	8.85	7.97	9.65	**1.21**
Vocational Higher Education	1.13		7.54	12.23	5.36	**0.44**	5.49	1.47	9.30	**6.35**
Higher Education	3.28		11.12	10.68	14.53	**1.36**	3.82	1.55	5.89	**3.79**

Table 3.10: Enrolment Rates by Region and Gender

	Primary				Secondary				Higher Education			
	B.Genders	**Female**	**Male**	**GDR**	**B. Genders**	**Female**	**Male**	**GDR**	**B. Genders**	**Female**	**Male**	**GDR**
Istanbul	97.35	97.26	97.43	**1.07**	86.34	85.27	87.43	**1.17**	39.54	35.04	45.38	**1.19**
Marmara	97.71	98.88	96.61	**0.33**	85.6	79.5	92.48	**2.73**	22.72	16.34	31.95	**1.23**
Aegean	96.39	95.34	97.48	**1.85**	78.15	72.24	83.75	**1.71**	26.44	21.95	31.92	**1.15**
Black Sea	97.75	97.33	98.17	**1.46**	72.42	63.97	81.7	**1.97**	15.95	10.86	24.53	**1.18**
East Anatolia	92.31	87.72	96.52	**3.53**	65.81	49.15	82.74	**2.95**	15.39	9.64	23.35	**1.18**
Central Anatolia	98.52	98.72	98.33	**0.77**	75.04	64.11	87.47	**2.86**	29.22	24.16	35.79	**1.18**
Mediterranean	97.29	96.73	97.83	**1.51**	73.24	68.2	79.38	**1.54**	20.65	14.51	29.11	**1.21**
S. East Anatolia	88.86	79.65	96.88	**6.52**	34.13	22.93	46.69	**1.45**	10.79	5.11	18.16	**1.16**
Turkey	95.69	93.85	97.42	**2.38**	71.83	63.72	80.62	**1.87**	23.67	18.17	31.16	**1.19**
Second Definition of enrolment rates												
Istanbul	97.35	97.26	97.43	**1.07**	96.25	95.58	96.91	**1.43**	64.81	58.13	73.27	**1.57**
Marmara	97.71	98.88	96.61	**0.33**	95.74	90.76	101.13	**-8.18**	41.18	34.1	48.66	**1.28**
Aegean	96.39	95.34	97.48	**1.85**	87.49	82.34	92.19	**2.26**	56.64	53.56	59.51	**1.15**
Black Sea	97.75	97.33	98.17	**1.46**	82.14	73.43	91.46	**3.11**	35.65	27.91	44.98	**1.31**
East Anatolia	92.31	87.72	96.52	**3.53**	80.82	66.27	93.18	**4.95**	38.82	35.53	40.99	**1.09**
Central Anatolia	98.52	98.72	98.33	**0.77**	84.74	74.66	95.49	**5.62**	51.64	46.58	57.06	**1.24**
Mediterranean	97.29	96.73	97.83	**1.51**	85.04	81.56	89.02	**1.68**	38.05	28.48	49.47	**1.42**
S. East Anatolia	88.86	79.65	96.88	**6.52**	61.39	43.66	79.06	**2.69**	41.47	29	49.18	**1.40**
Turkey	95.69	93.85	97.42	**2.38**	85.66	78.36	93.1	**3.14**	48.01	41.7	54.57	**1.28**

Table 3.11 shows the number of students per teacher in each region. For the regions Istanbul, East Anatolia and South East Anatolia, the number of students per teacher is higher than that of Turkish average, implying low quality in the services. Additionally, Table A 3.8 in Appendix 3.1 gives the percentage share of students and teachers by region. For the regions Istanbul, East Anatolia and South East Anatolia, the difference between the number of teachers and that of students is negative and high. This suggests that the quality of education services is the lowest in those regions. Since Istanbul is the center of industry, finance and art in Turkey, it has a serious immigration problem, especially from poorer regions of Turkey. South East and East Anatolia are the poorest regions of Turkey.

Table 3.11: The number of Students per teacher by education level and region, 2003

	Primary Education	Secondary Education
Istanbul	35.37	24.84
Marmara	24.08	16.23
Aegean	22.11	15.32
Black Sea	21.67	14.8
East Anatolia	27.65	17.81
Central Anatolia	23.87	15.62
Mediterranean	25.41	15.03
South East Anatolia	35.35	23.18
Turkey	26.49	17.1

Source: MONE 2003

3.4 Results

3.4.1 Descriptive Analysis

Before starting to apply the welfare dominance method and the progressivity indices to study the distributional impact of education benefits, following Demery (2000, 2003), we would like to compare the needs for the services and the actual utilization of the services to assess if the poor are well targeted by the services. We use the number of school age children by education level and decile as an indicator of the social need for the services[1]. Education benefits are equal to per student public expenditure on each education level times the number

[1] School age for primary and secondary education is between 6 and 17, for higher education it is between 18 and 23.

of students in each family divided by the equivalence scale. The upper part of Table 3.12 reports per adult equivalent household expenditure by deciles in comparison with per adult equivalent benefits by education level and deciles. The benefits of primary education decrease with deciles, suggesting that benefits are more concentrated in the lower deciles (pro-poor). On the other hand, the benefits of secondary and higher education increases with deciles. However, as percentage share of household expenditure is higher than percentage share of primary and secondary education, these two benefits have a progressive character. For higher education benefits, it seems that the middle and upper deciles receive benefits more than their expenditure share, implying regressivity to higher education. Finally, the total benefits from all levels of education are distributed proportional to the decile population, implying that the total education benefits are progressive but not pro-poor.

The bottom part of Table 3.12 presents the needs for services by decile and education level. When we compare percentage shares for education needs with percentage shares of education benefits, we see that apart from the first two deciles and the richest decile, primary education benefits are able to cover the needs of all deciles. The poorest first two quintiles receive 29.4% of total primary level benefits whereas the share of primary age children for these deciles 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 first two deciles receive 20% (4.7%) of total secondary (higher) level benefits, 29% (22.5%) percent of secondary (higher) level age group are included in these deciles. However, when we take into account children without primary and secondary level diplomas in calculating secondary and higher education needs, the difference between service needs and publicly provided benefits decreases. The numbers in parentheses in the table show the percentage of the secondary (higher education) age group who had a primary (secondary) level diploma in each decile. Even though the difference between education needs and benefits decreases with this new definition, the first four deciles still do not receive enough benefits to cover their needs for both secondary and higher education. Therefore, although benefits decrease with deciles for primary and secondary education, the poorest deciles are not well targeted; higher education benefits seem to be regressive since they are far from meeting social needs and increase with deciles. When we assess the overall education benefits, we see that benefits are distributed almost equally across the deciles, even if the deciles' share of benefits is higher than expenditure share, with the exception of the last three deciles.

Table 3.12: Education Service Needs and Per AE* Benefits, by decile % shares

Deciles	AE_EXP	Primary Education Benefits	Secondary Education Benefits	Higher Education Benefits	Total Education
1	2.51	15.12	8.83	1.6	9.58
2	3.84	14.31	11.2	3.09	10.23
3	4.85	12.45	10.19	3.88	9.37
4	5.83	10.43	10.88	6.36	9.34
5	6.83	10.43	10.34	9.19	10.04
6	8.02	9.13	10.37	9.29	9.48
7	9.49	8.57	10.9	13.19	10.51
8	11.53	7.92	10.82	13.45	10.27
9	15.04	6.62	9.64	17.97	10.71
10	32.04	5.03	6.83	21.99	10.47
Total	100	100	100	100	100
Deciles		**Number of Primary Age Children**	**Number of Secondary Education Age Children**	**Number of Higher Education Age People**	**Total Education Age Children**
1		19	15.5 (13)**	11.5 (4.4)	16.2 (15.3)
2		14.85	13 (12.8)	11 (7.4)	13.5 (13.2)
3		12.32	12 (11.5)	10.3 (8)	11.7 (11.4)
4		9.98	10.8 (10.9)	11.4 (10.3)	10.5 (10.2)
5		9.52	9.8 (9.9)	9.7 (9.5)	9.6 (9.6)
6		8.48	9.3 (9.6)	10.4 (11.5)	9.2 (9.2)
7		7.99	8.5 (9.2)	9.95 (11.6)	8.6 (8.9)
8		7.08	8.4 (8.9)	9.67 (12.9)	8.1 (8.4)
9		5.67	7 (7.8)	8.78 (12.7)	6.8 (7.3)
10		5.1	5.6 (6.3)	7.23 (11.8)	5.8 (6.5)
Total		100	100	100	100

Notes: Households were ranked by per adult equivalent total household expenditure.(AE_EXP)

**Benefits are per adult equivalent public education expenditure allocated to households*

***The numbers in parentheses show the percentage of secondary (higher education) age people who had primary (secondary) level diploma in each decile.*

3.4.2 Welfare Dominance Analysis

After these descriptive analyses, we consider benefit incidence by applying the welfare dominance analysis and statistical dominance tests. Figure 3.1 presents concentration curves for per adult equivalent education benefits with the Lorenz curve of per adult equivalent household expenditure (AE_EXP). We are interested in determining whether social services are: a) per capita progressive (i.e. the concentration curve is above the 45-degree line, implying that the poor receive more benefit than rich in absolute terms) b) are progressive (i.e. the concentration curve is above the Lorenz curve, implying that the poor benefit more in relative terms) and c) can be ranked or ordered by their degree of progressivity. According to

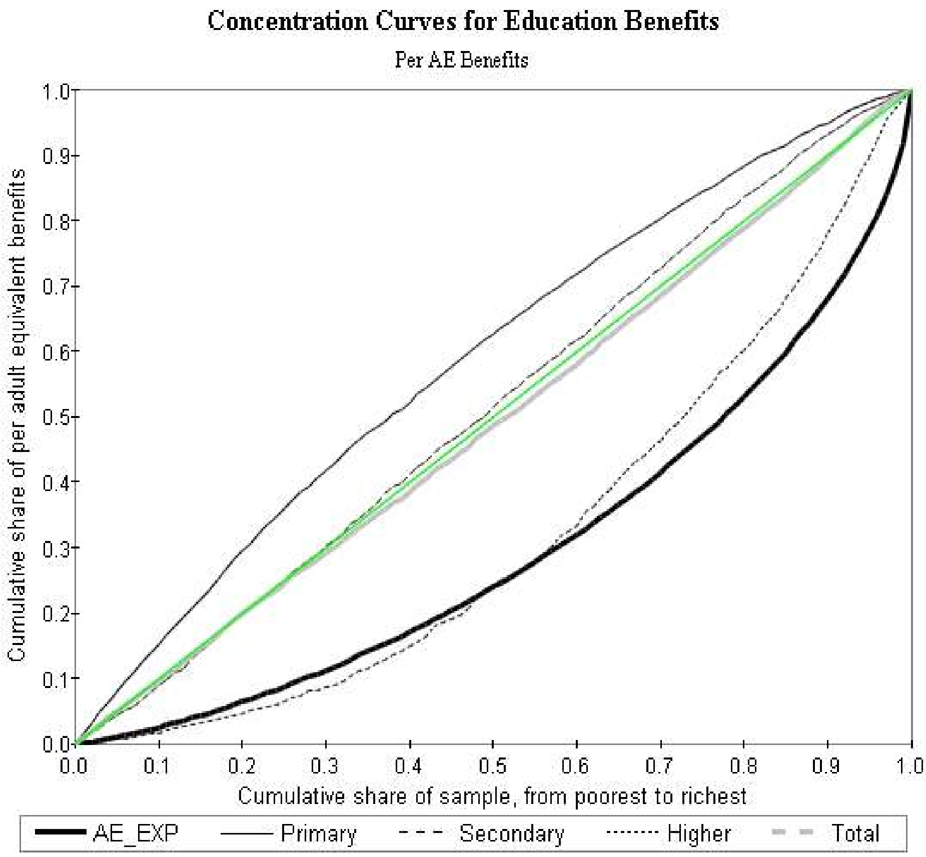
Figure 3.1Figure 3.1 primary education appears to be per capita progressive; secondary education is progressive but crosses the 45-degree line; higher education crosses the Lorenz curve; and finally the concentration curve for the total education benefits crosses the 45-degree line. As concentration curves of secondary and higher education benefits cross the 45-degree line and the Lorenz curve respectively, we have inconclusive results and need to test statistically whether these casual observations are statistically robust or not.

Table 3.13[2] reports the dominance test results for public education services for both decision procedures[3]. We use DAD software to estimate asymptotic standard errors of the differences between the ordinates of the curves. After calculating the differences between concentration curves and a concentration curve and the 45-degree line/Lorenz curve, we do a two-sided hypothesis test of whether these differences are equal to zero or not.

[2] Table A 3.9 provides the differences between ordinates of the Lorenz curve for per adult equivalent expenditure and the concentration curves for per adult equivalent benefits. Figures from Figure A 3.1 to Figure A 3.6 in Appendix 3.2 provide the differences between concentration curves and the Lorenz curve and 45-degree line with confidence interval. The figures were drawn with the help of Araar and Duclos's (2007) Stata DASP package.

[3] See Chapter 2 for the details of the welfare dominance test methodology.

Figure 3.1



Based on t-tests for the difference between ordinates of the two curves and both decision rules, we find that primary education is confirmed to be per capita progressive, that is, we reject the null hypothesis that the difference between the 45-degree line and the concentration curve of primary education is statistically zero. In other words, the concentration curve for primary education benefits dominates both the 45-degree line and Lorenz curve statistically. Secondary education benefits are progressive in the sense that the concentration curve is above the Lorenz curve and the difference between these curves is statistically significant. However, the comparison of the concentration curve for this service relative to the 45-degree line to see if the service is absolute progressive (pro-poor) delivers an inconclusive result. According to the first decision rule, it seems that the secondary education benefits are per-capita progressive. However, under Howes' criterion the test is inconclusive since we cannot reject the null hypothesis in favor of dominance for each ordinate tested. For higher education, both decision rules show that the concentration curve for the higher education benefits is dominated by the 45-degree line, but it crosses the Lorenz curve. By comparing the concentration curves of the services, we can say that the most progressive benefit is primary education, followed by secondary education services.

Table 3.13: Dominance Results for Public Education Services, (Per AE Benefits) Relative to the Lorenz Curve and the 45-Degree Line

	Per Adult Equivalent Benefits							
	Primary Education		**Secondary Education**		**Higher Education**		**Total Benefits**	
	1	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Decision rule 1	+	+	+	+	x	-	+	x
Howes' Test	+	+	+	nd*	x	-	+	x

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*

3.4.3 Progressivity Indices and the Extended Gini Test

To overcome ambiguity regarding the progressivity of higher education and secondary education benefits and also to examine the redistributive impacts and magnitude of the progressivity of the benefits, in this section we apply S-Gini progressivity indices and the extended Gini test. We report the indices for the wide range of inequality aversion parameters, ranging from 1.01 to 4. This allows us to see if progressivity and redistributive power of the benefits vary with the ethical parameter values (ρ). There are two approaches for global progressivity indices[4]: Tax Redistribution (TR-Progressivity) and Income Redistribution (IR-Progressivity). We are reporting the two most common indices, the Kakwani index of TR-Progressivity and the Reynolds-Smolensky index of IR-Progressivity, as well as the indices for redistribution and horizontal inequity. As discussed earlier, these two approaches carry different information on the progressivity of public policies. The

[4] See Chapter 2 for the approaches on progressivity.

Kakwani index measures the difference between the Gini coefficient of gross expenditures/incomes and the concentration coefficients of benefits. Hence, it deals with only the first feature of progressivity -departure from proportionality- and does not really give information on the redistributive impact of taxes and benefits in reducing inequality in net expenditures. On the other hand, the Reynolds-Smolensky index is thought to be a better tool to see not only the departure of taxes and benefits from proportionality but also their redistributive impacts since it takes into account the interaction between the distribution of benefits and average benefits as a proportion of post-transfer expenditures (Duclos 2000)[5]. The indices are zero for a proportional benefit and positive (negative) for a progressive (regressive) benefit. We report the indices of horizontal inequity (Atkinson-Plotnick Index) and redistribution in order to see the extent of inequality reducing impacts of benefits in addition to determining if they are progressive.

Table 3.14 presents S-Gini Indices at $\rho=2$ for education benefits with asymptotic standard errors estimated by DAD. As can be seen, all comparisons are statistically significant. Our aim in giving these indices is to obtain conclusive results on the progressivity of the services and their redistributive power. All indices will carry different information on the benefits in question. All levels of education and the total benefits are progressive as they have positive values for Kakwani and Reynolds-Smolensky indices and the ranking by both indices is the same: the most progressive level of education is primary, followed by secondary level, and the least progressive is higher education with a very small progressivity. If there is no reranking and no important difference between average benefits of the two benefits, the two approaches give the same ranking. The Atkinson-Plotnick index has positive numbers for all levels of education and does not alter the ranking. However, the redistributive impact estimated as the difference of Gini indices for pre-transfer and post

[5] Indices of IR-Progressivity can be defined as the products of TR progressivity indices and the average rate of taxation as a proportion of net expenditures (Duclos and Araar 2006; Kakwani, 1986).

transfer household[6] expenditure is lower. Primary, secondary and total education benefits cause 1.9, 0.7 and 2.2 percent inequality reduction respectively, whereas higher education increases inequality at 0.3 percent. Higher education has a negative estimated redistribution index because it has very small IR progressivity and the horizontal inequity rules out this progressive impact.

Table 3.14: S-Gini Indices for Benefits (ρ=2)

	Kakwani Index TR Progression	Reynolds-Smolensky IR Progression	Atkinson-Plotnick Horizontal Inequity	Redistribution
Primary	0.5770	0.0210	0.0019	0.0190
	0.007	*0.0003*	*0.0000*	*0.0003*
Secondary	0.4260	0.0090	0.0017	0.0070
	0.011	*0.0003*	*0.0001*	*0.0002*
Higher	0.0430	0.0010	0.0037	-0.0030
	0.014	*0.0003*	*0.0002*	*0.0003*
Total	0.3820	0.0291	0.0068	0.0223
	0.008	*0.0005*	*0.000*	*0.0005*

Notes: Asymptotic standard errors estimated by DAD are in italic

Although the progressivity indices with *ρ=2* provide us with information on the ranking of benefits, their progressivity and redistributive impacts, we need to test if this information is consistent with different inequality aversion parameters *(ρ)*. This will allow us to assess if we can confirm the results we have attained so far under different social welfare functions. If we can attain higher progressivity indices for one transfer for the whole range of parameters, we say that that transfer “dominates” the others. Sahn and Younger (1999) introduced the extended Gini test that the researchers can use when they face inconclusive results from the welfare dominance analysis. The test basically requires comparing the S-Gini or the extended Gini coefficient for the welfare indicator chosen and the extended concentration coefficient for the transfers for a wide range of inequality aversion parameters (from 1.01 to 4 in steps of 0.5). We apply the same procedure with a slightly different interpretation. It has been noted that the difference between the Gini coefficient and concentration coefficient for a benefit gives us TR-progressivity index. So we directly give

[6] The redistribution index can be calculated from the difference between Reynolds-Smolensky and Atkinson Plotnick indices too.

S-Gini Indices of TR progressivity for the whole range of inequality aversion parameter, which will indicate if the difference between the Lorenz curve and the concentration curve for a benefit is statistically different from zero. When TR progressivity is positive for a benefit for the whole range of the parameter, it signifies that the concentration curve dominates the Lorenz curve, so the benefit is progressive. Additionally, we give the extended Gini coefficient for per adult household expenditure and coefficients of concentration of the benefits for different inequality weights, to test if the benefits dominate the 45-degree line. If we can reject the null hypothesis of the estimated negative coefficient being zero, we call the benefit pro-poor.

To sum up, S-Gini indices of TR progressivity will provide the extended Ginis test in the sense of Sahn and Younger (1999), and provide us with summary statistics directly related to the welfare dominance analysis over a range of inequality aversion parameters. Meanwhile, S-Gini indices of IR progressivity and redistribution will show if the transfers improve inequality for the whole distribution.

Tables from Table A 3.10 to Table A 3.12 and figures from Figure A 3.7 to Figure A 3.9 in Appendix 3 provide S-Gini indices of TR and IR progressivity and redistribution and show us how the ranking of the benefits varies with values of ρ. We summarise the information in Table 3.15. With the per adult equivalent benefit method, we are still not able to reach an ambiguous result on the per capita progressivity of secondary level services, as we cannot reject the null hypothesis of extended coefficients of concentration (for the values of ρ from 2.5 to 4) being zero for the whole range of ρ (Table A 3.13); the estimated coefficients are negative, indicating that the benefit dominates 45-degree line. We have found with the welfare dominance method that the concentration curve for higher education benefits crosses the Lorenz curve. However, the extended-Gini test does not support this as TR progressivity rates for 2.5-4 of ρ are not statistically robust, which can be checked by asymptotic standard errors provided in Table A 3.10. Thus, although we cannot confirm the result of the crossing of curves we have found with Howes' test, we cannot say higher education services are progressive either, since we cannot reject the null hypothesis for all values of ρ. This may suggest that higher education may only be progressive if we put more weight on the middle and the upper parts of the distribution. In other words, if we had a social welfare function which gives more preference to the middle and higher income classes, we may draw a conclusion that higher education is progressive.

By using S-Gini indices of IR and redistribution for different values of ρ, we can confirm that primary and secondary education and the total education benefits are progressive and reduce inequality for the whole range of inequality aversion parameters. If we check the figures, the inequality reducing impact of the benefits increase with ρ for primary education, implying pro-poor characteristic; the indices for secondary level education jumps after the value 1.5, but stays almost at the same rate after 2.5, and takes an even smaller value once ρ is 4; conversely higher education services increase inequality except at ρ= 1.01, which gives more weight to the rich. However, even if the estimated indices are statistically significant, their values are very close to zero. This is not surprising as we have found with the welfare dominance analysis that the difference between the ordinates (up to 0.6) of the Lorenz curve and the concentration curve for higher education benefits is zero (Table A 3.9). The total education benefits have increasing redistributive impacts as we move to higher ρ values.

Table 3.15: The Extended-Ginis Test Results
Relative to the Lorenz Curve and the 45-Degree Line

	Primary Education		Secondary Education		Higher Education	
ρ	1	2	1	2	1	2
1.01	+	+	+	+	+	-
1.5	+	+	+	+	+	-
2	+	+	+	+	+	-
2.5	+	+	+	nd* (-)	nd (+)	-
3	+	+	+	nd (-)	nd (-)	-
3.5	+	+	+	nd (-)	nd (-)	-
4	+	+	+	nd (-)	nd (-)	-

Notes: Based on Table A 3.10 and Table A 3.13

3.4.4 Regional Level Analysis

It has been emphasized by several empirical studies on Turkey that regional disparities are an important component of income inequality and poverty (World Bank, 2003, 2005; Başlevent and Dayıoğlu, 2005). Earlier studies showed that living in certain areas affects considerably the possibility of being poor. The survey design allows for regional level analysis based on Turkey's seven geographical regions: Marmara, Aegean, Mediterranean, Central Anatolia, Black Sea, East Anatolia, and South East Anatolia; Turkey's biggest city, Istanbul, is examined separately.

Before turning to examine the distribution of benefits across geographical regions, it is worth investigating the contributions of regions to overall inequality in Turkey. Table 3.16 provides the decomposition of Gini inequality coefficient into regions. The table has information on the population and expenditure share of regions and their absolute and relative contribution to inequality. Absolute contribution is calculated by multiplying the estimated Gini coefficient for a subgroup with population and expenditure share of the subgroup; and relative contribution is obtained by dividing the absolute contribution of a subgroup by the overall Gini coefficient. The Gini coefficient for the country is 0.40. The Gini coefficient of all regions with the exception of Istanbul is smaller than the country's Gini coefficient, as expected since regional (horizontal) inequality contributes to the national Gini. Istanbul, with the highest population expenditure share, has the highest contribution to inequality, followed by Central Anatolia, Aegean, Marmara, Mediterranean, Black Sea, East Anatolia and S. East Anatolia. East and S. East Anatolia are the poorest regions with the smallest population and expenditure share, yet they have high inequality rates.

Table 3.16: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Contribution
Total Expenditure	**0.400**				
Istanbul	0.423	0.171	0.276	0.020	0.050
Marmara	0.327	0.138	0.134	0.006	0.015
Aegean	0.365	0.153	0.143	0.008	0.020
Black Sea	0.337	0.110	0.084	0.003	0.008
Central Anatolia	0.381	0.158	0.156	0.009	0.024
Mediterranean	0.375	0.134	0.120	0.006	0.015
East Anatolia	0.369	0.069	0.048	0.001	0.003
S. East Anatolia	0.363	0.067	0.040	0.001	0.002
Within-Group				*0.055*	*0.137*
Between-Group				*0.149*	*0.372*
Overlap				*0.197*	*0.492*

Notes: Total expenditure is per adult equivalent household expenditure*
Decomposition Approach: Analytical

Figure A 3.9, 10 and 11 give also some useful descriptive statistics at the regional level. According to Table 3.17 and Figure A 3.10, only Istanbul's mean expenditure/income is higher than the country's mean expenditure/income, whereas Central Anatolia (housing the capital) and Marmara's mean incomes/expenditures are almost equal to Turkey's averages. The poorest regions, South East and East Anatolia are characterized with the highest household size too, whereas richer regions (such as Istanbul, Marmara and Aegean) have household sizes under the country average. Figure A 3.11 shows that urban living standards are higher than that of rural areas.

Table 3.17: Descriptive Statistics by region, (Mean Values)

Regions	Income*	Expenditure**	Household Size	Primary Ed. Stud.	Secondary Ed. Stud.	Higher Ed. Stud.
Turkey	237	195	4.13	0.64	0.18	0.09
Istanbul	386	315	3.73	0.52	0.18	0.13
Marmara	228	189	3.79	0.49	0.19	0.07
Aegean	226	183	3.59	0.49	0.16	0.07
Black Sea	183	149	4.3	0.64	0.19	0.06
Central Anatolia	230	193	4.05	0.62	0.19	0.11
Mediterranean	219	175	4.01	0.64	0.18	0.07
East Anatolia	161	138	5.41	1.04	0.26	0.08
S. East Anatolia	118	116	5.93	1.27	0.16	0.06

** Million TL-per adult equivalent monthly income; ** Million TL-per adult equivalent monthly expenditure*

Table 3.18 compares the needs for public schools in each region and per adult equivalent benefits received by them; similarly Table 3.19 compares benefits with student numbers by region. Regions are in ascending order according to their per adult equivalent expenditure share. It is worth noting that the smallest share is received by the poorest region and the benefits increase with regions' expenditure level. According to Table 3.18, the highest share of benefits goes to Central Anatolia for all levels of education, whereas the smallest share goes to the poorest region, S. East Anatolia. However, if we do not compare benefits with either student numbers or potential users of the schools (eligible age group for each level of education), the distribution of benefits across regions would give rather little information. Therefore, the comparison between needs and benefits tells us that Istanbul, East and South East Anatolia and Black Sea do not receive enough public transfers to meet their educational needs for primary education. Although Istanbul is the richest city in Turkey, because of its immigration problem it has difficulty providing public services, particularly in poor slum areas of the city. The poorest regions of Turkey have the biggest negative gap between benefits and needs for primary education, S. East Anatolia can only cover half of its needs, whereas E. Anatolia covers 22% of its needs for primary schools.

For secondary education, Istanbul, East and South Anatolia are not able to cover their needs. Additionally, South East Anatolia seems to be the most unfortunate region for all education levels. If we look at the table closely, we see that when we exclude children without primary (secondary) degrees from the corresponding age group, the need increases for the regions such as Istanbul, Marmara, Central Anatolia, and Mediterranean which have higher enrollments rates for secondary and higher education. On the other hand, for the poor regions, S. East Anatolia and East Anatolia, the needs for secondary and higher education levels decrease as it seems the children in those regions have less opportunity to continue their education after primary level, as we noted in Section 3. Therefore, by focusing on the eligible age group for secondary education, the negative gap between benefits and needs becomes bigger for Istanbul and the positive gap for Marmara, C. Anatolia and

Mediterranean gets smaller as a result of the increase in needs. Although for the two poorest regions the negative gap becomes smaller, they still are not able to cover their needs, suggesting that the public education benefits do not target the poor effectively.

As for higher education, regions housing big public universities, such as Istanbul, Marmara, Central Anatolia and Aegean seem to receive the most benefit. The universities in these regions demand high scores from the central university entrance exam, which are hard to achieve if a student has not graduated from a high quality high school and has not attended an expensive private preparation course. These regions are also able to cover their needs, in contrast to Black Sea, Mediterranean, S. East and East Anatolia. By considering only the eligible age group, the needs for higher education increases for the regions with high secondary level graduates (Istanbul, Marmara, C. Anatolia and Mediterranean). As a result of this, while the positive gap for Istanbul becomes negative, the negative gap for Mediterranean becomes bigger. For the poorest regions, even if the negative gap gets smaller, they do not receive enough benefits to cover their needs.

Table 3.18: Education Needs and Shares of Benefits, Turkey, 2003

Regions	Primary Ed. Benefits	Secondary Ed. Benefits	Higher Ed. Benefits
S. East Anatolia	7.4	7.3	3.5
East Anatolia	9	9.1	8.2
Black Sea	13.3	13.7	5.8
Mediterranean	13.7	13.6	9
Marmara	14.2	14	15.4
Aegean	14.2	14.4	15.2
Central Anatolia	17.6	17.6	26.3
Istanbul	10.4	10.3	16.4
Regions	**Number of Primary Age Children**	**Number of Secondary Age People**	**Number of Higher Edu. Age People**
S. East Anatolia	14.35	12 (7.95)	10.6 (5.57)
East Anatolia	11.54	10.5 (10.21)	10.3 (8.26)
Black Sea	10.67	11.1 (11.71)	11.8 (10.75)
Mediterranean	13.05	13 (13.34)	12.6 (13.89)
Marmara	10.41	11.91 (12.70)	11.6 (13.02)
Aegean	11.51	11.9 (12.70)	11.27 (10.67)
Central Anatolia	14.86	15.7 (16.62)	16.9 (19.41)
Istanbul	13.61	13.80 (14.77)	14.89 (18.43)

Note: *The numbers in bracket show the percentage of secondary (higher education) age people who had primary (secondary) level diploma in each quintile.*

Table 3.19: Education Needs and Shares of Benefits, Turkey, 2003

Regions	Primary Ed. Benefits	Secondary Ed. Benefits	Higher Ed. Benefits
S. East Anatolia	7.4	7.3	3.5
East Anatolia	9	9.1	8.2
Black Sea	13.3	13.7	5.8
Mediterranean	13.7	13.6	9
Marmara	14.2	14	15.4
Aegean	14.2	14.4	15.2
Central Anatolia	17.6	17.6	26.3
Istanbul	10.4	10.3	16.4
	Number of Prim. Educ. Student	**Number of Secon. Educ. Student**	**Number of Higher Educ. Student**
S. East Anatolia	13.33	5.7	4.81
East Anatolia	11.13	9.63	6.68
Black Sea	10.91	11.23	7.98
Mediterranean	13.27	13.24	11.01
Marmara	10.63	14.2	11.17
Aegean	11.59	12.97	12.59
Central Anatolia	15.3	16.44	20.88
Istanbul	13.85	16.59	24.88

However, we need to be careful with the regional analysis for higher education services, as universities are concentrated in richer regions, which produce a bias toward the richer regions as one would expect.

In order to see if the public education services decrease the inequalities in each region and across regions, we decompose the Gini coefficient for after benefits household expenditure by regions. The tables[7] for the decomposition analysis are reported in Appendix 3.1. Table 3.20 also gives the redistribution index which estimates the difference between Gini coefficients of before and after benefits household expenditures, and summary information from the decomposition analysis for each public service. Both primary and secondary education benefits decreases expenditure inequality in the regions. The biggest inequality reduction after primary education benefits (secondary education) occurs in East Anatolia followed by South East Anatolia, Black Sea, Central Anatolia, Mediterranean, Aegean and Marmara (Central Anatolia, Mediterranean, Marmara, Black Sea, Aegean and

[7] Table A 3.14, Table A 3.15 and Table A 3.16.

Istanbul), whereas the smallest inequality reduction happens in Istanbul (S. East Anatolia)[8]. This also supports the pro-poor character of public primary education services. The comparison of Table 3.16 with Table A 3.14 and Table A 3.15 show that both primary and secondary education decrease both within and between group inequalities, but apparently the impact of primary education is bigger than secondary education which is in line with the previous results on the progressive power of benefits. Higher education either increases inequality in the regions or it has no impact (Istanbul). The biggest inequality increasing impact is seen in Central Anatolia followed by East Anatolia, S. East Anatolia, Aegean, Black Sea, Marmara and Mediterranean. It is interesting seeing that the public higher education services increase within group inequalities which we have seen with the redistribution index, yet it decreases between group inequalities. We believe that the source of this result arises from East Anatolia, the second poorest region in Turkey. New universities were opened in East Anatolia in the last 10 years to provide higher education services for the eastern part of the country.

We finally want to assess the direction of redistribution across regions with the help of a descriptive table. Table 3.21 presents the distribution of household expenditures before and after education benefits by education level and regions. Columns 3, 5 and 7 give the difference between post-transfer and pre-transfer expenditures for primary, secondary and higher education respectively. The negative difference means that after transfers the expenditure share of the region gets smaller. In other words, redistribution takes place from the regions with negative difference to the regions with positive difference. East and South East Anatolia have the lowest share of per adult equivalent expenditure, 4.83% and 3.97% respectively. Public education services seem to help mitigate inequality among regions. After per adult equivalent primary (secondary) education benefits, Black Sea, East Anatolia and South East Anatolia receive the largest shares from redistribution 0.17% (0.1%), 0.15%

[8] The difference between Gini coefficients for before and after secondary education benefits expenditure is not statistically different from zero. So secondary education does not change inequality in South East Anatolia.

(0.08%) and 0.15% (0.07%) (Column 3 and 5) respectively. Istanbul is the only region (province), whose expenditure share shrinks after primary and secondary education benefits. After higher education services, the biggest share (0.26%) (Column 7) of redistribution goes to Central Anatolia, which includes the capital of Turkey, Ankara. Three of the biggest public universities and five private universities are in Ankara. After higher education transfers, redistribution takes place from Istanbul, Black Sea, Mediterranean and South East Anatolia to other regions. While primary and secondary education redistributes expenditures to the poorer regions, so help mitigating inequality, higher education seems not to be pro-poor regionally either. Redistribution rates for rural-urban breakdown suggest that primary education is more helpful to fight against inequality in rural areas than urban areas with a higher redistribution rate. This also supports the finding regarding pro-poor feature of public primary education services. However, secondary education has a higher redistributive impact in urban areas and higher education's disequalising impact is higher for rural areas as expected.

Table 3.20: Redistribution Index by regions

	Primary		Secondary		Higher	
Istanbul	0.0096		0.0035		**0.0007**	
		0.0004		*0.0003*		*0.0005*
Marmara	0.0132		0.0056		-0.0033	
		0.0008		*0.0006*		*0.0009*
Aegean	0.017		0.0049		-0.0048	
		0.0008		*0.0007*		*0.0008*
Black Sea	0.0231		0.0055		-0.0034	
		0.0012		*0.001*		*0.0008*
Central Anatolia	0.0204		0.0072		-0.0084	
		0.0008		*0.0006*		*0.001*
Mediterranean	0.0174		0.0059		**-0.0012**	
		0.0008		*0.0007*		*0.0006*
East Anatolia	0.0306		0.0087		-0.0077	
		0.0017		*0.0013*		*0.0018*
S. East Anatolia	0.0282		**0.0023**		-0.0057	
		0.0011		*0.0012*		*0.0012*
Turkey	0.0191		0.0068		-0.0026	
		0.0003		*0.0002*		*0.0003*
Urban	0.0161		0.0072		-0.0014	
		0.0003		*0.0002*		*0.0004*
Rural	0.0230		0.0052		-0.0032	
		0.0007		*0.0005*		*0.0006*

Note:Values are the differences of Gini indices of expenditure distributions before&after education benefits. Asymptotic standard errors estimated by DAD are in italic .

Table 3.21: Redistributive Impacts of Education, by Region

Regions	1 AE_EXP	2 Exp. After Prim. Ed.	3 (2-1)	4 Exp. After Secon. Ed.	5 (4-1)	6 Exp. After High Ed.	7 (6-1)
S.East Anatolia	3.97	4.12	***0.15***	4.04	***0.07***	3.97	***-0.01***
East Anatolia	4.83	4.98	***0.15***	4.91	***0.08***	4.92	***0.09***
Black Sea	8.37	8.54	***0.17***	8.48	***0.1***	8.32	***-0.05***
Mediterranean	11.98	12.04	***0.06***	12.01	***0.03***	11.9	***-0.08***
Marmara	13.36	13.4	***0.04***	13.36	***0.01***	13.39	***0.04***
Aegean	14.24	14.25	***0.01***	14.26	***0.02***	14.29	***0.04***
Central Anatolia	15.65	15.69	***0.05***	15.67	***0.02***	15.9	***0.25***
Istanbul	27.6	26.97	***-0.62***	27.26	***-0.34***	27.32	***-0.28***

3.5 Conclusions

The aim of this chapter was to analyse the redistributive impacts of publicly provided primary, secondary and higher education services (university and non-university) in Turkey for 2003. Enrolment rates show that there are inequalities in accessing public education services regarding the factor of welfare level, gender and regions. These inequalities are important particularly for secondary and higher education.

We found that only primary education is pro-poor (benefits are absolutely more concentrated in the poor) according to the welfare dominance analysis and the extended Gini test procedure. However, the concentration curve for higher education services crosses the Lorenz curve, thus the progressivity result is ambiguous. In order to overcome this ambiguity, we estimated progressivity indices and applied the extended Gini test. The extended Gini test showed that higher education spending is progressive if higher ethical weight is attached to the upper income deciles. Therefore, under a social welfare function which puts more weight on the poor, we may conclude that higher education benefits are regressive.

By comparing Gini coefficients (*ρ=2*) for before and after education benefits expenditure, we can attain the redistributive power of public education services. Primary, secondary and total education benefits cause 1.9, 0.7 and 2.2 percent inequality reduction respectively, whereas higher education increases inequality by 0.3 percent. The magnitude of redistributive impacts is highest for primary education.

Another observation is that for secondary and higher education, the middle classes have more chance to reach public education services. It seems that the poor struggle to send their children to school after 8-years compulsory primary education. This is more the case for girls than for boys.

Regional analysis has also been conducted. According to the results of regional analysis, the poorer regions, South East and East Anatolia receive the least share of the benefits. In addition to these poor regions, Istanbul is also having difficulty covering the educational needs of its huge population. The inequality decomposition analysis shows that both the primary and secondary education services decrease both within regions and between regions inequalities, however, whilst the higher education services increase within region inequalities it decreases between regions inequalities. The reason for this finding may be that new universities have been opened in East Anatolia, the second poorest regions, in the last 10 years.

Appendix 3

Appendix 3.1: Tables

Table A 3.1: Income Shares by Education Level (as % of total income earned)

	Illiterate	Literate but No Diploma	Primary School	Secondary School	High School	University
1987	9.06	6.87	47.16	7.69	10.24	15.02
1994	5.99	4.81	45.82	8.8	14.81	17.02
2002	2.91	3.59	42.89	9.59	13.15	18.25
2003	2.58	3.09	38.92	10.59	16.57	19.56
2004	2.75	2.75	39.66	9.89	16	20.77
2005	2.82	2.87	42.42	10.13	15.46	17.76

Source: Duman (2008: 374)

Table A 3.2: The Number of Students and Schools by provider in 2003-2004 Academic Year

	Primary		Secondary	
	Student %	**School %**	**Student %**	**School %**
Public	98.42	98.3	97.35	90.88
Private	1.58	1.7	2.65	9.12

Source: MONE

Table A 3.3: Monthly Household per AE Expenditure on Education by region (% of total)

Expenditure and Region	1	2	3	4	5	6	7	8	Rural	Urban
Primary Education	44.5	9.3	10.5	6.8	10.8	16.3	0.7	1.1	8.7	91.3
Secondary Education	44.9	11.8	9.1	7.4	16.1	8.7	1.4	0.7	10.0	90.0
University Education	66.3	8.7	5.5	2.8	10.3	3.1	2.5	0.8	13.7	86.3
Non-University Higher education	14.8	11.1	12.6	17.2	18.5	15.5	5.9	4.3	19.7	80.3
Higher education*	42.2	9.8	8.8	9.6	14.2	8.9	4.1	2.4	16.5	83.5
Education Materials	25.5	11.8	12.1	9.3	16.0	14.8	5.1	5.4	25.3	74.7
Pre-School Education	1.8	34.8	23.2	2.8	1.1	32.7	3.6	0.0	6.4	93.6
Other Education	54.8	6.0	12.2	1.6	17.6	5.3	1.9	0.5	6.1	93.9
Total Household Expenditure	42.2	10.1	9.7	8.3	14.2	10.3	3.1	2.1	14.3	85.7

**University+Non-University Higher Education*
1-Istanbul, 2-Marmara, 3-Aegean, 4-Black Sea, 5-Central Anatolia, 6-Mediterrenaen, 7-East Anatolia, 8-S. East Anatolia

Table A 3.4:The Number of Public School Students by Education Level and Regions

	Primary	Secondary	Higher
Istanbul	13.32	15.97	24.33
Marmara	10.66	14.33	11.50
Aegean	11.61	13.01	12.55
Black Sea	11.00	11.41	8.26
Central Anatolia	15.33	16.48	20.41
Mediterranean	13.31	13.17	11.17
East Anatolia	11.27	9.82	6.79
South East Anatolia	13.49	5.81	4.99
Turkey	100	100	100

Table A 3.5: **Average Years of Schooling**

Years	Turkey	Developing Countries	Developed Countries
1960s	2.1	2.05	7.06
1970s	2.71	2.67	7.56
1980s	3.5	3.57	8.86
1990s	4.7	4.5	9.41
2000s	5.29	5.13	9.76

Source: Duman (2008: 376)

Table A 3.6: The number of students as a percentage of total by deciles and level of education

Deciles	Primary	Secondary	Primary and Secondary	Higher Education
1	17.70	8.77	15.71	2.04
2	14.70	10.97	13.86	3.34
3	12.36	10.06	11.85	3.89
4	10.26	10.69	10.36	6.72
5	9.78	9.94	9.82	8.65
6	8.65	10.18	8.99	9.18
7	8.03	10.62	8.61	12.31
8	7.32	10.80	8.10	13.09
9	5.87	9.60	6.70	17.44
10	5.33	8.37	6.01	23.33
Turkey	100	100	100	100

Notes: Ranked by per adult equivalent household expenditure

Table A 3.7: The Number of School Age Individuals as a percentage of total by deciles and level of education

Deciles	Primary Age Group	Secondary Age Group	Secondary Age Group with Primary Degree	Higher Education Age Group	Higher Education Age Group with Secondary Degree
1	19.00	15.49	12.98	11.50	4.37
2	14.85	13.41	12.83	11.01	7.35
3	12.32	11.90	11.46	10.30	7.98
4	9.98	10.77	10.93	11.41	10.28
5	9.52	9.68	9.93	9.72	9.49
6	8.48	9.25	9.64	10.43	11.52
7	7.99	8.49	9.22	9.95	11.64
8	7.08	8.40	8.97	9.66	12.89
9	5.67	7.03	7.75	8.78	12.73
10	5.10	5.59	6.29	7.23	11.76
Turkey	100	100	100	100	100

Notes: Ranked by per adult equivalent household expenditure

Table A 3.8:Percentage Shares of Number of Teachers and Students, by Region, 2003

	Primary Education (%)			**Secondary Education (%)**		
	1 Number of Students	**2 Number of Students**	**(1-2)**	**3 Number of Students**	**4 Number of Teachers**	**(3-4)**
Istanbul	15.92	11.92	**-4**	16.91	11.64	**-5.27**
Marmara	11.42	12.56	**1.14**	14.42	15.19	**0.77**
Aegean	11.39	13.65	**2.26**	13.19	14.72	**1.53**
Black Sea	10.03	12.27	**2.23**	11.13	12.85	**1.72**
East Anatolia	10.3	9.86	**-0.43**	6.81	6.54	**-0.27**
Central Anatolia	14.51	16.1	**1.59**	16.68	18.26	**1.58**
Mediterranean	13.09	13.64	**0.55**	13.58	15.44	**1.86**
South East Anatolia	13.34	9.99	**-3.34**	7.29	5.38	**-1.91**

Source: MONE

Table A 3.9: The differences of ordinates of the Lorenz curve and Concentration Curves

Ordinates (p)	Primary Education	Secondary Education	Higher Education	Total Benefits
0.05	-0.071	-0.035	**0.000**	-0.042
	0.006	*0.002*	*0.002*	*0.002*
0.1	-0.132	-0.070	**0.002**	-0.078
	0.014	*0.014*	*0.004*	*0.003*
0.15	-0.183	-0.106	**0.007**	-0.109
	0.020	*0.016*	*0.006*	*0.004*
0.2	-0.238	-0.148	**0.012**	-0.144
	0.028	*0.011*	*0.008*	*0.004*
0.25	-0.283	-0.186	0.018	-0.173
	0.038	*0.015*	*0.009*	*0.005*
0.3	-0.316	-0.208	0.027	-0.191
	0.046	*0.020*	*0.010*	*0.005*
0.35	-0.344	-0.236	0.024	-0.212
	0.050	*0.024*	*0.011*	*0.005*
0.4	-0.365	-0.263	**0.026**	-0.228
	0.052	*0.029*	*0.013*	*0.005*
0.45	-0.388	-0.278	**0.013**	-0.245
	0.053	*0.033*	*0.014*	*0.005*
0.5	-0.404	-0.297	**-0.005**	-0.263
	0.054	*0.037*	*0.014*	*0.005*
0.55	-0.411	-0.314	**-0.006**	-0.271
	0.058	*0.042*	*0.015*	*0.005*
0.6	-0.418	-0.318	-0.039	-0.285
	0.060	*0.049*	*0.015*	*0.005*
0.65	-0.413	-0.335	-0.065	-0.294
	0.063	*0.051*	*0.015*	*0.005*
0.7	-0.407	-0.336	-0.066	-0.292
	0.064	*0.054*	*0.015*	*0.005*
0.75	-0.392	-0.342	-0.083	-0.291
	0.067	*0.059*	*0.015*	*0.005*
0.8	-0.376	-0.335	-0.087	-0.283
	0.068	*0.063*	*0.015*	*0.005*
0.85	-0.340	-0.312	-0.096	-0.263
	0.069	*0.066*	*0.014*	*0.005*
0.9	-0.293	-0.277	-0.128	-0.242
	0.066	*0.061*	*0.012*	*0.004*
0.95	-0.217	-0.204	-0.135	-0.190
	0.037	*0.036*	*0.009*	*0.003*
0.99	-0.089	-0.089	-0.077	-0.085
	0.011	*0.010*	*0.001*	*0.001*

Notes: Asymptotic standard errors are in italic. The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 3.10: S-Gini Indices of TR-Progressivity for Education Benefits

Parameter Values (ρ)	Primary	Secondary	Higher	Total
1.01	0.0123	0.0105	0.0041	0.0094
	0.0002	*0.0002*	*0.0004*	*0.0002*
1.5	0.3881	0.3050	0.0633	0.2717
	0.0051	*0.0071*	*0.0107*	*0.0055*
2	0.5768	0.4258	0.0432	0.3820
	0.0073	*0.0111*	*0.0143*	*0.0075*
2.5	0.6969	0.4901	**0.0186**	0.4457
	0.0090	*0.0142*	*0.0163*	*0.0088*
3	0.7831	0.5301	**-0.0019**	0.4890
	0.0106	*0.0169*	*0.0176*	*0.0099*
3.5	0.8493	0.5572	**-0.0180**	0.5213
	0.0120	*0.0192*	*0.0188*	*0.0109*
4	0.9023	0.5766	**-0.0306**	0.5466
	0.0133	*0.0214*	*0.0198*	*0.0118*

Notes: Asymptotic standard errors are in italic. The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 3.11: S-Gini Indices of IR-Progressivity for Education Benefits

Parameter Values (ρ)	Primary	Secondary	Higher	Total
1.01	0.0004	0.0002	0.0001	0.0007
	0.0000	*0.0000*	*0.0000*	*0.0000*
1.5	0.0141	0.0061	0.0015	0.0207
	0.0002	*0.0002*	*0.0003*	*0.0004*
2	0.0210	0.0085	0.0010	0.0291
	0.0003	*0.0003*	*0.0003*	*0.0005*
2.5	0.0254	0.0098	**0.0004**	0.0340
	0.0004	*0.0003*	*0.0004*	*0.0006*
3	0.0285	0.0106	**-0.0001**	0.0373
	0.0005	*0.0004*	*0.0004*	*0.0007*
3.5	0.0309	0.0111	**-0.0004**	0.0397
	0.0005	*0.0004*	*0.0004*	*0.0008*
4	0.0328	0.0115	**-0.0007**	0.0417
	0.0006	*0.0005*	*0.0005*	*0.0008*

Table A 3.12: S-Gini Indices of Redistribution

Parameter Values (ρ)	Primary	Secondary	Higher	Total
1.01	0.0004	0.0002	0.0000	0.001
	0.000	*0.000*	*0.000*	*0.000*
1.5	0.013	0.005	-0.001	0.017
	0.000	*0.000*	*0.000*	*0.000*
2	0.019	0.007	-0.003	0.022
	0.000	*0.000*	*0.000*	*0.000*
2.5	0.023	0.007	-0.004	0.025
	0.000	*0.000*	*0.000*	*0.001*
3	0.025	0.008	-0.005	0.027
	0.000	*0.000*	*0.000*	*0.001*
3.5	0.026	0.008	-0.005	0.028
	0.000	*0.000*	*0.000*	*0.001*
4	0.028	0.007	-0.005	0.029
	0.001	*0.000*	*0.000*	*0.001*

Redistribution is measured by the difference between Lorenz curves for pre- and post-benefit household expenditure

Table A 3.13: Extended Coefficients of Gini and Concentration for Household Expenditure and Benefits

Parameter Values (ρ)	AE_EXP	Primary Education	Secondary Education	Higher Education
1.01	0.010	-0.003	-0.0009318	0.005
	0.000	*0.000*	*0.0001568*	*0.000*
1.5	0.282	-0.106	-0.0232892	0.218
	0.004	*0.003*	*0.0060889*	*0.010*
2	0.400	-0.177	-0.0255205	0.357
	0.004	*0.006*	*0.0102513*	*0.014*
2.5	0.468	-0.228	**-0.0215688**	0.450
	0.004	*0.008*	*0.0135539*	*0.016*
3	0.514	-0.269	**-0.0156884**	0.516
	0.004	*0.010*	*0.0163410*	*0.017*
3.5	0.548	-0.301	**-0.0092596**	0.566
	0.004	*0.011*	*0.0187836*	*0.019*
4	0.574	-0.328	**-0.0027527**	0.604
	0.004	*0.012*	*0.0209858*	*0.020*

Notes: Asymptotic standard errors computed with DAD in italic
The null hypothesis of the index not being zero could not be rejected for the values in bold at 5% significance level
Negative concentration coefficients indicate that the benefit dominates 45-degree line if the estimation is statistically robust.

Table A 3.14: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Primary Education Benefits*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Contributio n
Total Expenditure	<u>0.381</u>				
Istanbul	0.41	0.17	0.27	0.02	0.05
Marmara	0.31	0.14	0.13	0.01	0.02
Aegean	0.35	0.15	0.14	0.01	0.02
Black Sea	0.31	0.11	0.09	0.00	0.01
Central Anatolia	0.36	0.16	0.16	0.01	0.02
Mediterranean	0.36	0.13	0.12	0.01	0.02
East Anatolia	0.34	0.07	0.05	0.00	0.00
S. East Anatolia	0.33	0.07	0.04	0.00	0.00
Within-Group				*0.052*	*0.137*
Between-Group				*0.140*	*0.368*
Overlap				*0.189*	*0.495*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE primary education benefits*

Decomposition Approach: Analytical

Table A 3.15: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Secondary Education Benefits*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Contribution
Total Expenditure	<u>0.393</u>				
Istanbul	0.420	0.17	0.27	0.02	0.05
Marmara	0.322	0.14	0.13	0.01	0.02
Aegean	0.360	0.15	0.14	0.01	0.02
Black Sea	0.332	0.11	0.08	0.00	0.01
Central Anatolia	0.374	0.16	0.16	0.01	0.02
Mediterranean	0.369	0.13	0.12	0.01	0.02
East Anatolia	0.360	0.07	0.05	0.00	0.00
S. East Anatolia	0.361	0.07	0.04	0.00	0.00
Within-Group				*0.054*	*0.137*
Between-Group				*0.144*	*0.366*
Overlap				*0.195*	*0.497*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE secondary education benefits*

Decomposition Approach: Analytical

Table A 3.16: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Higher Education Benefits*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	**0.403**				
Istanbul	0.423	0.17	0.27	0.02	0.05
Marmara	0.331	0.14	0.13	0.01	0.02
Aegean	0.370	0.15	0.14	0.01	0.02
Black Sea	0.341	0.11	0.08	0.00	0.01
Central Anatolia	0.389	0.16	0.16	0.01	0.02
Mediterranean	0.376	0.13	0.12	0.01	0.01
East Anatolia	0.376	0.07	0.05	0.00	0.00
S. East Anatolia	0.369	0.07	0.04	0.00	0.00
Within-Group				*0.055*	*0.137*
Between-Group				*0.148*	*0.367*
Overlap				*0.200*	*0.496*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE secondary education benefits*

Decomposition Approach: Analytical

Appendix 3.2: Figures

Figure A 3.1:

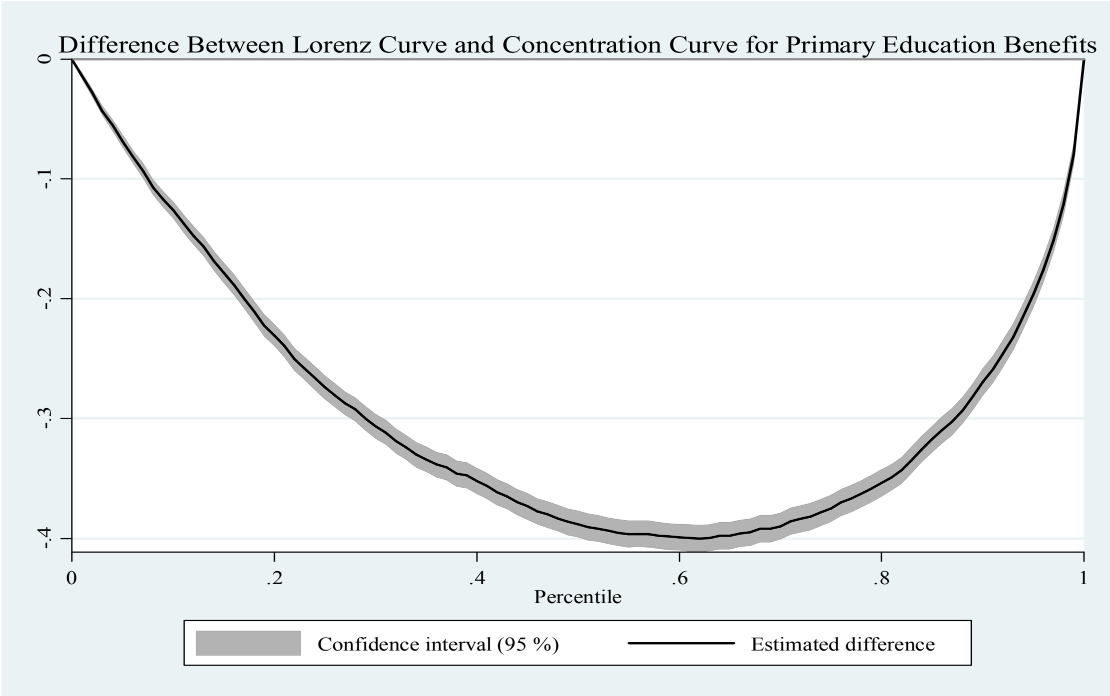


Figure A 3.2:

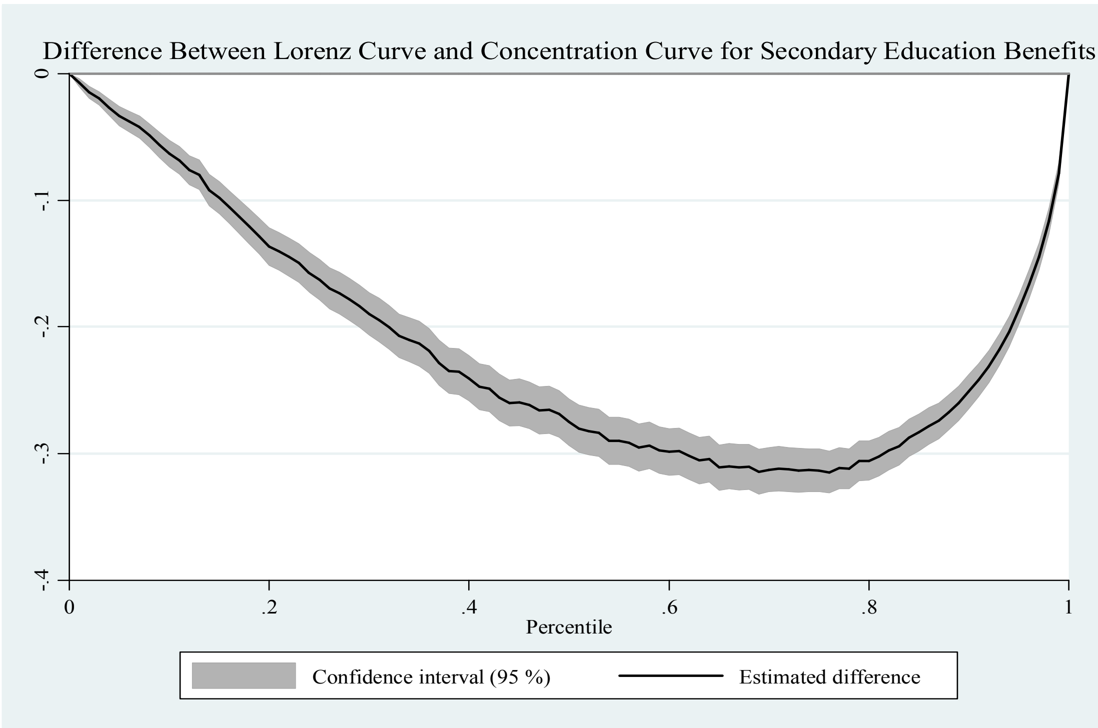


Figure A 3.3:

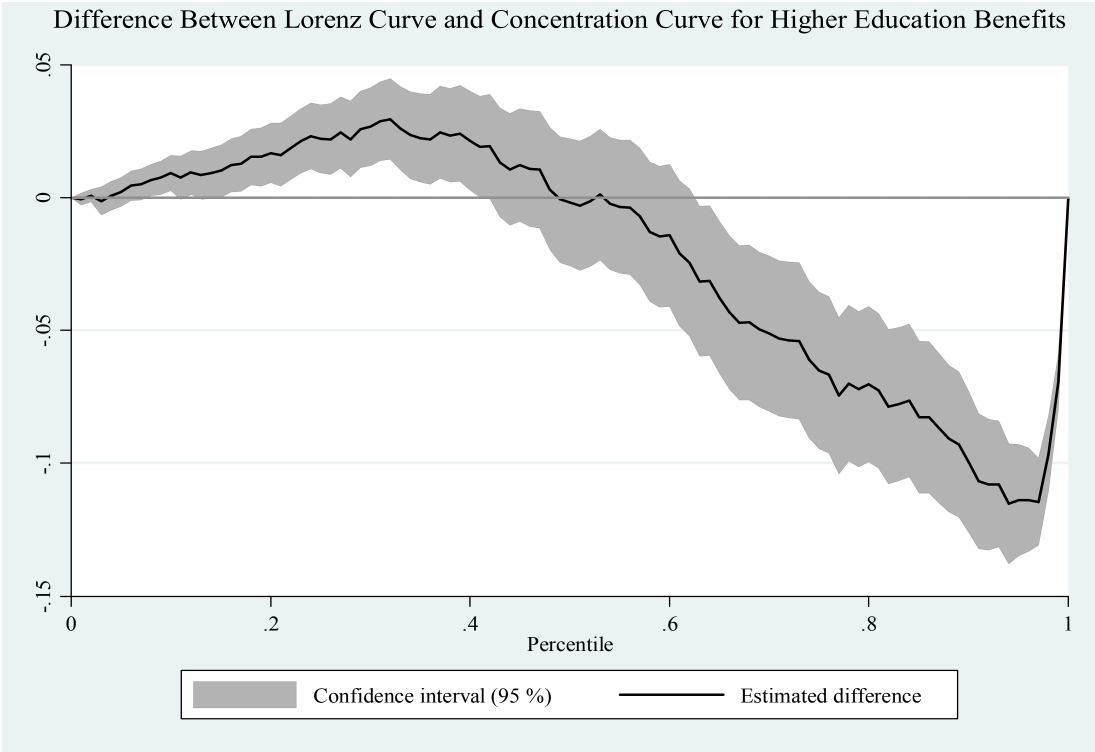


Figure A 3.4:

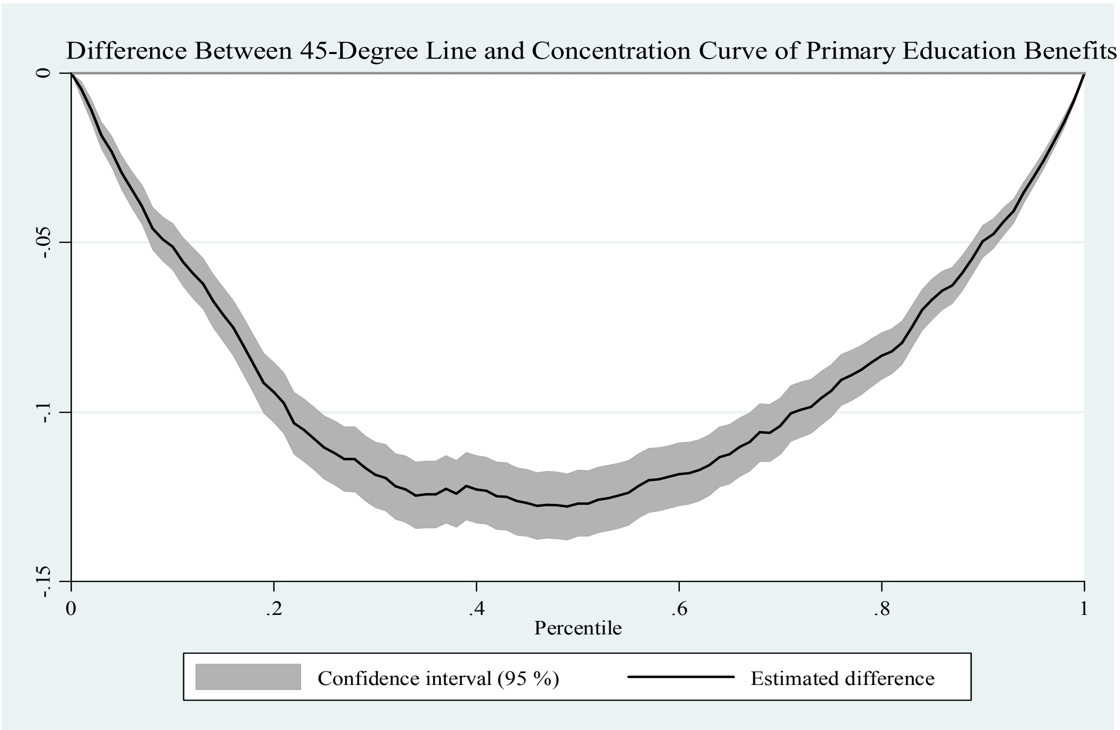


Figure A 3.5:

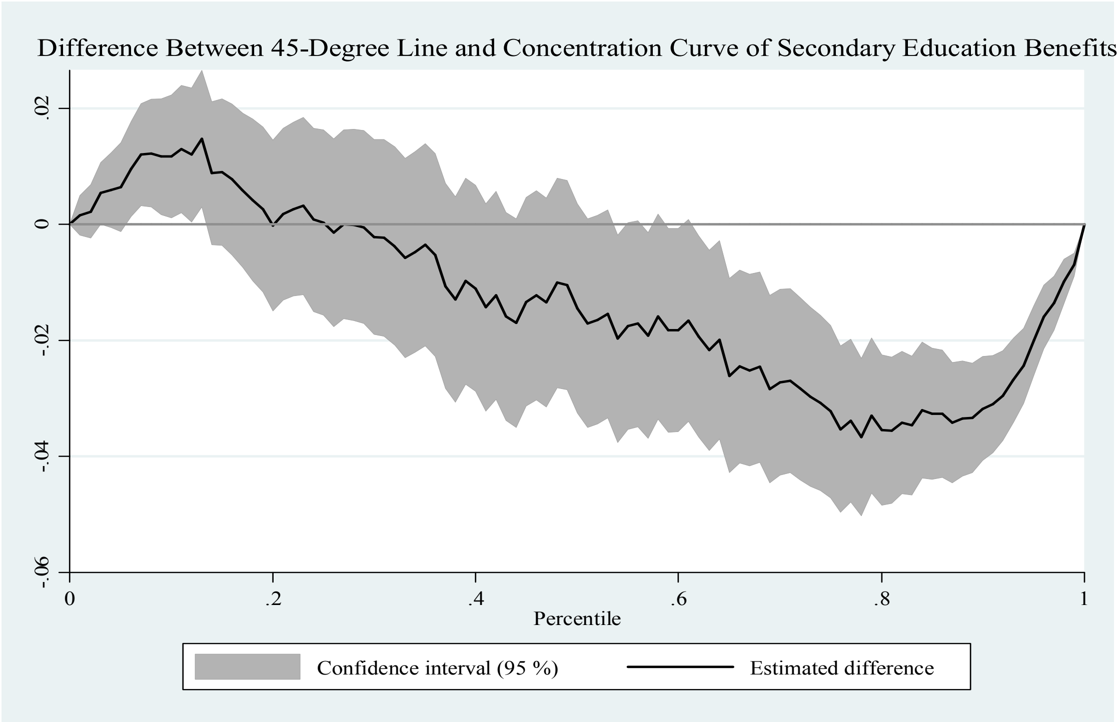


Figure A 3.6:

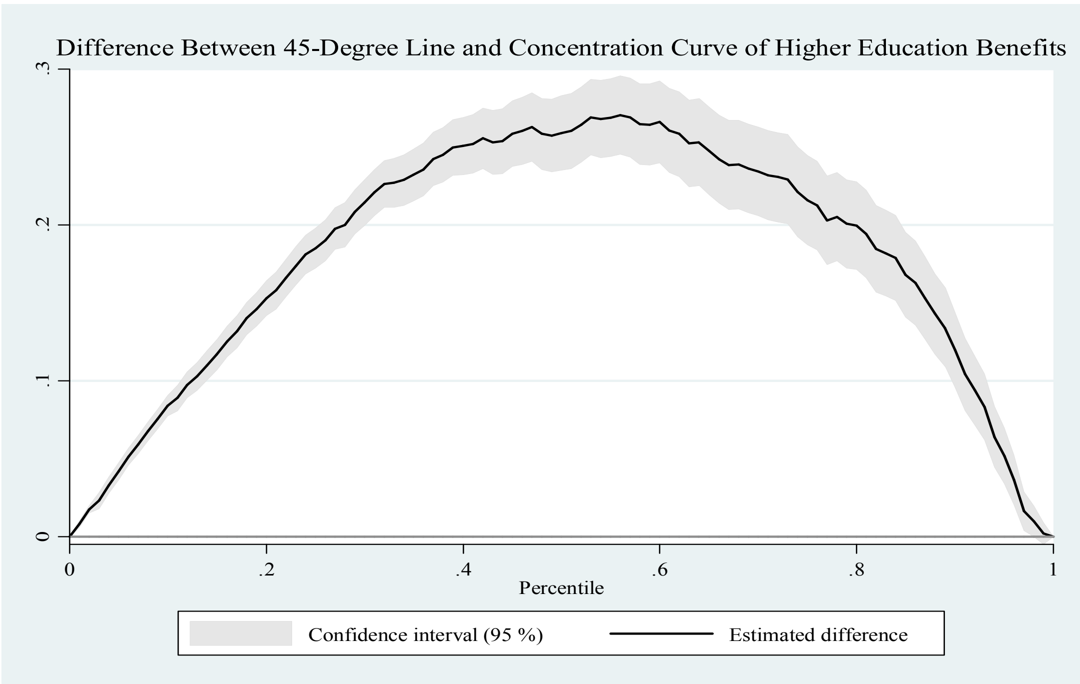


Figure A 3.7:

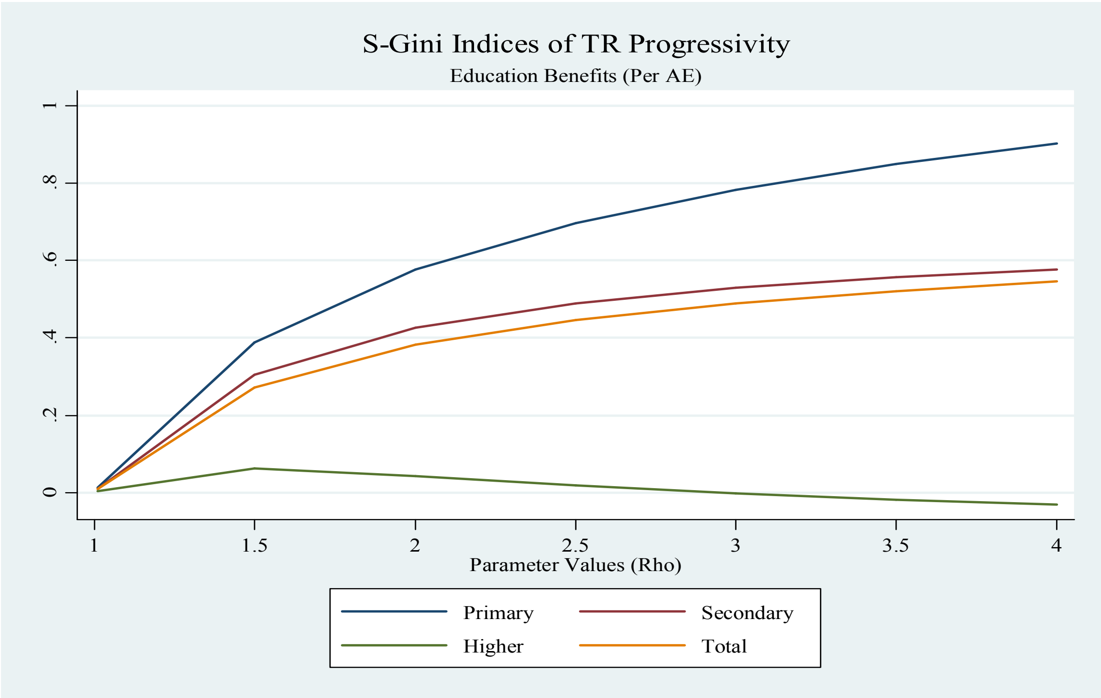


Figure A 3.8:

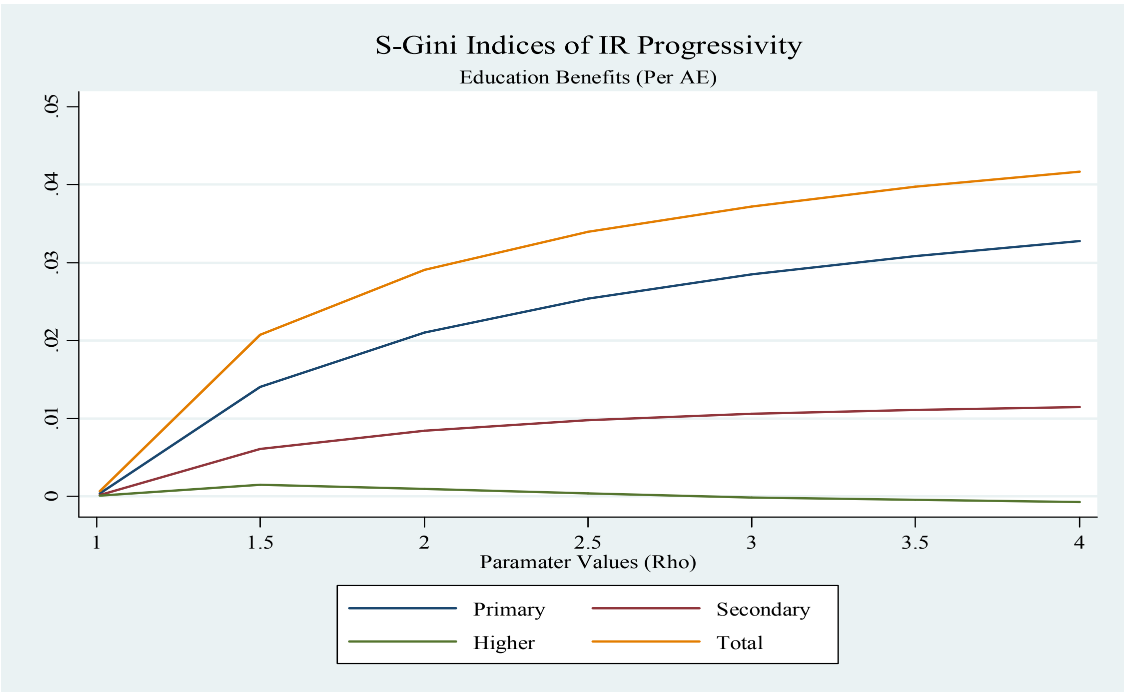


Figure A 3.9:

Figure A 3.10:

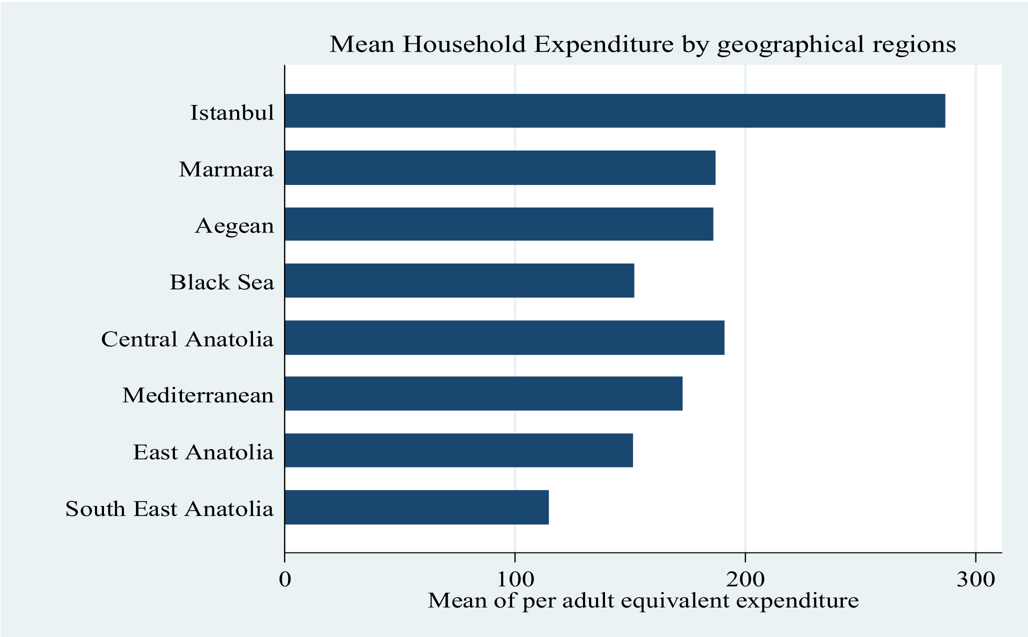


Figure A 3.11:

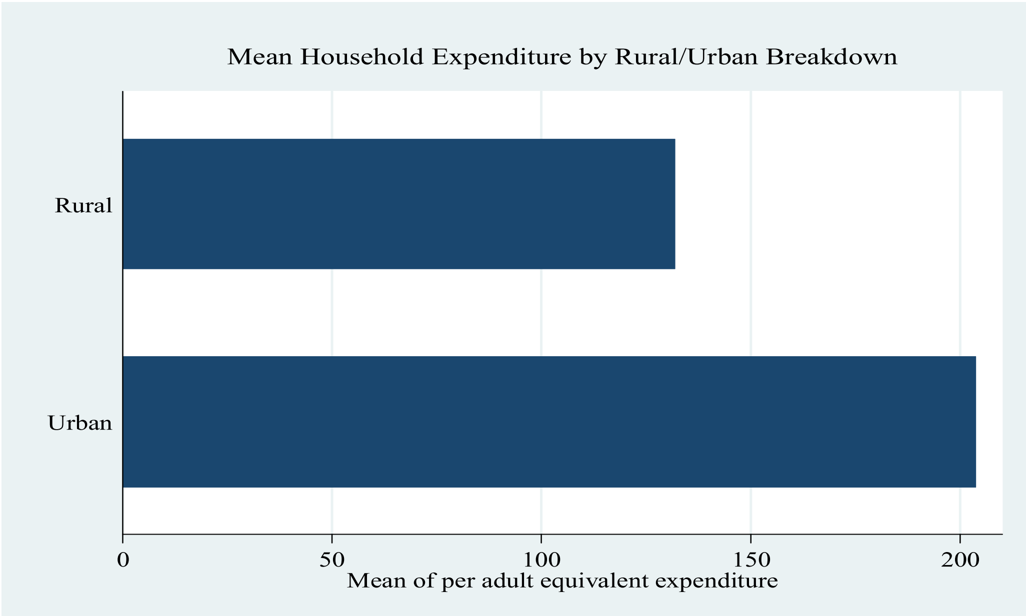


Figure A 3.12

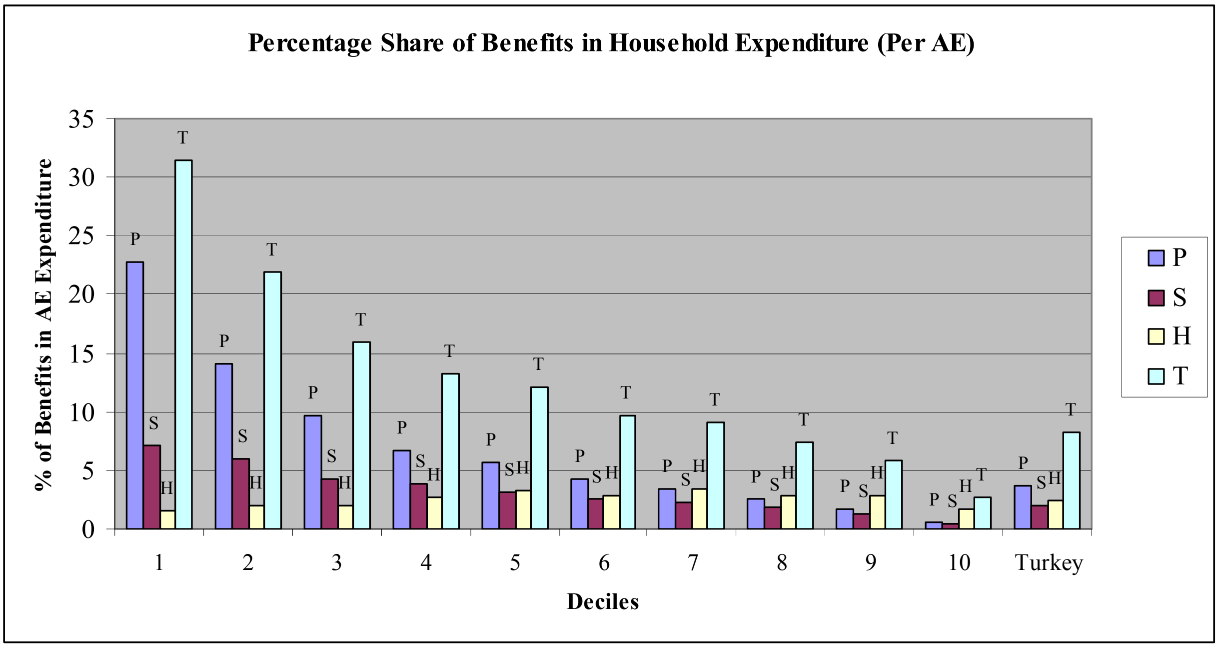
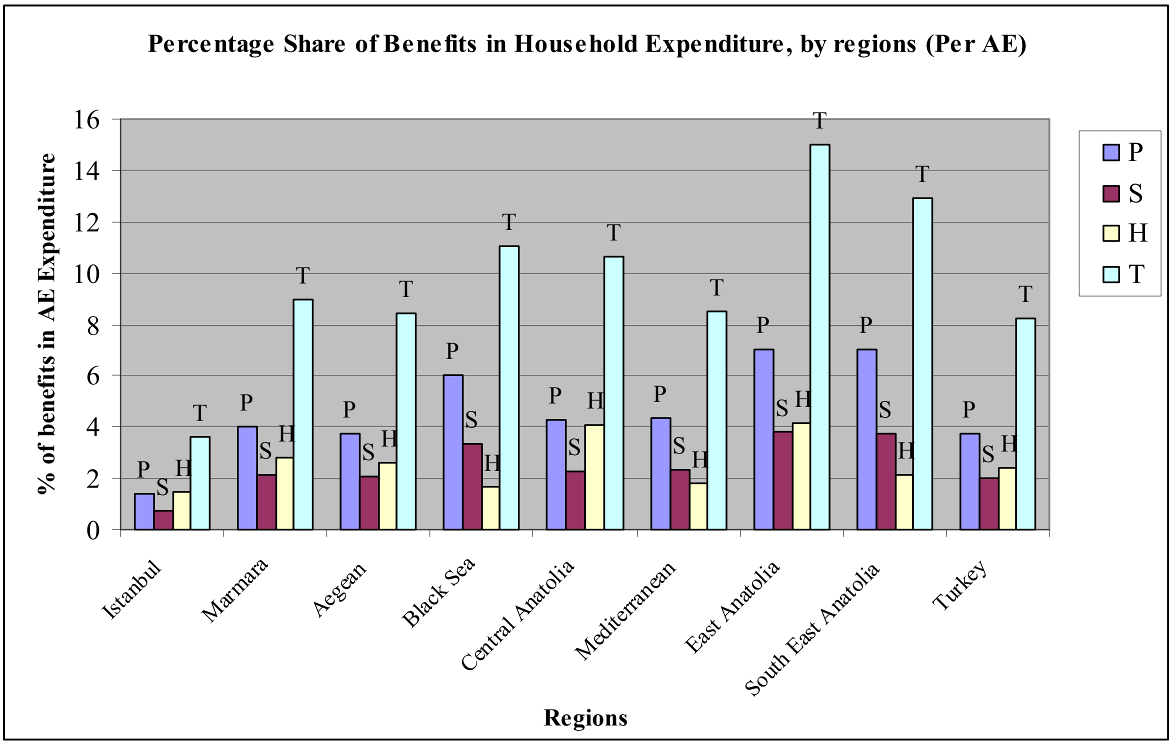


Figure A 3.13


Percentage Share of Benefits in Household Expenditure, by regions (Per AE)
% of benefits in AE Expenditure
16
14
12
10
8
6
4
2
0
P
S
H
T
Istanbul
Marmara
Aegean
Black Sea
Central Anatolia
Mediterranean
East Anatolia
South East Anatolia
Turkey
Regions

CHAPTER 4: BENEFIT INCIDENCE ANALYSIS ON PUBLIC SERVICES FOR HEALTH, INFRASTRUCTURE AND SOCIAL TRANSFERS

4.1 Introduction

As with education, health and infrastructure services and social transfers have been considered by researchers as effective tools to improve welfare and capabilities of the poor. The justification for pro-poor health spending is based on both the common perception of health as a basic human right and its *"instrumental value in raising the health of the population and so the productivity of the labour force, and consequently, economic growth"* (O'Donnell et. al., 2008: 165). Infrastructure services are expected to have a positive impact on growth, income distribution and health status (through facilities such as sewerage, clean water and electricity). They increase the opportunities of the population to access the other services such as education and health (through facilities such as roads) (Calderón and Servé, 2004; Leipziger et al., 2003). Social transfers are seen as a direct way of fighting poverty and inequalities by reaching the people in need and providing income maintenance or insurance system, which may redistribute incomes across the lifecycle.

The empirical studies on the benefit incidence of these three services have been done for developing countries[1]. Pinar (2004) investigated the incidence of these services for 1994 and 2002. He found that these services are progressive but middle income classes seem to benefit more than the poor.

[1] See Davoodi et. al. (2003), Lanjouw et. Al. (2002), O'Donnell et. al. (2008), Pinar (2004), Van de Walle (1995), Heady et. Al. (2001) and Whiteford (2008) for the benefit incidence analysis on health and infrastructure services and social transfers among others.

This chapter analyses the incidence of the public spending on these services, stated above, following the analysis of education in the previous chapter. In this case the data are limited. In particular, the HICES 2003 does not provide information on the usage of these services except for public cash and in-kind transfers. In order to assess the distributional impacts of health and infrastructure services, we create proxy measures to allocate the public spending on these services to the users of the services.

The structure of the chapter is as follows. The second section summarizes the general setting of the social services, namely health, infrastructure and social transfers. The third section gives the results. The fourth section has the conclusions.

4.2 The General System of Public Health, Infrastructure Services and Social Transfers

In this section our aim is to give the broad characteristics of the services to provide a background for the potential distributive impacts these services can produce. The first subsection explains the public health system, the second one is public infrastructure services, and the final subsection explains public cash transfers.

4.2.1 Health System in Turkey

Turkey has a complex structure for financing and providing health care facilities (see Table A 4.1). The Ministry of Health (MoH) is the main government body responsible for health sector policy making, implementation of the national health strategies and the largest health services provider. Turkey does not have universal coverage for health services; only people who are covered by a social security organisation[2] can access public health services freely. The Green

[2] Turkey has three social security organisations that provide health insurance to their members and dependants of the members: the Social Insurance Agency of Merchants, Artisans and the Self-employed,

Card was introduced in 1992 as a mechanism to ensure targeted delivery of health services to the poor who have little or no capacity to pay for health services. This card enables people who are not covered by any social security organisation to access public health services without paying any fee or social security contribution if they can prove that they earn less than 1/3 of minimum wage. The Green Card program is seen as a transitional solution until a general health insurance system is introduced. There are a number of obstacles for Green Card holders to access the services and there are concerns about the quality of services they utilise.

Health services in Turkey are provided mainly by the MoH, the Ministry of Labour and Social Security (through hospitals of SSK)[3], universities (through university hospitals), the Ministry of Defence (through hospitals for military workers), private hospitals (including minority hospitals). MoH is the major provider of primary and secondary health care, maternal health services, children's and family planning services. It is essentially the only provider of preventive health services through an extensive network of health facilities (health centres and health posts) providing primary, secondary, and specialized in-patient and out-patient services. The public sector accounts for ninety two percent of hospital capacity in Turkey. MoH, SSK and the universities are the major public providers of in-patient hospital care. MoH hospitals account for about forty six percent of all hospital beds, SSK accounts for eighteen percent, while university hospitals account for about sixteen percent. A number of authorized private hospitals

(Turkish acronym, Bag-Kur), the Social Insurance Organisation, (turkish acronym of Sosyal Sigortalar Kurumu, SSK), and the Government Employees Retirement Fund (turkish acronym of Emekli Sandigi, ES). Bag-Kur covers merchants, artisans and other self employed persons. ES covers active civil servants working according to Personnel Law No. 657 and their dependants and retired civil servants and their dependants. SSK is for private sector employees and blue collar public sector employees and their dependants. While Bag-Kur and ES function only as an insurer, SSK functions both as an insurer and as a health care provider. Members of these institutions pay payroll taxes to benefit the services (both health insurance and pensions). Membership status for these social security institutions by deciles are reported in Table A 4.2 in Appendix 4.1.

[3] With the reform program on health system in 2007, hospitals of SSK have been integrated with public hospitals that are run by MoH.

and health services have also been established in addition to the public facilities (Agartan 2005, Giray 2003, MoH 2004).

SSK, as both a provider and a financer of the health services, provides mainly curative services to its members. SSK health services are funded by premiums paid by employees and employers. Income from fees paid on behalf of non-members using SSK facilities, income obtained through co-payments of drug costs for outpatients and general state budget transfers (to compensate its deficits) are also the other sources of income for SSK. Bag-Kur and ES only finance the health services that the members use from the public health facilities.

There are differences among the services that the members of these social security organisations could achieve. The members of SSK should use SSK hospitals but are referred when needed to MoH, university and private health institutions. However, the service quality is known to be very poor in SSK hospitals. Since the members of ES can go to any hospitals of MoH, university hospitals and health centres, it is accepted that ES members (civil servants, active or retired and their dependants) could achieve better public health services than SSK and Bağ-Kur members (Agartan, 2005; MoH 2004; MoH, 2006; Giray, 2003). Since ES members are concentrated in the higher deciles (68% of ES members are in last 4 deciles), this differential service quality becomes more important. Unfortunately we are not able to consider the quality differences among service providers and this more likely leads to overestimate progressivity of health services.

Turkish public health system has three main problems: absence of universal coverage for health services, inadequate public spending on health services and low quality of services. The share of MoH budget and total public expenditure on health care in GNP are given in Table A 4.3. Although the percentage share of the total public health spending[4] in GNP has risen from

[4] The total public health spending includes the spending of other government institutions and social security organisations in addition to MoH budget.

2.7 in 1994 to 5.3% in 2004, it is still lower than its desired rate (MoH 2004). In addition to the general problems outlined, it is worth mentioning two other characteristics of the Turkish public health system. First, the sick tend to go directly to the hospitals for outpatient services, since they think that they can achieve better quality of both staff and equipment than they could get at MoH primary health centres. As a result of this general impression about primary health centres, hospital outpatient facilities have become over-loaded with patients who do not require specialist care[5]. On the other hand, the overcrowding of hospital outpatient facilities has led to an extremely heavy workload on doctors, which decreases the quality of services too: MoH, SSK hospitals and health centres which are used by the poor generally provide low quality health services (MoH 2004).[6] MoH also accepts that the Turkish health system is based on the principle of the ability to pay instead of the service utilisation according to need (MoH, 2004: 69).

Secondly, doctors working in MoH and university hospitals are allowed to see private out-patients in these facilities after 4.00 pm. Social insurance beneficiaries making appointments with specific doctors in public facilities after 4.00 pm pay an out-of-pocket surcharge, while basic treatment fees are covered by their insurance institution. Revenues from treatment of private patients in public hospitals are shared between the hospitals' revolving fund and the physician. While such arrangements help public hospitals and physicians increase their revenues[7], they again pose a significant moral hazard problem, as doctors have little incentives

[5] The fact that there is no referral from a primary care physician is needed and there is no penalty if a patient makes direct use of outpatient facilities also helps make hospitals overcrowded.
[6] See the Table A 4.4.
[7] These revenues of hospitals and other health facilities and payments by people who are not eligible to use public health facilities free are called "revolving funds". Therefore, revolving funds suggests out-of pocket expenditures of households who may have right to use public health services free or not. Revolving funds have become more important to public hospitals and to the system in time. 95% of private health expenditures are revolving funds of public health institutions. Thus, only 5% of private health expenditures goes to private health hospitals and centres in 2003. Revolving funds account for 17% of total public expenditures (SPO 2004, 2006; MoH 2005).

to treat patients adequately before 4.00 pm[8]. This implies that even people having the right to use public health services free need to pay to achieve better health services, and also causes differences in the quality of services utilised by insurance beneficiaries. Unfortunately we are not able to consider these quality differences in our analysis (MoH 2004).

Private Expenditures on Health Care

Given the fact that people still need to pay money to reach better public health services even if they have free access to the services, it is worth seeing how private expenditures on health care are distributed. Almost 78% of the households who spent money on health care have at least one individual in the family with health insurance, implying the importance of out-of-pocket expenditures in the health system. According to MoH (2006)[9], 16% of people with a health problem did not do anything, for 60% of these it was due to lack of money, and most were living in East regions, rural areas and uninsured[10].

Table A 4.5 reports monthly per adult equivalent household expenditures on health according to location (rural/urban) and deciles of per adult equivalent monthly household expenditure in 2003. Drugs are the highest expenditure component followed by doctors and inpatient care in Turkey, whereas the same pattern is shared by both urban and rural residents.

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[8] Specialists who work for public hospitals have also private offices outside the hospitals. It is a common knowledge that patients who have seen a specialist in his/her private office and have paid private service fee will be able to reach better treatment in the hospitals and will not need to wait for inpatient services if necessary. SSK physicians can not see private patients at SSK facilities except from a recently initiated pilot in a limited number of SSK facilities.

[9] Turkey Households Health Expenditures Survey by MoH (2006) examined households' health expenditure attitudes for 2002-2003. The survey's main aim was to study the size and the distribution of out-of-pocket expenditures among households. The survey also provides information on the size, share and providers of resources allocated to health care besides destination, dimension and kinds of the services used. The survey has about 10,000 households interviewed. Unfortunately, since the data set was not given us, we could not able to use this rich data set and we could only give the results of this study to support our findings from HICES.

[10] It may be assumed also that the poor tend to ignore ilnesses (out of necessity) more than rich ones (van de Walle, 1995).

The bottom decile spent most on drugs; in contrast, the highest expenditure components for the top decile are doctors and drugs.

Some 72% of total private expenditures on health care are by households living in urban areas, although the total private expenditures are higher in rural areas than urban areas for the first 7 deciles (mostly on drugs). We do not have information on if drugs purchased by households are prescribed or not, but it is well known that people without health insurance (or people with health insurance but who think the quality of services they would get is low) have a tendency to use non-prescribed drugs to solve their health problems if they do not have any chance to see a doctor. MoH (2006) reports that people in the first income quintile and people without health insurance have the highest mean out-of-pocket expenditure on drugs in outpatient care. The fact that 90% of individuals without health insurance are in the first 7 deciles is also another explanation for why drugs are the highest expenditure component in Turkey (MoH, 2006). Additionally, in rural areas people may have more problems to access the public health services because of time they need to spend to get to the health centres or hospitals. Thus, they prefer to use non-prescribed drugs without getting any professional treatment. Generally, the private expenditure on health care increases with overall living standards, suggesting higher out-of-pocket expenditures to reach better quality public health services and higher usage of private health services[11]. As a simple summary measure, the least squares elasticities are recorded in the last column of Table A 4.5 following van de Walle (1995). We attain this by regressing the natural logarithm of per adult equivalent household private expenditure in each health category on the natural logarithm of per adult equivalent total household expenditure. The elasticity of expenditures for each category with respect to total household expenditures tends to exceed 1 with the exceptions of paramedics, outpatient and inpatient care, suggesting that private

[11] As we noted before, only 20% of total private household health expenditures were made by household without any member with health insurance. So it would not be very wrong if we conclude that most of the private health expnditures by households are out of pocket expenditures.

expenditures increase more than proportionately with consumption. An elasticity less than 1 for some categories may be related the fact that expenditures on these services make up a very small part of total health expenditures of households[12].

There are also concerns about some health indicators such as infant mortality rates and life expectancy. Although Turkey has achieved significant declines in the recent past, infant mortality (28.8 per 1000 live births in 2005) still remains much higher than that of other countries in the European region as well as the EU average (8 per 1000 live births). Life expectancy at birth is about 68 for males and about 73 for females in 2005 and this is 10 years shorter than the average of OECD countries (MoH 2004; MoH 2005).

There are discrepancies across geographical areas. Table A 4.6 gives the distribution of public health spending and number of health staff by regions in 2003. Comparison between the population share of a region and the public expenditure share on health care[13] may show if regions are treated according to their need. Istanbul, the biggest city of Turkey, and South East Anatolia, the poorest region of Turkey, receive public health fund less than they need to serve their population. In terms of health staff, west regions and Istanbul have enough personnel, whereas South East Anatolia, East Anatolia (both north and central) and Black Sea regions have less health staff than they would need given population. Table A 4.7 from MoH (2006) also supports the regional differences in health expenditures (both private and public). According to the table, while 72% of the total health expenditures spent in West was by public agents, this rate is 56 and 59% in South and East regions respectively, implying higher out-of pocket expenditures and private health expenditures. We try to consider these discrepancies among regions allocating regional public health expenditure to households with respect to the regions they locate in.

[12] Households spend only 0.9, 3 and 13 percent of their total health expenditures on paramedics, outpatient and inpatient care respectively. 68% of total household health expenditures goes to drugs and doctors.
[13] How we calculate regional public health spending is explained below.

Data and Determining Users of the Public Health Services

As mentioned before, Turkey has a complex system regarding financing and providing public health services. Public expenditures on health consist of expenditures incurred by the MoH, General Directorate of Coastal Health Services, universities, other ministries and agencies, local governments, state enterprises, civil servants, and social security institutions. Because of this complex system, overlapping functions between financing agents and providers of the services make it hard to calculate public health expenditures. The State Planning Organisation (SPO) provides annual public health expenditure since 1980 at a national level by taking into account all public agents performing in public health provision. General practice in estimating unit costs of the services, is to disaggregate the total public expenditure on health down to facility/or service (hospital, health centre/inpatient, outpatient etc.) and to geographic region to consider differences in the quality of the services to some extent. We neither have disaggregation at the facility or service level nor do we have information on the users of different services or facilities. However we still can consider regional differences in the public health spending by allocating the total public health expenditure with respect to regions' health expenditure share from 2004 consolidated budget[14]. We divide the total regional government expenditure by the population[15] in each region to obtain per capita average cost of the service to

[14] Ministry of Finance started reporting consolidated budget by functional classification from 2004 by provinces. Also the total health expenditure of Ministry of Health also can be found at the province level. We prefer to use 2004 consolidated budget instead of using the total expenditure of Ministry of Health, since the public expenditure on health care consists of more than the budget of MoH as mentioned before. Except for a few regions, the index that we would get from the MoH budget is almost same as the one we have attained using Ministry of Finance's data.

[15] Since HICES do not provide any information on the usage of public or private health services, we use per capita average regional subsidy to obtain unit cost of the health services by regions. The usual practice is to divide the total government health spending by the total visits to the health institutions. As HICES does not provide this information, we assume that the health system targets the whole population. We also used per insurer health subsidy which is found by dividing the total public health spending by the number of people with health insurance (including Green card holders). There are two advantages of using per capita public spending over using per insurer subsidy. First, it might capture the quality of the services which may be assumed to be inversely correlated with the population density through the higher demand towards the services. Secondly, in the poorer regions such as South East Anatolia and East Anatolia, the number of people with health insurance is very small. When we use the number of people with health

the government. Hence, we assume that the potential benefit to individuals can be approximated by the average cost to the government of providing the service and all beneficiaries in each region receive the same potential average benefits. Table 4.1 presents per capita annual spending of the public health services.

Table 4.1: Per Capita Annual Public Spending of Health Services

Regions	*Million TL*
Istanbul	138
East Marmara	209
South East Anatolia	221
West Marmara	247
Mediterranean	254
Central Anatolia	258
Aegean	259
West Black Sea	286
North East Anatolia	310
East Black Sea	312
Central East Anatolia	319
West Anatolia	328
Turkey	**247**

Source: SPO

To examine the redistributive impacts of public health spending, we need to know who uses the public health facilities and the extent to which public health services are used by individuals (van de Walle, 1995). This information is obtained from household expenditure surveys via the direct questions on the utilisation[16] of public health facilities. However, HICES does not include any question on usage of the public health facilities and so does not provide accurate information on usage of public health services. However, the data have three questions

insurance to attain average unit subsidy, this may lead to the false perception that people in those regions attain higher subsidy from the government. We only report the estimations based on per capita average health subsidy.

[16] Household budget and expenditure surveys include questions such as if individuals need to get any medical help; if individuals have visited any public health facility in the interview period; if they have not visited any public health institution even if they were ill, and the reason for this. For the details of surveys including questions for the analysis of health benefit incidence see van de Walle (1995) and O'Donnell et al. (2008).

that we can use to obtain a reasonable approximation for users of public health services. The first question identifies individuals covered by any social security institution and having health insurance (including the Green Card holders). The individuals with health insurance through public social security institutions have the right to use public health services free and we can call these individuals the potential users (or intended beneficiaries) of public health services. Thus, our first indicator (*POTENTIAL*) for the users of public health services includes individuals with health insurance and also with the Green Card. Using this indicator *(POTENTIAL),* we examine if the public health system has the potential to help decrease inequality in the economy or not, instead of examining if the public health expenditures actually are pro-poor or progressive.

Secondly, the data gives information on households' private spending on health goods and services (such as doctor and drugs), which is the sign of at least one person in a household having used public or private health services. The final question identifies households whose drug expenditures are paid by the public (ES, SSK and Bag-Kur). We create *VISIT* variable by matching households with positive health spending and households whose drug expenditures are paid by public. This second indicator intends to identify "real" users of public health services. *VISIT* gives us the households, who have used any health good and services in the month that they were interviewed. We simply assume that households, who have needed to see a doctor or purchase drugs, and whose drug expenditures were paid by the public, have actually used/visited public health services in the period of interview.

However, there are two problems with the second indicator. First, by considering *VISIT* we may exclude households who have used public health services but have not spent any money out-of-pocket[17]; as a result of this we may underestimate the progressiveness of public health services. Secondly, questions used to generate *VISIT* were asked to households not to

[17]Active members of ES can get their drugs from pharmacies without paying any money. However, dependants of ES members, SSK members and Bag-Kur members are asked to pay some percentage of the cost of the drugs.

individuals, so we do not know how many members in the households needed health services nor do we know if the households spent the money on public or private services. As a result of this, we will only report the distribution of *VISIT* across deciles but not allocate the service benefits with respect to this indicator. We only allocate the per capita health benefit with respect to the number of people with health insurance in the family by using the indicator *POTENTIAL.* On the other hand, the analysis based on *POTENTIAL* may lead to overestimate the progressiveness of the public health spending, as we saw that out-of pocket expenditures are significant to attain the services.

Table 4.2 provides the distribution of beneficiaries of public health services and per adult equivalent household total expenditure by expenditure deciles. Potential users of public health services (*POTENTIAL*) rise with deciles steadily, indicating that the poor's access is more limited and the health system does not target to the poor. Despite this, *POTENTIAL* seems to have a progressive distributive impact in the sense that the percentage share of potential users in the first seven deciles is higher than the percentage expenditure share of those deciles. The number of households utilising the services (*VISIT*) increases with deciles also. However, the percentage share of *VISIT* in the first decile is smaller than the decile's expenditure share, implying the poorest households use health services less. This is consistent with the observation that their access, captured by *POTENTIAL*, is more limited. Given that poorer people tend to have lower health status, one would expect them to need more health services. So it seems that even if the poor has access to public health services, they still hesitate to use the services. HICES does not give any information on individuals' use of public health services less, but, we can use the findings of MoH (2006), which shows that 60% of people who did not do anything to solve their health problems reported that the reason was lack of money. The reasons for 17% of them were low quality of service and long distance, 27% were not insured, 26% were the Green Card holders, 22% were living in the east region and 25% were in the first quintile.

Table 4.3 also gives the distribution of beneficiaries by regions. If we take *POTENTIAL* first as an indicator of usage of public health services, while Istanbul has 28% of household expenditure, 17% of people who can potentially use the publicly provided services live in Istanbul. We may interpret this in the way that residents of Istanbul may have problems with public health services. If we take *VISIT,* East Anatolia has smaller share of potential users than its expenditure share too in addition to Istanbul. East and South East Anatolia are the poorest regions of Turkey. These regions have geographical disadvantages as well, making hard to achieve the public services particularly in winter. Therefore, we may conclude that even if the poor potentially have the right to access the public health services (*POTENTIAL*), their presumed use (*VISIT*) is the least in the poorest decile and in the poorest regions or the region with high inequality rate (Istanbul).

Table 4.2: The Beneficiaries of public health services by deciles

Deciles	Per AE Household Expenditure	POTENTIAL	VISIT
1	2.51	5.64	2.43
2	3.84	8.44	4.53
3	4.85	9.19	6.66
4	5.83	10.28	8.49
5	6.83	10.89	10.30
6	8.02	11.33	10.90
7	9.49	11.28	12.91
8	11.53	11.17	13.35
9	15.04	11.14	14.40
10	32.04	10.67	16.04
Total	100	100	100

Table 4.3: The Beneficiaries of Public Health Services by regions

Regions	Per AE Household Expenditure	POTENTIAL	VISIT
Istanbul	27.60	17.38	20.98
Marmara	13.36	14.46	16.73
Aegean	14.24	14.53	17.37
Black Sea	8.37	11.22	8.64
Central Anatolia	15.65	16.90	15.05
Mediterranean	11.98	12.65	13.05
East Anatolia	4.83	7.28	3.97
South East Anatolia	3.97	5.59	4.21

Descriptive Analysis

Table 4.4 is prepared under the presumption that every individual in the society should have the right to utilise public health services freely (universal coverage). The third column gives the percentage share of population in each decile (universal coverage case), whereas the fourth gives the actual situation- the percentage share of people with health insurance in each decile *(POTENTIAL)*. The share of per adult equivalent household health benefits[18] received by each decile is given in the sixth column. The first four deciles do not receive public health benefits enough to cover their needs, captured by the population. Moreover, the shares of health benefits increase with the deciles implying the benefit is not pro-poor in the sense that health benefits are not distributed disproportionately in favour of the poor. However, the services seem to have the potential to reach people in the sense that the percentage shares of per adult equivalent benefits and potential users are higher than the expenditure share up to the 7th decile; it appears that there is redistribution from the top three deciles to the lower deciles.

Table 4.4: Public Health Service Needs and Benefits, by deciles, % shares

Deciles	Per AE Household Expenditure	Population	POTENTIAL	Per AE Public Health Benefits
1	2.51	13.23	5.64	5.29
2	3.84	11.73	8.44	8.21
3	4.85	10.78	9.19	9.11
4	5.83	10.49	10.28	10.23
5	6.83	10	10.89	10.95
6	8.02	9.71	11.33	11.17
7	9.49	9.29	11.28	11.31
8	11.53	8.81	11.17	11.35
9	15.04	8.29	11.14	11.57
10	32.04	7.67	10.67	10.81
Total	100	100	100	100

Notes: (1) Per adult equivalent public health expenditure is allocated with respect to POTENTIAL indicator

[18] Household public health benefits are calculated by multiplying the number of people with health insurance (*POTENTIAL*) by per capita public health expenditure, which approximates average public health benefit.

Table A 4.10 given in Appendix 4.1 presents the regional distribution of the health benefits and the needs for the services captured by the number of health insurers and the population. The regions, Istanbul[19] and Marmara's shares of the health benefits are smaller than their shares of both population and the number of health insurer. However, Marmara's benefit share is higher than its expenditure share. Istanbul seems to suffer from high migration. The poorest region (Southeast Anatolia) receives higher share from the health benefits than it gets from the distribution of expenditure, suggesting positive distributional impact of the health benefits, although the region seems not to able to cover the needs of health care. From this table, we may conclude that public health expenditures help decrease the discrepancies among the regions.

4.2.2 Infrastructure Services

In Turkey, infrastructure services are provided by a variety of central government institutions[20]. In addition to these four central government institutions, 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 sum the total spending of four central government institutions responsible for different infrastructure services and the tax revenue share of each municipality and SPA from general budget tax revenues to capture central spending via local authorities for each province to attain the total public spending of

[19] To remind us of Istanbul, Istanbul is the most populous city of Turkey with a very high migration rate. It has the biggest share of per adult equivalent household expenditures with a very high inequality rate: Gini coefficient is 0.42 whereas it is 0.40 for overall Turkey.
[20] 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 the General Directorate of Rural Services which works for only rural areas.

infrastructure services in Turkey[21]. Table 4.5 shows total annual public spending on the infrastructure services per household in each region.

Table 4.5: Per Household Annual Public Spending of Infrastructure Services in Turkey, 2003

Regions	*Million TL*
West Marmara	387
Aegean	463
East Marmara	665
Mediterranean	704
Istanbul	726
Central Anatolia	742
East Black Sea	825
South East Anatolia	836
West Black Sea	857
North East Anatolia	989
West Anatolia	1134
Central East Anatolia	1274
Turkey	**751**

Source: TUIK and Ministry of Finance

We have the same problem that we have had for the health incidence analysis regarding determining the beneficiaries of public services. In order to solve this problem and allocate government spending on infrastructure services to households, we produce an index which considers the quality of houses in which households live following Pinar (2004). We suppose that households living in more valuable properties derive more benefit from infrastructure services. This assumption implies the services to have regressive incidence. In HICES, we have information on the value of house a household lives in. For owner-occupied houses, we have two

[21] The total spending of four government institutions by provinces are taken from the Ministry of Finance, while the spending of municipalities and SPAs were provided by TUIK (2003). We do not use the total spending of local governments, since local governments have a range of different revenue sources such as service fees, local taxes and debt. Since we restrict our analysis on the central government budget, we take only the tax share of local governments from the consolidated budget, and so we restrict ourselves to examining the distribution of infrastructure spending of the central government.

different values: the sale value of the house in the case that the owner wants to sell it and imputed rental income of the house if the household wanted to rent it. For households who are tenants, we have information on monthly rent. We use imputed rental income for owner-occupied houses and the rents for renters to calculate the index (*Infra_Index*) for *i*th household as follows:

$$\text{Infra\_Index}_i\text{: } (\text{Rent})_i \,/\, (\text{Mean Rent})_j, \qquad j{:}1,\ldots,26$$

where *i* denotes households and *j* denotes 26 regions. We assume that if a household pays more rent than average regional rent, that household lives in a neighbourhood with better infrastructure services (good infrastructure increases the value of the house). Per household total government spending on physical infrastructure (such as roads, street lightening, electricity, and water supply) is allocated to households according to the *Infra_Index*. Table 4.6 provides mean value of *Infra_Index,* with standard deviations by deciles. Mean value of the index rises with deciles as expected. This makes us expect that public infrastructure services may be regressive. But this also depends on per household public spending which varies across regions.

Table 4.6: Mean Infra_Index by deciles

Deciles	Mean	Standard Deviation
1	0.54	0.29
2	0.67	0.35
3	0.75	0.39
4	0.84	0.44
5	0.89	0.46
6	0.93	0.5
7	1.05	0.58
8	1.13	0.61
9	1.3	0.72
10	1.91	1.3
Total	**1**	**0.73**

In the data, households were asked if they had basic facilities in their houses such as piped water, toilet, electricity, and hot water. We also use these questions to examine incidence of public infrastructure services. However, it is worth noting that we do not have any information on the quality of services. We aim for creating indicators which show if the basic infrastructure services are utilised by households. As we do not have any direct question for sewage facilities in HICES we use the question which seeks if a household has a toilet in the residence. *Transport* and *HighRoad* are indicators of usage of city and high roads. If there is a person in the household who takes any vehicle to commute to work we assume that this household uses city roads more (*Transport*). *HighRoad* shows if the household has a car or not, hence able to use high roads. Table 4.7 and 4.8 gives the distribution of infrastructure facilities by expenditure deciles and the percentage of the users of the facilities in each decile. According to the tables, while it seems that almost all households have electricity, other facilities such as piped water and sewerage[22] are distributed unevenly. Table 4.8**Table 4.8** presents the percentage shares of users in each decile by facilities. Almost all households have electricity, but 26%, 36%, 42% and 85% of households in the first decile do not have piped water, sewerage, phone and hot water respectively. When we look at the users of city transport facilities (particularly city roads) and high roads, we see that it increases with the deciles. Table A 4.11 and Table A 4.12 in Appendix 4.1 give the distribution of house facilities by region. South East and East Anatolia regions receive the least share from the facilities as expected. Moreover rural-urban difference seems more striking. As all households have piped water in urban areas, only 81% of rural households have piped water. 75% of rural households have sewerage facilities whereas 95% of urban residents could enjoy piped water. There is no big difference between rural and urban usage for having telephone and electricity and using high roads (having car). However, it is clear that hot water is still largely an urban facility.

To see if *Infra_Index* is a good approximation to allocate public infrastructure spending, the correlation between *Infra_Index* and dummy variables illustrating if households have basic

[22] According to Turkey Demography and Health Survey 2003 (TDHS), only 76% of households (93% of households in urban and 36% of households in rural areas) have sewerage facility in Turkey. According to HICES 2003, this is 88% for overall Turkey and 95 and 75% for urban and rural areas respectively. The difference between HICES and TDHS comes from the fact that TDHS has a clear question if the toilet in the residence has sewerage facilities or not. However we accepted that if a house has a toilet in the property; it also has sanitary facilities, which is not true always particularly in rural areas.

facilities is examined. Table 4.9 presents the correlation coefficients and mean *Infra_Index* by facilities. As it is expected correlation between the index and the dummy variable for electricity is very weak as all households have electricity. The high correlation coefficients come from *Hotwater, HighRoad* and Sewerage, since *Infra_Index* increases with deciles and possessing hot water and car is still a phenomenon for households with higher incomes. As we have seen already that only 62% of first decile and 75% of rural households have sewerage facilities, so the correlation coefficient is high for sewerage. The reason for the relatively weak correlation between the index and the dummy variables may make us think that the index does not provide a good way to allocate the public spending on infrastructure services. However, we do not know the quality of the services households enjoy and as in the case of sewerage we use some information to attain a proxy for the service without knowing if households really have the service or if the facility works properly. In other words, even if the tables above indicate that basic facilities are owned by a large part of the population, it is not clear that households utilise those services equally. Therefore, even if the correlation between the index created and the dummy variables seems to be weak, we think the index still provides a reasonable way to allocate public spending on public infrastructure services.

GTable 4.7: The Distribution of Basic House Facilities by deciles (%)

Expenditure Deciles	Per AE Expenditure	Population	Electricity	Piped Water	Sewerage	Telephone	Transport	HighRoad	Hot water
1	2.51	10	9.98	7.89	7.07	6.93	4.79	2.06	2.67
2	3.84	10	10	9.07	8.9	8.83	6.64	4.09	5.62
3	4.85	10	10	9.7	9.35	9.65	7.96	5.6	6.91
4	5.83	10	10.01	10.15	10.03	10.19	9.01	6.86	8.89
5	6.83	10	10	10.25	10.3	10.5	9.93	8.65	10.19
6	8.02	10	10	10.45	10.53	10.62	10.94	10.03	10.71
7	9.49	10	10	10.55	10.59	10.83	11.17	11.01	11.95
8	11.53	10	10.01	10.6	10.89	11.01	11.92	12.97	13.09
9	15.04	10	10	10.65	11.12	11.19	13.27	15.91	13.92
10	32.04	10	10	10.69	11.21	10.26	14.35	22.83	16.06
Turkey	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 4.8: The Percentage of Users of House Facilities by decile and by facility

Expenditure Deciles	Electricity	Piped Water	Sewerage	Telephone	Transport	HighRoad	Hot water
1	99.8	73.52	62.46	58.88	21.22	5.6	14.9
2	99.98	84.53	78.61	75	29.42	11.15	31.39
3	99.96	90.49	82.66	81.95	35.26	15.27	38.6
4	100	94.59	88.59	86.48	39.92	18.69	49.6
5	100	95.6	91.09	89.19	44.02	23.6	56.95
6	100	97.37	93.03	90.18	48.46	27.33	59.8
7	100	98.41	93.61	92.01	49.52	30.02	66.76
8	100	98.75	96.2	93.5	52.81	35.33	73.07
9	100	99.32	98.31	95.06	58.83	43.38	77.78
10	100	99.7	99.11	87.19	63.6	62.25	89.74

Table 4.9: Correlation between Infra_Index and Basic Infrastructure Facilities and Mean Infra_Index by facilities

	Infra_Index	Mean Infra_Index	
	Correlation Coefficient	If the facility does not exist	If the facility exists
Electricity	0.02	0.26	1
Piped Water	0.2	0.46	1.04
Sewerage	0.24	0.52	1.06
Telephone	0.09	0.84	1.03
Transport	0.18	0.83	1.1
HighRoad	0.25	0.89	1.3
Hot Water	0.34	0.73	1.22

Descriptive Analysis

Table 4.10 provides per household infrastructure benefits by deciles. Since mean value of *Infra_Index* increases with deciles (Table 4.6), the share of per household benefits increases with the deciles also, implying that the services are not pro-poor. However, the services appear to be progressive in the sense that the shares of the benefits of the deciles up to the 8th decile are higher than the expenditure shares of the deciles. The richest two deciles' shares of benefits are smaller than their expenditure shares, suggesting redistribution from these deciles to the lower deciles.

Table 4.10: The Distribution of Public Infrastructure Services, by deciles, % shares

Expenditure Deciles	Per AE Household Expenditure	Population	Per Household Public Infrastructure Expenditure
1	2.51	13.23	5.73
2	3.84	11.73	6.96
3	4.85	10.78	7.50
4	5.83	10.49	8.45
5	6.83	10	8.97
6	8.02	9.71	9.12
7	9.49	9.29	10.31
8	11.53	8.81	11.08
9	15.04	8.29	12.89
10	32.04	7.67	19.00
Total	**100**	**100**	**100**

The distribution of the infrastructure services among regions seems to be strong. (Table A 4.13 in Appendix 4.1). However, Central Anatolia housing the capital receives the highest share of per adult benefits followed by Istanbul and Mediterranean. Apart from the regions, South East, Marmara and Aegean, the regions cover their needs. The poorest regions' share of benefits is higher than their expenditure share suggesting equality enhancing impact through the services.

4.2.3 Social Transfers

Social transfers are important as a direct instrument for governments to affect the distribution of household incomes along with the taxes and other public spending. The purposes of social transfers may be poverty reduction, income redistribution, the provision of insurance such as unemployment insurance, and redistribution of family income through time such as child or old age benefits and retirement pensions (Atkinson, 1995; Heady et al. 2001; Whiteford, 2008). Depending on the main objectives of social transfer systems countries have, some classifications have been offered to identify the countries' social policies (Barr, 2001; Esping-Andersen, 1991). Whilst some countries are much keener on the direct redistributive role of the transfers by mean-tested cash transfers, others are more focused on providing universal benefits and risk insurance. For these differences in the objectives of the social transfer systems lead to the different redistributive impacts on well-being of households, it is important to examine the distributional impacts of the social transfer system to see if these transfers help diminish inequality and poverty, and to assess the social objectives of governments. This subsection outlines the characteristics of the social cash transfer system in Turkey to depict the potential direction of social cash transfers in narrowing inequality.

The Turkish social transfer system consists of direct cash transfers and social insurance system (universal benefits). Direct cash transfers are supposed to be means-tested thus target to the poor directly. Social insurance system has two objectives: redistribute lifetime income (retirement pensions) and provide risk insurance (unemployment benefits). Turkey has a wide retirement pension system however, because of the high unrecorded employment employees at the bottom end of the deciles appear not to engage in the system. The second part of the insurance system, unemployment benefits, is a quite recent and suffers from unrecorded employment too. Means-tested transfers are old-age benefits, Direct Income Support (DIS) for farmers, social transfers from the Social Assistance and Solidarity Fund (SASF), and student grants. However, their share in total transfers and in households' income are negligible, additionally student grants seem not to benefit the poor. So Turkish social transfer system does not seem to function neither risk insurance role of it nor providing cash income to the people in need. Because of the distribution of beneficiaries, we conclude that social transfer system is expected not to be progressive or even if it is progressive it is not expected to be very important in reducing inequality.

Turkey has been paying more attention to poverty alleviation using social cash transfers in recent years. Buğra and Adar (2008) report that means-tested social expenditures by institutions directly involved in poverty alleviation increased between 2001 and 2004. Despite these recent improvements in social transfers targeting the poor, social transfers still remain very marginal and are very far from being systematic. Table 4.11 reports social transfers in cash and in kind as a percentage of total decile income. In European Union (EU) countries, social transfers account for at least 40% of total decile income in the first decile (Heady et. al., 2001). In Turkey, on the contrary, percentage share of social transfers in cash in total household income increase with deciles and the share of total transfers in cash and in kind in total household incomes account for only 17%[1]. As we discuss in detail below, this is mainly due to the distribution of pensions and other employment-related, non-means-tested transfers such as

[1] Transfers in kind are organised generally by the local governments and their amount has increased in recent years with the right wing ruling party (AK Party) which has islamic roots. However, Buğra and Adar also warn that the mentality behind the social transfers is problematic since social transfers are regarded as charity instead of a systematic instrument to fight against poverty and inequalities in the society. Thus, these recent developments seem not to be a part of any long-run redistribution policies.

unemployment insurance and tax refund, and the significant share of these transfers in total transfers.

The HICES data provide information on if individuals receive any social transfer (cash or in-kind) from public or private institutions (or other individuals) and how much they get. In the data, individuals reported a number of different transfer types such as retirement pension, tax refund, old-age pension, DIS for farmers, social transfers from the SASF targeting especially the poor, unemployment benefits, public scholarships to students from poor families, and finally the pension for veterans, disabled, widows and orphans.

Table 4.11: Social Transfers as a percentage of total decile income*

Expenditure Deciles	Total Transfers	Transfers in Cash	Transfers in Kind	Pensions (% of Total Transfers)
1	10.09	9.89	0.2	53.67
2	14.76	14.67	0.08	68.8
3	18.13	18.08	0.05	74.08
4	19.25	19.2	0.05	76.31
5	19.88	19.84	0.04	77.63
6	18.7	18.68	0.02	79.09
7	20.09	20.06	0.02	79.53
8	20.12	20.11	0.01	80.61
9	19.78	19.77	0.01	78.69
10	13.93	13.93	0	82.95
Turkey	17.43	17.4	0.03	78.4

Notes: Ranked by per adult equivalent household expenditure
**Income is defined as disposable household income in cash and in kind including imputed rental income*

Tax refund[2] is received only by pensioners and recorded workers who are covered by any social security organisation. Old-age pension is given to individuals who are older than 65. DIS for farmers and social transfers targeting to the poor from SASF and old-age pension were recorded in one question. In order to separate old-age pensions from SASF and DIS transfers, old-age pensions have been imputed to those individuals who are over 65. Unemployment

[2] Tax refund was about VAT payments wage earners do. It was introduced to encourage wage earners to get their receipt after shopping as an instrument to increase VAT collection and decrease tax evasion regarding VAT. Tax refund was abolished in 2008.

benefit as a main instrument of risk insurance was introduced only in 2000 and it has very limited coverage. Employees who had not been employed in the last 120 days continuously and who had paid social security contributions at least 600 days in the last three years before applying for benefit qualify to receive the unemployment benefit.

As can be seen from Table 4.12, potential beneficiaries of employment-related social transfers are concentrated in the poorer deciles as expected. However, middle deciles seem to utilise the transfers most. The reasons may be twofold. First, means-tested transfers targeting directly the poor are a very small part of the total transfers. Secondly, the large part of the transfers is employment-related and the poor, who are more likely to be in unrecorded employment, do not qualify for these transfers; 35% of unrecorded employees, who are not covered by any social security organisation, are in the first two deciles, and those workers cannot receive any social transfer. This is an important problem for a country like Turkey which faces instability in the economy very often, affecting particularly employment status of unskilled labour.

Unemployment benefits are particularly far from being enough to cover the needs of unemployed. Less than one percent of unemployed individuals[3] in HICES could receive the unemployment benefits, mainly because of high unrecorded employment. If we compare the percentage shares of unemployed workers and unemployment beneficiaries by deciles, we find out that 13% of unemployed are in the poorest decile whereas only 5% of unemployment beneficiaries are entitled to obtain the benefit in this decile. However, the distribution of the beneficiaries does not have any pattern by deciles. It seems it is completely coincidence to be able to get the benefits. However, when we look at the percentage share of unemployment beneficiaries in unemployed individuals by deciles, we can report that only 0.31% of total

[3] Only 29 individuals reported that they had the unemployment benefit in the past year.

unemployed in the first decile receive the benefits, this is only 0.81% for the whole country. Thus it seems the unemployment benefits are negligible as a transfer instrument.

The pension system seems not to reach to the poorer deciles either. Only 2% of pensioners are in the poorest decile, whereas 9% of potential pensioners[4] is in the first decile. Because of high unrecorded employment in the lower deciles, social transfers such as pensions, unemployment benefits and tax refund mostly go to the middle deciles, implying that the redistributive power of social transfers are quite limited in Turkey and a large part of the transfers is intended for households that are not poor.

However, the last column shows a different picture, for beneficiaries of old-age benefits, public scholarships, DIS, the pension for veterans, disabled, widows and orphans and SASF transfers. Apart from DIS and the pension, the other transfers are designed to target directly the poor, but only account for 19% of the total transfers received by households in the data. Moreover, when we look at transfers separately, we see that only the old-age pension is successful to meet the needs in the society. Table A 4.14 in Appendix 4.1 also gives the distribution of receivers of other cash transfers such as student grants and old-age benefits. While receivers of old-age benefits and SASF and DIS transfers are concentrated in the first deciles, the opposite is true for student grants as the share of the receivers rises with deciles. Additionally, beneficiaries of transfers in-kind too seem to be concentrated in lower deciles[5].

There has been a discussion on if means-tested transfers or universal transfers should be used to fight against inequality and poverty in the literature[6]. Since means-tested transfers are

[4] Before 1999 retirement age was 38 for female and 43 for male employees who had worked at least for 5,000 days. In 1999, the retirement age became 50 for females and 60 for male workers if they had worked for 7,000 days. However, the law let people retire before 50 (or 60) if they started to work before 1999. Thus we assume that in 2003 minimum retirement age is 43 for female and 47 for male.

[5] It is impossibe to separate the receivers of DIS and SASF transfers that are the only direct transfers to the poor in the social transfer system. However, the data allow us to determine old-age pension and public scholarship beneficiaries. These figures are reported in Table A 4.15 and Table A 4.16 in Appendix 4.1.

[6] See Atkinson (1995) and Besley (1990) for the discussion.

supposed to go to the people in need, they are considered to be more effective than universal benefits in terms of cost effectiveness and reducing poverty and inequality. However, the arguments against means-tested transfers have been also considered. These arguments are focused on the problems of targeting and related inefficiencies caused by these problems. Administrative costs and imperfect information are the most discussed problems which are thought to make means-tested transfers inefficient.

Table 4.12: Percentage shares of receivers of social transfers by deciles

Expenditure Deciles	Unrecorded Employees	Potential Pensioners*	Pensioners	Unemployed	Unemployment Beneficiaries	% of Unemployment Beneficiaries in Unemployed	Tax Refund	Others**
1	19.29	9.13	2.11	13.34	5.02	0.31	1.56	11.31
2	15.83	9.01	4.93	13.03	15.58	0.97	4.52	10.47
3	13.37	9.48	7.04	11.65	5.47	0.38	5.77	10.65
4	11.3	9.77	8.49	10.96	14.93	1.11	7.73	10.19
5	9.58	10.09	9.95	9.9	14	1.15	9.65	9.99
6	8.54	10.22	10.6	10.62	10.8	0.83	10.79	9.94
7	7.57	10.26	11.84	8.68	9.85	0.92	12.27	10.06
8	5.98	10.4	13.18	8.65	5.89	0.55	13.76	9.02
9	4.65	10.94	14.63	7.6	12.6	1.35	16.46	10.31
10	3.9	10.72	17.23	5.58	5.86	0.85	17.49	8.06
Turkey	100	100	100	100	100	0.81	100	100

Note: Ranked by per adult equivalent household expenditure

** Potential pensioners are people over 43 (female) or 47(male) who had the right to retire in 2003.*

***Other: Old-age pensioners, farmers receiving DIS, students with public scholarships and SASF beneficiary*

Descriptive Analysis

Table 4.13 provides the distribution of social transfers by deciles. Per adult equivalent household expenditure indicates the after benefit living standard of the households in the case of transfers since household expenditures were made with the transfers households have received. We have two different definitions for the total transfers: per adult equivalent transfers with pensions (1) and without pensions (2). The reason for this division is the big share of retirement pensions (78%) in the total transfers. Pensions are the kind of transfers whose aim is to redistribute incomes across the lifecycle instead of providing insurance in the face of adverse risks (unemployment, disability, sickness). On the other hand the some unknown part of retirement pensions come from the sum of which pensioners have paid to the social security institutions as payroll tax while they were working. Hence, it is impossible to determine the size of the pure redistributive role of the state in the case of pensions with a cross sectional data.

Table 4.13: The Distribution of Social Cash Transfers, by deciles % shares

Expenditure Deciles	Per AE Expenditure	Per AE Social Transfers with pension	Per AE Social Transfers without pension
1	2.51	1.93	3.97
2	3.84	3.82	5.29
3	4.85	5.76	6.71
4	5.83	7.12	7.39
5	6.83	8.44	8.38
6	8.02	9.03	8.62
7	9.49	11.04	9.98
8	11.53	13.09	12.14
9	15.04	16.45	17.68
10	32.04	23.32	19.83

Notes: (1) Per adult equivalent transfers (expenditure) with pensions. (2) Per adult equivalent transfers without pensions.

Considering this fact, some empirical research, seeking lifetime redistributive impacts of public policies, has been done to distinguish the share of pensioners' contributions in total retirement pensions (Whiteford 2008). Our aim here is to attain a better understanding about the role of social transfers in Turkey by examining pensions separately.

As can bee seen from the table the share of transfers (with and without pensions) increases with deciles suggesting that they are not pro-poor. The percentage share of transfers with pensions in the first decile is smaller than that of household expenditures implying regressivity to the transfers. However, it becomes proportional for the second decile and progressive for the rest of the deciles with the exception of 10th decile. However when we exclude pensions, social transfers become highly progressive in the sense that the share of transfers is far higher than that of household expenditures, particularly for the first four deciles. However, we do not expect transfers without pensions have a strong redistributive impact since social transfers without pensions make up only very small part of the total household incomes and expenditures. Table 4.14 provides the distribution of disaggregated social transfers. Apart from old-age benefits, SASF ad DIS transfers and transfers in kind the shares of all transfers increase with deciles.

The distribution of social transfers among regions can be examined with the help of Table A 4.15 and Table A 4.16 in Appendix 4.1. According to Table A 4.15, the share of South East, East Anatolia, Istanbul and Mediterranean from social transfers (1) is smaller than their expenditure shares, and the opposite is true for Aegean, Marmara, Black Sea and Central Anatolia. However when we look at the transfers excluding pensions, apart from the shares of Marmara and Aegean, the other regions increase the shares of social transfers they receive.

Table 4.14: The Distribution of Social Transfers by deciles

Deciles	Per AE Household Expenditure	Pensions	Unemployment Benefits	Tax Refund	Old-Age Benefits	SASF and DIS Transfers	Student Grants	Transfers in kind	Other*
1	2.51	1.31	3.51	0.84	26.12	11.49	0.72	26.03	2.57
2	3.84	3.37	9.15	3.01	15.03	9.31	1.61	13.60	4.86
3	4.85	5.49	4.71	4.20	16.29	11.78	0.00	11.58	6.31
4	5.83	7.03	9.12	5.66	6.87	11.40	5.72	11.79	7.50
5	6.83	8.45	13.72	7.52	10.11	9.56	3.53	9.96	8.40
6	8.02	9.13	3.64	8.86	7.61	11.69	10.35	6.88	8.37
7	9.49	11.35	6.52	11.02	10.13	12.07	10.66	8.64	9.58
8	11.53	13.38	2.87	13.88	4.55	8.34	16.04	4.88	12.52
9	15.04	16.13	41.76	18.41	2.29	7.53	38.27	3.53	19.24
10	32.04	24.37	5.00	26.60	1.01	6.83	13.09	3.11	20.65
Turkey	100	100	100	100	100	100	100	100	100

**The pensions for veterans and widows.*

Deciles are organised by ranking per adult equivalent household expenditure

Decomposition Analysis

We employ the technique of inequality decomposition by income sources to assess the contribution of social transfers to income inequality, using S-Gini decomposition by income sources. An S-Gini inequality index for a variable can be decomposed as a sum of the concentration indices of the component variables adding up to that variable (Duclos and Araar, 2006)[1]. The income variable is per adult equivalent household disposable income, which includes imputed rental incomes. We use DAD Software (Duclos and Araar, 2006) to estimate the inequality decomposition for different social transfers and per adult equivalent household income excluding social transfers with standard deviations, reported in Table 4.15. Table 4.15 has four columns: coefficient of concentration, share of source of income in total income, relative contribution of income source to inequality and absolute contribution of income source to inequality. To remind us: the more concentrated income source, the higher contribution from that source of income to the overall inequality depending on the share of income source in total income. Thus, the negative coefficient of concentration means that source of income in question contributes to equality rather than inequality in the distribution.

According to the results of decomposition analysis, all social transfers make up only 17 percent of total household incomes and contribute to income inequality rather than equality with "0.36" coefficient of concentration[2]. The most important type of social transfer is retirement pensions, accounting for 13 percent of the total household disposable income. Retirement pensions (employment related), pensions for widows and tax refund (another employment-related transfer), are the most important social transfers contributing to inequality, followed by public scholarships. Old-age benefits and SASF and DIS transfers and social transfers in kind

[1] See Chapter 2. Additionally, we follow the natural approach to run the estimation and presenting the results under $\rho=2$.

[2] 2 times of the share column gives us the exact share of the source of income.

seem to help decrease inequality with the negative coefficients of concentration and contribution. However, their share in the total income is so small, 0.043 and 0.02 percent respectively, implying that their contribution to equality is negligible (relative and absolute contributions are almost zero).

Table 4.15: Decomposition Analysis: Contribution of Social Transfers (in cash and in kind) to Total Income*

Source of Income	Coefficient of Concentration	Share	Relative Contribution	Absolute Contribution
Gini for Total Income	0.43376	ρ=2		
Standard Error	*0.00484*			
Total Income	0.4338	0.5000	0.5000	0.2169
	0.0048	*0.0000*	*0.0011*	*0.0024*
Total Income without Transfers	0.4493	0.4126	0.4274	0.1854
	0.0057	*0.0013*	*0.0025*	*0.0020*
All Social Transfers	0.3602	0.0874	0.0726	0.0315
	0.0066	*0.0013*	*0.0023*	*0.0008*
Pensions	0.3748	0.0671	0.0580	0.0252
	0.0076	*0.0011*	*0.0020*	*0.0007*
Tax Refund	0.4239	0.0038	0.0037	0.0016
	0.0063	*0.0001*	*0.0001*	*0.0000*
Old-Age Benefits and SASF&DIS Transfers	-0.0126	0.0022	-0.0001	0.0000
	0.0268	*0.0001*	*0.0001*	*0.0001*
Scholarships	0.3736	0.0001	0.0001	0.0000
	0.0789	*0.0000*	*0.0000*	*0.0000*
Unemployment Benefits	0.2184	0.0000	0.0000	0.0000
	0.2294	*0.0000*	*0.0000*	*0.0000*
Transfers in-kind	-0.3450	0.0001	-0.0001	0.0000
	0.0306	*0.0000*	*0.0000*	*0.0000*
Other Transfers**	0.3377	0.0141	0.0110	0.0048
	0.0191	*0.0005*	*0.0009*	*0.0003*

Notes: Total Income is per adult household disposable income. **Other transfers include pensions for widows, veterans and disabled. Asymptotic standard errors are in italic*

4.3 Results

4.3.1 Welfare Dominance Analysis

In this section we initially want to use concentration curves to study progressivity and redistributive impacts of benefits of these three social services and the total benefits including education benefits. We apply the welfare dominance method to examine the progressivity and compare distributions of benefits (Yitzhaki and Slemrod, 1991). Because concentration curves are constructed from sample data rather than the whole population, it is compulsory to take into account statistical robustness of the comparisons we are intended to make. We apply Davidson and Duclos (1997) to test the differences between the Lorenz curve and concentration curves statistically. We estimate the differences between curves with asymptotic standard errors by using DAD software[3].

It is worth explaining a point before moving to discuss the results. The analysis of the distributional and redistributive impact of the benefits requires determining a "benchmark distribution or pre-benefit distribution" which indicates how income distribution would be in the absence of the public benefits. As noted in the previous chapter, determining the benchmark distribution simply as the welfare indicator less benefits needs another strong assumption: public policies do not have any behavioral impact on the distribution of market incomes. In other words, with this reasoning it is assumed that if there is no public cash benefit (say pensions), the beneficiaries of the public social transfers would not try to have the same income level by doing any other activity. This assumption leads to obtain exaggerated results over the redistributive role of the public policies, since some public policies such as social cash transfers may cause a big reranking of some households who largely depend on the public benefits in question (Whiteford, 2008). In order to avoid this problem, it is suggested to measure the redistributive

[3] See Chapter 2 for the details.

power of a public policy by the difference between the concentration coefficient of the pre-intervention distribution ranked according to the post-intervention distribution and the Gini coefficient of the post-intervention distribution, instead of taking the difference of the Gini coefficients of pre-intervention and post-intervention distributions. By doing this, it is implicitly assumed that the public policies in question do not modify the underlying distribution.

The benchmark distribution for the benefit incidence analysis is given by the total household expenditure (per adult equivalent). For public education, health and infrastructure services, there appears no problem with choosing this as the household expenditure does not comprise these benefits (still ignoring possible behavioral responses of the households). The problem appears when we analyse the public cash and in-kind transfers, since the total household expenditure also includes the social cash and in-kind transfers and actually the distribution of the total household expenditure gives us the post-social transfer distribution. However, as we will see in the next section with S-Gini indices of progressivity and redistribution, the social transfers cause a significant reranking of the households with social transfers and that overestimate the progressivity and redistributive role of the social transfers even if their distribution is not more progressive than the underlying distribution, that is, per adult equivalent household expenditure. Therefore, we also assume that the social cash and in-kind transfers do not modify the underlying expenditure distribution and keep ranking households according to per adult equivalent household expenditure (AE_EXP) to examine the redistributive impacts of the social transfers.

Figure 4.1 gives the concentration curves[4] of the social services apart from education. From the figure it seems that all concentration curves are below the 45-degree line, so none of

[4] Concentration curves, the differences between Lorenz curve of per adult equivalent household expenditure and concentration curves of the benefits with standard errors are given in Table A 4.17 in Appendix 4.1. The figures for differences among the concentration curves with confidence interval drawn by using DASP Stata Package can be provided on demand.

them is absolute progressive (pro-poor). Based on t-tests[5] for the differences between ordinates of the 45-degree line and concentration curves, we confirm that none of these three social services are pro-poor statistically in the sense that concentration curves of the services are dominated by 45-degree line (Table 4.16) under both decision rules. This finding gives further support to the finding we have attained with descriptive analysis that health, infrastructure services and social transfers do not target the poor, since the share of benefits increase with the deciles.

In order to decide if the benefits are progressive or not, we test for the differences between ordinates of the Lorenz curve and concentration curves. According to the statistical tests, the concentration curves for health and infrastructure services dominate the Lorenz curve of per adult equivalent household expenditures (AE_EXP) under the both decision rules. However, while social transfers (both 1 and 2) are progressive under the Decision Rule 1, Howes' Criterion says that we cannot reject the null hypothesis for social transfers (1) for all ordinates we tested. To overcome ambiguity regarding progressivity of social transfers (1), we use S-Gini indices of progressivity and also apply extended-Gini test in the next section.

In order to rank the benefits in terms of progressivity, we compare the concentration curves for the public transfers. From Figure 4.1[6] it seems that the most progressive benefit is created by the health services followed by infrastructure services (INFRA), transfers (2) without pensions and transfers (1) with pensions. However the concentration curves for infrastructure services and both transfers seem to cross, so we apply the dominance test methodology to reach unambiguous results. According to the welfare dominance test for the differences of concentration curves, transfers (2) dominates transfers (1), yet we reject the null hypothesis of

[5] The null hypothesis of the test is that the ordinates of the curves are all the same, in other words there is no dominance. Please see Chapter 2 for the details.

[6] Households are ranked according to per adult equivalent household expenditure.

non-dominance in favour of crossing for the concentration curves of transfers and infrastructure services, since there are two ordinates differing statistically in the opposite directions (Table 4.17). So we are not able to rank the benefits from transfers and infrastructure services unambiguously with the dominance test methodology.

Finally we would like to see the impact of the private health expenditures on the progressivity of the public health services. We simply add the private health expenditures to the household health benefits to take into account the impact of the private health expenditures. Figure A 4-1 provides the concentration curves for the health benefits with (Health Benefits1) and without (Health Benefits2) the private household expenditures on health. As we have already seen in the second section, the private health expenditures rise with the total household expenditure (per adult equivalent), implying that it is more regressive than the total household expenditures. We can see that from the table too as the concentration curve for the private health expenditures is below the Lorenz curve of the total household expenditures. The impact of the private health expenditure is significant in the sense that it reduces the progressivity of the public health services by making the concentration curve for the health benefits with private expenditures much closer to the Lorenz curve than the health benefits without private expenditures. For the rest of the analysis, we do not take into account the impact of the private health expenditures, however the negative impact of it on the progressivity of the services should be kept in mind in assessing the results.

Figure 4.1: Concentration Curves for Benefits

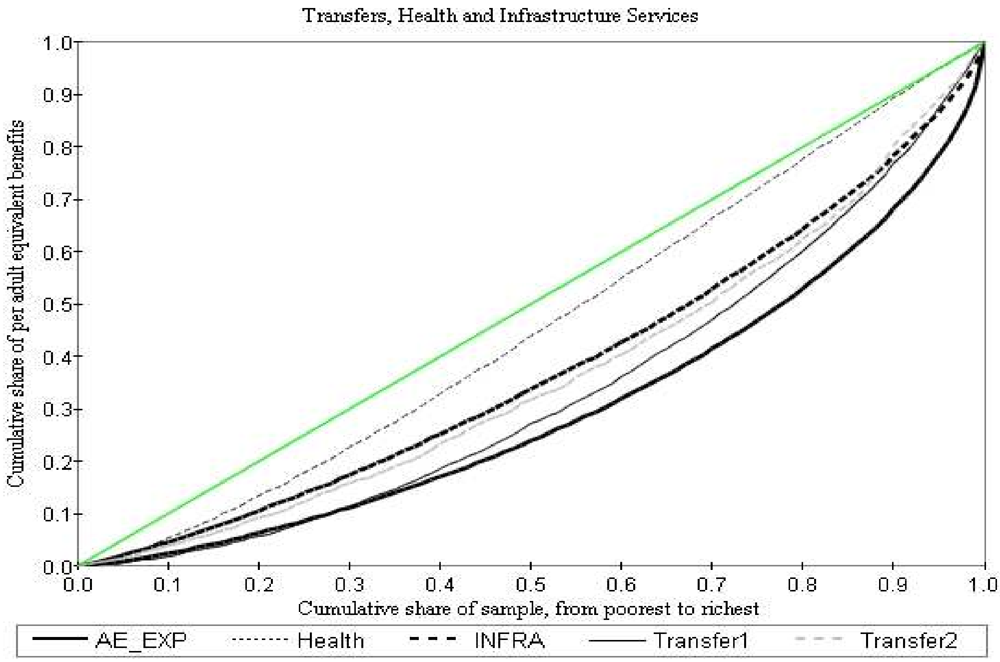


Table 4.16: Dominance Results for Public Services,
Relative to the Lorenz Curve and the 45-Degree Line

	Health (1)		Transfer 1		Transfer 2		Infrastructure	
	1	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Decision rule 1	+	-	+	-	+	-	+	-
Howes' Test	+	-	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. The service is dominated by 45-degree line

'x' indicates that the curves cross

nd: non dominance: we cannot reject the null hypothesis

Table 4.17: Results of Dominance Tests for Public Services
Howes' Test

	Health	Infrastructure	Transfer 2	Transfer 1
Health		+	+	+
Infrastructure			X	X
Transfer 2				+
Transfer 1				

Notes: *'+' indicates that the row's benefit dominates the column's benefit*
X' indicates that concentration curves cross

4.3.2 The Progressivity Indices and The Extended Ginis Test

In this section we follow the same procedure as we did in Chapter 3 and employ summary indices of progression and redistribution to reach unambiguous results. We report the indices for redistribution and horizontal inequity (Atkinson-Plotnick Index) as well as the Kakwani index of TR-Progressivity and the Reynolds-Smolensky index of IR-Progressivity, in order to see the extent of inequality reducing impacts of the benefits.

Table 4.18 reports the indices for the benefits with asymptotic standard errors (in italic) estimated by DAD software. In order to show the problem of overestimating the progressivity and the redistributive impact of the social transfers, we report two different estimations of the indices for the social transfers. For the first one, we accept the benchmark distribution as the household expenditure less the social transfers and rank the households by this to obtain the progressivity indices. For the second estimation, we assume that the social transfers do not modify the underlying expenditure distribution and in estimating the indices of progressivity, reranking and redistribution, we keep ranking of households by per adult equivalent household expenditure. So we also implicitly suppose that there is no reranking as a result of transfers, thus S-Gini indices of IR progressivity and redistribution are equal to each other for the social transfers.

Since all benefits have positive Kakwani and Reynold-Smolensky indices, they are all progressive and have the positive redistributive impact. Let us first discuss the estimations for the social transfers. As can be seen from the table, if we rank people by pre-social transfers distribution to measure the indices, the most progressive type of benefit is the social transfers (both with and without pensions) with very high TR and IR progressivity rates, 0.74 and 0.14 respectively for the transfers (1) with pensions. Also the social transfers cause 7.8% reduction in expenditure inequality which is highest among the benefits. However, the transfers cause 0.065 reranking which is the highest reranking as well. On the other hand, if we ignore the reranking as a result of the social transfers (the results indicated ** in the table), the progressivity rates are 0.065 and 0.012 for the social transfers (1) and the inequality reduction is only 1.2% which is equal to IR progressivity rate. The difference between the two estimations is a result of the reranking which is mainly arising from the retirement pensions, as 10% of retired individuals have no source of income other than the retirement pensions. As we emphasized before, assuming that those individuals would not try to have any other source of income in the absence of the pensions is not realistic and this overestimates the progressivity and redistributive power of the social transfers. Retired individuals paid payroll taxes to entitle them to the retirement pensions and in the absence of the pension system they would save some money, which would make them have more than zero income. In this reasoning, for the rest of the analysis, we ignore the reranking caused by the social transfers and keep ranking the households by post-social transfer expenditure.

The public health benefits have the highest indices, followed by infrastructure and transfers. Transfers without pensions (2) have the higher Kakwani index than with pensions (1) as expected, yet transfers (1) is more progressive than transfers (2) according to Reynold-Smolensky index. The rankings given by Kakwani and Reynold-Smolensky indices for transfers are different, because the share of transfers (2) in the total household expenditure is very small, even if it is more concentrated amongst the poor. Thus, due to the small size of the transfers (2), the progressivity and the redistributive power of them is quite limited. If we rank all public services including the education benefits, the primary education is the most progressive public service, in other words it is the most concentrated amongst the poor; and the higher education is the least progressive (least concentrated amongst the poor). All comparisons are statistically significant.

The most inequality reducing impact comes from the health services (1.8%), followed by transfers (1) (1.2%), infrastructure services (1.1%) and finally transfers (2) (0.6%). When we incorporate the education benefits too, an interesting observation appears. Although higher education seems to be progressive with both TR and IR progressivity indices, the redistributive impact of it is regressive, arising from the higher reranking relative to progressivity of higher education services. The other interesting point is that even if the progressivity rate of the primary education is far higher than that of the health benefits, the final redistributive impact they lead is almost the same (1.9% for the primary education). The reason for this result may be the relative share of benefits in the household total expenditures. It seems that the public health benefits make up 6.8% of the total household expenditures, whereas the primary education benefits are only 3.8% of the total household expenditures. Therefore, this suggests that in reducing inequality both public services need to be given the equal importance.

Table 4.18: S-Gini Indices for Benefits (ρ=2)

	Kakwani Index TR Progression	Reynolds-Smolensky IR Progression	Atkinson-Plotnick Horizontal Inequity	Redistribution
Primary	0.577	0.021	0.002	0.019
	0.007	*0.000*	*0.000*	*0.000*
Secondary	0.426	0.009	0.002	0.007
	0.011	*0.000*	*0.000*	*0.000*
Higher	0.043	0.001	0.004	-0.003
	0.014	*0.000*	*0.000*	*0.000*
Health	0.312	0.020	0.001	0.018
	0.005	*0.000*	*0.000*	*0.000*
Infrastructure	0.155	0.012	0.001	0.011
	0.003	*0.000*	*0.000*	*0.000*
Transfers (1)*	0.740	0.143	0.065	0.078
	0.010	*0.003*	*0.002*	*0.002*
Transfers (2)*	0.647	0.030	0.012	0.017
	0.021	*0.001*	*0.001*	*0.001*
Transfers (1)**	0.065	0.012	0	0.012
	0.008	*0.002*	*0*	*0.002*
Transfers (2)**	0.129	0.006	0	0.006
	0.015	*0.001*	*0*	*0.001*

Notes: Asymptotic standard errors estimated by DAD are in italic. Transfer1: including pensions; Transfer2:excluding pensions.
**The households are ranked by pre-social transfer expenditure (the total household expenditure less the social transfers)*
***The households are ranked by the total household expenditure*

Although the progressivity indices give us a ranking of benefits, we would like to test if this ranking is consistent with different inequality aversion parameters. If we could attain higher progressivity index for one transfer for the whole range of inequality aversion parameters, we say that that transfer "dominates" the others. Also if we attain positive numbers for the indices of progressivity and redistribution for the whole range of inequality weights, we confirm the progressiveness of the benefit. Table A 4.18, Table A 4.19 and Table A 4.20 give S-Gini indices of IR, TR and redistribution with asymptotic standard errors for different values of ρ. Also based on these tables, Figure A 4-2, Figure A 4-3 and Figure A 4-4 show visually how the indices of the benefits vary with values of inequality aversion parameter, ρ *(rho)*.

We summarise the information that we could get from these tables in Table 4.19 which gives the extended-Gini test. According to Table 4.19, none of the public services is pro-poor (none of the benefits has a negative coefficient of concentration - Table A 4.21), as we have found in the previous section. Yet all of them are progressive since TR progressivity indices are all positive for the whole range of parameter values. However, TR progressivity rates are not different from zero statistically for parameter values of 3.5 and 4, in other words, for the lower part of the distribution the concentration curve for transfers (1) and the Lorenz curve of per adult equivalent expenditure coincide statistically. Hence according to the Howes' test we have inconclusive result for transfers (1). However, we may say that transfers (1) can be progressive if we have a social welfare function which cares more about middle and upper middle part of the distribution. It can be seen from Figure A 4-2: TR progressivity values increase up to 2.5 but it starts decreasing after 3. This is supported by IR progressivity rates too.

Table 4.19: Extended-Ginis Test Results,
Relative to the Lorenz Curve and the 45-Degree Line

	Health		**Transfer 1**		**Transfer 2**		**Infrastructure**	
ρ	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
1.01	+	-	+	-	+	-	+	-
1.5	+	-	+	-	+	-	+	-
2	+	-	+	-	+	-	+	-
2.5	+	-	+	-	+	-	+	-
3	+	-	+	-	+	-	+	-
3.5	+	-	na	-	+	-	+	-
4	+	-	na	-	+	-	+	-

Notes: Based on Table A 4.18 and Table A 4.21

For ranking benefits with TR progressivity, we can confirm that health benefits dominate all other benefits as it has the highest indices for all values of ρ for both progressivity indices; it also has the highest redistributive impact. Health services are followed by infrastructure services, social transfers without pensions (2) and transfers with pensions (1). For social transfers with pensions, TR-progressivity index takes the smallest values for 1.01 and 4 (two extreme points). But the index increases with ρ up to 2, and when we keep increasing the value of ρ, in other words when we put more weight on the poorer, the index declines. We have seen this pattern with the descriptive analysis as well. The reason for this phenomenon is the high concentration of unrecorded employment in the lower deciles, which causes relatively fewer beneficiaries of employment related cash transfers such as retirement pensions and the tax refund in the lower deciles and implies the services do not benefit the poor disproportionately.

Figure A 4-3 in Appendix 4.2 presents how the IR progressivity ranking of the benefits varies with values of inequality aversion parameter, ρ. All benefits have positive numbers for the whole range of inequality parameter. The most sensitive benefit is generated by health spending, whose progressivity increases with ρ very quickly once ρ is greater than 1.5. The progressivity keeps increasing when ρ is greater than 2. Health benefits are followed by infrastructure services. However, we cannot rank the benefits unambiguously with IR progressivity approach. The progressivity of transfers (1) is higher than that of infrastructure services if we put higher weight to the upper part of the distribution, but in contrast with the infrastructure services, its progressivity begins to decline once ρ is greater than 1.5. Hence it can be said that transfers with pensions are more concentrated in the middle and upper deciles. TR progressivity approach told us that transfers (2) is more concentrated amongst the poor than transfers (1), so the former dominates the latter. However, with IR progressivity approach, transfers (1) seems to have higher progressivity up to 3 for ρ; when we increase ρ further to 3.5 and 4, transfers (2) becomes more progressive than transfers(1), suggesting pro-poor characteristics. The different ranking estimated by TR and IR approaches comes from the very small share of transfers (2) in the total household expenditure as noted before. As IR approach captures redistributive impact too, it produces different ranking from TR approach.

Finally if we look at the redistributive impact of the benefits (Figure A 4.4), we see that the primary education, health and social transfers (1) compete with each other for the lower values of ρ, but the primary education creates more redistributive impacts when we put more weight on the lower part of the distribution. In other words as ρ rises, the redistributive impact of transfers (1) decreases and that of the health benefits stays same after ρ is 2. Moreover, higher education is the only inequality worsening public service.

4.3.3 The Overall Analysis of the Social Services

In this section, we aggregate all public expenditures on education, health, infrastructure and social transfers to see the total effect of social services on inequality. The concentration curves are given in Figure 4.2. The total benefits[7] are progressive regardless of the definition since the Lorenz curve is dominated by the concentration curves for the total benefits. However, the benefit system is not pro-poor in the sense that the concentration curves are dominated by 45-degree line. The social transfers worsen the distribution of the total benefits as the concentration curve of the total benefits without social transfers are much closer to the 45-degree line than the concentration curves with social transfers. These findings are confirmed by the summary indices of redistribution in Table 4.20. S-Gini redistribution indices[8] increase with ρ for Total Benefits (2) and Total Benefits (3), however, the total social transfers (including pensions) decrease the redistributive impact of the total benefit system once ρ is bigger than 2.5. The total benefit system causes around 5% reduction in inequality. It should be emphasized that the publicly provided services we have chosen to examine are supposed to benefit the poor

[7] Total Benefits (1) indicates the sum of per adult equivalent benefits from all public services examined with social transfers (1); Total Benefits (2) indicates the sum of all benefits with transfers (2); Total Benefits (3) indicates the sum of all benefits without social transfers. For Total benefits 1 and 2, we rank households according to per adult equivalent expenditure, that is post-social transfer expenditure.

[8] To obtain the redistribution indices for the total benefits with social transfers we estimate the difference between the concentration index of the pre-social transfer household expenditure ranked by per adult equivalent household expenditure (post-transfer expenditure) and the Gini index for post-benefits household expenditure that does not include the social transfers. Pre-social transfers household expenditure is equal to household expenditure minus social transfers. As noted before, we assume that the social transfers do not modify the underlying distribution which is based on household expenditure the data provides. In this manner, we use the concentration coefficient of pre-social transfers household expenditure ranked by per adult equivalent expenditure instead of the Gini coefficient of pre-social transfers household expenditure.

disproportionately to have a significant impact on inequality and poverty. Apart from the primary and secondary education services, the public services do not target the poor and the benefits appear to be received by middle classes most.

Figure 4.2: Concentration Curves for Total Benefits

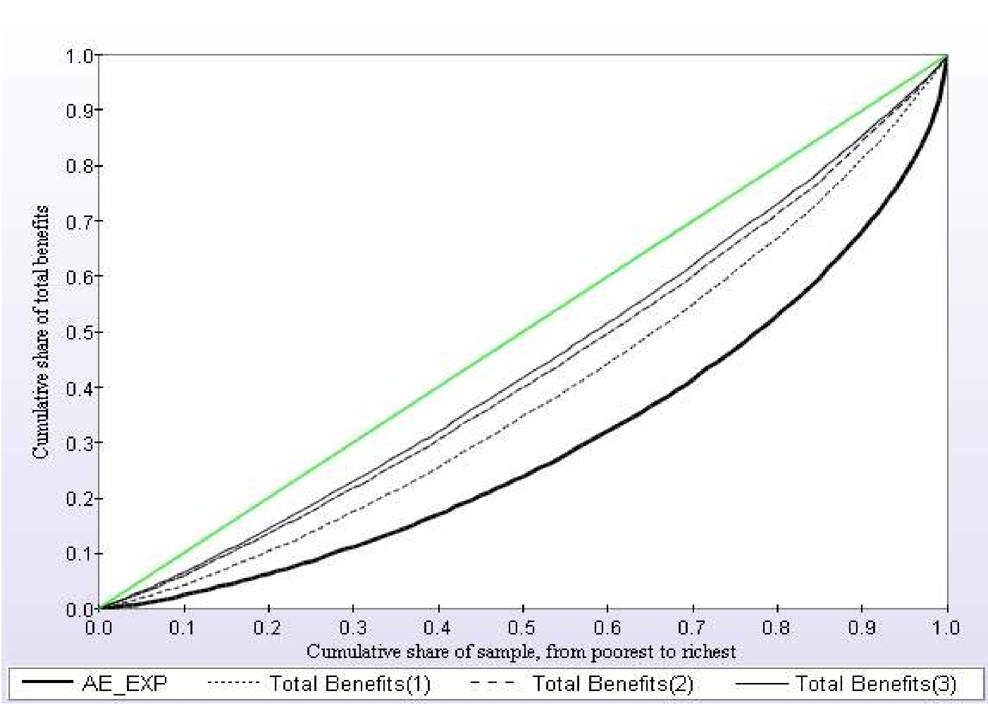


Table 4.20: Redistribution Index for Total Benefits with different inequality aversion parameter

Parameter Values	Total Benefits (1)	Total Benefits(2)	Total Benefits (3)
1.01	0.002	0.002	0.001
	0.000	*0.000*	*0.000*
1.5	0.048	0.039	0.034
	0.002	*0.001*	*0.001*
2	0.056	0.051	0.045
	0.002	*0.001*	*0.001*
2.5	0.057	0.055	0.049
	0.002	*0.001*	*0.001*
3	0.055	0.058	0.052
	0.002	*0.001*	*0.001*
3.5	0.053	0.059	0.053
	0.002	*0.001*	*0.001*
4	0.051	0.059	0.053
	0.002	*0.001*	*0.001*

Notes: Asymptotic standard errors computed with DAD in italic
Redistribution is measured by the difference between Lorenz curves for pre-benefit(per AE household expenditure) and post-benefit household expenditure

4.3.4 Regional Level Analysis

As discussed in Chapter 3, regional disparities are important to understand inequalities in Turkey. We have given the regional distribution of the benefits so far in each corresponding section. In this final section we examine the redistributive impacts of health, infrastructure and social transfers and the overall benefit system including the public education benefits by regions. In order to see how the services affect within and between regions inequalities, we use the inequality decomposition method. The inequality decomposition analysis for each public service by regions can be found in Table A 4.22 to Table A 4.27 in Appendix 4.1. Table A 4.22 provides the inequality decomposition results for per adult equivalent expenditure which gives post-transfers and pre-benefits (the sum of education, health and infrastructure) distribution. By comparing Table A 4.22 with Table A 4.23 and Table A 4.24, we see that the public health and infrastructure services decrease both between-group and within-group inequalities, yet the public health services seem more effective than the public infrastructure services. From Table A 4.25

and Table A 4.26, we can say that the social transfers decrease the inequalities both within regions and across regions. However, the results for the social transfers are based on the pre-social transfer distribution as we cannot rank the households by post-transfer expenditures with the inequality decomposition method. Thus, the results overestimate the redistributive power of the social transfers due to the reasons explained before. In order to avoid this and find out if there is any discrepancy in inequality reductions in regions, we give the redistributive impacts of each service in each region.

Table 4.22 provides the redistribution indices by the geographical regions. The biggest inequality reducing impact as a result of the health services is seen by Central Anatolia (housing the capital), followed by Aegean, Black Sea, East Anatolia, Marmara, and Mediterranean; the inequality reduction varies from 1.5% to 2%. The extent of inequality change in Istanbul and S. East Anatolia is quite limited, less than 1%. The infrastructure services seem to affect the poorest regions more: the biggest inequality reduction happens in East Anatolia, and this region is followed by S. East Anatolia, Central Anatolia, Marmara, Mediterranean, Aegean and Black Sea. Istanbul appears the least affected region surprisingly. This indicates the infrastructure problems of big slum areas in Istanbul, which shows the high inequality in the region. The redistributive impact of the social transfers (1) is not statistically different from zero (numbers in bold) for four regions and it is negative for S. East Anatolia. As the poorest region, S. East Anatolia is expected to receive the highest benefits, particularly from the social transfers, which are supposed to target the poor directly. Instead the social transfers increase inequality in S. East Anatolia. Social transfers (2) seem to have positive but small impact on the expenditure inequality in regions; Central Anatolia has the biggest inequality reduction impact with 1%, which comes from the capital's privileges. The redistribution indices for the other regions are either statistically zero (Istanbul and S. East Anatolia) or smaller than 1%. When we look at urban and rural areas, we see that health and infrastructure services improve inequalities in both areas but the impact is smaller for rural areas; this gives another evidence for targeting problems of public services. Social transfers also seem to have no effect in rural areas.

Table 4.21: Redistribution Index by regions

	Health	Infrastructure	Transfers (1)	Transfers (2)
Istanbul	0.0088	0.0014	0.020	**0.0024**
	0.0002	*0.0005*	*0.0038*	*0.0015*
Marmara	0.0152	0.01	0.0304	0.0091
	0.0006	*0.0005*	*0.0041*	*0.0015*
Aegean	0.0186	0.0074	**0.0068**	0.0069
	0.0007	*0.0004*	*0.0049*	*0.0016*
Black Sea	0.0167	0.0053	0.0237	0.0087
	0.0011	*0.0011*	*0.005*	*0.0019*
Central Anatolia	0.0206	0.0106	**0.0047**	0.01
	0.0007	*0.0006*	*0.0041*	*0.0015*
Mediterranean	0.015	0.0094	**0.0004**	0.0055
	0.0008	*0.0008*	*0.0039*	*0.0015*
East Anatolia	0.0158	0.012	**0.0018**	0.0058
	0.0018	*0.0017*	*0.0046*	*0.0021*
S. East Anatolia	0.0045	0.0107	-0.0105	**-0.0027**
	0.0012	*0.001*	*0.0029*	*0.0017*
Turkey	0.0184	0.0110	0.0117	0.0058
	0.0003	*0.0003*	*0.0018*	*0.0006*
Urban	0.0196	0.0128	0.0165	0.0050
	0.0003	*0.0003*	*0.0022*	*0.0008*
Rural	0.0125	0.0111	**0.0020**	**0.0076**
	0.0006	*0.0005*	*0.0030*	*0.0012*

Note: Values are the differences of Gini indices of expenditure distributions before and after education benefits.
Asymptotic standard errors estimated by DAD are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

As noted before, we have three categories for the total benefits to see the impact of social transfers properly. The redistribution index for total benefits (1) is measured by the difference between the concentration coefficient of pre-social transfers (1) household expenditure (ranked by per adult equivalent household expenditure) and the Gini coefficient of post-benefits (education, health and infrastructure) household expenditure. Total benefits (3) consist of education, health and infrastructure benefits, but exclude the impact of the social transfers. If we focus on first the total impact of the education, health and the infrastructure services (total benefits 3), the extent of inequality reduction in the regions due to these public services varies from 2% to 4.7%. The biggest impact goes to East Anatolia, followed by Central Anatolia and Mediterranean. Istanbul and S. East Anatolia appear to have the smallest reduction in inequality as a result of the total benefits without the social transfers. Moreover, the public education, health and infrastructure services decrease both between and within-group inequalities (Table A 4.27). When we include the social transfers with pensions (Total Benefits 1), Marmara and Black Sea experience the biggest reduction in inequality, and it seems the social transfers have the positive impact in all regions except S. East Anatolia, which has the smaller redistribution index relative to the redistribution indices caused by Total Benefits (2) and (3). When we exclude the pensions from the total social transfers, the decrease in inequality caused by the total benefits declines for Istanbul, Marmara and Black Sea, reflecting the high number of the pensioners in these regions, whereas the inequality reduction for S. East Anatolia, East Anatolia, Mediterranean, Central Anatolia increases relative to Total Benefits (1), suggesting the social transfers without retirement pensions target these regions more.

Table 4.22: Redistribution Index for Total Benefits by regions

	Total Benefits (1)	**Total Benefits (2)**	**Total Benefits (3)**
Istanbul	0.0422 *0.0042*	0.0246 *0.0019*	0.0222 *0.0009*
Marmara	0.0660 *0.0046*	0.0448 *0.0022*	0.0357 *0.0015*
Aegean	0.0442 *0.0052*	0.0443 *0.0023*	0.0374 *0.0015*
Black Sea	0.0622 *0.0062*	0.0472 *0.0032*	0.0385 *0.0024*
Central Anatolia	0.0466 *0.0046*	0.0519 *0.0023*	0.0419 *0.0016*
Mediterranean	0.0405 *0.0048*	0.0456 *0.0025*	0.0401 *0.0017*
East Anatolia	0.0491 *0.0067*	0.0531 *0.0046*	0.0473 *0.0037*
S. East Anatolia	0.0225 *0.0043*	0.0303 *0.0032*	0.0330 *0.0026*
Turkey	0.0564 *0.0022*	0.0505 *0.0010*	0.0447 *0.0007*
Urban	0.0630 *0.0026*	0.0514 *0.0012*	0.0465 *0.0008*
Rural	0.0424 *0.0035*	0.0480 *0.0018*	0.0404 *0.0013*

Note: Values are the differences of Gini indices of expenditure distributions before and after education benefits. Asymptotic standard errors estimated by DAD are in italic
The null hypothesis could not be rejected for the values in bold at 5% significance level

Finally we want to see the direction of redistribution across regions. While Table 4.23 presents the percentage expenditure shares of regions before and after each public service benefit, Table 4.24 also provides the percentage expenditure shares of regions before and after the total benefits. The tables also provide the differences between the shares of regions before and after benefit expenditure shares to see if the regional distribution becomes more equal or not by assessing the change in regions' expenditure shares[9]. According to Table 4.23, the public health services redistribute expenditures from Istanbul to the other regions but Istanbul increased expenditure share after health benefits. However, the biggest share goes to the second richest region, Central Anatolia, followed by Black Sea, East Anatolia (the third and second poorest regions respectively) and Aegean (the third richest region). The smallest share goes to Marmara and the poorest region S. East Anatolia. To sum up, the health benefits redistribute expenditure from the richest city to the other less wealthy regions, but the redistribution does not go to the poorest region, implying the health services are not pro-poor regionally either. The infrastructure services also follow very similar pattern. In this case, the redistribution occurs from Marmara and Aegean as well as Istanbul to the rest of the regions. The biggest share goes to Central Anatolia, Black Sea and East Anatolia. The social transfers appear to increase regional inequalities. The expenditure shares of Istanbul, S. East and East Anatolia and Mediterranean decrease after the social transfers. Surprisingly after the social transfers (1) S. East Anatolia's expenditure lost is very big, even if it is the poorest region, proving the poor targeting of the social transfers. Central Anatolia and Aegean receive the biggest share from the redistribution. When we analyse the overall benefit system, it is clear that pensions make the total benefit system less inequality reducing at the regional level too. The redistribution caused by Total Benefits (1) happens from Istanbul, Mediterranean and S. East Anatolia to the other regions

[9] Columns 3, 5, 7 and 9 for Table 4.23; Columns 3, 5 and 7 for Table 4.24. Negative difference indicates that the expenditure share of the region with negative difference is declined as a result of the public services, and redistribution is taking place from the regions with negative difference to the regions with positive difference.

whereas Total Benefits (2) and (3) redistribute expenditures from Istanbul, Marmara and Aegean to the other regions and the biggest share from the redistribution is received by East and Central Anatolia.

Table 4.23: Redistributive Impacts of benefits, by Region

Regions	1 Per AE Expenditure	2 Per AE Exp. After Health Ben.	3 Dist. (2-1)	4 Per AE Exp. After Infra. Ben.	5 Dist. (4-1)
S. East Anatolia	3.97	4.01	***0.03***	4.16	***0.19***
East Anatolia	4.83	5.06	***0.24***	5.20	***0.37***
Black Sea	8.37	8.67	***0.30***	8.69	***0.31***
Mediterranean	11.98	12.05	***0.07***	12.00	***0.02***
Marmara	13.36	13.36	***0.01***	13.13	***-0.23***
Aegean	14.24	14.39	***0.15***	13.92	***-0.33***
Central Anatolia	15.65	15.97	***0.32***	16.05	***0.40***
Istanbul	27.60	26.49	***-1.10***	26.85	***-0.75***
Regions	**1 Per AE Expenditure**	**6 Per AE Exp. Before Transfers(1)**	**7 Dist (6-1)**	**8 Per AE Exp. Before Transfers(2)**	**9 Dist (8-1)**
S. East Anatolia	3.97	4.56	***-0.59***	4.08	***-0.10***
East Anatolia	4.83	5.18	***-0.35***	4.85	***-0.02***
Black Sea	8.37	8.01	***0.36***	8.28	***0.09***
Mediterranean	11.98	12.27	***-0.29***	12.04	***-0.06***
Marmara	13.36	13.15	***0.20***	13.35	***0.00***
Aegean	14.24	13.27	***0.98***	14.16	***0.08***
Central Anatolia	15.65	14.88	***0.77***	15.44	***0.21***
Istanbul	27.60	28.68	***-1.08***	27.80	***-0.20***

Notes: Regions are ranked in ascending order according to their expenditure share.

Table 4.24: Redistributive Impacts of Total Benefits, by Region

Regions	1 AE_EXP	2 Exp. After Total Ben.(1)	3 . (2-1)	4 Exp. After TotalBen(2)	5 (4-1)	6 Exp. After Total Ben.(3)	7 (6-1)
S. East Anatolia	3.97	3.92	***-0.06***	4.23	***0.25***	4.30	***0.33***
East Anatolia	4.83	5.28	***0.46***	5.58	***0.75***	5.61	***0.78***
Black Sea	8.37	9.24	***0.87***	9.14	***0.76***	9.09	***0.72***
Mediterranean	11.98	11.92	***-0.06***	12.06	***0.08***	12.10	***0.12***
Marmara	13.36	13.39	***0.03***	13.24	***-0.11***	13.24	***-0.11***
Aegean	14.24	14.74	***0.49***	14.17	***-0.07***	14.11	***-0.14***
Central Anatolia	15.65	16.88	***1.24***	16.66	***1.01***	16.60	***0.95***
Istanbul	27.60	24.63	***-2.97***	24.92	***-2.67***	24.95	***-2.65***

Notes: Total Benefits(1): total education benefits+health+infrastructure+social transfers
Total Benefits(2): total education benefits+health+infrastructure+social transfers without pensions
Total Benefits(3): total education benefits+health+infrastructure

4.4 Conclusions

This chapter has aimed to complement the education benefit analysis of the previous chapter with the benefit incidence analysis of other public services, namely health, infrastructure and social transfers and to examine the redistributive impacts of the whole benefit system, which is supposed to have significant impacts on inequality and poverty. We have examined the distributional impacts of the health and infrastructure services and the social transfers in cash and in kind with the help of different measures and methods. The results show that, at least from a static point of view, these services have potential to help reduce inequality; however, public expenditures on these services are not pro-poor.

Turkey does not have universal coverage for the public health services and only employees covered by any social security organisation, retired people and their dependants can utilise public health services. According to the results, the public health services seem to meet the needs of individuals with health insurance. Given the fact that unrecorded employment is concentrated in the poorer sections of the society (first four deciles), the public health services are not pro-poor. Although the health services are not pro-poor (or absolute progressive) the health services have the highest positive redistributive impact in reducing inequality after the primary education services.

There should be concern over the role of out-of pocket expenditures to reach public health services. As been discussed in the chapter, the health system demands households spend money to reach better public health services, even though they have the right to use the services for free. It is well known that the poor hesitate to use the public health services, either due to the necessary out-of pocket expenditures or due to giving less importance to health conditions. This can be seen by the fact that the household private expenditures on health rise with expenditure deciles in Turkey. These household expenditures on health include spending on private health services, but the largest part of these expenditures still can be assessed as out-of pocket expenditures to reach the public health services. We have shown that when we take into account the private health expenditures, the public health services become less progressive.

As for the public infrastructure services, we see that the households have basic infrastructure services such as electricity, sewage and running water. However, there is still a need to pay more attention the needs of the lower deciles. To allocate the infrastructure expenditures of the government to the households, we have created an index which is based on the value of residences. The logic of the index comes from the assumption that more valuable properties also have better, or make more use of infrastructure services. Since this index increases with the deciles as expected, the distributional impact of the services happens to be moderate. Social transfers either in cash or in kind have generally been found to be progressive in the literature. Since they are supposed to be targeting the poor directly, the social transfers are expected to be pro-poor as well. However, HICES suggests that the most important social transfers are retirement pensions, and due to the high unrecorded employment in the lower deciles, pensions contribute to inequality. Even the total social transfers with pensions in cash and in kind are regressive for the lower deciles. According to the results from the S-Gini inequality decomposition analysis, transfers in kind, old-age benefits, SASF transfers to the poor and DIS transfers to the farmers seem to contribute to equality. However, the shares of these transfers in total income are so small and contribution from these transfers is negligible.

Given that the data did not allow us to determine the actual beneficiaries of the services except the social transfers; the results should be taken with caution apart from the social transfers. However, we still think that the findings are a reasonable approximation of the distributional impacts of public services in Turkey. Finally, we have aggregated the total benefits from the public education, health, infrastructure services and the social transfers to assess the distributional impact of public expenditures which are supposed to be effective instruments to fight against inequality and poverty in the literature. The total benefits from these public spending seems to be progressive in that the concentration curves are all above the Lorenz curve of per adult equivalent household expenditure. On the other hand, they are not pro-poor in the sense that their concentration curves are below the 45-degree line. We have tested the differences between concentration curves and Lorenz curve and 45-degree line statistically and the test results support the findings. The total benefit system including education benefits decreases inequality between 3 and 5%.

The regional level analysis has been conducted too. The public services except social transfers cause reduction in both within and between regions inequalities. The total social transfers increase inequality in the poorest region, S. East Anatolia. Istanbul with the high Gini coefficient and the poorest region, S. East Anatolia, appear to be the most unfortunate regions in terms of utilising public services. The redistribution caused by the total benefits without pensions is from Istanbul, Mediterranean and S. East Anatolia to the other regions. However, when we exclude either only pensions or all social transfers, the direction of the redistribution becomes more equitable, namely from Istanbul, Marmara and Aegean to the other regions, yet the biggest share from the redistribution is received by East (the second poorest region) and Central Anatolia. When we look at urban and rural areas, we see that health and infrastructure services improve inequalities in both areas but the impact is smaller for rural areas; this gives another evidence for targeting problems of public services. Social transfers also seem to have no effect in rural areas.

Appendix 4

Appendix 4.1: Tables

Table A 4.1: **Organizations involved in Turkish health care classified by their function**

Policy Formulation	***Provision of Health Care***
The Parliament	**Public**
The State Planning Organization	The MoH
The MoH	Social Insurance Organization
The Higher Education Council	University Hospitals
The Court of Constitution	The Ministry of Defence
Administrative Jurisdiction	**Private**
The MoH	Private Hospitals
Provincial Health Directorates	Foundations
	Minority Hospitals
Finance of Health Care	Private Practitioners/Specialists
The Ministry of Finance	Outpatient Clinics
SSK	Laboratories and Diagnostic Centres
Bağ-Kur	Pharmacies
ES (or GERF)	
Private Insurance Companies	**Philanthropic**
Self Funded Schemes	Red Crescent
International Agencies	*Foundations*

Source: MoH, 2004

Table A 4.2: Social Security Membership among individuals (employee/employer/self-employed) by deciles

Expenditure Deciles	SSK	ES	Bag-Kur	No Coverage	Private
1	2.82	0.49	4.18	19.4	0
2	6.31	2.65	8.03	15.7	0
3	8.03	3.55	9.56	13.12	0
4	9.87	5.38	10.31	11.07	0
5	10.53	7.54	10.91	9.57	0.3
6	13.21	9.29	10.47	8.44	6.52
7	11.67	12.84	11.36	7.33	4.73
8	11.93	15.59	10.29	6.19	6.79
9	13.02	20.93	10.43	5.05	10.67
10	12.59	21.73	14.46	4.12	70.99
Turkey	100	100	100	100	100

Source: HICES

Table A 4.3 : The Share of MoH Budget in GNP and the State Budget and the Share of Total Public Health Expenditures in GNP

Years	% share of MoH Budget in GNP	% share of MoH Budget in the State Budget	% share of Total Public Health Expenditures in GNP
1994	0.78	3.7	2.7
1995	0.62	3.65	2.5
1996	0.65	2.76	2.4
1997	0.7	3.28	2.2
1998	0.73	2.65	2.8
1999	0.84	2.81	3.3
2000	0.84	2.26	3.5
2001	0.71	2.66	4.3
2002	0.86	2.4	4.8
2003	1.01	2.4	4.8
2004	1.13	3.19	5.3
2005*	1.14	3.55	-

Source: MoH 2005, SPO 2004

(*) GNP; Estimates of SPO 2005 year program (YTL) by new GNP series

Table A 4.4: The quality of different types of health services

Outpatient Care

• MoH health centres and posts, providing free care for the Green Card holders, ostensibly at low levels of clinical quality;

• SSK clinics and hospitals providing care free to its members, ostensibly at low levels of clinical quality and patient satisfaction

• Private providers providing care at high costs to users, at high levels of patient satisfaction though not necessarily high levels of clinical quality.

Inpatient Care:

• MoH hospitals providing free care to Green Card holders, ostensibly at low levels of clinical quality

• MoH hospitals providing care at established fee-schedules, ostensibly at low to medium levels of clinical quality

• University hospitals providing care at established fee-schedules, at medium to high low levels of clinical quality

• MoH and University hospitals providing care at rates higher than the established fee-schedules, at medium to high low levels of clinical quality and high levels of patient satisfaction.

• SSK hospitals providing care free to its members, ostensibly at low levels of Clinical quality and patient satisfaction

• Private hospitals providing care at high costs to users, at high levels of patient satisfaction though not necessarily high levels of clinical quality

Preventive Care:

• MoH health centres and posts, providing free preventive care

Source: MoH, 2004

Table A 4.5: Monthly household per adult equivalent expenditure on health, by decile, region and type of service, Turkey, 2003

Deciles, Region, Service Type	1	2	3	4	5	6	7	8	9	10	Expenditure Elasticity	t-ratio
Doctors												
Turkey	0.7	1.3	3.1	4.6	5.1	6.8	10.1	8.5	17.2	42.7	1.4	22.4
Urban	0.1	0.7	1.9	2.5	4.1	5.1	8.8	8.2	18.3	50.4	1.5	18.1
Rural	2.0	2.9	5.9	9.5	7.5	10.7	13.1	9.1	14.6	24.7	1.3	12.6
Drugs												
Turkey	2.4	4.1	4.8	5.8	7.0	7.8	10.1	11.7	14.5	31.8	1.6	21.2
Urban	1.1	2.4	3.1	4.6	5.5	6.7	9.1	11.4	16.6	39.5	1.7	17.7
Rural	5.7	8.7	9.0	9.1	11.0	10.6	12.7	12.6	9.0	11.5	1.5	10.1
Other												
Turkey	0.4	0.8	1.9	1.9	3.0	5.0	5.5	6.4	15.0	60.1	0.9	16.6
Urban	0.1	0.4	1.0	1.9	2.5	4.4	5.2	6.2	15.2	63.2	1.0	13.7
Rural	1.2	2.6	5.6	2.0	5.1	7.5	6.7	7.5	14.4	47.5	0.6	7.6
Paramedics (nurses, midwives)												
Turkey	0.8	1.0	2.7	2.2	2.7	5.9	8.5	8.6	7.4	60.3	0.1	5.1
Urban	0.9	0.7	2.7	2.3	2.7	5.1	4.6	8.9	7.8	64.3	0.1	3.3
Rural	0.0	4.0	3.0	0.2	2.6	17.2	61.4	3.9	1.8	6.0	0.0	2.2
Outpatient Care												
Turkey	0.2	0.9	0.7	0.8	3.3	7.4	6.6	7.2	13.5	59.5	0.2	6.8
Urban	0.1	0.5	0.2	0.6	1.5	6.9	4.9	8.0	15.3	62.2	0.2	5.2
Rural	0.8	3.1	3.2	2.3	13.5	10.3	16.0	3.0	3.9	44.0	0.2	4.0
Inpatient Care												
Turkey	0.2	0.3	0.2	0.7	1.9	1.0	5.8	7.9	14.7	67.2	0.1	6.3
Urban	0.1	0.5	0.3	0.4	2.2	1.0	3.1	8.6	14.7	69.1	0.1	5.1
Rural	0.5	0.0	0.2	1.2	1.4	1.0	9.8	6.9	14.7	64.4	0.2	3.5
Individuals without social insurance												
Turkey	26.5	17.4	13.5	10.8	8.3	6.8	6.8	4.6	3.2	2.2		
Urban	17.1	15.3	13.8	11.9	10.1	8.7	7.7	6.7	5.0	3.7		
Rural	17.1	15.3	13.8	11.9	10.1	8.7	7.7	6.7	5.0	3.7		
Total Private Expenditure												
Turkey	1.2	2.1	3.1	4.0	5.0	6.2	8.7	9.2	15.4	45.3	2.3	29.5
Urban	0.5	1.2	2.0	2.9	4.0	5.2	7.5	9.0	16.5	51.2	2.4	24.5
Rural	2.9	4.4	5.9	6.9	7.5	8.6	11.8	9.7	12.5	29.9	2.2	14.1
% of AE_EXP	1.1	1.2	1.4	1.6	1.7	1.8	2.1	1.8	2.3	3.2	2.3	

Note: Deciles are ranked by total household expenditure per adult equivalent (AE_EXP); Source: HICES

Table A 4.6: The Distribution of Public Health Expenditure and Number of Health Staff by regions in 2003

Region	AE_EXP	Population	Public Health Expenditure	Specialist	GP	Dentist Pharmacist	Paramedics
Istanbul	27.6	15.47	8.67	28.63	15.2	23.71	10.11
West Marmara	4.8	4.16	4.16	3.47	3.7	4.4	5.35
Aegean	14.25	13.26	13.92	16.32	16.3	16.89	16.63
East Marmara	8.56	8.55	7.24	8.4	8.7	8.31	9.31
West Anatolia	11.07	9.36	12.44	16.07	15.5	15.7	13.03
Mediterranean	11.98	13	13.35	9.73	11.8	11.45	13.52
Central Anatolia	4.55	6.15	6.43	3.53	6.4	4.22	7.09
West Black Sea	4.62	6.9	7.98	4.54	6.8	5.17	7.96
East Black Sea	3.76	4.5	5.68	2.14	3.6	2.77	5.17
North East Anatolia	1.96	3.55	4.46	1.5	2.6	1.32	2.69
Central East Anatolia	2.88	5.44	7.02	2.06	3.8	1.64	3.69
South East Anatolia	3.97	9.67	8.66	3.62	5.7	4.41	5.44
Turkey	100	100	100	100	100	100	100

Source: HICES, MoH 2005; GP: general practitioner

Table A 4.7: Public and Private Health Expenditures by Regions, (%) 2000

Regions	Public Health Expenditure	Private Health Expenditure	Total
West (Istanbul, Marmara and Aegean) *	72.44	27.56	100
South (Mediterranean)	56.19	43.81	100
Central (Central Anatolia)	66.23	33.77	100
North (Black Sea)	63.88	36.12	100
East (South East and East Anatolia)	59.42	40.58	100
Turkey	64.34	35.66	100

Source: MoH (2006)
** MoH (2006) uses a different regional classification from the one we use throughout the study. Our classification is given in parentheses.*

Table A 4.8: The Distribution of Private Expenditures on Health Care by Region(1)

	Rural	Urban	Turkey
Doctors	29.82	70.18	100
Drugs	27.55	72.45	100
Other	19.92	80.08	100
Paramedics	6.83	93.17	100
Outpatient Care	15.21	84.79	100
Inpatient Care	39.89	60.11	100
Total Private Health Expenditure	28.09	71.91	100

Source: HICES

Table A 4.9: The Distribution of Private Expenditures on Health Care by Region (2)

	Rural	Urban	Turkey	1st Decile	10th Decile
Doctors	34.3	31.53	32.31	20.77	30.5
Drugs	34.84	35.78	35.52	69.58	24.94
Other	11.22	17.62	15.82	6.16	21
Paramedics	0.21	1.14	0.88	0.4	1.18
Outpatient Care	1.63	3.55	3.01	1.3	3.96
Inpatient Care	17.72	10.43	12.48	1.78	18.53
Total Private Health Expenditure	100	100	100	100	100

Source: HICES

Table A 4.10: Public Health Service Needs and Benefits, by region % shares

Regions	Per AE Household Expenditure	Population	POTENTIAL	VISIT	Per AE Public Health Expenditure
Istanbul	27.6	17.13	17.38	20.98	10.28
Marmara	13.36	13.85	14.46	16.73	13.46
Aegean	14.24	15.25	14.53	17.37	16.51
Black Sea	8.37	10.96	11.22	8.64	13.24
Central Anatolia	15.65	15.82	16.9	15.05	20.82
Mediterranean	11.98	13.39	12.65	13.05	13.15
East Anatolia	4.83	6.87	7.28	3.97	8.30
S. East Anatolia	3.97	6.74	5.59	4.21	4.24
Turkey	100	100	100	100	100

Table A 4.11 : The Percentage of Users of House Facilities by rural/urban location and by facility

	Rural	Urban	Turkey
Electricity	99.93	100	100
Piped Water	81.55	100	100
Sewerage	75.19	95.33	99.11
Telephone	81.45	86.82	87.19
Transport	45.91	74.61	63.6
HighRoad	23.67	29.26	62.25
Hotwater	39.53	65.03	89.74

Table A 4.12: The Distribution of Basic House Facilities by region (%),

Region	Population	Per AE Household Expenditure	Electricity	Piped Water	Sewage	Phone	Transport	HighRoad	Hot water
Istanbul	17.13	27.6	17.14	18.36	19.36	17.46	22.18	17.77	21.31
Marmara	13.85	13.36	13.85	14.75	14.45	14.43	15.56	14.04	14.97
Aegean	15.25	14.24	15.25	15.93	14.76	15.43	14.25	17.76	14.48
Black Sea	10.96	8.37	10.96	9.28	11.88	11.47	7.45	8.08	9.78
Central Anatolia	15.82	15.65	15.82	16.47	15.31	16.56	15.65	18.18	16.04
Mediterranean	13.39	11.98	13.38	13.63	12.34	13.17	14.52	17.29	15.92
East Anatolia	6.87	4.83	6.86	6.3	6.34	6.31	5.16	3.9	4.8
Southeast Anatolia	6.74	3.97	6.74	5.29	5.56	5.17	5.21	2.99	2.7
Turkey	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table A 4.13: Redistributive Impacts of Public Infrastructure Services by regions

Regions	Per AE Household Expenditure	Population	Per Household Public Infrastructure Benefits
Istanbul	27.6	15.47	16.51
Marmara	13.36	12.71	10.40
Aegean	14.24	13.27	9.41
Black Sea	8.37	11.40	12.31
Central Anatolia	15.65	15.47	20.70
Mediterranean	11.98	13.00	12.59
East Anatolia	4.83	9.00	10.59
S. East Anatolia	3.97	9.68	7.49
Turkey	100	100	100

Table A 4.14: Percentage shares of receivers of social transfers by deciles

Expenditure Deciles	People aged 65+	Old-Age Pensioners	SASF and DIS receivers	Students with Public Scholarships	Beneficiaries of Public In-kind Transfers
1	12.45	26.74	14.98	2.31	15.6
2	10.04	16.72	12.69	1.71	12.78
3	10.18	14.02	13.77	0	10.37
4	9.97	7.48	13.91	6.19	10.41
5	10.9	8.82	10.16	6.17	10.7
6	10.07	9.77	11.04	14.06	10.06
7	9.11	8.64	8.98	13.75	10.04
8	9.14	3.96	5.98	15.96	8.74
9	9.4	2.52	4.54	29.77	6.5
10	8.74	1.34	3.96	10.08	4.81
Turkey	100	100	100	100	100

Note: Ranked by per adult equivalent household expenditure

Table A 4.15: The Distribution of Social Transfers by regions

Regions	Per AE Household Expenditure	Per AE Transfers (1)	Per AE Transfers (2)
Istanbul	27.6	22.71	23.47
Marmara	13.36	14.18	13.12
Aegean	14.24	18.43	16.01
Black Sea	8.37	10.06	10.16
Central Anatolia	15.65	18.57	19.03
Mediterranean	11.98	10.88	11.33
East Anatolia	4.83	3.43	4.66
S. East Anatolia	3.97	1.74	2.21
Turkey	100	100	100

Table A 4.16: The Distribution of Social Transfers by regions

Regions	Per AE Household Expenditure	Pensions	Unemployment Benefits	Tax Refund	Old-Age Benefits	SASF and DIS Transfers	Student Grants	Transfers in kind	Other*
Istanbul	27.6	22.48	11.42	20.71	3.57	0.37	24.71	5.05	27.77
Marmara	13.36	14.50	56.16	13.69	12.02	21.45	3.65	16.15	12.21
Aegean	14.24	19.15	8.52	14.59	19.82	14.40	13.12	11.05	16.41
Black Sea	8.37	10.02	0.00	10.06	15.74	8.61	13.52	9.32	9.97
Central Anatolia	15.65	18.43	6.81	21.05	19.54	38.46	33.65	31.23	16.51
Mediterranean	11.98	10.75	9.56	12.49	14.90	9.00	7.37	19.87	10.94
East Anatolia	4.83	3.06	7.53	4.50	10.54	7.06	3.90	5.00	4.12
S. East Anatolia	3.97	1.60	0.00	2.92	3.88	0.64	0.08	2.34	2.07
Turkey	100	100	100	100	100	100	100	100	100

**The pensions for veterans and widows*

Table A 4.17. The differences of ordinates of the Lorenz curve and Concentration Curves

Ordinates (p)	Health	Transfers (1)	Transfers (2)	Infrastructure
0.05	-0.014	0.002	-0.006	-0.011
	0.002	*0.001*	*0.003*	*0.001*
0.1	-0.031	**0.004**	-0.016	-0.022
	0.002	*0.002*	*0.004*	*0.001*
0.15	-0.056	**0.004**	-0.022	-0.032
	0.003	*0.002*	*0.005*	*0.001*
0.2	-0.080	**0.004**	-0.030	-0.044
	0.003	*0.003*	*0.006*	*0.001*
0.25	-0.103	**0.000**	-0.044	-0.055
	0.003	*0.004*	*0.007*	*0.002*
0.3	-0.128	-0.012	-0.055	-0.064
	0.003	*0.004*	*0.007*	*0.002*
0.35	-0.151	-0.020	-0.059	-0.074
	0.003	*0.004*	*0.008*	*0.002*
0.4	-0.174	-0.027	-0.075	-0.083
	0.003	*0.005*	*0.010*	*0.002*
0.45	-0.193	-0.033	-0.090	-0.092
	0.003	*0.005*	*0.010*	*0.002*
0.5	-0.216	-0.041	-0.090	-0.100
	0.003	*0.005*	*0.010*	*0.003*
0.55	-0.234	-0.044	-0.100	-0.105
	0.003	*0.006*	*0.011*	*0.003*
0.6	-0.251	-0.047	-0.094	-0.107
	0.003	*0.006*	*0.011*	*0.003*
0.65	-0.262	-0.058	-0.097	-0.112
	0.003	*0.006*	*0.012*	*0.003*
0.7	-0.271	-0.064	-0.103	-0.116
	0.003	*0.006*	*0.012*	*0.003*
0.75	-0.274	-0.076	-0.098	-0.114
	0.003	*0.006*	*0.012*	*0.003*
0.8	-0.271	-0.082	-0.095	-0.112
	0.003	*0.006*	*0.012*	*0.003*
0.85	-0.259	-0.092	-0.095	-0.107
	0.002	*0.006*	*0.012*	*0.003*
0.9	-0.236	-0.097	-0.139	-0.101
	0.002	*0.006*	*0.009*	*0.003*
0.95	-0.186	-0.113	-0.117	-0.082
	0.002	*0.005*	*0.007*	*0.002*
0.99	-0.082	-0.009	-0.009	-0.042
	0.001	*0.000*	*0.000*	*0.001*

Notes: Asymptotic standard errors are in italic. The null hypothesis could not be rejected for the values in bold at 5% significance level. Ranked by per adult equivalent gross household expenditure the data provides

Table A 4.18: TR-Progressivity Index for Benefits by different inequality weights

Parameter Values (ρ)	Health Benefits	Infrastructure	Transfers (1)	Transfers (2)
1.01	0.0086	0.0044	0.0037	0.0048
	0.0002	*0.0001*	*0.0002*	*0.0004*
1.5	0.2355	0.1162	0.0681	0.1074
	0.0040	*0.0026*	*0.0062*	*0.0116*
2	0.3118	0.1548	0.0653	0.1291
	0.0050	*0.0032*	*0.0075*	*0.0151*
2.5	0.3435	0.1737	0.0545	0.1369
	0.0057	*0.0035*	*0.0079*	*0.0165*
3	0.3577	0.1849	0.0435	0.1408
	0.0063	*0.0038*	*0.0081*	*0.0173*
3.5	0.3636	0.1923	0.0335	0.1431
	0.0069	*0.0039*	*0.0083*	*0.0179*
4	0.3652	0.1974	0.0247	0.1443
	0.0075	*0.0040*	*0.0084*	*0.0183*

Notes: *Asymptotic standard errors computed with DAD in italic.*

Table A 4.19: IR-Progressivity Index for Benefits by different inequality weights

Parameter Values (ρ)	Health Benefits	Infrastructure	Transfers (1)	Transfers (2)
1.01	0.0006	0.0004	0.001	0.000
	0.0000	*0.0000*	*0.000*	*0.000*
1.5	0.0150	0.0093	0.014	0.005
	0.0002	*0.0002*	*0.002*	*0.001*
2	0.0199	0.0123	0.012	0.006
	0.0003	*0.0003*	*0.002*	*0.001*
2.5	0.0219	0.0139	0.008	0.006
	0.0003	*0.0003*	*0.002*	*0.001*
3	0.0228	0.0148	0.004	0.006
	0.0004	*0.0003*	*0.002*	*0.001*
3.5	0.0232	0.0153	**0.001**	0.006
	0.0004	*0.0003*	*0.002*	*0.001*
4	0.0233	0.0158	**-0.002**	0.006
	0.0005	*0.0003*	*0.002*	*0.001*

Notes: *Asymptotic standard errors computed with DAD in italic. Pre-benefit household expenditure for transfers is equal to gross (pre-benefit, post-indirect taxes) household expenditures the data provides minus transfers.*

Table A 4.20: Redistribution Index with different inequality aversion parameter

Parameter Values (ρ)	Health	Infrastructure	Transfers (1)	Transfers (2)
1.01	0.001	0.000	0.001	0.000
	0.000	*0.000*	*0.000*	*0.000*
1.5	0.014	0.008	0.014	0.005
	0.000	*0.000*	*0.002*	*0.001*
2	0.018	0.011	0.012	0.006
	0.000	*0.000*	*0.002*	*0.001*
2.5	0.020	0.012	0.008	0.006
	0.000	*0.000*	*0.002*	*0.001*
3	0.020	0.013	0.004	0.006
	0.000	*0.000*	*0.002*	*0.001*
3.5	0.020	0.013	**0.001**	0.006
	0.000	*0.000*	*0.002*	*0.001*
4	0.019	0.014	**-0.002**	0.006
	0.000	*0.000*	*0.002*	*0.001*

Notes: *Asymptotic standard errors computed with DAD in italic. Redistribution is measured by the difference between S-Gini indices for pre- and post-benefit household expenditure. Both pre-benefit post-benefit expenditures are ranked by per adult equivalent expenditure. Pre-benefit expenditures are equal to household expenditures the data provides minus total transfers; Post-benefit expenditures are equal to pre-benefit expenditures plus per AE transfers in question. So redistribution is equal to IR progressivity.*

Table A 4.21: Extended Coefficients of Gini and Concentration for Household Expenditure and Benefits

Parameter Values (ρ)	Per AE Household Expenditure	Health Benefits	Infrastructure Benefits	Transfers with pension	Transfers without pension
1.01	0.010	0.001	0.005	0.006	0.005
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.282	0.046	0.165	0.214	0.174
	0.004	*0.002*	*0.003*	*0.005*	*0.011*
2	0.400	0.088	0.245	0.335	0.271
	0.004	*0.003*	*0.004*	*0.007*	*0.015*
2.5	0.468	0.125	0.295	0.414	0.332
	0.004	*0.004*	*0.004*	*0.007*	*0.016*
3	0.514	0.157	0.329	0.471	0.373
	0.004	*0.005*	*0.004*	*0.008*	*0.017*
3.5	0.548	0.184	0.356	0.514	0.405
	0.004	*0.006*	*0.005*	*0.008*	*0.018*
4	0.574	0.209	0.376	0.549	0.430
	0.004	*0.007*	*0.005*	*0.008*	*0.018*

Notes: Asymptotic standard errors computed with DAD in italic

Table A 4.22: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Contribution
Total Expenditure	**<u>0.400</u>**				
Istanbul	0.423	0.17	0.28	0.02	0.05
Marmara	0.327	0.14	0.13	0.01	0.02
Aegean	0.365	0.15	0.14	0.01	0.02
Black Sea	0.337	0.11	0.08	0.00	0.01
Central Anatolia	0.381	0.16	0.16	0.01	0.02
Mediterranean	0.375	0.13	0.12	0.01	0.02
East Anatolia	0.369	0.07	0.05	0.00	0.00
S. East Anatolia	0.363	0.07	0.04	0.00	0.00
Within-Group				*0.055*	*0.137*
Between-Group				*0.149*	*0.372*
Overlap				*0.197*	*0.492*

Notes: Total expenditure is per adult equivalent household expenditure*
Decomposition Approach: Analytical

Table A 4.23: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Health Benefits*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	**<u>0.382</u>**				
Istanbul	0.41	0.17	0.26	0.02	0.05
Marmara	0.31	0.14	0.13	0.01	0.02
Aegean	0.35	0.15	0.14	0.01	0.02
Black Sea	0.32	0.11	0.09	0.00	0.01
Central Anatolia	0.36	0.16	0.16	0.01	0.02
Mediterranean	0.36	0.13	0.12	0.01	0.02
East Anatolia	0.35	0.07	0.05	0.00	0.00
S. East Anatolia	0.36	0.07	0.04	0.00	0.00
Within-Group	---	---	---	*0.052*	*0.137*
Between-Group	---	---	---	*0.137*	*0.359*
Overlap	---	---	---	*0.192*	*0.504*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE health benefits*
Decomposition Approach: Analytical

Table A 4.24: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Infrastructure Benefits*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	**0.389**				
Istanbul	0.42	0.17	0.27	0.02	0.05
Marmara	0.32	0.14	0.13	0.01	0.01
Aegean	0.36	0.15	0.14	0.01	0.02
Black Sea	0.33	0.11	0.09	0.00	0.01
Central Anatolia	0.37	0.16	0.16	0.01	0.02
Mediterranean	0.37	0.13	0.12	0.01	0.02
East Anatolia	0.36	0.07	0.05	0.00	0.00
S. East Anatolia	0.35	0.07	0.04	0.00	0.00
Within-Group	---	---	---	*0.053*	*0.137*
Between-Group	---	---	---	*0.138*	*0.354*
Overlap	---	---	---	*0.198*	*0.508*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE infrastructure benefits*
Decomposition Approach: Analytical

Table A 4.25: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure Before Social Transfers(1)*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	**0.478**				
Istanbul	0.49	0.17	0.29	0.02	0.05
Marmara	0.44	0.14	0.13	0.01	0.02
Aegean	0.46	0.15	0.13	0.01	0.02
Black Sea	0.46	0.11	0.08	0.00	0.01
Central Anatolia	0.46	0.16	0.15	0.01	0.02
Mediterranean	0.44	0.13	0.12	0.01	0.02
East Anatolia	0.43	0.07	0.05	0.00	0.00
S. East Anatolia	0.38	0.07	0.05	0.00	0.00
Within-Group	---	---	---	*0.066*	*0.139*
Between-Group	---	---	---	*0.150*	*0.315*
Overlap	---	---	---	*0.261*	*0.547*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE social transfers (1)*
Decomposition Approach: Analytical

Table A 4.26: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure Before Social Transfers(2)*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	0.417				
Istanbul	0.44	0.17	0.28	0.02	0.05
Marmara	0.35	0.14	0.13	0.01	0.02
Aegean	0.39	0.15	0.14	0.01	0.02
Black Sea	0.36	0.11	0.08	0.00	0.01
Central Anatolia	0.40	0.16	0.15	0.01	0.02
Mediterranean	0.39	0.13	0.12	0.01	0.02
East Anatolia	0.39	0.07	0.05	0.00	0.00
S. East Anatolia	0.37	0.07	0.04	0.00	0.00
Within-Group	---	---	---	*0.057*	*0.137*
Between-Group	---	---	---	*0.149*	*0.356*
Overlap	---	---	---	*0.211*	*0.506*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE social transfers (2)*
Decomposition Approach: Analytical

Table A 4.27: Decomposition Analysis: Contribution of Geographical Regions to Total Expenditure After Total Benefits (3)*

Regions	Estimated Gini	Population Share	Expenditure Share	Absolute Contribution	Relative Cont.
Total Expenditure	0.355				
Istanbul	0.40	0.17	0.25	0.02	0.05
Marmara	0.29	0.14	0.13	0.01	0.02
Aegean	0.33	0.15	0.14	0.01	0.02
Black Sea	0.30	0.11	0.09	0.00	0.01
Central Anatolia	0.34	0.16	0.17	0.01	0.03
Mediterranean	0.34	0.13	0.12	0.01	0.02
East Anatolia	0.32	0.07	0.06	0.00	0.00
S. East Anatolia	0.33	0.07	0.04	0.00	0.00
Within-Group	---	---	---	*0.049*	*0.138*
Between-Group	---	---	---	*0.117*	*0.330*
Overlap	---	---	---	*0.189*	*0.532*

Notes: Total expenditure is per adult equivalent household expenditure plus per AE benefits of education, health and infrastructure*
Decomposition Approach: Analytical

Appendix 4.2: Figures

Figure A 4-1: Concentration Curves for Health Benefits with private health expenditures

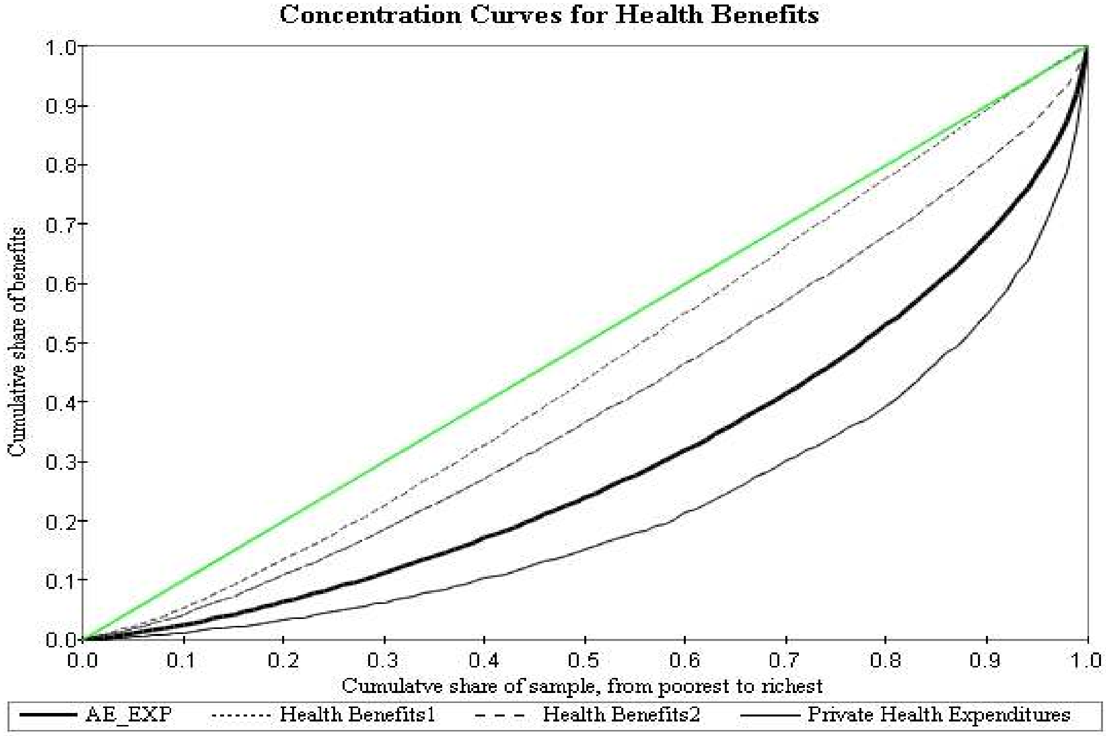


Figure A 4-2: TR Progressivity of Benefits with varying inequality aversion

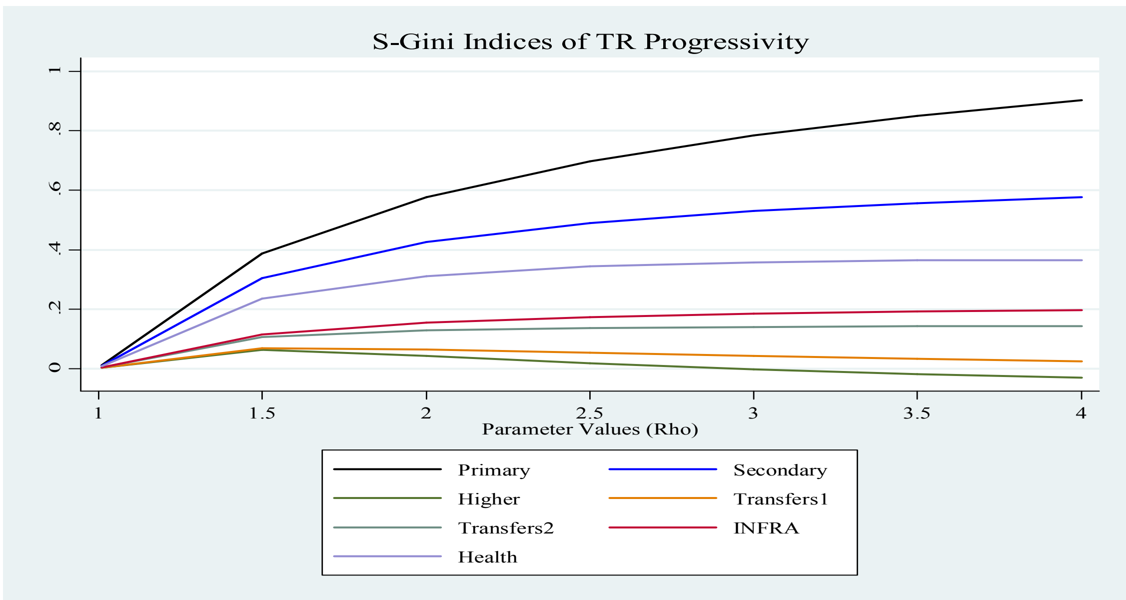


Figure A 4-3: IR Progressivity of Benefits with varying inequality aversion

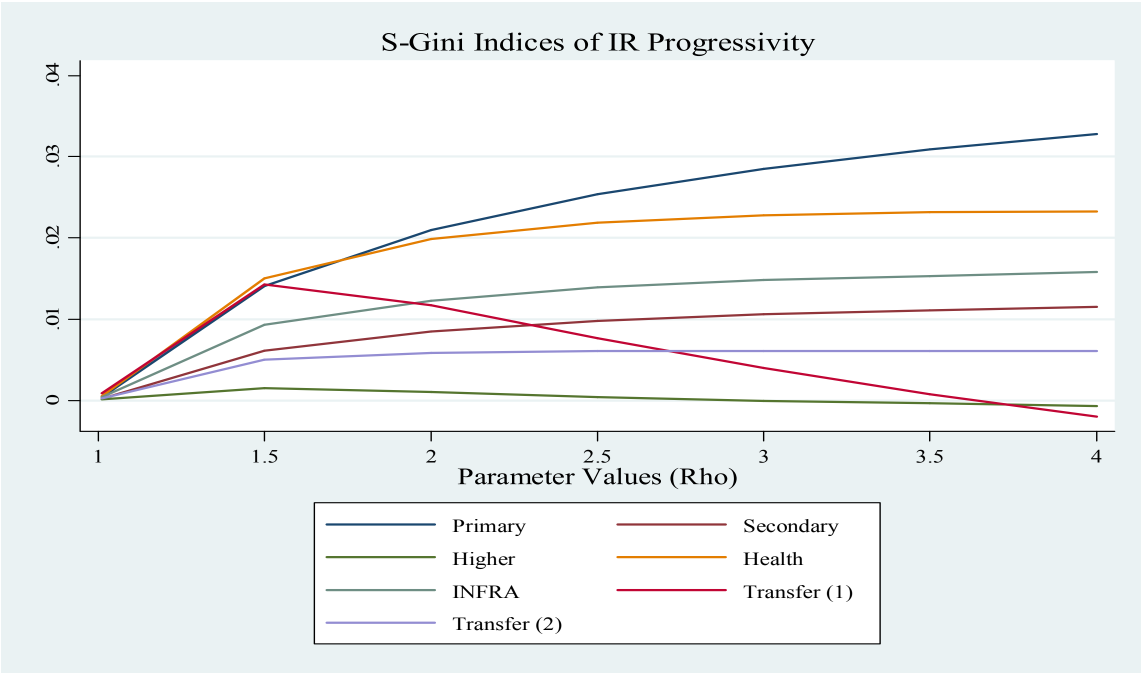
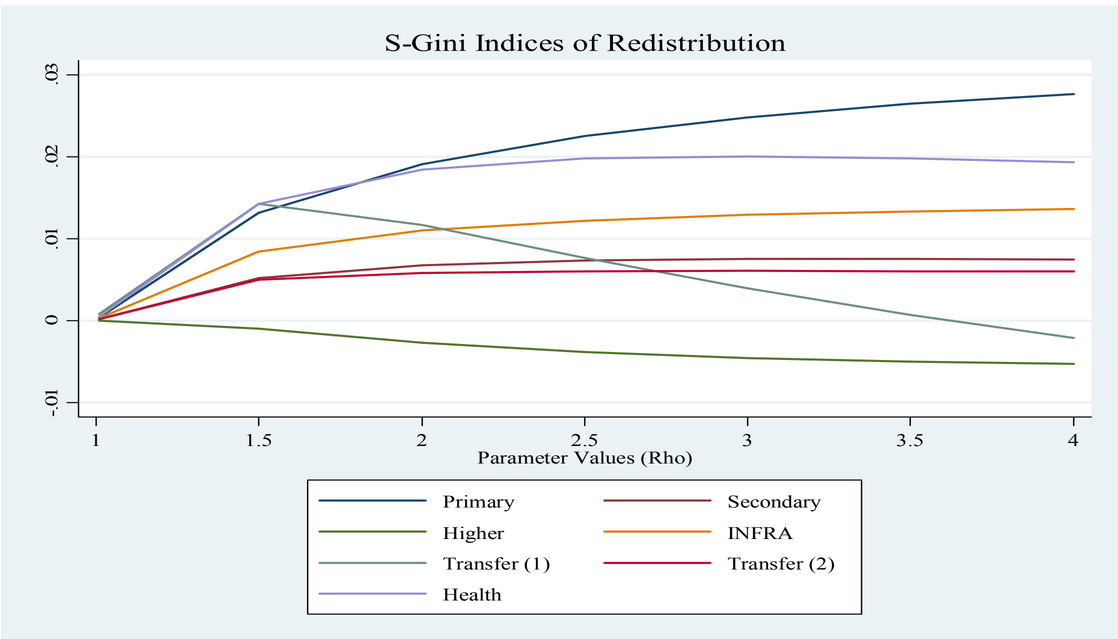


Figure A 4-4: Redistribution of Benefits with varying inequality aversion



CHAPTER 5: TAX INCIDENCE ANALYSIS IN TURKEY, 2003

5.1 Introduction

It is commonly believed that redistribution through tax policies is limited and this limitation is particularly significant in developing countries whose tax effort as a percentage of GNP is especially small due to the limited tax base, arising from high level of informal economy and tax evasion and their pervasiveness. Additionally due to the observation of that the poor rarely pay income taxes in developing countries, it is argued that expenditure side of government budgets should be given more attention as a redistributive tool (Chu et. al. 2000; Martinez-Vazquez, 2004; Shah and Whalley, 1991; Tanzi 1998;). Despite these concerns, it is an important empirical question how tax policies affect income distribution to understand the role of tax policies as a redistributive instrument in developing countries.

The main way to examine the distributional impacts of government taxation is the analysis of tax incidence. Tax incidence is the analysis of whose purchasing power ultimately declines due to taxes. The partial equilibrium models or conventional models of tax incidence allocate tax burdens to different income groups by using different assumptions on who bears the final tax burden. The assumptions used to calculate tax burdens are called shifting or incidence assumptions and these assumptions aim to capture how different taxes are shifted to households as consumers, producers or owners of factors. Household income and expenditure surveys are used to acquire information on households' income sources and consumption patterns, which are necessary to calculate tax burdens originated from either direct or indirect taxes. To calculate tax burdens of each household, either actual tax revenues by income brackets (from tax collection data provided by tax authorities if available) for each tax are allocated to households according to their income sources or consumption patterns; or alternatively, the nominal legal tax rates are applied to information on household income sources and consumption patterns by using adopted shifting assumptions. After calculating each household's tax burden, the same procedure of the benefit incidence analysis is followed and households are ranked by a welfare indicator from poor to rich to see how calculated household tax burdens are distributed.

Tax incidence analysis has been performed for developing countries recently (Devarajan, and Hossain, 1998; Sahn and Younger, 1998, 2003; Rajemison and Younger, 2000; Younger 1996; Younger, et.al., 1999; Pinar, 2004). These studies generally focus on the impacts of recent tax policy changes in developing countries. Those works capture the effects of both direct and indirect taxes depending on available data. Direct taxes include income and business taxes, while indirect taxes encompass excise, import tariffs, and value added taxes (VAT)[1]. Although the results change with adopted shifting assumptions and countries, the general results from these studies showed that direct taxes and property taxes are mostly progressive; indirect taxes are generally regressive but vary with particular indirect tax examined; the overall tax system varies with countries but regressive at low incomes.

Turkey's tax system took its present structure after 1980s, when Turkey implemented structural adjustment programs with IMF and World Bank support[2]. One of the aims of these structural adjustment programs was to improve fiscal imbalances in the economy, including the introduction of VAT in 1985. The major components of government tax revenue in Turkey are the personal income tax (PIT) and the indirect taxes. With the introduction of VAT in 1985, the share of indirect taxes in total tax revenues (TTR) increased dramatically from 37% in 1980 to 52% in 1985 and made the indirect taxes the main source of tax revenue for government budget, while the percentage share of the direct taxes kept declining in time. The percentage share of the

[1] See Chu et al. (2000), Gemmell and Morrissey (2003) and Martinez-Vazquez (2004), Shah and Whalley (1991) among others for detailed survey on developing countries' tax systems and tax incidence analysis.
[2] For the historical background of Turkish tax system, see Bulutoglu and Thirsk (1997).

direct taxes in TTR is 31% and indirect taxes account for 52% (or 67% when foreign trade taxes are included) in 2003[3]. Despite these structural changes in the tax system, due to the late introduction of household level data, there is only one empirical work (Pinar 2004) studying the incidence of tax policies for Turkey using micro data. This study examines redistributive impacts of both tax and expenditure policies for 1994 and 2002. The results show that personal income tax is progressive, but redistribution is enjoyed mostly by middle income classes; VAT has no effect on income distribution but it has very small negative impact on the bottom part of the distribution. Pinar concludes that if the aim of VAT is to raise tax revenues this aim is accomplished but it has no redistributive impact. Excise taxes such as Motor Vehicles Taxes and Petroleum Consumption Tax create a higher burden on higher incomes in absolute terms, although they do not result in a redistributive impact because the distribution of car ownership is similar to the initial income distribution. Pinar did not examine the payroll tax. However, Pinar only applies descriptive analysis and ignores statistical robustness of the results.

The main contribution of this chapter is twofold. The first contribution of the chapter is to examine the distributional impacts of tax policies by applying the welfare dominance analysis and different summary statistics of progressivity with the statistical dominance testing methodology for 2003 by using the 2003 HICES. The second contribution of the chapter is to estimate effective tax rates for indirect taxes by using Input-Output tables to capture incidence of indirect taxes not only on final goods but also intermediate inputs and imported goods. 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 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.

[3] See Table A 5.1 in Appendix 5.1.

Following Ahmad and Stern (1991) and Rajemison et al. (2003), we calculate "effective tax rates" by using the Input-Output table in order to attain the incidence of taxes on intermediate inputs and imports. In the chapter we apply both the standard tax incidence analysis and the effective tax rate methodology and compare the results from both methods.

The plan of the chapter is as follows. Section 2 provides an overview of Turkish tax structure. Section 3 discusses the extent of informal economy and tax evasion in Turkey. The incidence assumptions and calculations of tax liabilities for each tax examined are explained in Section 4. Section 5 provides the results of both direct and indirect tax incidence analysis. While the effective tax rate methodology is applied to indirect taxes in Section 6, Section 7 presents the regional level analysis. The final section offers concluding remarks.

5.2 Turkish Revenue System

The major components of government tax revenue in Turkey are the personal income tax (PIT) and the indirect taxes. The former is considered a progressive tax in the sense that (average) tax rate increases with taxable income and is expected to have an equalizing impact on income distribution (Kakwani, 1986:72-86; Lambert 1993) [4]. The latter is usually levied at a standard rate, which may result in a pro-rich redistribution due to relatively higher propensity to consume among the poor. In order to prevent such an effect, some differential lower rates are applied to some goods, such as basic needs and luxury goods. Turkish tax system has also property taxes such as Motor Vehicles Tax (MVT), property tax and trade taxes.

Table 5.1 illustrates the relative importance of different taxes, particularly the share of each tax in GDP (Gross Domestic Product) and Total Tax Revenue (TTR) in 2003. The percentage share of the direct taxes in TTR is 31% and indirect taxes account for 52% (or 67%

[4] See Chapter 2 for the discussion on progressivity definitions.

when foreign trade taxes are included). One can also notice from the table that the share of property taxes is very limited (2.48%). In this respect, Turkey represents a typical developing country, which has limited coverage of direct taxes.

As we will discuss later in detail, Turkey is a typical developing country in terms of other senses as well such as a low tax-to-GDP ratio, widespread tax evasion, the predominance of indirect taxes and a limited share of capital and wealth taxes (Chu et. al. 2000).

Table 5.1: Central Government Domestic Revenue, Turkey, 2003

	Total Amount*	% of GDP	% of Total Tax Revenue
Direct Taxes	25,716	7.21	30.50
Income tax	17,064	4.78	20.24
Corporation Tax	8,645	2.42	10.25
Other	7	0.00	0.01
Taxes on Property			
Motor Vehicles Tax	1,206	0.34	1.43
Property Tax and Other	886	0.25	1.05
Indirect Taxes	43,927	12.32	52.10
VAT	15,390	4.31	18.25
Private Consumption Tax	22,306	6.25	26.46
Private Communication Tax	1,048	0.29	1.24
Other Indirect Taxes	5,184	1.45	6.15
Foreign Trade Taxes	12,579	3.53	14.92
Other	2	0.00	0.00
Total Tax Revenue	84,314	23.64	100
Total Non Tax Revenue	15,934	4.47	
Total Revenue	100,248	28.11	

**Trillion (1,000,000,000,000)TL*
Source: Ministry of Finance

We can see trends in direct[5] and indirect taxes and tax effort with the help of Table A 5.1 in the last 25 years. Direct taxes (measured as a percentage of TTR) have downward pattern since 1985 whereas indirect taxes kept increasing its share in TTR in the same period. The share of direct taxes declined dramatically from 62% in 1980 to 46% in 1985 and kept declining over time. The share of direct taxes in TTR decreased to the level of 30% in 2003. We may conclude that Turkish governments prefer indirect taxes to finance their spending to direct taxes.

[5] Direct taxes include PIT, corporation tax and property taxes.

One of the main problems of developing countries is the lack of ability to increase their tax effort. This is also an issue in Turkey. As a middle-income country Turkey increased its tax revenue share in GNP in 2000s. The share of total taxes in GNP varied from very low level of 14 and 11% between 1980 and 1995. Recent years have seen a rise in tax effort since 1995 and it became 24% in 2003. Average tax effort is 29% in developed countries and 23% in middle-income countries (Bird and Zolt, 2005). The main reason for this low level of taxation is the size of informal economy and high rate of tax avoidance in Turkey and other developing countries (Pinar, 2002). The size of informal economy and tax evasion and their impact on tax system in Turkey will be discussed later in this section.

5.2.1 Direct Taxation[6]

Direct taxes are known to be less likely than indirect taxes to be shifted as they are generally applied to a tax base closer to the individual, such as her income and do not directly interfere with market operations, although their indirect effects cannot be avoided (Kakwani, 1986). Turkish direct taxation system consists of three main taxes: PIT, corporation tax, property taxes and payroll tax (social security premiums). The only tax we exclude from the analysis is the corporation tax, as we work with household level data.

Personal Income Tax

An individual is subject to income tax on his income and earnings, in contrast to a company, subject to corporation tax on income and earnings. Personal income tax (PIT), the most important direct tax in Turkey comprising 20% of TTR, is followed by the corporation tax with 10%. Table 5.2 demonstrates the income tax schedule for employers or self-employed

[6] See The Presidency of Revenue Administration Department of Taxpayer Services (2006) for details of Turkish taxation system.

individuals and employees with different income ranges in Turkey. As can be seen from the table, the tax rate increases with taxable income, implying progressive property of PIT schedule.

Table 5.2: Income Tax Schedule 1 for Employers and Self-Employed Individuals

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 2,4000	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 Employees

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%

**All incomes in millions of Turkish Lira (TL)*

Because of its progressive character, it is expected to have equalising impact on the distribution of income in the society. The expected progressive effect of PIT may be limited on the economy because of its low share in TTR. In order to understand the possible redistributive effect of PIT, we may need to assess sources of income in Turkey. Table 5.3 and Table 5.4 created from 2003 HICES, provide the percentage shares of different sources of income in the total net disposable income of Turkey by rural-urban breakdown and by quintiles: wages and salaries including daily wage comprise 42% of the total, incomes from capital is 32%, transfers account for 20% (mostly pensions), rent and property incomes account for 6% of total income. As these tables are based on the reported net disposable income of individuals, it is subject to underreporting of income for especially higher income classes.

Table 5.3: Income Structure of Turkey, 2003

The Sources of Income	Total Income*	% of Total Income	Urban*	% of Total Urban Income	Rural*	% of Total Rural Income
Total	**161,832**	**100**	**114,194**	**100**	**47,638**	**100**
Wage and Salary	62,561	38.7	51,741	45.3	10,820	22.7
Daily Wage	5,042	3.1	2,992	2.6	2,050	4.3
Total Capital Income	**51,817**	**32.0**	**27,584**	**24.2**	**24,233**	**50.9**
Agriculture	*15,932*	*30.7*	*1,574*	*5.7*	*14,359*	*59.3*
Manufacturing	*6,146*	*12.4*	*5,228*	*19.0*	*1,188*	*4.9*
Construction	*2,129*	*4.1*	*1,636*	*5.9*	*493*	*2.0*
Trade	*16,923*	*32.7*	*11,359*	*41.2*	*5,564*	*23.0*
Service	*10,416*	*20.1*	*7,787*	*28.2*	*2,629*	*10.9*
Rent	5,812	3.6	5,079	4.4	733	1.5
Property Income	4,261	2.6	3,270	2.9	991	2.1
Transfers	**32,340**	**20.0**	**23,528**	**20.6**	**8,812**	**18.5**
From Government	*28,238*	*87.3*	*20,542*	*87.3*	*7,696*	*87.3*
From abroad	*975*	*3.0*	*616*	*2.6*	*359*	*4.1*
Other	*3,127*	*9.7*	*2,370*	*10.1*	*757*	*8.6*

Source: TURKSAT HICES 2003
**Trillion (1,000,000,000,000) TL*

Table 5.4 would be more helpful to assess possible redistributive effects of PIT as it provides the percentage shares of different sources of income in each expenditure quintile. Before we start examining the table, it is worth noting that transfers (both public and private), accounting for 20% of total income, are exempt from PIT. The percentage shares of all sources of income increase as we move to upper quintiles apart from daily wage and agricultural incomes. Daily wage is generally paid to informal employees[7] who are not paying any tax and as we'll discuss in detail later, agricultural incomes are largely subject to a stoppage rate which ranges from 2 to 4%. Around 50% of total incomes from these two income types are located in the first two quintiles. However, the share of these two sources of income in the total household income is only 13%. From these first observations, we may expect that households with daily wage and agricultural incomes in the first and maybe in the second quintiles are expected to pay

[7] Only 20% of individuals who are earning daily wage is covered by a social security instituiton.

less tax relative to their income shares. As shares of the other sources of income increase with quintiles, we may expect that progression in the tax schedule will produce redistribution from upper quintiles to lower quintiles. However, this will depend on the extent of tax evasion and informal economy which are two main problems in Turkey.

Table 5.4: Income Structure of Turkey by deciles, 2003

Quintiles	1	2	3	4	5	Turkey
Expenditure	6.4	10.7	14.9	21.0	47.0	100
Wage and Salary	4.8	10.2	16.1	22.3	46.7	38.7
Daily Wage	32.7	24.4	19.7	13.9	9.3	3.1
Total Capital Income	11.1	14.3	16.2	18.8	39.7	32.0
Agriculture	*25.3*	*23.7*	*20.1*	*18.1*	*12.8*	*30.7 (9.8)*
Other	*5.2*	*10.4*	*14.5*	*19.2*	*50.7*	*69.3 (22.2)*
Transfers	6.9	12.7	17.2	23.6	39.5	19.9
Rent&Property Income	2.2	4.4	6.6	14.4	72.4	6.2

Source: TURKSAT HICES 2003
Households are ranked by per adult equivalent household expenditure

In Turkey, there are two main tax collection methods, the '*declaration'* method and the '*deduction of tax at source'* method. PIT on wage and salaries, agricultural incomes, interest incomes and a large part of rental income on commercial buildings are subject to deduction at source; incomes of self-employed and employers are taxed according to their declaration[8]. However, the share of agricultural taxes deducted at source in total taxes collected via deduction

[8] Agricultural incomes, interest incomes and rental income on commercial buildings are supposed to be taxed by the declaration method too. However, the governments hesitate to tax agricultural incomes and this sector is only taxed at certain stoppage rates, which are deducted when agricultural products are traded in markets. Agricultural goods are exempted by the income tax if this stoppage has been paid. The same process is working for the interest incomes. Banks withhold 5% or 15% of the total amount of interest income from a bank account (depending on the legal status of the bank), when interest incomes are realized and then the owner of the bank account is exempted to pay the income tax, even if the total amount of the bank account is really high. There is a discussion on this issue in Turkey, which states that interest incomes are not fully taxed; this stoppage prevents to see the potential taxable income of the taxpayer and tax evasion is taking place legally. For rent incomes on commercial buildings, there is 25% stoppage rate the tenants are supposed to pay. The owner of the property declares rental income on the commercial buildings if the total gross rental income is higher than certain amount which would cause higher tax liability than the stoppage rate produces.

was only 2.19% in 1999 (Nejatkan, 2003)[9]. Additionally, tax revenues deducted at source come largely from wage and salaries[10]. Although there are no statistics about the percentage share of taxes paid by each source of income[11], one may use Table 5.5 to get an idea about the extent of the tax burden on each income source. Table 5.5 presents percentage shares of these two methods in total PIT; 90% of PIT is collected by the deduction at source method. If we unite the observations from Table 5.3, Table 5.4 and Table 5.5, we may conclude that PIT revenue is borne largely by wage earners, particularly civil servants due to the high tax avoidance in the private sector. In order for taking this fact into account we will need to know the extent of tax evasion among self-employed individuals and employers.

For civil servants, tax evasion is impossible since the income tax is deducted from their salary; for wage earners in private companies, the employer declares the tax base to the tax authorities. It is known that employers have a high inclination not to declare the whole amount of wage they pay to the employee, in order to pay less payroll taxes[12]. These issues have to be accounted in incidence analysis discussed in the next section. The government plans to introduce some new instruments about PIT to decrease the share of tax paid by employees, such as minimum living allowance from 2008.

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[9] This rate has declined from 4.99 in 1990 to 2.19 in 1999 (Nejatkan, 2003; Yılmaz, 1996).

[10] See http://www.vdd.org.tr/index.php?option=com_content&task=view&id=1729&Itemid=48 (in Turkish), Yilmaz (1996) states that 61% of total collected PIT via deduction come from wage and salaries in 1994, but the author warns that this rate may account for 70% for some years.

[11] Ministry of Finance provides income taxes paid by each economical sector and occupations that can be found on following web page: http://www.gib.gov.tr/fileadmin/user_upload/VI/FGGOVB79.htm. Unfortunately, these figures do not provide the information required to assess who is paying and who is not paying taxes.

[12] The Social Insurance Organisation (*Turkish acronym, SSK*), the pension fund for workers in the private sector and the public sector. For SSK members there is minimum and maximum wage levels that are subject to the payroll tax. Employers cannot declare less than this minimum wage level and if a wage level of an employee is higher than the maximum wage level for payroll tax, the tax base of payroll tax is accepted to be the maximum amount determined by the government every year. Based on SSK Annual Statistics (2003), 52,9% of employees' wages are declared by their minimum wage for SSK payroll tax. However, from the HICES data we see that only 20% of total SSK members' annual wage income is equal or less than the official minimum wage valid for payroll tax. This implies that the tax evasion by underreporting true wages is taking place in private companies.

Table 5.5: Tax Collection Methods for Personal Income, 2003

(% of Total Personal Income)	%
Total Personal Income	100
Declaration Method	6.39
Deduction at source Method	90.2
Other	3.4

Source: Ministry of Finance

Personal income tax bills are also calculated on interest incomes and rent incomes. Taxpayers do not need to declare interest incomes if 5 or 15% of stoppage rate has been withdrawn by the bank. However, the taxpayer should declare rent incomes. The tax burden for persons who have rent incomes and whose amount we can find in the data is taken into account. Two different pieces of information on rent incomes are provided in the data, the total individual net rent income and the monthly rent incomes from different properties (residences, land, and commercial and industrial buildings) at household level. We use the household level monthly gross rent information, as the incidence assumptions on residential and commercial properties differ and there are different exemptions related to these properties.

Property taxes

There are two main property taxes: Property Tax for buildings (residential or commercial) and land and Motor Vehicles Tax (MVT). Property tax is paid each year on the tax values of land and buildings at rates varying from 0.1% to 0.3%. Property taxes take very small place in TTR; the share of property taxes generally varies between 1 and 2% of TTR. Due to the existence of different tax rates on properties, the tax burden of the property tax at the individual level is not taken into account for this study and the tax burden of the property tax will be calculated at household level. The data gives us the pre-tax market value of households' properties. Hence we compute tax bill for Property Tax as follows:

$PTB = t_i * VoP$, *i:* Property tax

where, *PTB*= Tax Bill for property taxes and *VoP*=Value of Property; *t*=tax rate

Property tax rates change with respect to the location (village or municipality) of property and are employed primarily by local governments. As the data does not give the location of households' property, we do not know which tax rate the owner of the property faces. We know only whether the households live in rural or urban areas and assume that rural (urban) households face the property tax rates prevailing in villages (municipalities) to calculate the burden of property tax on households[13]. We take into account the exemptions, even if the exemptions depend on unobserved characteristics of the owner of property. Firstly, legally a pensioner having only one home and not having any other income does not pay the property tax. Assuming the household head is the owner of the house, we exclude pensioners with one home from the taxpayers of the property tax. Secondly, we exclude households whose income is zero and have only one house. In addition to these exemptions, we assume that there is no tax levied on agricultural land. At the first stage, we will estimate tax incidence with no evasion assumption and then we will compare our results to assess how tax evasion on agricultural land changes the distribution of the tax burden.

MVT is paid by car owners who register their cars every year. The rate is subject to quality and cost of vehicles. The data gives us who has motor vehicles and how many vehicles households have; however we do not know the quality and cost of the vehicles (with the exception of jeeps). We assume that households in higher quintiles have more expensive and high quality vehicles to compute the MVT bill for each household, which more likely gives us progressive incidence. Accepting this assumption, we take the amount of tax valid in 2003 for

[13] For residences, the property tax rate is 0.01%, for other buildings 0.02%, for land 0.01% and for building estate 0.03% in villages. To get tax rates in municipalities, we double the property tax rates of villages.

the luxury cars aged between 4 and 6 year old. The amount of the tax varies with the weight of the car. Thus it is assumed that households in the first expenditure quintile have the lightest car and pay 178 million Turkish Liras and households in the 5th quintile have the heaviest car and pay 3,621 Turkish Liras.

Table 5.6: **The Annual Amount of Motor Vehicles Tax (MVT) by type of car**

Net weight (KG)	Quintile	1 - 3 years	4-6 years	7 - 11 years	12 - 15 years
950 and below	**1**	267*	**178**	89	89
951 - 1200	**2**	406	**271**	135	135
1201 - 1600	**3**	900	**675**	225	225
1601 - 1800	**4**	2711	**1808**	675	450
1801 and above	**5**	5432	**3621**	1356	904

**Million TL. Engine cylinder volume is 1601 cm3 (luxury car) for all cars*

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Payroll Tax

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 contributions 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 to the tax authorities.

Table 5.7 provides social security membership of employees by quintiles. More than half of total employees seem to work without any social security (Informal), suggesting very high unrecorded employment. The social security contributions for wage earners who are covered by any social security institution are calculated in this study. Some assumptions are made for calculating the tax bill for the payroll tax for each social security institution. For SSK, it will be assumed that the employers' share of the payroll tax is also paid by employees in the private sector, yet it is paid by the employers if the employer is public. In Turkey, wages are determined on the base of the net wages suggesting that the social security contributions may be subject of wage bargaining between employees and employers in the private sector. Private employers may offer higher net wages in return for no social security or lower wages to make employees cover employer's share of social security contribution in addition to the employees' share. Hence this means that the net salary of an employee working for a private company may be lower than the salary of a public employee. Moreover, there is a maximum amount of taxable salary for payroll tax to SSK members (27,489 YTL in 2003). If the salary of a member of SSK is higher than this amount, the payroll tax bill is calculated as if the salary of the employee was 27,489. Additionally, the second payroll tax bill for workers with SSK in the private sector will be assessed. For those workers, it will be assumed that their payroll tax base is the gross minimum wage level. Moreover, the premiums for self-employed and employer will be worked out if they are covered by Bag-Kur.

Table 5.7: Social Security Membership by expenditure quintiles

Quintiles	1	2	3	4	5	Turkey
SSK	13.1	28.6	39.6	42.0	46.5	32.9
ES	1.6	4.9	9.8	17.6	27.0	11.5
BK	0.4	0.5	0.3	0.3	0.3	0.4
Private	0.0	0.00	0.08	0.1	0.9	0.2
Informal	84.9	65.9	50.2	39.9	25.2	54.9
Turkey	100	100	100	100	100	100

Note: Ranked by per adult equivalent household expenditure

5.2.2 Indirect Taxation

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 of the tax in 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.

Trade taxes are another important part of indirect taxes. Import tariffs and VAT on imported products are the main trade taxes. Since 1998, when Turkey entered into a formal Custom Union agreement with European Union, the share of trade taxes in indirect tax revenues started declining (Table 5.8). Table 5.9 presents import trends by the country groups. The European Union is the most important trade partner of Turkey with 50% of the total. Table 5.10 also gives the information on which products Turkey imports; intermediate goods account for some 70% of the total. In the first part of our work, we exclude import taxes, since we do not know which goods in the consumption bundle of households in the data are imported. In the second part of the chapter, we estimate effective tax rates by using Input-Output Tables for the indirect tax incidence analysis, so we will be able to cover the effects of import taxes and indirect taxes on intermediate goods. As aforementioned, Turkey has differential rate for VAT to reduce its regressive character. Table 5.11 presents consumption pattern in Turkey by expenditure deciles calculated from 2003 HICES.

Table 5.8: The Structure of Indirect Tax Revenue (% of Total Tax Revenue)

Years	Taxes on goods and services	Taxes on trade	Total Indirect Taxes
1995	39.59	17.95	57.54
1996	43.26	17.25	60.52
1997	41.84	17.41	59.25
1998	39.07	14.27	53.35
1999	41.27	13.36	54.63
2000	42.87	16.18	59.06
2001	45.55	13.97	59.52
2002	50.42	15.91	66.33
2003	52.10	14.92	67.02

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

Table 5.9: Import by Source since 2000

	2000	2001	2002	2003	2004	2005	2006
EU (25 Country)	50.25	45.77	47.56	48.31	46.59	42.15	42.54
Africa	4.98	6.81	5.23	4.81	4.94	5.18	5.31
America	8.8	9.28	7.88	7.1	6.76	6.73	6.74
Asia	18.91	19.08	18.85	20.33	21.62	24.45	25.95
Other	17.06	19.06	20.48	19.45	20.09	21.5	19.46
Total Import	100	100	100	100	100	100	100

Source: Undersecretariat of the Prime Ministry for Foreign Trade

Table 5.10: Import Composition, selected years in Turkey

	2002	2003	2004	2005
Investment Goods	16.29	16.33	17.84	17.44
Intermediate Goods	73.04	71.73	69.25	70.11
Consumption Goods	9.50	11.27	12.41	11.97
Others	1.16	0.67	0.51	0.49
Total Import	100	100	100	100

Source: Undersecretariat of the Prime Ministry for Foreign Trade

Table 5.11: Consumption Pattern in Turkey, 2003

Expenditure Quintiles	1	2	3	4	5	Turkey
Food	43.1	38.3	34.5	30.0	18.9	27.5
Alcohol and Tobacco	5.6	5.4	5.0	4.7	3.0	4.1
Clothing	3.1	4.4	5.3	6.2	7.5	6.2
Housing, fuel, light and water	32.6	30.9	30.3	29.4	25.8	28.3
Durable&Non-durable Household Goods	2.5	3.7	4.4	5.4	7.3	5.7
Health	1.3	1.3	1.6	2.1	2.8	2.2
Transportation	3.7	5.1	6.3	7.6	14.0	9.8
Communication	3.3	3.9	4.1	4.4	4.6	4.3
Recreational goods and services	0.6	0.9	1.2	1.7	3.4	2.2
Education	0.1	0.3	0.6	1.1	3.5	2.0
Restaurants and other catering services	2.4	3.7	4.1	4.3	4.5	4.1
Other	1.6	2.2	2.6	3.1	4.7	3.5

Source: TURKSAT 2003 HICES

It is assumed that households bear a greater burden of a tax if the expenditure share of the product is above the national average. From the table it is seen that the poorest first quintile's expenditure share is over the national average on food, alcohol and tobacco, and housing, fuel, light and water. For food, VAT rates are either 1% or 8%, which may help reduce the regressive impact of VAT. Although alcohol and tobacco products are subject to the high PCT, 72% of people consuming alcohol is concentrated on the 4th and 5th expenditure quintiles, which may imply a progressive character to PCT. Therefore we suggest that despite the fact that the share of indirect taxes in TTR is very high in Turkey, regressivity of indirect taxes could be small.

5.3 Informal Economy and Tax Evasion

There is a consensus on the fact that informal economy[14] causes many problems in an economy and its size increased on a global scale (Schneider, 2005). However there are important disagreements on how to define and measure it and its impacts on the economy (Schneider and Savaşan 2006: 2).

The commonly used definition of informal economy refers to all economic activities which contribute to the officially calculated (or observed) Gross National Product, but not captured official national accounts statistics (Schneider and Enste, 1999; Bagachwa and Naho, 1995)[15]. Bagacha and Naho (1995) classify unrecorded economies as informal sector, parallel and black market activities. By informal sector the authors mean very small-scale (unrecorded) units producing and distributing goods and services and consisting of both employed workers and independent self-employed persons in both rural and urban areas. Economic units in informal sector are "mostly unregistered, unrecorded in official statistics; and participants have little or no access to organized markets, to credit institutions, to formal education and training or to many public services" (Bagacha and Naho, 2000: 1388).

[14] In the literature informal economy is called unrecorded, underground, shadow, unofficial, black or irregular economy. We prefer to use informal economy following Bagachwa and Naho (1995)' classification.

[15] See Schneider and Enste (1999), Schneider (2005) and Öğünç and Yılmaz (2000) for different definitions of informal economy.

Schneider and Savaşan (2006) make broad and narrow definitions to capture all features of unrecorded economies. The broad definition includes both legal and illegal economic activities. Illegal activities such as drug dealing and trade of stolen goods could be done through monetary and non-monetary economic transactions. Legal activities comprise of all hidden monetary and non-monetary transactions to avoid legal costs. The narrow definition consists of only legal economic activities. For Schneider and Savaşan (2006:3-5) the reasons for those legal economic activities to be concealed from public authorities are: to avoid payment of income, value added or other taxes; to avoid payment of social security premiums; to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards; to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms[16]. The empirical studies to measure the size of unrecorded economy in a country are generally based on this narrow definition and exclude illegal economic activities from the discussion.

Following Bagacha and Naho (1995), we use the term informal economy in this study to refer the legal economic activities which are not recorded in official statistics. This also captures the narrow definiton of Schneider and Savaşan (2006). Moreover, the small-scale economic units (enterprises) dominate Turkish economy. Businesses with less than 10 employees make up 96.32% of total businesses and 3.09% of total businesses have between 10 and 49 employees in 2002 in Turkey (TUIK, 2002). According to HICES 2003, while 85% of employees work in enterprises with less than 50 workers, 15% of total emplyees work in enterprises with 50 or more employees[17]. In this sense, the term "informal sector" is therefore appropriate for Turkey. The main problem with small-scale businesses in terms of taxation is that it is much difficult and costly to inspect those small-scale businesses.

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[16] See Schneider and Enste (1999) for the detailed discusion on the causes of unrecorded economy.

[17] When we exclude agricultural enterprises, 78% of total employees work in smal-scale economic units, whereas 22% of them work in enterprises having 50 or more than workers.

Although one could hear that the size of informal economy in Turkey is 50% of GDP, Schneider and Savaşan (2006) estimated the size of the informal economy by using the narrow definition and found the size is around 35% of actual GDP[18]. However, there are serious doubts on the reliability of these estimations (Öğünç and Yilmaz, 2000).

In addition to the impact of the informal economy on reliability of statistics, employment, price level, distribution of sources and income, it restricts taxable income in the economy. Empirically it has been found that tax and social security contribution burdens are one of the main causes of the shadow economy (Schneider, 2005; Schneider and Savaşan 2006). Savasan (2003) also found that direct and indirect taxes and social security contributions have affected the size of informal economy in Turkey positively and significantly. This close relationship between the motives of being in informal sector and tax burdens should not allow us to use the terms tax evasion or avoidance[19] and informal sector as if they refer to the identical facts. It is not necessarily true that economic agents working in the informal part of the economy are evading tax or the reason for them being in the informal part of the economy to evade tax. Moreover, taxes could also be evaded easily even when an economic agent is running a completely formal economic activity by underreporting incomes made. Moreover, there are some costs relating to running a business in the informal sector too such as not being able to access subsidised public loans for small and medium-scale businesses and to reclaim VAT. To

[18] See Table A 5.2 in Appendix 5.2 for the estimations of the size of informal economy in Turkey for different years by different authors. See also Öğünç and Yilmaz (2000) for the review on empirical studies about the size of informal economy in Turkey.
[19] Tax evasion and tax avoidance are two different notions. Tax evasion is an unlawful way of reducing tax liabilities, for example, by underreporting income made or reporting inflated business deductions. Tax avoidance implies all those permitted lawful steps made in order to reduce or totally obviate the tax liability, making use of all the legal shortcomings and loopholes. However, in this study we use the term tax evasion to refer both lawful and unlawful actions by taxpayers to reduce their tax liabilities.

sum up, the decision of running a business in the informal sector would depend on relative size of benefits to the related costs of it[20].

The effect of the informal economy on taxation is important. If unrecorded incomes are circulated in recorded economic activities through consumption and investment, some of unrecorded incomes may be taxed via indirect taxes. In this sense, we need to find out the actual impact of informal economy on taxation. 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. This creates sort of circle in the economy: The revenue loss forces governments to levy more taxes or increase rates of existing taxes, encouraging people particularly in the private sector to locate in the informal sector (Savasan 2003).

The only information that we could attain from the HICES data about the fact of informal economy in Turkey is based on unrecorded employees. In this sense we accept that if employees are not involved in any social security organisation, they work in informal sector and then they do not pay any direct tax and social security contribution. Savasan (2003)'s finding supports this assumption. Therefore, when we use informal economy we refer to the unrecorded employees. The proportion of people who are not covered by any social security institution to the total labour force can also be used as an indicator of informal economy. The 2003 HICES data displays that this rate is 42%, which is higher than the estimated size of informal economy in Turkey. In addition to the high unrecorded employment, 52% of the SSK members' wages are declared at the minimum amount even if they are recorded employee, implying high underreporting of incomes to pay less tax and social security contribution (SSK, 2003).

[20] A business is not necessarily located in the informal sector completely. It can be formal to access some public facilities such as subsidised public loans but still hide some employees from the legal authorities to avoid the burden of social security constributions or meet some labour market regulations for bigger scale businesses.

Data on the extent of tax evasion are not easily available for Turkey like some other developed or developing countries because of the fiscal authorities' attitude to keep data secret. We were not able to access any formal tax evasion statistics from Ministry of Finance. Additionally, we could not attain any information on actual tax payment in terms of income ranges or average tax rates that we can use to approximate who is paying or evading tax. However, Table 5.12 reveals the extent of tax evasion with two different indicators. The table's second column was attained from an official report for the 9th Development Plan of State Planning Organisation (SPO). According to the second column of table the rate of non-taxed incomes to the potential tax base is 42% in 2003. However, 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.

Table 5.12: Tax Evasion in Turkey

Years	The rate of non- taxed incomes to potential tax base in Turkey, 1985-2004(%)
1985	50
1990	39
1995	30
2000	35
2001	65
2002	37
2003	42
2004	46

Source: SPO, 9th Development Plan, Tax Report 2006

In tax incidence analysis, informal economy 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 need to be included in our analysis. As we mentioned before, we will cover informal economy by considering unrecorded employees, but this allows only us to take into account tax loss from employees. However, we do not have any precise information about who actually evades taxes and to what extent, but can make assumptions regarding the tax evasion. The methods of tax evasion vary according to the certain types of tax and sources of income. Some well-known facts related to wage earners 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 such as tax payers over business incomes, we estimate tax evasion rates by using HICES for self-employed and employers. The estimation of tax evasion rate will be explained in the next section. Allowing for the share of overall income tax in TTR and the size of tax evasion, one may expect that progressivity of PIT is very limited in Turkey.

5.4 Incidence Assumptions and Estimating Tax Liabilities

5.4.1 Incidence Assumptions

Determining who pays the taxes is the key issue in the analysis of tax incidence and redistribution. Direct taxes are thought to be less likely to be shifted, whereas indirect taxes are easier to be shifted. The idea behind this is the fact that direct taxes are generally applied to tax bases closer to individuals, such as their incomes or properties. Additionally direct taxes do not have direct impacts on markets, even if they may create some indirect effects. On the other hand, due to the direct effects indirect taxes have on markets, it is easier to shift indirect tax burdens. Theoretically, Dalton's law uses demand and supply conditions of taxed commodities to determine the incidence of taxes. In the context of indirect taxes, the extent of shifting tax burden to buyers in increased prices depends on price elasticities of demand and supply of the commodity. Thus, "the more elastic the supply, the more the market price will rise and the greater will be the extent of shifting the tax to the buyers" (Kakwani, 1986: 116-118). Generally speaking, in a competitive market the incidence of a tax on a factor whose supply is perfectly elastic is completely shifted (Stiglitz, 2000: 496). In this section the incidence assumptions used to estimate tax burdens are explained.

Two different sets of incidence assumptions are used in this study[21] and the assumptions are summarised in Table 5.15. In addition to the shifting assumptions, we also adopt additional assumptions to allow for the impacts of informal employment and tax evasion. By adopting the assumptions, we will identify two extremes to represent "maximum" and "minimum" estimates of tax burdens. Finally, in this study it is assumed that there is no indirect effects taxes create as in line with the benefit incidence, therefore, we ignore the behavioural responses individuals could show against taxes and assume that the existing distribution of before taxes would have been the same in the absence of taxes.

The first set of the shifting assumptions is called the standard tax incidence assumptions reflecting the statutory incidence of taxes in question. For the first set *(Variant 1)*, PIT is assumed to be bourne by those who pay it and indirect taxes (general sales and excise taxes), by consumers of the taxed commodities. PIT on rent incomes (residencies, commercial and industrial buildings and land) is bourne by who owns properties. The owners of the properties can deduce the expenses they have made for their properties from their gross rental incomes. They either deduce actual expenses they have spent by providing documents for them or they simply deduce 20% of gross rental incomes. The taxable rental incomes are found after this deduction. 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 mostly 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.

Moreover, with the assumption of no tax evasion or informal economy (*Variant 1*), it is assumed that net individual incomes in the data are the net incomes that individuals would earn in the absence of informal employment and tax avoidance opportunities. This assumption

[21] See Shah and Whalley (1991) for an assessment of incidence assumptions adopted in the empirical literature for developed and developing countries

implies that individual taxpayers would not change their work preferences if there were no way to work in the informal economy or to avoid paying income and payroll tax.

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 from which households get interest incomes. 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 also subject to the stoppage, namely interest incomes from dividends. There is 10% stoppage for these incomes.

Agricultural incomes are subject to the usual PIT, with three stoppage rates depending on the size of agricultural land. The average stoppage rate is used (2.5%) to calculate the tax bill for agricultural incomes and no evasion is assumed.

For the second set of incidence assumptions *(Variant 2)*, shifting assumptions on payroll tax and PIT on rent are affected. It is assumed that employer's share of payroll tax is paid by employees who work for a private company. For both *Variant 1* and *2* we also assume that there is no tax evasion and no informal employment, but we consider the exemption on rent incomes on residential properties. Thus, we assume that unrecorded wage earners are members of SSK and calculate payroll tax bill for unrecorded wage earners to see what would happen if there was no informal employment for both *Variant 1* and *Variant 2*.

For PIT on rent, it is assumed that 50% of PIT 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 PIT for the tenants, it is assumed that households, who are in the same expenditure decile, are in a relationship of tenant and landlord. As a result of this incidence assumption, tenants will pay more rents and owners will pay less tax, in other words they will get 50% "refund" from tenants.

For commercial and industrial buildings and land, it is assumed that the tax is largely shifted to tenants. There is 25% stoppage for rent incomes on commercial buildings that are supposed to pay by the tenants. The owners of the properties declare their rental income only if the calculated tax burden according to the PIT schedule is higher than the paid stoppage by the tenants. Therefore, under *Variant 2*, we calculate 25% stoppage, the tenants are supposed pay, and deduce 25% stoppage from the calculated tax burden under *Variant 1* to get the tax burden for the owners of commercial buildings under *Variant 2*.

As mentioned before, the size of informal economy is an important problem in Turkey. For both *Variant 1* and *Variant 2* we assess the tax incidence if there were no informal employment and no tax evasion. To see how tax liabilities change when we consider unrecorded employments, we have a third case called *Variant 3*. With *Variant 3,* we assume that individual wage earners who are not covered by any social security institution pay neither PIT nor payroll tax. We both adjust *Variant 1* (Variant1&Variant3) and *Variant 2* (Variant2&Variant3) according to this assumption to see how the informal employment affects the tax burdens under different shifting assumptions. Thus, the difference between *Variant 1* (Variant 2) and *Variant1&Variant3* (Variant2&Variant3) is that we exclude unrecorded employees with the latter.

PIT bill (IT) is calculated for wage earners, self-employed and employers and the taxpayers who earn interest income and rental income. There are some well-known facts regarding to wage earners in public or private sector. In addition to *Variant 3*, we create *Variant 4* to use these facts to include exemptions and tax evasion attitudes. 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 managers. However, these extra amounts are exempted from PIT, 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 PIT she paid as a percentage of salary. In order to consider this, it is presumed that civil servants' tax base is equal to the minimum salary in public institutions *(Variant 4)*. As emphasized before, 52% of the SSK members' wages are declared at the minimum amount even if they are recorded employee. Therefore 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. In other words, we assume that private employees only pay PIT on the minimum wage *(Variant 4)*. Employees with no social security do not pay any tax under *Variant 4* either, so *Variant 4* includes the impacts of informal employment as well.

Estimation of Tax Evasion for Business Incomes

There is a problem with self-employed and employer incomes in terms of taking into account tax evasion among these groups apart from agricultural incomes. Although it is known that the rate of tax evasion among self-employed and employers is high, there is no information by sources of income or income classes. However, we can use the HICES data to determine who is evading tax and what extent. The discrepancy approach was used to estimate the size and extent of tax evasion by making use of household level data. Dilnot and Morris (1981) introduced this approach to estimate the extent of tax evasion for UK by using 1977 Family Expenditure Survey. Dilnot and Morris assume that individuals who evade taxes tend to underreport their income and as a result of this underreporting there should be difference between their expenditure and incomes in household surveys. There may be other reasons behind the discrepancy between household expenditures and incomes such as temporary fall in current incomes of households, age-dependent higher expenditure attitudes of very young or very old people, taking expected lifetime income as a base for expenditures instead of current income (Pyle, 1989).

They found that the discrepancy is true mostly for self-employed people who have more opportunity to hide their actual incomes from tax authorities. The method requires some assumptions: tax evaders should be represented in the sample to the same degree as non-evaders and tax evaders must declare the same income as they reported to the tax authorities[22]. The authors call households "evaders" if their reported expenditure is higher than their reported income. They use different criteria to determine evaders in the sample and as a result of these different criteria they ended up having different estimations of the size and extent of tax evasion. For example, they think households whose expenditure exceeded income by at least 50 percent are evaders and then they relax this criterion and they include households whose spending is more than 20 percent of their recorded income. In order to take into account the other reasons for having exceed expenditures, they exclude some households from the sample such as retired and unemployed.

We use the discrepancy approach to attain an estimation for tax evasion in the subsample of households with self-employed and employer members[23]. Even if we estimate tax liabilities by using individual annual income, we have to compare the annual disposable household incomes and household monthly expenditure to determine tax evaders as the HICES reports expenditures only at household level. Household disposable income includes imputed rent as household total expenditure does. The HICES have 8,834 (out of 25,764 households)

[22] Thus tax evaders must not report their true income to the survey; otherwise the discrepance between reported expenditure and income would disappear. Please see Pyle (1989: 57-83) for the detailed discussion of the discrepancy approach.

[23] We excluded households with no business enterprise incomes even if they have a self-employed or employer member. Those households we excluded are mostly earning agricultural incomes. Agricultural incomes are reported separately in the HICES. As agricultural incomes are assumed to be subject to 2.5% stopage we do not include hosueholds with agricultural incomes in the tax evasion estimation.

households with at least one self-employed or employer member. After excluding households with no enterprise incomes, we have 4,454 households to examine tax evasion.

We use two different criteria to determine tax evaders among households with enterprise income. First we assume that households whose expenditure-income difference is higher than average decile expenditure-income difference are evading PIT (*EVADERS1*). Secondly, we presume that households whose expenditure is more than 20 percent of their recorded income are tax evaders (*EVADERS2*). After determining who is evading taxes, the extent of evasion is estimated. In order to estimate the extent of evasion, we simply divide the expenditure-income difference of households by their incomes. For *EVADERS1*, we take the part of expenditure-income difference, which exceeds average decile difference, as numerator. For example if household expenditure-income difference is 100 Turkish Liras, average decile difference 50 Turkish Liras, and the household income is 200 Turkish Liras, we assume that the household is evading 25 percent of its income. The calculation made is follows:

$$EvasionRate1 = (\mathrm{D_i} - D_j) / I_i, \qquad i\text{: } 1,\ldots,4454;\ j\text{: } 1,\ldots,10$$

$$\mathrm{E}vasionRate2 = (\mathrm{D_i} - 0.20 * I_i) / I_i$$

where, D_i is expenditure-income difference of *i*th household, I_i is the monthly disposable income of *i*th household, D_j is average expenditure-income difference of *j*th decile.

The estimations based on these two criteria by decile are presented in Table 5.13. Under *EVADERS1,* 9% of self-employed and employer households evade 41% of their incomes whereas 13% of households evade 48% of their incomes under *EVADERS2*. The number of tax evaders rise with expenditure deciles under both *EVADERS1* and *EVADERS2* as expected. However, the extent of evasion does not follow a certain pattern. It interestingly takes the highest values in the first and 10th deciles under both criteria.

We use the average of these two estimations by decile to calculate tax burdens of each decile that is given in Table 5.14. So it is assumed that 2.9% of total household income in the first decile is evaded. We adjust both *Variant 1* and *Variant 2* according to *Variant 4* to see both the impacts of informal employment and tax evasion under each set of shifting assumption, namely *Variant1&Variant4* and *Variant2&Variant4* as in the case of *Variant 3*. Table 5.15 summarises the incidence assumptions and the assumptions made to incorporate informal employments and tax evasion in our analysis. *Variant 3* is not seen in the table as it requires only one assumption.

Table 5.13: The Size and Extent of Tax Evasion among Self-employed and Employer Households
(as a percentage of total number of self-employed households by decile)

Decile	EVADERS1 %	EVADERS2 %	Extent of Evasion 1* %	Extent of Evasion 2 %
1	7.06	9.19	32.88	38.41
2	7.86	9.03	19.44	26.08
3	7.99	8.66	26.68	32.67
4	8.01	9.26	24.53	32.10
5	7.46	10.14	33.94	36.44
6	8.53	10.41	22.34	29.36
7	10.17	12.93	27.32	34.82
8	12.48	16.72	23.81	34.07
9	10.43	12.69	29.41	37.10
10	12.09	26.25	55.56	57.61
Turkey	9.44	13.25	40.67	47.53

** Percentage of positive expenditure-income difference in total household disposable income*
EVADERS columns give percentage of households, Extent of Evasion columns give reported expenditure-income difference as a percentage of household incomes.

Table 5.14: Tax Evasion among Self-employed Households
(average of EVADERS1 and EVADERS2 by decile)

Decile	Average of EVADERS1&2 %	Average of Extent of EVADERS1&2 %	Evasion Rate %
1	8.13	35.65	2.90
2	8.45	22.76	1.92
3	8.32	29.67	2.47
4	8.63	28.32	2.45
5	8.80	35.19	3.10
6	9.47	25.85	2.45
7	11.55	31.07	3.59
8	14.60	28.94	4.23
9	11.56	33.25	3.84
10	19.17	56.58	10.85
Turkey	11.34	44.10	5.00

** Percentage of positive expenditure-income difference in total household disposable income*
Evasion rate is obtained by multiplying average number of EVADERS1&2 by average extent of evasion by decile

Table 5.15: Incidence and Tax Evasion Assumptions

	Variant 1	Variant 2	Variant 4
	(V1)	(V2)	(V4)
PERSONAL INCOME TAX			
on Wages	The owner of the factor		Employees without social security do not pay any tax
ES members	The owner of the factor		The part of salary over minimum civil servant salary is exempted from income tax (the proportional share of tax bill in salary decreases as salary increases)
SSK members	The owner of the factor		
Public sector (SSK)	The owner of the factor		
Private sector (SSK)	The owner of the factor		Tax base is equal to the minimum gross wage level for payroll tax if individuals' wage is higher than this amount
on Business Incomes	The owner of the factor		Estimated Evasion
on Interest Incomes	The owner of the factor		
on Rental Incomes	The owner of the factor		
on Residences	The owner of the factor	50% tenants/50% the owner of the property (50% "tax refund" for owners)	
on Land	The owner of the factor		Agricultural land is not taxed
on Commercial Buildings	The owner of the factor	Tenants and the owners	Tenants and the owners
On Agricultural Incomes	The owner of the factor (2.5% stoppage)		
PROPERT TAX			
On Residences and Commercial Buildings	The owner of the property		
On Land	The owner of the property		Agricultural land is not taxed
Motor Vehicles Tax	The owner of the property		
PAYROLL TAX			
ES members	Both employee and employer		Tax base adjusted according to the assumption on income tax
SSK members	Both employee and employer		
Public sector (SSK)	Both employee and employer		
Private sector(SSK)	Both employee and employer	Employee	Tax base adjusted according to the assumption on income tax
Indirect Taxes	Consumers		

Note: Empty cells indicate that the assumptions in the previous column are valid.

5.4.2 Estimating Tax Liabilities

For direct taxes, we use individual annual disposable income to calculate direct tax burden and then we aggregate individual tax burdens into household level. We use net (after income and payroll tax) annual income from all sources earned in the past 12 months provide by HICES. As noted before, the data provides monthly incomes too, as monthly incomes do not include all sources of income such as bonus and tips for wage earners and some cash transfers from government, we prefer to adopt annual incomes. The following components of income are provided by the data: wages and salaries, business income, private and government cash transfers, other income and imputed rent. Wages and salaries include all net individual earnings from the main, additional, and changed jobs[24] after deduction of personal income tax. Business income is the net income of employers or self-employed persons after deduction of personal income tax and business expenses. Government cash transfers consist of pensions (retirement, old-age, and other pensions), unemployment benefits, student scholarships, DIS and SASF transfers, whereas private transfers include transfers from private institutions or individuals and other governments. Other income includes income from investment, bank, and other interests, dividends, and rent. All components of annual income are reported in both cash and kind. However, in calculating tax burdens of individuals, we only consider total cash incomes as taxable incomes except government and other cash transfers and imputed rent. Government transfers are exempt from taxation and the private transfers are assumed to be unrecorded.

There are two different taxes that wage earners have to pay: PIT and payroll tax. The survey reports income net of (after) income and payroll tax, whereas household expenditure incorporates indirect taxes paid in consumption. Given the tax regimes on various income components, the income tax bill (*IT*) for each household has been computed as follows:

[24] If the individual has changed the job or the individual is unemployed currently but worked for a while in the past one year, we include the earnings from these changed jobs too.

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

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

where IT : income tax bill, t: income tax rate, ATI: after-tax income, PTI: pre-tax income

Pre-tax income (*PTI*) is equal to the total tax bill paid by each household plus net income. Since PIT 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 calculate maximum amount of *ATI* to place households in correct income ranges with different tax rates.[25].

Tax base for PIT for wage earners is after payroll tax individual gross income. In other words pre-tax income (gross income) for PIT is post-tax income (net income) for payroll tax. Since the data reports post-income and payroll tax net income of individuals, to obtain pre-tax (both payroll tax and income tax) gross income of individuals we first need to find tax base of PIT and then add payroll tax to this amount. Thus, tax base of PIT (PTI) is payroll tax-inclusive income of individuals:

$$PTI = ATI + IT$$

Tax bill for payroll tax is calculated as follows:

$$PT = PTI / (1 - t_p)$$

where *PT* is payroll tax paid by individual, and t_p payroll tax rate. As stated before, there are three social security institutions with different payroll tax rates. Employees' payroll tax share for *SSK* members is 15% and employers' share is 22% of gross wage. Employees' share for *ES* members (civil servants) is 16%. Finally members of Bag-Kur pay 40% of their gross salary as social security contribution. With the assumption that employees pay employers' share of

[25] Calculation is presented in Table A 5.3 in Appendix 5.1.

payroll tax if they are working for private companies (*Variant 2),* payroll tax rate for the employees will be 37%. Since the data reports net incomes, this assumption will affect gross incomes. Thus gross income for those employees will be higher than other wage earners' gross income implying that they pay higher taxes even if they have the same level of post-tax net income. To sum up, we suppose that the employees working for private companies would have earned higher incomes, if the employers had paid their share of payroll tax. Since the mean wages in the private sector are lower than the public sector (Table A 5.4), we think this assumption is reasonable and able to capture the fact in Turkey.

To show this issue with an example, let's have two wage earners with the same level of net income, 100 Turkish Liras. The first employee works for a private company and the second one for a public institution and both is member of SSK. Thus, PIT rate is 15%, payroll tax rate is 15%, but the first worker pays employer's share as well, so the employee faces 37% payroll tax rate. Pre-tax gross incomes and tax bills for PIT and payroll tax are calculated as follows:

First worker:

$$PTI_I = 100/(1-0.15) = 118$$

$$IT = 0.15*118 = 18$$

$$PTI_P = 118/(1-0.37) = 187$$

$$PT = 0.37*187 = 69$$

Second worker:

$$PTI_I = 100/(1-0.15) = 118$$

$$IT = 0.15*118 = 18$$

$$PTI_P = 118/(1-0.15) = 138$$

$$PT = 0.15 * 138 = 21$$

where, PTI_I is pre-tax income for PIT (tax base for PIT), PTI_P is pre-payroll tax income. *IT* is tax bill of PIT and *PT* is payroll tax bill. As can be seen from above, both workers pay same amount of income tax, 18 Turkish Liras and have the same level of income tax-inclusive income level (*PTI*). However, even if the workers have the same net income which is reported by the data, the first one pays higher payroll tax and thus have higher gross income than the second worker does.

In order to calculate tax burdens for households with self-employed and employer member who are found to evade PIT, we still assume that reported income is true income of those households and apply the same method to find their pre-tax income as we used for non-evaders. After finding pre-tax income of tax evaders, we simply use estimated average tax evasion rate of each decile to calculate "true" pre-tax incomes of tax evaders declared to tax authorities. Calculations are follows.

$$PTI^*_{ij} = PTI_{ij} - (ER_j * PTI_{ij}) \qquad i: 1,\ldots,4454; \quad j: 1,\ldots,10$$

where ER_j is the evasion rate of jth decile, PTI^*_{ij} is the "true" pre-tax income of ith household in the jth decile.

We calculate three different tax bills for the incidence of indirect taxes: VAT, *PCT* and *PCOT*. The data gives us tax-inclusive consumption expenditures at 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* first and add this amount to tax-exclusive spending in order to get the tax base for *VAT* and *PCOT*.

Since household expenditures on each good in the data shows tax-inclusive spending that each household has made on goods, we firstly need to compute tax-exclusive spending (*PTS*) of households as follows:

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

where *ATS* is tax-inclusive 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:

$$PTS_{ij} = \frac{ATS_{ij}}{(1 + t_{VAT,ij} + t_{PCOT,ij}) * (1 + t_{PCT,ih})}$$

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:

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

$$TB_{ij} = t_j * (PTS_{ij} + TB_{PCT,ij}), \text{ j: VAT and PCOT}$$

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 have consumed by taking an average oil price.

As a result of these calculations, we will have six different total gross incomes based on each corresponding incidence assumption: I- Variant 1 (V1); II- Variant 1 and Variant 3 (V1&V3); III- Variant 1 and Variant 4 (V1&V4); IV- Variant 2 (V2); V- Variant 2 and Variant

3 (V2&V3); *VI-* Variant 2 and Variant 4 (V2&V4). The extremes, "maximum" and "minimum" tax burdens, are given by cases I and IV respectively. *Variant 1* is the most unrealistic case, which does not consider the unrecorded employment, tax evasion and the shifting of the tax burdens on the payroll tax and PIT on rent incomes, which are well known facts for Turkey and most of other developing countries. Therefore, *V1* is the case, which would give the incidence of the tax system, if there was no informal economy, tax evasion and shifting opportunities for the tax payers. In other words, *V1* provides the "intended" incidence of the tax system. The second extreme case is *Variant 2* with *Variant 4 (V2&V4).* In this case, we adopt the shifting assumptions concerning the payroll tax and PIT on rent incomes as well as the assumptions of the informal employment and the tax evasion. In the thesis, we will try to discuss and compare the all variants as far as possible, but mostly focus on these two extreme cases to discuss the incidence of taxes[26].

5.5 Results

Before starting with the welfare dominance analysis, it would be helpful to look at some descriptive statistics to assess the distributive impacts of taxes in Turkey. In this section we aim to discuss the differences among the results that the shifting assumptions would produce. Table 5.16[27] presents the average rates of PIT under different shifting assumptions by income deciles (as a percentage of the household income) and indicate how the burden of the tax varies with the household income. According to Table 5.16, the overall tax rate of all households is just over 15% under both *V1* and *V2* and varies with income deciles with the minimum of 9% to the maximum of 23%. However the overall rate declines when we consider informal employment

[26] See Table A 5.8 in Appendix 5.1 for the definitions of gross and net incomes (expenditures) for the tax incidence analysis.

[27] Appendix 5.1 provides the average tax rates by expenditure deciles for the direct taxes (Table A 5.5, Table A 5.6 and Table A 5.7). As the tables based on the expenditure deciles have the same pattern that the income deciles offer, we do not discuss the tables in detail.

and tax evasion (*V3* and *V4*) as expected. While the informal employment (*V*3) decreases the overall average tax rate by around 1%, informal employment and tax evasion together (*V4*) causes 5% drop in the average tax rates for both incidence sets (*V1* and *V2*).

The average tax rate for PIT increases with deciles under all variants, but the rates are more or less constant for the first five deciles under *V1* and *V2* and the sharp progressiveness of income tax shown in the individual income tax schedules is not reflected in the actual income taxes paid by the household. We can show this phenomenon by comparing average tax rates with average household net disposable income in each decile. While the average income of the richest decile is 16 times as big as that of the poorest decile, the average tax rate of the richest decile is only 2.5 times as big as that of the poorest decile. To remind us, the difference between shifting assumptions of *V1* and *V2* comes from the assumptions about payroll tax and rent incomes on residences and commercial buildings. Because of these shifting assumptions, employees and tenants pay more tax under *V2* than they do under *V1* and property owners pay less tax under *V2*. Since tenants are more or less equally allocated among deciles there is no big jump in deciles' tax rates. The only interesting observation is provided by 10th decile tax rate under *V2* which is smaller than the rate of 10th decile under *V1*. This may come from the fact that households having rental income on properties are concentrated in the higher deciles[28]. Since property owners pay less tax under *V2*, we might expect that *V2* may be less progressive that *V1*.

When we take into account unrecorded employment (*V3*), the average tax rates drop dramatically in the first decile. The reason for this phenomenon is that unrecorded employees, who pay neither PIT nor payroll tax under *V3,* are concentrated in the first quintile (Table 5.7). Since informal employment decreases with quintiles, the difference between the first decile's and 10th decile's average tax rate is bigger under both *V1&V3* and *V2&V3* than is that under *V1*

[28] 31% of households with rental income on commercial buildings or land is in the 10th decile and 72% of households with rental income on commercial properties is in the last 4 deciles. Very similar pattern can be found for households having rental income on residences. 66% of them is in the last 4 deciles.

and *V2*. It seems that the informal employment makes PIT more progressive. However, it is worth noting that unrecorded employees and their family are not able to benefit public health facilities and public social transfers, which makes these services regressive at the lower deciles[29].

When the tax evasion is taken into account in addition to the informal employment (*V4*), all deciles experience average tax rate decline. Both under *V1 (V1&V2)* and *V2 (V2&V4)*, tax evasion makes higher deciles pay less tax, which can be seen by increasing average tax rate drop as we move to higher deciles. There may be two reasons for this: Firstly, for the recorded employees, we assume that the private employees declare only the minimum wage to the tax authorities, suggesting that progressivity of PIT is ruled out for these employees. Similarly, for the civil servants we assume that the part of their wage, which is over minimum civil servant salary is exempt from PIT as a subsidy. Secondly, the tax evasion rate we estimated for self-employed and employers in the previous section rises with deciles, implying that the higher income classes evade more taxes than the lower income classes. These assumptions may decrease the extent of potential progressivity of PIT.

Table 5.16: Average Rates of PIT by decile as a percentage of per adult equivalent household disposable income (AE_INC)

Income Deciles	Average Income (Million TL)	V1	V2	V1&V3	V2&V3	V1&V4	V2&V4
1	50	9.04	10.06	3.75	4.77	3.65	4.67
2	83	9.71	10.72	5.88	6.86	5.40	6.37
3	107	9.56	10.50	6.94	7.89	6.17	7.11
4	131	9.45	10.23	7.53	8.31	6.39	7.17
5	156	9.50	9.96	8.08	8.54	6.82	7.32
6	184	10.32	10.81	8.96	9.45	7.24	7.73
7	220	11.03	11.36	9.73	10.05	7.51	7.83
8	273	12.19	12.52	11.16	11.49	8.46	8.82
9	360	13.98	14.23	13.10	13.33	10.08	10.32
10	826	23.26	22.90	22.17	21.88	15.00	14.64
Turkey	239	15.44	15.62	14.03	14.24	10.25	10.44

Notes: Income is per adult equivalent net disposable household income after income and payroll tax, including Households are ranked by per adult equivalent household net disposable income; V1: Variant 1 (Standard tax V2: Variant 2 (Income tax on rent is partly shifted to tenants and payroll tax is on only employees) V3: Variant 3 (Unrecorded employees do not pay any tax); V4: Variant 4 (Informal employment and tax evasion

[29] Please refer to the second chapter.

The average tax rates for the payroll tax as a percentage of the total household disposable income and wage can be found in Table 5.17 and Table 5.18 respectively by deciles. The average tax rate is around 7% for all deciles except the 8th decile (8%), if both the employers and the employees bear the burden of the payroll tax together (*V1*). However, when the employers in the private sector shift the tax burden to the employees under *V2,* the overall average tax rate is more than doubled; even it takes the values of between 17 and 20% for the deciles in which the private sector employment is concentrated. Under *V1* and *V2*, we assume that there was no informal employment, and thus we try to see what would happen if all employees paid the payroll tax. When we take into account the unrecorded employees who are paying no payroll tax actually (*V1&V3* and *V2&V3*), we see a more realistic picture. As the informal employment declines with deciles, the difference between the tax rates of *V1*, and *V1&V3* and *V2*, and *V2&V3* gets smaller as we move to higher deciles. However, the average tax rate of higher deciles decreases dramatically, when we include the tax evasion assumptions for the private sector employees and presumed subsidies for civil servants (*V4*). This arises from the fact that since PIT base for private employees and civil servants are assumed to be minimum wage and salary respectively, the tax base for the payroll tax is also modified with respect to tax base for PIT.

Table 5.18 is important to see the tax burden on wages. If there was no informal employment, the average tax paid by the wage earners would make 21% and 46% of the overall wages, which is very high. The most realistic variant is given by *V2* with the informal employment and tax evasion (V4) (the last column of the table). The tax burden for *V2&V4* case is the minimum of about 12% in the first decile reflecting the high unrecorded employment, and the maximum of 27%. The burden increases with the deciles up to the 5th decile and start decreasing after this point as the public employment is concentrated in the middle deciles and the public employees pay only their share for the payroll tax. As a final observation from the table, in the richest decile the average rate decreases to 13%. The reason for the low rate for the 10th decile comes from the facts that we do not calculate the payroll tax for the employees with the private insurance that are mostly in the 10th decile and the public employment.

The total property tax for each household is sum of property tax and MVT bill. Table 5.19 suggests that, under both *V1* and *V4*, average rates rise with deciles. Under *V1*, the overall tax rate is 6% and it is only around 1.5% up to the 3rd decile. Since we assume that agricultural land is not taxed under *V4*, *V4* seems to affect first 3 deciles' rates mostly, in which households working in the agricultural sector are located.

Table 5.17: Average Rates of Payroll Tax by decile
as a percentage of per adult equivalent household disposable income (AE_INC)

Income Deciles	Average Wage (Million TL)	V1	V2	V1&V3	V2&V3	V1&V4	V2&V4
1	19	7.0	17.6	1.6	4.5	1.7	4.4
2	33	7.7	20.2	3.7	10.6	3.9	9.3
3	40	7.6	18.8	4.8	12.1	4.8	9.7
4	45	7.1	17.8	5.1	12.8	4.7	9.4
5	49	6.7	15.7	5.2	12.0	4.7	8.6
6	64	7.4	16.3	6.0	12.9	5.3	8.9
7	78	7.6	16.3	6.3	12.9	5.3	8.6
8	100	8.0	16.1	7.0	13.6	5.7	8.4
9	121	7.3	14.0	6.5	12.0	5.3	7.4
10	245	6.6	13.6	5.8	11.7	3.1	4.1
Turkey	79	7.1	15.3	5.8	12.1	4.4	6.9

Notes: Income is per adult equivalent net disposable household income after income and payroll tax, including imputed rent. Households are ranked by per adult equivalent household net disposable income

Table 5.18: Average Rates of Payroll Tax by decile
as a percentage of per adult equivalent household wage

Income Deciles	Average Wage (Million TL)	V1	V2	V1&V3	V2&V3	V1&V4	V2&V4
1	19	18.7	47.2	4.2	12.1	4.4	11.7
2	33	19.5	51.5	9.5	27.0	10.0	23.6
3	40	20.4	50.8	13.1	32.8	12.9	26.1
4	45	20.8	51.8	14.9	37.4	13.8	27.4
5	49	21.3	49.9	16.5	38.2	14.9	27.4
6	64	21.4	46.9	17.4	37.2	15.3	25.7
7	78	21.6	45.9	17.8	36.5	15.1	24.2
8	100	21.8	44.1	19.0	37.1	15.6	23.1
9	121	21.8	41.6	19.4	35.6	15.8	22.0
10	245	22.0	45.6	19.4	39.4	10.5	13.6
Turkey	79	21.5	46.1	17.5	36.4	13.2	20.7

Notes: Household wage is per adult equivalent net household wage after income and payroll tax
Households are ranked by per adult equivalent household net disposable income

Table 5.19: Average Tax Rates of Property Tax by decile
as a percentage of per adult equivalent net household disposable income

Income Deciles	V1	V4
1	1.46	0.98
2	1.66	1.31
3	2.30	1.93
4	2.41	2.15
5	3.41	3.18
6	4.61	4.35
7	5.50	5.26
8	7.17	6.97
9	8.26	8.09
10	7.97	7.83
Turkey	6.22	6.02

Note: Ranked by per adult equivalent household net disposable income

As for the indirect taxes, Table 5.20 presents the average tax rates by deciles with the percentage of household expenditure in the household net disposable income (propensity to consume). Households in the first 3 deciles spend more than they earn. As we move to the upper deciles the percentage share of the household expenditure in the household income declines, revealing relatively higher propensity to consume among the poor. This would create a regressive impact from the indirect taxes. The overall average tax rate for the total indirect taxes is about 17% and it takes the maximum value of 23% in the first decile. The average rates for all indirect taxes apart from the private communication tax (PCOT) decrease with the deciles, implying that the indirect taxes may have disequalising impact on the distribution of income.

However, when we rank the households by the household expenditure we face completely different results (Table 5.21). The average rates for all indirect taxes and the total indirect taxes increase with the deciles, implying progressive distribution with the exception of VAT with 1% (VAT1) and VAT with 8% (VAT8). These results are completely opposed to what we have found when we rank the households with income. These tables show that the incidence of the indirect taxes is sensitive to the welfare indicator chosen. We have not faced this problem with the benefit incidence analysis and the direct taxes. We will examine this issue in the next section in detail.

Table 5.20: Average Rates of Indirect Taxes by income decile as a percentage of per adult equivalent household net disposable income

Income Deciles	Household Expenditure* (%)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1	138.55	0.19	2.89	10.57	13.61	9.06	0.23	22.89
2	110.07	0.14	2.03	8.92	11.08	7.48	0.27	18.78
3	105.56	0.13	1.74	9.06	10.94	7.39	0.35	18.67
4	97.26	0.11	1.6	8.45	10.18	6.94	0.34	17.44
5	94.25	0.1	1.46	8.39	9.96	6.63	0.36	16.93
6	93.18	0.1	1.37	8.7	10.16	7.08	0.42	17.66
7	86.72	0.09	1.21	7.94	9.24	6.37	0.44	16.04
8	83.99	0.08	1.06	8.2	9.34	7.35	0.49	17.17
9	76.29	0.06	0.9	7.61	8.57	7.01	0.5	16.1
10	65.65	0.04	0.62	7.23	7.9	7.46	0.46	15.8
Turkey	81.87	0.07	1.08	7.93	9.09	7.2	0.44	16.71

Note: Households are ranked by per adult equivalent household net disposable income
** Percentage share of the household expenditure in the household income*

Table 5.21: Average Rates of Indirect Taxes by expenditure deciles as a percentage of per adult equivalent household expenditure

Deciles	Household Expenditure*	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1	65.32	0.13	2.21	6.65	8.98	6.76	0.13	15.92
2	70.79	0.13	1.98	7.48	9.60	7.40	0.27	17.22
3	72.94	0.12	1.86	7.80	9.81	6.98	0.31	17.04
4	75.49	0.12	1.73	8.01	9.84	6.91	0.39	17.17
5	76.71	0.11	1.64	8.62	10.36	7.77	0.47	18.62
6	78.98	0.11	1.51	8.78	10.42	7.60	0.49	18.52
7	81.84	0.10	1.44	9.16	10.71	7.81	0.53	19.07
8	83.63	0.10	1.34	9.37	10.82	7.80	0.57	19.21
9	85.00	0.09	1.20	9.76	11.03	8.01	0.63	19.68
10	88.24	0.06	0.90	11.43	12.38	11.24	0.62	24.19
Turkey	81.89	0.09	1.32	9.67	11.08	8.78	0.53	20.38

Notes: Households are ranked by per adult equivalent household expenditure
**Percentage share of the household expenditure in the household income*

5.5.1 The Welfare Dominance Analysis

In this section, concentration curves are used to examine the redistributive impacts of the Turkish tax system. We will see if a tax is progressive or not by comparing concentration curves of taxes to Lorenz curve of per adult equivalent household expenditure. Moreover, we will compare concentration curves of taxes to see if a tax is more progressive than any other tax. Although, the descriptive tables have provided some indications about the possible impacts of different taxes on inequality, the concentration curves would give us global conclusion about the redistributive impact of Turkish tax system. We could also examine if the results are statistically robust to reach definitive conclusions which has been ignored so far.

In this section we will use per adult equivalent household expenditure (AE_EXP) and household income (AE_INC) as welfare indicators (as benchmark distributions) to rank the households in drawing concentration curves. Although AE_EXP and AE_INC, the data provide, gives the distribution after income and payroll tax, but before property and indirect taxes, we rank households by AE_EXP and AE_INC[30]. The assumption behind this is that AE_EXP and AE_INC are gross income for both direct and indirect taxes to compare the progressivity of different shifting assumptions and the impact of tax evasion and informal employment on progressivity. The confusion arises in the case of direct taxes, because income provided by the data is reported net disposable income instead of gross income. We reach different gross incomes for each set of shifting assumptions (see Section 5.4.2 for the calculations of tax liabilities). We will take into account the differences in gross incomes appearing with different shifting assumptions in the next section. In the case of indirect taxes we will give both income and expenditure based welfare dominance analysis, as we have found that the incidence of indirect taxes is sensitive to the welfare indicator chosen.

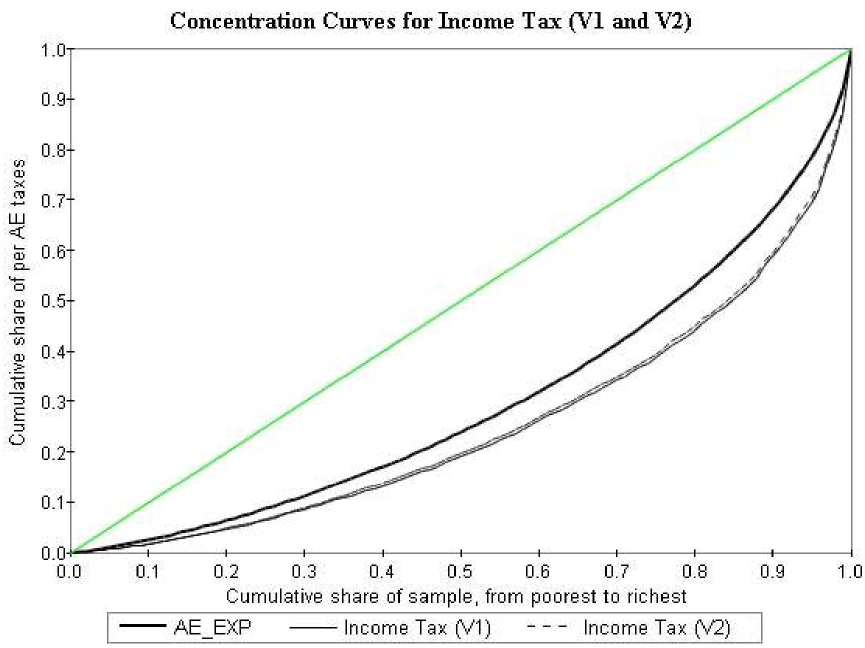
The concentration curves for the taxes are given in Appendix 5.3. Figure 5.1 below provides the Lorenz curve for per adult equivalent household expenditure (AE_EXP) and the concentration curves for the direct taxes under *V1,* Figure A 5.1 compares *V1* and *V2* for PIT. Since the concentration curves for the per adult equivalent household tax burden for PIT and the property taxes are located under the Lorenz curve, both of them are progressive under all variants. However, it is clear that *V2* is less progressive than *V1* for PIT due to the assumption of rent incomes on residencies. On the other hand, the ambiguity concerning to the progressiveness of the payroll tax under *V1* can be seen from the concentration curves. The concentration curve for the payroll tax seems to cross the Lorenz curve at the lower expenditure deciles, which means that it is not possible to reach a conclusion on the redistributive direction of the tax without statistical tests. However, the concentration curve of the payroll tax under *V2* is lying completely above the Lorenz curve, implying that the tax is regressive. From the figures, we can

[30] See Table A 5.8 for the definitions of gross and net incomes (expenditures) for the tax incidence analysis.

confirm that the most progressive tax is property tax and the least progressive one is the payroll tax under both *V1* and *V 2*.

When we consider informal employment (*V3*), PIT becomes more progressive, whereas it becomes less progressive when we include the assumptions of the tax evasion and the informal employment together (*V4)*. The payroll tax becomes more regressive under the tax evasion and the informal employment assumptions, since the assumptions regarding the tax evasion affect mostly the employees under formal employment, who are in the higher expenditure deciles. The concentration curve either below or on Lorenz curve at the first three deciles, but it is above the Lorenz curve after the 3rd decile and very close to 45-degree line, which suggests that the payroll tax is highly regressive, particularly under *V2* (Figure A 5.5, 5.6 and 5.7).

Figure 5.1



In Table 5.22, Table 5.23 and Table 5.24, the dominance test results[31] are given for both decision rules (Davidson and Duclos, 1997). Both DAD software by Duclos and Arrar (2006) and Distributive Analyse Stata Package (DASP) by Abdelkrim (2006) are employed to produce the difference between the ordinates of a concentration curve and the Lorenz curve with asymptotic standard errors. After calculating the differences between the ordinates of curves, a two-sided hypothesis test of whether these differences are equal to zero or not with DAD is performed. DASP gives us a curve, which plots the differences of two curves with confidence intervals that can be provided if required.

The tables confirm the results we have previously reported. According to the tables, the income, and property taxes are progressive statistically under both decision rules regardless of the shifting assumptions adopted. In the case of payroll tax, under the first decision rule, the payroll tax is regressive with both *V1* and *V2.* The tax turns to be progressive at the lower ordinates and proportional at the higher ordinates (statistically zero difference between the Lorenz curve and the concentration curve) when we allow for effects of informal employment under *V1 and V2* (V1&V3 and V2&V3) (Table A 5.10). Thus, although Howes' test does not verify, under the first decision rule the payroll tax can be said progressive with the introduction of informal employment effects. Finally the concentration curve for the payroll tax crosses the Lorenz curve when the assumption of tax evasion is included as well as the informal employment under both *V1* and *V2.* The concentration curves (for V1&V4 and V2&V4) are below the Lorenz for the ordinates up to 0.25, but then the curves are located above the Lorenz curve, implying the tax is regressive at the middle and higher ordinates, which is the result of assumptions we adopted in the case of PIT and the payroll tax. Howes' test does not confirm the first decision rule in the case of the payroll tax with the variants of *V1*, *V2, V1&V3* and *V2&V3*,

[31] For the dominance test methodology, see the second chapter. The differences between the ordinates of the Lorenz curve and each concentration curve are given in the tables (Table A 5.9 to Table A 5.16) in Appendix 5.1.

as we cannot reject the null hypothesis of the difference between curves being zero for some ordinates. We cannot say it crosses the Lorenz curve either, since there is no significant t-statistic with opposite sign.

Table 5.22: Dominance Results for Income Tax
Relative to the Lorenz Curve

	Per Adult Equivalent Taxes					
	Income Tax					
	V1	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
Decision rule 1	+	+	+	+	+	+
Decision Rule 2	+	+	+	+	+	+

Notes: *'+' (-) indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

Table 5.23: Dominance Results for Payroll Tax
Relative to the Lorenz Curve

	Per Adult Equivalent Taxes					
	Payroll Tax					
	V1	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
Decision rule 1	-	+	x	-	+	x
Decision Rule 2	na	na	x	na	na	x

Table 5.24: Dominance Results for Property Taxes
Relative to the Lorenz Curve

	Per Adult Equivalent Taxes	
	Property Taxes	
	V1	**V4**
Decision rule 1	+	+
Decision Rule 2	+	+

We use two welfare indicators to examine the progressivity of the indirect taxes as emphasized before. The concentration curves for the indirect taxes also support the finding from the descriptive tables that the indirect taxes are sensitive to the welfare indicator chosen (the figures from Figure A 5.12 to Figure A 5.15). With the per adult equivalent household expenditure as a concept for gross income, all indirect taxes are progressive in the sense that the concentration curves for each tax and the total indirect taxes are below the Lorenz curve except VAT1 and VAT8. This is confirmed by the welfare dominance test reported in Table 5.25[32]. VAT is the least progressive indirect tax; the most progressive indirect tax is PCOT on mobile phone services. At the bottom of the distribution the concentration of PCT curve and the Lorenz curve coincide in the sense that the differences for first ordinate are not statistically different from zero. Because of this Howes' test cannot confirm progressivity of the tax, yet PCT is progressive under the first decision rule. However, when we rank the household by per adult equivalent household net disposable income (AE_INC) instead of household expenditure, all indirect taxes become regressive except PCOT under the first decision rule. We cannot reject the null hypothesis in favour of dominance for PCT and PCOT with Howes' test, as we have statistically insignificant differences for some ordinates, implying that the concentration curves for these two taxes coincide the Lorenz curve at those ordinates, which make the welfare dominance analysis inconclusive (Table 5.26).

Table 5.25: Dominance Results for Indirect Taxes
Relative to the Lorenz Curve for AE_EXP

	Per Adult Equivalent Taxes						
	Indirect Taxes						
	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total
Decision rule 1	-	-	+	+	+	+	+
Decision Rule 2	-	-	+	+	na	+	+

Notes: '+' *(-) indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve. 'na' indicates that the difference between the curves are zero for some ordinates 'x' indicates that the concentration curve crosses the Lorenz curve for per AE household expenditure, so no dominance*

[32] See the Table A 5.12 and Table A5.13 for the differences between the ordinates of the concentration curves of the indirect taxes and the Lorenz curves for per adult equivalent household expenditure and income respectively.

Table 5.26: Dominance Results for Indirect Taxes Relative to the Lorenz Curve for AE_INC

	Per Adult Equivalent Taxes						
	Indirect Taxes						
	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total
Decision rule 1	-	-	-	-	-	+	-
Decision Rule 2	-	-	-	-	na	na	-

Notes: **'+'** ***(-)*** *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve. 'na' indicates that the difference between the curves are zero for some ordinates*
'x' indicates that the concentration curve crosses the Lorenz curve for per AE household income, so no dominance

In order to overcome the ambiguousness regarding the progressivity of the payroll tax, we run the extended Gini test. Table 5.27 provides S-Gini TR-progressivity indices which also give the difference between the Lorenz curve and the Concentration curve for the payroll tax for different inequality aversion parameters. As can be seen from Table 5.28, we could partly overcome the ambiguousness. The results are in line with the welfare dominance method for V1, V1&V3, V1&V4 and V2&V3. We have all positive and statistically significant progressivity rates for V1&V3 except for 1.01 of *ρ,* where TR-progressivity rate is zero. Thus, under the second decision rule we can only say that informal employment makes the tax progressive when we have social welfare function, giving less weight to the rich. For V2 and V2&V4, we can confirm that the tax is regressive as the progressivity rates are negative for the whole range of parameter values.

Table 5.27: S-Gini Indices of TR-Progressivity for Payroll Tax

	Payroll Tax					
Parameter Values (Rho)	**V1**	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
1.01	-0.001	**0.000**	-0.004	-0.001	**0.000**	-0.005
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.015	0.024	-0.057	-0.028	**0.016**	-0.097
	0.007	*0.008*	*0.006*	*0.009*	*0.010*	*0.005*
2	**-0.012**	0.051	-0.038	-0.037	0.032	-0.098
	0.008	*0.009*	*0.007*	*0.010*	*0.011*	*0.007*
2.5	**-0.007**	0.072	**-0.015**	-0.039	0.047	-0.083
	0.008	*0.008*	*0.008*	*0.010*	*0.010*	*0.007*
3	**-0.003**	0.087	**0.005**	-0.038	0.059	-0.066
	0.008	*0.008*	*0.008*	*0.009*	*0.009*	*0.008*
3.5	**0.000**	0.099	0.021	-0.037	0.070	-0.051
	0.007	*0.008*	*0.008*	*0.009*	*0.009*	*0.008*
4	**0.003**	0.108	0.034	-0.035	0.079	-0.037
	0.007	*0.007*	*0.008*	*0.009*	*0.009*	*0.008*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Households ranked by AE_EXP

Table 5.28: Extended Gini Test for Payroll Tax
Relative to the Lorenz Curve

	Per Adult Equivalent Taxes					
	Payroll Tax					
	V1	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
Decision rule 1	-	+	x	-	+	-
Decision Rule 2	na	na	x	-	na	-

Notes: *Based on Table 5.27.*
'+' (-) *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

The Overall Tax Incidence

Total indirect and direct taxes are also confirmed statistically to be progressive regardless of the shifting assumptions if we rank the households by household expenditure (Table 5.29 and Table A 5.14). As can be seen by the concentration curves (Figure A 5.16 and

Figure A 5.17), the informal employment makes the total tax system more progressive under both *V1* and *V2*, as the wage earners in the lower deciles are unrecorded and do pay neither the income tax nor the payroll tax. As noted before, these informal employees are outside the public social services such as the pension system and health services too. We may expect that the whole fiscal system may produce less progressive distribution because of this, which we will see in the next chapter. But, when the tax evasion is included in the analysis as well as the informal employment, the total taxes become less progressive than the intended incidence suggests under both *V1* and *V2*. The comparison of *V1* and *V2&V4* (Figure A 5.18) shows that *V2&V4* is less progressive. This implies that if the tax authorities could decrease the extent of tax evasion, the tax system, particularly the direct taxes have the potential to decrease inequality in a greater extent. So it seems that the tax evasion does not only decrease the tax revenues but also it decreases the progressivity of the tax system.

We also checked if the results regarding the total tax system is sensitive to the chosen welfare indicator. The concentration curves (Figure A 5.19, Figure A 5.20, and Figure A 5.21) for the total taxes which are ranked by AE_INC indicate that the total taxes are progressive in the sense that the concentration curves are below the Lorenz curve for AE_INC under both *V1* and *V2*. Table 5.30 provides the results of the welfare dominance test for the total taxes and the differences of the ordinates of the Lorenz curve of AE_INC and the concentration curves for the total taxes are given in Table A 5.15. The total tax system is progressive under all variants. The only problem appears for the second ordinate for *V2*. It seems that at that ordinate the concentration curve and the Lorenz curve coincides and the difference between the ordinates of the curves is statistically zero. Because of this we cannot confirm the progressivity of Variant 2 with Howes' test. By comparing *V1* and V2&V4 (Figure A 5.21), it can be concluded that *V2&V4* is less progressive. But statistically the concentration curves for the total taxes under *V1* and *V2&V4* cross each other regardless of the welfare indicator chosen to rank the households.

Table A 5.16 provides the differences of the ordinates of the concentration curve for the total taxes under *V1* and *V2&V 4*. The first column gives the results we obtain if we rank the households by AE_EXP and the second column gives the results for AE_INC. As can be seen we reject the null hypothesis for the opposite signs, so the curves cross each other. However, for the lower ordinates (up to 0.3 and 0.2 respectively) the total taxes with *V1* is less progressive than the one with *V2&V4*, but for the higher ordinates *V1* becomes more progressive in the sense that its concentration curve is below the concentration curve of *V2&V4*. *V1* seeks the incidence when there is no informal employment; so low income earners at the bottom of the distribution (in informal employment with no social security) pay tax under *V1*, which makes *V1* less progressive at the bottom of the distribution.

Table 5.29: Dominance Results for Total Direct and Indirect Taxes
Relative to the Lorenz Curve for Household Expenditure

	Per Adult Equivalent Taxes					
	Total Taxes					
	V1	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
Decision rule 1	+	+	+	+	+	+
Decision Rule 2	+	+	+	+	+	+

Notes: '+' (-) *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

Table 5.30: Dominance Results for Total Direct and Indirect Taxes
Relative to the Lorenz Curve for Household Income

	Per Adult Equivalent Taxes					
	Total Taxes					
	V1	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
Decision rule 1	+	+	+	+	+	+
Decision Rule 2	+	+	+	na	+	+

Notes: '+' (-) *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

5.5.2 S-Gini Progressivity Indices

Even though the results presented above give the evidence for the distribution of tax burdens, in this section we would like to see the magnitude of the redistributive impact and also to see if the results change with different social welfare functions, which we consider with a wide range of inequality aversion parameter. In this section we could also have observations on which households enjoy the positive impacts of redistribution through taxes. In order to examine this we estimate S-Gini indices of progressivity and redistribution for a wide range of inequality aversion parameter which would tell us how the indices would change if we put more attention to the poor or the rich.

In this section, we will use both household expenditure and household income as welfare indicators. For the benefit incidence analysis, the results were not sensitive to the welfare indicator chosen and we only reported the findings based on household expenditure. However the welfare dominance analysis showed that the indirect taxes are sensitive to the welfare indicator chosen. So in this section we will report the results based on both income and expenditure.

Table 5.31 and Table 5.32 provide the indices of TR and IR-Progressivity, reranking and redistribution for an inequality aversion parameter, $\rho=2$ for household income and household expenditure respectively. S-Gini indices with $\rho=2$ provide us the values of the indices when we focus more on the middle of the distribution. We give this table as a summary of the tables from Table A 5.17 to Table A 5.28 in Appendix 5.1, providing S-Gini indices of IR and TR-progressivity and redistribution by the inequality aversion parameter to see if the progressivity and redistributive power varies with inequality aversion parameter. We do not report the all progressivity rates for all incidence assumptions. Progressivity rates for only the two extreme incidence assumptions - the "intended" or statutory tax incidence (*V1)* and the incidence considering shifting opportunities of the payroll tax and PIT on rent with informal employment and tax evasion (*V2&V4)*- rather than for all incidence assumptions are reported.

Direct Taxes

The personal income tax is progressive, as all S-Gini indices are positive for the whole range of parameter values regardless of the welfare indicator. TR and IR-progressivity rates are the highest when we put more weight on the middle of the distribution and they start to decline, once ρ is 2.5 and more, when household income is taken. The redistributive power of PIT takes the highest value of 2.5 and 1.6 percent, when ρ is 2 under *V1* and *V2&V4* respectively. We can interpret this in a way that the middle classes enjoy the most of the redistribution caused by PIT. The redistributive impact declines by almost 1 percent when the owners of rental incomes shift their tax burden to the tenants and the tax evasion and the informal employment are considered (*V2&V4*). This impact comes largely from the tax evasion and, this proves that the tax evasion does not only have a negative impact on the tax revenues it also deteriorates the potential redistributive impact of the most important direct tax of the Turkish tax system.

The payroll tax is progressive for the whole range of ρ and progressivity rises with ρ under *V1* regardless of the welfare indicator. While it is regressive only when ρ is 1.01, it becomes progressive once ρ is equal to 2 and rises with ρ under *V2&V4* with household expenditure. This result is interesting in the sense that *V2* makes the payroll tax more regressive as it supposes employees pay employers' share of the tax too. So this progressive impact for higher ρ values mainly comes from the assumptions regarding informal employment and tax evasion, affecting mainly the lower part of the distribution. The redistributive impact is statistically zero, when higher inequality aversion is given to the higher part of the distribution and very small for the lower part of the distribution for the intended incidence (*V1*). Under *V2&V4*, the redistributive impact is negative for first three values of ρ, and is almost zero once ρ

is bigger than 3 under *V2&V4,* although the redistribution rises with ρ. The difference between the welfare dominance analysis and S-Gini indices arises from gross expenditure definition. We kept ranking households by AE_EXP and AE_INC for the direct taxes to compare the progressivity of different shifting assumptions. However, in this section we adjust gross incomes and expenditures according to the tax we examine.

The property taxes are progressive and decrease both income and expenditure inequality. However, its redistributive impact seems to be smaller than the income tax, which is reasonable, as the share of the property taxes is only 2.5% in the total tax revenues. With *V4* it is assumed that the owners of agricultural land do not pay the property tax. This assumption increases progressivity of the tax, but its impact on the redistributive power of the tax is negligible.

Indirect Taxes

As for the indirect taxes, as noticed earlier, the progressivity of the indirect taxes is sensitive to the welfare indicator chosen. We confirm that apart from VAT1 and VAT8, all indirect taxes are progressive according to the both TR and IR approaches with AE_EXP as gross expenditures. Thanks to the differential rates on VAT, the total VAT is progressive although VAT1 and VAT8, on generally food products, are regressive. TR-progressivity rates confirm that the most progressive tax is PCOT which is a special tax on mobile phone services. PCT seems to be more progressive than VAT when ρ is smaller than 3; as we increase our ethical focus on the poor, progressivity rates for PCT decline and PCT becomes less progressive than VAT. VAT is the most progressive tax with IR approach, which is the result of the bigger share of VAT in the household expenditures relative to PCOT and PCT. For VAT18, VAT, and PCOT the progressivity rates rise with ρ, but for PCT and the total indirect taxes the progressivity rates take the highest values when ρ is between 1.5 and 2.5, it starts decreasing once ρ is 2.5. Although the redistributive impact from the total indirect taxes is positive for the whole range of ρ, the extent of redistribution is quite limited: the indirect taxes cause less than 1% inequality reduction in expenditure inequality.

When we use household income (AE_INC), all indirect taxes turn to be regressive for the whole range of inequality parameters according to both TR and IR approaches except PCOT. The most regressive tax is VAT1, followed by VAT8 and VAT18 with TR approach. The regressivity rises with ρ, so the most regressive impact is felt by the poor. The ranking according to IR approach suggests that the most regressive impact comes from the overall VAT, followed by PCT, VAT8, and VAT1. Although PCOT corrects the income inequality with positive values of S-Gini indices of redistribution for the whole range of ρ except 1.01, the impact of PCOT is not big enough to make the total indirect taxes have improving affect on income inequality. Disequalising impact of the total indirect taxes on income inequality increases with inequality aversion parameter and when ρ is 4, the taxes cause 4% increase in income inequality, which is higher than equalising impact of PIT.

Table 5.31: S-Gini Indices for Taxes (ρ=2) (Income)

	Kakwani Index TR Progression	Reynolds-Smolensky Index, IR Progression	Horizontal Inequity Atkinson-Plotnick Index	Redistribution
Income Tax				
Variant 1	0.173	0.027	0.002	0.025
	0.004	*0.001*	*0.000*	*0.001*
Variant2&Variant4	0.171	0.018	0.002	0.016
	0.008	*0.001*	*0.000*	*0.001*
Payroll Tax				
Variant 1	0.031	0.002	0.002	**0.000**
	0.006	*0.001*	*0.000*	*0.001*
Variant2&Variant4	-0.017	-0.001	0.003	-0.005
	0.006	*0.000*	*0.000*	*0.000*
Property Taxes				
Variant 1	0.186	0.012	0.0038	0.0085
	0.005	*0.000*	*0.000*	*0.000*
Variant4	0.199	0.013	0.0038	0.0089
	0.005	*0.000*	*0.000*	*0.000*
VAT1	-0.2569	-0.0002	0.0000	-0.0002
	0.0083	*0.0000*	*0.0000*	*0.0000*
VAT8	-0.2302	-0.0025	0.0000	-0.0025
	0.0089	*0.0001*	*0.0000*	*0.0001*
VAT18	-0.0565	*-0.0047*	0.0020	*-0.0067*
	0.0077	*0.0006*	*0.0002*	*0.0006*
VAT	-0.0795	-0.0077	0.0021	-0.0098
	0.0069	*0.0006*	*0.0002*	*0.0006*
PCT	-0.0470	-0.0029	0.0036	-0.0066
	0.0171	*0.0010*	*0.0004*	*0.0010*
PCOT	0.0662	0.0003	0.0000	0.0003
	0.0050	*0.0000*	*0.0000*	*0.0000*
Total Indirect Taxes	-0.0627	-0.0111	0.0149	-0.0260
	0.0105	*0.0017*	*0.0018*	*0.0011*

Notes: Asymptotic standard errors estimated by DAD are in italic.

Table 5.32: S-Gini Indices for Taxes (ρ=2) (Expenditure)

	Kakwani Index TR Progression	Reynolds-Smolensky Index, IR Progression	Horizontal Inequity Atkinson-Plotnick Index	Redistribution
Income Tax				
Variant 1	0.169	0.032	0.055	0.025
	0.007	*0.002*	*0.007*	*0.002*
Variant2&Variant4	0.164	0.021	0.040	0.015
	0.011	*0.002*	*0.006*	*0.002*
Payroll Tax				
Variant 1	0.064	0.006	0.003	0.002
	0.007	*0.001*	*0.001*	*0.001*
Variant2&Variant4	0.039	0.003	0.005	-0.002
	0.006	*0.001*	*0.001*	*0.001*
Property Taxes				
Variant 1	0.265	0.022	0.0044	0.0174
	0.004	*0.001*	*0.000*	*0.001*
Variant4	0.285	0.023	0.0041	0.0185
	0.004	*0.001*	*0.000*	*0.001*
VAT1	-0.1416	-0.0001	0.0000	-0.0001
	0.0074	*0.0000*	*0.0000*	*0.0000*
VAT8	-0.1449	-0.0019	0.0000	-0.0020
	0.0077	*0.0001*	*0.0000*	*0.0001*
VAT18	0.0690	0.0071	0.0003	0.0067
	0.0043	*0.0006*	*0.0000*	*0.0006*
VAT	0.0410	0.0049	0.0003	0.0046
	0.0034	*0.0006*	*0.0000*	*0.0006*
PCT	0.0515	0.0040	0.0012	0.0027
	0.0142	*0.0012*	*0.0000*	*0.0012*
PCOT	0.1190	0.0006	0.0000	0.0006
	0.0048	*0.0000*	*0.0000*	*0.0000*
Total Indirect Taxes	0.0473	0.0107	0.0036	0.0071
	0.0075	*0.0020*	*0.0001*	*0.0020*

Notes: Asymptotic standard errors estimated by DAD are in italic

The Overall Tax Incidence

In this section we examine the redistributive impact of the total taxes including both direct and indirect taxes. The figures, from

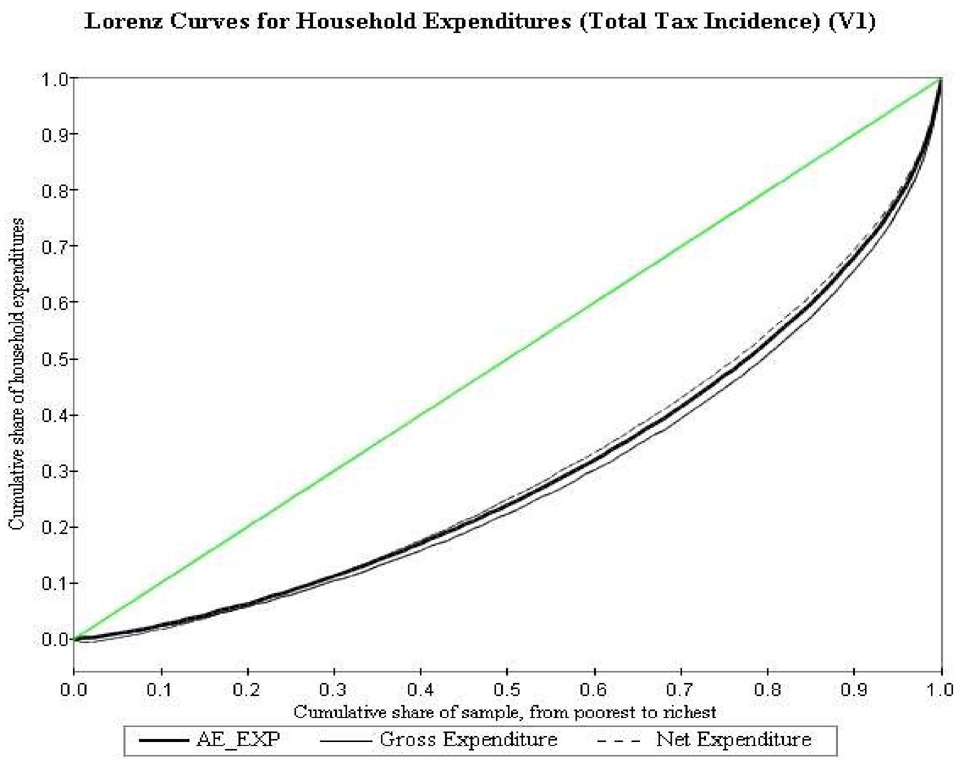
Figure A 5.22 to Figure A 5.25 presents the comparison of the Lorenz curves before and after the total taxes for both income and expenditure measure, and Table A 5.29 gives the differences between the ordinates of the Lorenz curves with asymptotic standard errors for the statistical inference. The comparison between the Lorenz curves of gross and net incomes (expenditures) give the total redistributive impact of the taxes.

Before discussing the results, it is worth recalling the definitions of gross and net income/expenditure not to cause any confusion. Household net disposable income (per adult equivalent) (AE_INC), reported by households, gives post-income and payroll tax but pre-property and indirect tax distribution. Household expenditure (AE_EXP) gives pre-direct and indirect tax distribution. So we add direct tax burden (except property tax) to income and expenditure (AE_INC and AE_EXP) to reach gross income and expenditure (pre-tax distribution of income and expenditure). To see the overall redistributive impact of the tax system, we compare gross income/expenditure with net income/expenditure (post-indirect and direct tax distribution of income/expenditure), which is found by deducing the tax burden originated by indirect taxes and property taxes from AE_EXP and AE_INC. Normally we should not deduce the indirect taxes from expenditure or income as they are part of the prices. But we simply assume that purchasing power of households is decreased by indirect taxes to see their progressivity and redistributive impact (See Table A 5.8).

Figure 5.2 shows that the Lorenz curve for net expenditures is above the Lorenz curve for gross expenditures, suggesting that the total taxes reduce expenditure inequality *under V1*. With *V2&V4*, the redistributive impact on expenditure inequality seems to be smaller relative to *V1*, but still the Lorenz curve for net expenditures is much closer to the 45-degree line than that for gross expenditures. The negative differences between the Lorenz curves (Table A 5.29) indicate that the tax system causes more equal distribution of expenditure regardless of the variant chosen.

Figure A 5.24 provides the Lorenz curves for household incomes under *V1*. The redistributive impact of the total tax system is ambiguous as the curves apparently cross. The total taxes increase income inequality until *p* is equal to 0.5, then they have neutral impact for next three ordinates and for the higher part of the distribution the total taxes have inequality reducing impact on income inequality. The total taxes have negative impact on income inequality with *V2&V4* as the Lorenz curve for net incomes is below that for gross incomes, so it suggests more unequal distribution. The magnitude of inequality reduction will be given below with S-Gini indices of redistribution.

Figure 5.2



S-Gini indices of IR-progressivity, reranking and redistribution for the incidence of the whole tax system are given in the tables Table A 5.30 and Table A 5.31 in Appendix 5.1. IR-progressivity rates for the whole tax system are positive for all ρ values, implying the tax system is progressive regardless of the welfare indicator and the shifting assumptions. With income as the welfare indicator, progressivity rates take the highest values when ρ is 2.5 under *V1*, but after this point it starts decreasing, suggesting under the social welfare function giving more weight to the poor, the progressivity gets smaller. Under *V2&V4*, the progressivity rates are smaller than the rates obtained with *V1*. Under *V2&V4*, the progressivity rates rise with ρ, showing the impact of informal employment and tax evasion (despite of high regressivity of the indirect taxes for the poor), which favours the lower part of the distribution. Despite positive IR-progressivity rates, due to high reranking relative to the progressivity rates, the redistributive impact of the tax system is negative; in other words because of the horizontal inequality caused by the tax system, the tax system increases income inequality. It is either positive or zero only we adopt *V1* and when ρ is 1.01 and 1.5, which favours the rich. Rise in income inequality ranges from 0.7% (0.03%) to 2.5% (3%) under *V1 (V2&V4).*

When we adopt expenditure as the welfare indicator, the tax system seems to decrease expenditure inequality both with *V1* and *V2&V4*. The horizontal inequality decreases the redistributive power of the tax system and but the redistributive power of the taxes increases with ρ. The intended incidence (*V1*) seems to have a larger inequality reducing impact than *V2&V4* as in line with the findings from the previous analysis. With expenditure as the welfare indicator, the S-Gini indices of redistribution vary from 0.17% (0.10%) to 5.8% (5.4%) depending on value of ρ under *V1 (V2&V4*).

5.6 The Incidence of Indirect Taxes by Effective Tax Rates Estimated from Input-Output Tables

5.6.1 Effective Tax Rate Estimation Using Input-Output Tables

Ahmad and Stern (1991) provide a method for estimating effective tax rates using Input-Output (I-O) Tables, so researchers can 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 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) examine 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, the effective tax rates estimated are marginal rates, which show the marginal impact of a change in a tax rate on the distribution of welfare. Since we focus on average tax incidence, we use a simpler model (discussed below) to calculate effective tax rates.

We have input-output tables including the tax payments of each sector for import duties, purely domestic taxes (such as PCT and PCOT), VAT on domestic goods and VAT on imported goods[33]. Hence, we calculate four effective tax rates using I-O tables. The formula in matrix form for the effective tax rates are given below:

$$VAT\_D^{e'} = VAT\_D' + VAT\_D' * VAD * A$$

$$VAT\_M^{e'} = VAT\_M' + VAT\_M' * M2$$

[33] 1998 I-O tables provide only one VAT table. However, by using the shares of each I-O sector's share for imported and domestic goods, we have produced two I-O tables for VAT paid by each sector: VAT on imported goods and VAT on domestic goods.

$$S^{e'} = S' + S' * A$$

$$D^{e'} = D' + D' * M1$$

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. These are Jx1 vectors, where *j* is the number of industries in the IO table, VAD is the diagonal matrix with each industry's unit value added on the diagonal. *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. *A* and *M* are JxJ matrices. 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 the Input-Output Table for imported goods at after duty prices instead of the table at *cif* prices *(M1)*.

Although we estimate VAT rates on imported goods and import duty rates for I-O industries, HICES expenditure survey does not provide the origin (imported or domestic) of the goods purchased by households. However, we can use I-O tables to attain households' consumption share on imported and domestic goods for each I-O industry to overcome this drawback. Therefore, we use calculated effective tax rates weighted by domestic and import shares of sectors. Calculations for nominal tax rates are given in Appendix 5.2.

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

5.6.2 Results

Estimated effective tax rates and nominal rates by I-O industries are presented in Table A 5.43 in Appendix 5.2. Table 5.33 and Table 5.34 present average effective tax rates for indirect taxes as a percentage of household expenditure and income. Average tax rates for VAT on imported goods and domestic taxes rise with expenditure deciles even if increment in deciles' rates is small. However, average tax rates for VAT on domestic goods and import duty decrease as we move to higher deciles, implying higher tax burden to the poor relative to their expenditure share. The total tax burden of the total indirect taxes is 17.6% for the first decile and 19% for 10th decile. The pattern for average tax rates for domestic excises (PCT and PCOT in the standard analysis) is in line with the standard analysis, but average rates for VAT on domestic goods imply a regressive distribution. When we calculate average tax rates as a percentage of household income and rank households by household income (adult equivalent), average tax burdens for all indirect taxes decrease with income deciles, suggesting that the indirect taxes with effective rates have higher burden on lower part of the income distribution. This result is in line with the standard indirect tax incidence, although implied tax burdens on lower deciles with effective tax rates are higher than tax with statutory rates.

Table 5.33: Average Effective Rates of Indirect Taxes by deciles as a percentage of per adult equivalent household expenditure

Expenditure Deciles	AE_EXP	VAT_M	Import Duty	Domestic Taxes	VAT_D	Total Indirect Taxes
1	2.51	5.19	1.56	2.56	8.37	17.62
2	3.84	5.45	1.51	2.75	8.41	18.10
3	4.85	5.62	1.47	2.81	8.24	18.18
4	5.83	5.65	1.41	2.83	8.06	17.96
5	6.83	5.85	1.40	2.97	8.17	18.39
6	8.02	5.97	1.36	2.96	7.98	18.29
7	9.49	6.17	1.36	3.03	8.10	18.65
8	11.53	6.24	1.32	3.02	7.94	18.49
9	15.04	6.37	1.23	3.10	7.73	18.42
10	32.04	6.60	0.90	4.09	7.43	19.05
Turkey	100	6.20	1.21	3.32	7.83	18.57

Note: Ranked by per adult equivalent household expenditure

Table 5.34: Average Effective Rates of Indirect Taxes by decile as a percentage of per adult equivalent household income

Income Decile	AE_INC	VAT_M	Import Duty	Domestic Taxes	VAT_D	Total Indirect Taxes
1	2.08	8.14	2.17	3.52	12.41	26.27
2	3.48	6.50	1.63	3.00	9.57	20.65
3	4.50	6.39	1.49	2.94	8.94	19.83
4	5.48	5.84	1.38	2.82	8.13	18.22
5	6.53	5.79	1.31	2.72	7.74	17.55
6	7.70	5.88	1.26	2.80	7.66	17.60
7	9.23	5.39	1.12	2.62	6.91	16.02
8	11.41	5.22	1.04	2.68	6.62	15.57
9	15.08	4.76	0.91	2.60	5.79	14.06
10	34.52	4.15	0.60	2.68	4.68	12.10
Turkey	100	5.08	0.99	2.72	6.42	15.21

Note: Ranked by per adult equivalent household net disposable income

Concentration curves[34] and the dominance test methodology are performed. The concentration curve of the total indirect taxes with effective tax rates dominates the Lorenz curve for household expenditure under the first decision rule (Table 5.35 and Table 5.36). However, the differences for the ordinates between 0.75 and 85 are not statistically different from zero, thus Howes' test cannot verify that the total indirect taxes are progressive. The curve is very close to the Lorenz curve for AE_EXP. Domestic VAT and import duty is dominated by the Lorenz curve for household expenditure for both decision rules, so they are regressive, whereas VAT on imported goods and domestic excise taxes are progressive. Indirect taxes with effective tax rates become regressive when we rank household by income, which is in line with the standard indirect tax incidence analysis. We have a problem to reject the null hypothesis for the differences of the higher ordinates for the domestic taxes. Apart from this we can confirm

[34] See Table A 5.32 and Table A 5.33 for the differences between ordinates of the Lorenz curve and the concentration curves. See Figure A 5.22 for the concentration curves of effective indirect taxes.

statistically that the indirect taxes with effective rates are regressive with income as a welfare indicator.

Table 5.35: Dominance Results for Indirect Taxes with effective rates (expenditure) Relative to the Lorenz Curve for AE_EXP

	Per Adult Equivalent Taxes				
	Indirect Taxes	**Domestic Taxes**	**Domestic VAT**	**Import Duty**	**Import VAT**
Decision rule 1	+	+	-	-	+
Decision Rule 2	na	+	-	-	+

Notes:
'+' (-) *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

Table 5.36: Dominance Results for Indirect Taxes with effective rates (income) Relative to the Lorenz Curve for AE_INC

	Per Adult Equivalent Taxes				
	Indirect Taxes	**Domestic Taxes**	**Domestic VAT**	**Import Duty**	**Import VAT**
Decision rule 1	-	-	-	-	-
Decision Rule 2	-	na	-	-	-

Notes:
'+' (-) *indicates that the tax is progressive (regressive) and the concentration curve of the tax is below (above) the Lorenz curve*
'na' indicates that the difference between the curves are zero for some ordinates
'x' indicates that the concentration curve crosses the Lorenz curve, so no dominance

S-Gini Indices of progressivity and redistribution support the welfare dominance analysis (see the tables from Table A 5.34 to Table A 5.39 in Appendix 5.1). Let's first discuss the results with household expenditure. Both VAT on imported goods and domestic taxes are progressive as their progressivity indices are positive for all values of ρ. Yet, progressivity rates for domestic goods fall as we focus more on the poor. This finding is consistent with the standard analysis for the most important excise tax, PCT. For the total progressive impact, both TR and IR progressivity rates take the smallest value for 1.01 of ρ, and then increase with ρ up to

2 and stay constant. When we consider household income, all taxes are regressive and regressivity increases with values of ρ, suggesting that the poor is more affected by negative impact of indirect taxes. The redistributive impact of the indirect taxes with effective tax rates on expenditure inequality is around 0.15% (it is around 0.7% with statutory tax rates) which is lower than the impact with statutory rates and negligible, whereas the negative impact on income inequality ranges from 0.07% for the smallest ρ, to 3% for the highest ρ. Inequality increasing impact of indirect taxes on income inequality was 4% for the highest ρ with the standard incidence analysis.

Figure A 5.27 compares the concentration curves for the total indirect taxes with standard tax rates and effective tax rates. The concentration curve with the effective rates is above that with the standard rates. The difference comes from import taxes and the higher tax rates for domestic taxes and VAT because of taxation on intermediary goods, which lead higher tax burdens on lower expenditure/income deciles.

The Overall Tax Incidence

The figures from Figure A 5.29 to Figure A 5.32 provide the Lorenz curves for the total direct and indirect taxes with the effective tax rate methodology. Table A 5.40 gives the differences of the ordinates between before and after total tax system with asymptotic standard errors for both income and expenditure. The differences are all negative and statistically different from zero with household expenditure which means that the total tax system decreases expenditure inequality for both *V1* and *V2&V4*. However, while under *V1*, the Lorenz curves for before and after total taxes household incomes cross each other, under *V2&V4*, the distribution of household incomes after total taxes are more unequal than gross incomes. S-Gini indices of IR-progressivity and redistribution confirm these findings. Although IR-progressivity rates are positive for household incomes, the progressivity rates are smaller than reranking rates, which lead negative redistribution rates with *V2&V4*. Under *V1*, when ρ is 1.01 and 1.5 the tax system narrows income inequality by 0.04 and 0.5% respectively, but if we give more attention to the middle of the distribution the tax system becomes neutral, but then it turns to increase income inequality if we put more weight on the lower income classes. Increase in income inequality is much smaller with effective tax rates than statutory tax rates. However, the tax system seems to reduce expenditure inequality for both *V1* and *V2&V4* and positive redistributive impact increase with ρ values.

5.7 Regional Level Analysis

In this section, we look at how taxes affect between regions and within regions inequalities. Table 5.37 and Table 5.38 present the redistributive impact of taxes by regions estimated by the differences between the Gini indices of gross and net expenditures (incomes). We apply the decomposition analysis by groups with the analytical approach to obtain the Gini indices for gross and net expenditures (incomes) and the numbers in the tables give the differences between the Gini indices for each region and for the overall country. Negative numbers in the tables indicate that inequality for after tax (net) distribution is higher than before tax distribution, thus the tax in question increases inequality in the region. The personal income tax, the property taxes and the total direct taxes decrease both expenditure and income inequality in all regions for both *V1* and *V2&V4*. Equalising impact of PIT is smaller with *V2&V4* in almost all regions except S. East Anatolia and for the whole country, but not all regions are affected by the assumptions of *V2&V4* equally. While Istanbul appears to be the most affected region by tax evasion and informal employment, the least affected region is East Anatolia and Mediterranean. As noted before the less progressive impact of *V2&V4* for PIT comes from largely tax evasion, as informal employment supports progressivity. The reason for this high impact on Istanbul is the fact that Istanbul houses the richest and we have found that the rich evade tax more relative to lower income classes. Interestingly, *V2&V4* increases the positive redistributive impact of PIT in S. East Anatolia, since this region is the poorest region and it is affected by informal employment more than tax evasion (see Table A 5.44 and Table A 5.45 for the distribution of social security membership by region). The smallest redistributive impact is felt by S. East Anatolia under *V1*, whereas under *V2&V4*, the smallest impact goes to Aegean. When we look at the impacts of the taxes on urban and rural areas, under *V1*, PIT's equalising impact is almost equal for both urban and rural areas. However, because tax evasion is higher in urban areas relative to rural areas and rural areas are dominated by agricultural sector which is taxed with 2.5% flat PIT rate, PIT's equalising impact is higher in rural areas.

The payroll tax has diverse impacts in regions. The payroll tax increases income inequality in regions with high recorded employment such as Istanbul, Marmara, Mediterranean, yet the tax increases expenditure inequality in only Istanbul under *V1*. Payroll tax with *V2&V4* decreases income inequality only in the regions with low private sector employment and low welfare level such as Black Sea, East and S. East Anatolia. The impact of payroll tax on expenditure inequality with *V2&V4* is negative only in the regions with very high private sector employment (Istanbul, Marmara and Aegean). The magnitude of the redistributive impact of the payroll tax with *V1* is less than 1% except Black Sea (with expenditure); however, under V2&V4 the redistributive impact is over 1% for few regions such as Istanbul, S. East Anatolia, East Anatolia and Black Sea. Another interesting observation regarding the payroll tax appears when we look at rural-urban breakdown. The payroll tax decreases both income and expenditure inequality for the whole country and rural areas under *V1*, however, the tax increases inequality in urban areas. The possible reason for this finding comes from the fact that wage earners are concentrated in urban Turkey and under *V1* we assume that there is no informal employment and urban workers with very low wages in informal employment also pay the payroll tax. Under *V2&V4*, the payroll tax increases both expenditure and income inequality for the whole country and urban areas, but it decreases inequality in rural areas. Moreover, the negative impact of the tax in urban areas is higher than the impact for the whole country. With assumptions regarding tax evasion for the payroll tax, we assume that civil servants and SSK members in private sector pay the payroll tax as if they earn minimum wage level for civil servants and private workers, making the payroll tax rate flat for these workers. Also with *V2* we allow employers to shift their payroll tax burden to employees in private sector, concentrated in urban areas. Therefore, the assumptions of *V2&V4* generate regressive impact. Since civil servants and private employment are concentrated in urban areas, these impacts are felt less in rural areas, where self employment is more common.

The total direct taxes decrease both expenditure and income inequality under *V1* in all regions. Black Sea seems to receive the highest redistribution under *V1*, followed by East and Central Anatolia and Marmara. With *V2&V4*, regions with high unrecorded employment see higher positive redistributive impact relative to *V1*, and regions with high tax evasion see higher negative redistributive impact. Therefore, while Istanbul's redistribution rate is 2.88% (3.79) for income inequality (expenditure inequality) with *V1*, this rate drops to 0.51% (1.11), implying that tax evasion and high payroll tax burden on private employees decreases most of the redistributive power of the direct taxes in Istanbul, the centre of industry and finance of Turkey.

Indirect taxes' (both with standard and effective rates) redistributive impact on income inequality is negative for all regions, whereas the impact on expenditure inequality is positive. Another interesting observation from these tables is that the indirect taxes with effective tax rates increase expenditure inequality in S. East Anatolia and the negative impact of indirect taxes with effective rates on income inequality is bigger than that with standard rates in the same region. The reason for this finding may be the region's higher propensity to consume. 97% of household income goes to consumption in this region and most of the consumption is on food products and effective tax rates for VAT on food and food related sectors are higher than statutory VAT rates (which are 1% and 8%), due to taxation on imported and intermediate goods.

While the total taxes with standard indirect tax rates have negative impact on income inequality in Marmara, Aegean, Mediterranean and Central Anatolia with *V1*, the total taxes with effective indirect tax rates deteriorate income inequality in Marmara, Aegean, Mediterranean and S. East Anatolia. However, the estimated rates are statistically significant only for Black Sea, East Anatolia, Mediterranean and urban Turkey. Under *V2&V4*, the total taxes (both with standard and effective indirect tax rates) increase income inequality in Istanbul, Marmara, Aegean, Mediterranean and Central Anatolia. While inequality decreasing impact of the total taxes with standard indirect tax rates is over 1% for East Anatolia and Black Sea under *V1*, Mediterranean appears to be the most negatively affected region because of the total taxes. With effective rates the negative impact is eased for Mediterranean. The total taxes with standard indirect tax rates improve expenditure inequality under both *V1* and *V2&V4*, and decline in expenditure inequality ranges between 4 and 7% with *V1* and 2 and 6.5% with *V2&V4*. With effective indirect tax rates, Marmara and Aegean experiences inequality increase as a result of the total taxes, but the negative redistributive impact is less than 1% for these regions and the rates are not statistically significant.

Table 5.37: Redistribution Index by regions (V1) (Expenditure)

Regions	PIT	Payroll Tax	Property Taxes	Direct Taxes	Indirect Taxes	Indirect Taxes (Effective)	Total Taxes	Total Taxes (Effective)
Istanbul	0.0291	-0.0041	0.0130	0.0379	**0.0106**	**0.0040**	0.0489	0.1061
	0.0054	*0.0019*	*0.0014*	*0.0062*	*0.0061*	*0.0022*	*0.0080*	*0.0143*
Marmara	0.0264	**0.0002**	0.0187	0.0457	0.0150	0.0108	0.0603	**-0.0076**
	0.0085	*0.0012*	*0.0013*	*0.0081*	*0.0041*	*0.0014*	*0.0095*	*0.0131*
Aegean	0.0167	**0.0009**	0.0191	0.0381	0.0037	0.0039	0.0420	**-0.0061**
	0.0033	*0.0011*	*0.0012*	*0.0036*	*0.0020*	*0.0009*	*0.0042*	*0.0202*
Black Sea	0.0332	0.0112	0.0173	0.0603	0.0083	0.0073	0.0694	0.0247
	0.0055	*0.0015*	*0.0015*	*0.0057*	*0.0019*	*0.0010*	*0.0059*	*0.0125*
Central Anatolia	0.0238	0.0045	0.0223	0.0502	**0.0016**	**-0.0001**	0.0516	0.0559
	0.0031	*0.0011*	*0.0011*	*0.0035*	*0.0019*	*0.0009*	*0.0041*	*0.0101*
Mediterranean	0.0256	**0.0012**	0.0175	0.0437	0.0158	0.0091	0.0604	0.0479
	0.0054	*0.0015*	*0.0023*	*0.0061*	*0.0036*	*0.0013*	*0.0072*	*0.0136*
East Anatolia	0.0148	0.0099	0.0156	0.0406	0.0132	0.0087	0.0553	0.0464
	0.0024	*0.0019*	*0.0016*	*0.0039*	*0.0034*	*0.0013*	*0.0055*	*0.0162*
S. East Anatolia	0.0102	0.0079	0.0114	0.0296	0.0131	**0.0027**	0.0443	**0.0188**
	0.0019	*0.0014*	*0.0013*	*0.0029*	*0.0038*	*0.0015*	*0.0046*	*0.0129*
Turkey	0.0253	0.0024	0.0174	0.0449	0.0071	0.0015	0.0523	0.0681
	0.0022	*0.0007*	*0.0006*	*0.0024*	*0.0020*	*0.0007*	*0.0030*	*0.0065*
Urban	0.0231	**-0.0012**	0.0166	0.0387	0.0081	0.0027	0.0469	0.0648
	0.0028	*0.0009*	*0.0007*	*0.0030*	*0.0025*	*0.0009*	*0.0037*	*0.0071*
Rural	0.0253	0.0030	0.0164	0.0455	0.0094	0.0066	0.0547	**0.0112**
	0.0034	*0.0008*	*0.0012*	*0.0036*	*0.0023*	*0.0008*	*0.0047*	*0.0120*
V2&V4 for PIT and Payroll Tax; V4 for Property Tax								
Istanbul	0.0137	-0.0163	0.0131	0.0111			0.0221	0.0803
	0.0049	*0.0011*	*0.0013*	*0.0053*			*0.0081*	*0.0136*
Marmara	0.0212	**-0.0018**	0.0195	0.0378			0.0531	**-0.0148**
	0.0085	*0.0013*	*0.0013*	*0.0079*			*0.0093*	*0.0128*
Aegean	0.0104	-0.0029	0.0202	0.0289			0.0330	**-0.0150**
	0.0031	*0.0012*	*0.0012*	*0.0034*			*0.0040*	*0.0201*
Black Sea	0.0273	0.0111	0.0190	0.0559			0.0654	**0.0202**
	0.0050	*0.0015*	*0.0014*	*0.0051*			*0.0055*	*0.0119*
Central Anatolia	0.0162	**0.0006**	0.0231	0.0397			0.0418	0.0459
	0.0029	*0.0011*	*0.0011*	*0.0032*			*0.0039*	*0.0098*
Mediterranean	0.0209	0.0022	0.0187	0.0405			0.0576	0.0455
	0.0049	*0.0014*	*0.0022*	*0.0056*			*0.0068*	*0.0131*
East Anatolia	0.0123	0.0125	0.0167	0.0410			0.0559	0.0475
	0.0021	*0.0020*	*0.0016*	*0.0037*			*0.0053*	*0.0162*
S. East Anatolia	0.0148	0.0164	0.0123	0.0424			0.0576	0.0335
	0.0018	*0.0016*	*0.0012*	*0.0028*			*0.0046*	*0.0128*
Turkey	0.0151	-0.0019	0.0185	0.0315			0.0393	0.0552
	0.0020	*0.0005*	*0.0006*	*0.0021*			*0.0029*	*0.0061*
Urban	0.0117	-0.0090	0.0169	0.0202			0.0285	0.0477
	0.0025	*0.0006*	*0.0007*	*0.0027*			*0.0036*	*0.0065*
Rural	0.0229	0.0065	0.0179	0.0470			0.0571	**0.0125**
	0.0031	*0.0008*	*0.0012*	*0.0032*			*0.0044*	*0.0117*

Note: The differences between the Gini indices of gross and net expenditures. Asymptotic standard errors are in italic.

Table 5.38: Redistribution Index by regions (V1) (Income)

Regions	PIT	Payroll Tax	Property Taxes	Direct Taxes	Indirect Taxes	Indirect Taxes (Effective)	Total Taxes	Total Taxes (Effective)
Istanbul	0.0266	-0.0042	0.0067	0.0288	-0.0203	-0.0147	**0.0019**	0.0101
	0.0030	*0.0014*	*0.0010*	*0.0028*	*0.0026*	*0.0026*	*0.0046*	*0.0037*
Marmara	0.0288	**-0.0012**	0.0079	0.0354	-0.0313	-0.0266	**-0.0078**	**-0.0007**
	0.0051	*0.0012*	*0.0015*	*0.0037*	*0.0038*	*0.0024*	*0.0058*	*0.0041*
Aegean	0.0205	**0.0006**	0.0081	0.0295	-0.0222	-0.0233	**-0.0014**	**-0.0019**
	0.0021	*0.0009*	*0.0011*	*0.0022*	*0.0019*	*0.0016*	*0.0035*	*0.0032*
Black Sea	0.0302	0.0072	0.0070	0.0431	-0.0230	-0.0257	0.0131	0.0104
	0.0031	*0.0013*	*0.0012*	*0.0026*	*0.0022*	*0.0018*	*0.0036*	*0.0031*
Central Anatolia	0.0230	0.0021	0.0115	0.0362	-0.0282	-0.0264	**-0.0007**	**0.0031**
	0.0020	*0.0009*	*0.0010*	*0.0019*	*0.0020*	*0.0013*	*0.0033*	*0.0026*
Mediterranean	0.0257	-0.0029	0.0060	0.0289	-0.0371	-0.0304	-0.0212	-0.0107
	0.0031	*0.0011*	*0.0016*	*0.0031*	*0.0045*	*0.0028*	*0.0066*	*0.0047*
East Anatolia	0.0201	0.0089	0.0100	0.0375	-0.0193	-0.0228	0.0138	0.0106
	0.0014	*0.0014*	*0.0013*	*0.0023*	*0.0034*	*0.0023*	*0.0054*	*0.0037*
S. East Anatolia	0.0128	0.0069	0.0095	0.0284	-0.0172	-0.0292	**0.0064**	**-0.0039**
	0.0016	*0.0013*	*0.0012*	*0.0023*	*0.0033*	*0.0029*	*0.0053*	*0.0044*
Turkey	0.0248	**0.0005**	0.0085	0.0334	-0.0260	-0.0248	**-0.0010**	**0.0021**
	0.0013	*0.0005*	*0.0005*	*0.0011*	*0.0011*	*0.0009*	*0.0019*	*0.0015*
Urban	0.0230	-0.0021	0.0082	0.0287	-0.0262	-0.0227	-0.0061	**-0.0004**
	0.0016	*0.0006*	*0.0005*	*0.0014*	*0.0014*	*0.0012*	*0.0022*	*0.0018*
Rural	0.0244	0.0005	0.0059	0.0311	-0.0271	-0.0304	**-0.0045**	-0.0067
	0.0022	*0.0007*	*0.0009*	*0.0022*	*0.0021*	*0.0014*	*0.0036*	*0.0030*
V2&V4 for PIT and Payroll Tax; V4 for Property Tax								
Istanbul	0.0131	-0.0157	0.0067	**0.0051**			-0.0218	-0.0136
	0.0033	*0.0009*	*0.0010*	*0.0032*			*0.0050*	*0.0041*
Marmara	0.0233	-0.0060	0.0076	0.0249			-0.0181	-0.0111
	0.0054	*0.0013*	*0.0015*	*0.0040*			*0.0060*	*0.0043*
Aegean	0.0143	-0.0042	0.0088	0.0197			-0.0110	-0.0114
	0.0021	*0.0011*	*0.0011*	*0.0022*			*0.0035*	*0.0032*
Black Sea	0.0252	0.0059	0.0080	0.0382			0.0084	**0.0058**
	0.0029	*0.0013*	*0.0011*	*0.0025*			*0.0035*	*0.0031*
Central Anatolia	0.0163	-0.0023	0.0115	0.0258			-0.0110	-0.0072
	0.0021	*0.0009*	*0.0010*	*0.0020*			*0.0033*	*0.0026*
Mediterranean	0.0219	-0.0040	0.0064	0.0244			-0.0253	-0.0149
	0.0031	*0.0011*	*0.0015*	*0.0029*			*0.0065*	*0.0046*
East Anatolia	0.0170	0.0098	0.0102	0.0357			0.0122	0.0089
	0.0013	*0.0015*	*0.0014*	*0.0023*			*0.0053*	*0.0037*
S. East Anatolia	0.0172	0.0159	0.0091	0.0405			0.0185	**0.0083**
	0.0015	*0.0015*	*0.0012*	*0.0024*			*0.0054*	*0.0045*
Turkey	0.0161	-0.0046	0.0089	0.0207			-0.0135	-0.0104
	0.0013	*0.0004*	*0.0005*	*0.0012*			*0.0019*	*0.0016*
Urban	0.0130	-0.0100	0.0083	0.0119			-0.0229	-0.0172
	0.0017	*0.0005*	*0.0005*	*0.0015*			*0.0024*	*0.0019*
Rural	0.0224	0.0016	0.0062	0.0304			**-0.0048**	-0.0070
	0.0020	*0.0007*	*0.0009*	*0.0020*			*0.0034*	*0.0028*

Note: The differences between the Gini indices of gross and net expenditures. Asymptotic standard errors are in italic.

5.8 Conclusions

This chapter's main aim was to examine the redistributive impact of overall Turkish tax system. In order to do this, the standard tax incidence analysis has been applied for direct taxes which tax burdens of households/individuals are calculated with the actual statutory tax rates. In the context of indirect taxes, in addition to the estimations of tax burdens with statutory tax rates, effective tax rates have been estimated by using input-output tables (this allowed us to take into account the taxes on intermediary and imported goods). Two main sets of shifting assumptions are used to see the effect of different shifting assumptions on the incidence of taxes as well as the assumptions for tax evasion and informal employment.

The results are summarised in Table 5.39 below. The results have shown that the personal income tax (PIT) and the property taxes are progressive regardless of the shifting assumptions and welfare indicator chosen. Despite the progressivity of PIT, S-Gini indices of progressivity and redistribution have shown that when we have a social welfare function giving more importance to the poor, the progressivity of PIT declines and redistributive impact is highest when we put more weight to the middle part of the distribution. S-Gini indices have confirmed that tax evasion reduces the redistributive power of PIT, implying that high evasion is harmful not only because it generates revenue loss but also it decreases the potential redistributive power of PIT.

However, the progressivity of the payroll tax is ambiguous and sensitive to the shifting assumptions and welfare indicator chosen. According to the welfare dominance analysis in which we rank households by reported household expenditure, the tax is regressive under both *V1* and *V2*. When we allow for informal employment effects, the tax becomes progressive except for the very top of the distribution, reflecting the concentration of unrecorded employment in the lower and middle parts of the distribution. The Extended Gini test has shown that the payroll tax is progressive if the focus is on the poor, but regressive otherwise. However these results are based on the comparison of the Lorenz curve for reported household expenditure (AE_EXP) and the concentration curve for the payroll tax ranked by AE_EXP. When we adjust reported household expenditure and income to obtain gross expenditure and incomes and use them to estimate S-Gini indices the payroll tax is generally progressive, especially when more weight is attached to the middle and lower income classes.

Indirect taxes are sensitive to the welfare indicator chosen. While the total indirect taxes are progressive with household expenditure, the taxes become regressive with household income as a welfare indicator. The most progressive tax with higher redistributive impact is VAT because of its larger share in household expenditure, even if PCT and PCOT are distributed more unequally than VAT in favour of the poor. Although the redistributive impact from the total indirect taxes is positive for the whole range of inequality aversion parameter, the extent of redistribution is quite limited: the indirect taxes generate a less than one per cent reduction in expenditure inequality.

When we use household income all indirect taxes are regressive, except PCOT, and the most regressive impact is felt by the poor. Total indirect taxes increase income inequality with greater inequality aversion. The indirect tax incidence with effective tax rates is less progressive in the case of household expenditure and more regressive in the case of household incomes, because of the impact of taxation on imported and intermediate goods. Domestic excises have been found to be progressive with household expenditure, which is consistent with the standard incidence analysis. However VAT on domestic goods is regressive in contrast with the standard analysis. While import duty is regressive, VAT on imported goods is progressive. Indirect taxes with effective tax rates become regressive with income in line with the standard indirect tax incidence.

Total taxes are progressive with both statutory indirect and effective tax rates and reduce expenditure inequality by around six per cent (the redistributive power rises as we put more weight on the poor), thanks to high progressivity of PIT and property taxes. The total taxes are progressive with household income but because of the high horizontal inequality (reranking) they generate, the redistributive impact is negative for the lower parts of the distribution; the overall impact on income inequality depends on the shifting assumptions and measure of tax rates. These results demonstrate the importance of the welfare indicator chosen in the tax incidence analysis.

Taxes have diverse impacts on regions' inequality depending on employment structure and welfare level. The personal income tax, property taxes and total direct taxes decrease both expenditure and income inequality in all regions payroll tax depend on shifting assumptions, but generally the payroll tax increases both expenditure and income inequality for the whole country and urban areas, but it decreases inequality in rural areas.

Table 5.39: **The Summary of The Results**

	Welfare Dominance Method		**The Extended Gini Test and S-Gini Indices**		**Redistributive Impact**	
	Income	**Expenditure**	**Income**	**Expenditure**	**Income**	**Expenditure**
Income Tax						
Variant 1	Progressive	Progressive	Progressive	Progressive	Positive	Positive
Variant2&Variant4	Progressive	Progressive	Progressive	Progressive	Positive	Positive
Payroll Tax						
Variant 1	Indeterminate	Indeterminate	Progressive	Progressive	Indeterminate	Indeterminate
Variant2&Variant4	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Indeterminate
Property Taxes						
Variant 1	Progressive	Progressive	Progressive	Progressive	Positive	Positive
Variant4	Progressive	Progressive	Progressive	Progressive	Positive	Positive
Indirect Taxes with statutory rates						
VAT1	Regressive	Regressive	Regressive	Regressive	Negative	Negative
VAT8	Regressive	Regressive	Regressive	Regressive	Negative	Negative
VAT18	Regressive	Progressive	Regressive	Progressive	Negative	Positive
VAT	Regressive	Progressive	Regressive	Progressive	Negative	Positive
PCT	Regressive	Progressive	Indeterminate	Progressive	Negative	Indeterminate
PCOT	Progressive	Progressive	Indeterminate	Progressive	Positive*	Positive
Total Indirect Taxes	Regressive	Progressive	Regressive	Progressive	Negative	Positive
Indirect Taxes with effective rates						
VAT on Domestic Goods	Regressive	Regressive	Regressive	Indeterminate	Negative*	Negative*
VAT on Imported Goods	Regressive	Progressive	Regressive	Progressive	Negative*	Positive
Import Duty	Regressive	Regressive	Regressive	Regressive	Negative*	Negative *
Domestic Excises	Indeterminate	Progressive	Regressive	Progressive	Negative*	Positive
Effective Indirect Taxes	Regressive	Progressive	Regressive	Progressive	Negative	Positive
Total Taxes						
Variant 1	Progressive	Progressive	Progressive	Progressive	Indeterminate	Positive
Variant 2&Variant4	Progressive	Progressive	Progressive	Progressive	Negative	Positive
Total Taxes with effective indirect taxes						
Variant 1	Progressive	Progressive	Progressive	Progressive	Indeterminate	Positive
Variant2&Variant4	Progressive	Progressive	Progressive	Progressive	Negative	Positive

**The impact is negative or positive except for ρ=1.01*

Appendix 5

Appendix 5.1: Tables

Table A 5.1: The Trend of Direct&Indirect Taxes (% of TTR) and Tax Effort (TTR as % of GNP)

Years	Direct Taxes	Indirect Taxes	Tax Effort
1980	62.78	37.22	14.14
1985	47.68	52.32	10.83
1990	52.11	47.89	11.43
1995	42.46	57.54	13.80
1996	39.48	60.52	14.98
1997	40.75	59.25	16.14
1998	46.65	53.35	17.24
1999	45.37	54.63	18.91
2000	40.94	59.06	21.10
2001	40.48	59.52	22.52
2002	33.67	66.33	21.68
2003	32.98	67.02	23.64
2004	29.71	70.29	23.18
2005	29.44	70.56	24.09

Source: DPT Economic and Social Indicators 1950-2006

Table A 5.2: The Size of Informal Economy in Turkey

The Author	Estimation Method	Term of Analysis	Informal Economy % of official GNP
Çetintaş and Vergil (2003)	Econometric Approach	1971-2000	%18-30
Savaşan (2003)	Mimic Model	1970-1998	%10-45
Ilgın (2002)	Constant Rate Approach	1968-2001	%31-84
	Tax Approach	1985-2001	%26-184
Öğünç and Yılmaz (2000)	Constant Rate Approach	1960-1998	%0-46
	Constant Rate Approach	1971-1999	%11-22
Yayla (1995)	Monetary Approach	1970-1993	%9-21
Temel, Şimşek and Yazıcı (1994)	Tax Approach	1984-1991	%8-45
	Constant Rate Approach	1970-1992	%0-26
	Volume	1970-1992	%0-26
	Econometric Approach	1975-1992	%6-20
Kasnakoğlu (1993)	Monetary Approach	1970-1990	%3-11

Source: Baldemir et. All (2005)

Table A 5.3: Calculation for Income Tax Ranges (Wage Earners)

	Tax Rate	A Maximum gross income (PTI)	B Tax bill up to the next range	C Tax bill over the previous range	D Maximum net income (ATI)	
1. range	**15%**	5000	750		4250	D=A-B-C
2. range	**20%**	12000	750	1400	9850	D=A-B-C
3. range	**25%**	24000	2150	3000	18850	D=A-B-C
4. range	**30%**	60000	5150	10800	44050	D=A-B-C
5. range	**35%**	120000	15950	21000	83050	D=A-B-C
6. range	**40%**	no limit	36950			

As seen from Table A 5.3, if household net reported income is equal to or less than 4,250 Turkish Liras (TL), that household is subject to 15 percent PIT. If household net reported income is higher than 4,250 TL but equal to or less than 9,850 TL, that household is subject to 20 percent PIT.

Table A 5.4: Mean Wages by the Ownership Status of the Employer and Social Security Institution

	Mean*	Standard Errors
Private Sector	4510	81
SSK members	5940	141
Unrecorded Employees	2980	60
Public Sector	8230	84
SSK members	7860	147
ES members	8550	88
Turkey	5320	64
SSK members	6330	118
Unrecorded Employees	3020	65
ES members	8550	88

**Milyon TL*

Table A 5.5: Average Rates of PIT by expenditure decile as a percentage of per adult equivalent household expenditure

Deciles	AE_EXP	V1	V2	V1&V3	V2&V3	V1&V4	V2&V4
1	2.51	12.88	12.88	7.30	7.30	6.87	6.87
2	3.84	14.52	15.48	10.87	11.75	9.92	10.87
3	4.85	15.22	15.60	12.14	12.58	10.82	11.26
4	5.83	15.13	16.65	12.72	14.19	11.05	12.57
5	6.83	15.85	16.12	13.79	14.06	11.74	12.01
6	8.02	16.88	17.19	15.29	15.59	12.51	12.85
7	9.49	15.66	15.95	14.28	14.57	11.41	11.74
8	11.53	16.32	16.80	15.16	15.61	11.90	12.35
9	15.04	18.30	18.42	17.24	17.36	13.29	13.41
10	32.04	24.19	24.10	22.86	22.76	14.10	14.00
Turkey	100	18.81	19.07	17.12	17.37	12.50	12.76

Notes: Household expenditure is after indirect and direct tax expenditure
Households are ranked by per adult equivalent (AE) household expenditure: V1 Standard tax incidence
V2: Income tax on rent is partly shifted to tenants and payroll tax is on only employees
V3:Unrecorded employees do not pay any tax); V4: Informal employment and tax evasion together

Table A 5.6:Average Rates of Payroll Tax by decile as a percentage of per adult equivalent household expenditure

Expenditure Deciles	Average Wage (Million TL)	V1	V2	V1&V3	V2&V3	V1&V4	V2&V4
1	21	7.98	19.56	2.43	6.00	2.39	5.05
2	33	8.89	20.79	5.02	11.35	4.84	9.21
3	39	8.55	20.38	5.47	12.89	5.24	10.13
4	48	8.74	20.42	6.34	14.55	5.86	10.89
5	57	9.11	20.27	6.92	14.91	6.21	10.71
6	71	9.54	21.75	7.95	17.79	6.81	11.86
7	79	9.16	19.13	7.75	15.63	6.59	10.39
8	92	8.84	17.96	7.62	14.97	6.32	9.58
9	121	9.05	17.71	8.03	15.25	6.39	9.11
10	232	8.12	17.24	7.10	14.76	3.79	5.15
Turkey	79	8.71	18.67	7.10	14.74	5.34	8.40

Table A 5.7: Average Tax Rates of Property Tax by decile % of per adult equivalent household disposable income

Expenditure Deciles	V1	V4
1	1.41	0.64
2	1.37	0.81
3	1.60	1.11
4	1.66	1.24
5	3.03	2.62
6	3.03	2.78
7	6.85	6.59
8	6.83	6.59
9	12.74	12.58
10	11.05	10.86
Turkey	7.60	7.33

Notes: Households are ranked by per adult equivalent household expenditure

Table A 5.8: The Definitions for Income and Expenditure Concepts for the Tax Incidence Analysis

Tax in examination	**Definition**
The total tax system	
Household Expenditure (the data provides-AE_EXP)	*After direct tax but before indirect and property tax expenditure*
Gross Expenditure	AE_EXP+Income Tax+Payroll Tax
Net Expenditure	AE_EXP-Property Taxes-Indirect Taxes
Household Net Disposable Income (the data provides-AE_INC)	*After direct tax but before indirect and property tax income*
Gross Income	AE_INC+Income Tax+Payroll Tax
Net Income	AE_INC-Property Taxes-Indirect Taxes
Income Tax	
Gross Expenditure	AE_EXP+Income Tax
Net Expenditure	AE_EXP
Gross Income	AE_INC+Income Tax
Net Income	AE_INC
Payroll Tax	
Gross Expenditure	AE_EXP+Payroll Tax
Net Expenditure	AE_EXP
Gross Income	AE_INC+Payroll Tax
Net Income	AE_INC
Property Taxes	
Gross Expenditure	AE_EXP
Net Expenditure	AE_EXP-Property Taxes
Gross Income	AE_INC
Net Income	AE_INC-Property Taxes
Indirect Taxes	
Gross Expenditure	AE_EXP
Net Expenditure	AE_EXP-Indirect Taxes
Gross Income	AE_INC
Net Income	AE_INC-Indirect Taxes

Table A 5.9: The differences of the Ordinates of the Lorenz curve for Household Expenditure and the Concentration Curves

ρ=2	Income Tax					
Ordinates (p)	**V1**	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
0.05	0.003	0.006	0.005	0.003	0.006	0.005
	0.000	*0.000*	*0.001*	*0.000*	*0.000*	*0.001*
0.1	0.008	0.014	0.010	0.008	0.014	0.010
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.15	0.012	0.020	0.014	0.012	0.020	0.013
	0.002	*0.002*	*0.003*	*0.002*	*0.002*	*0.003*
0.2	0.017	0.027	0.017	0.015	0.026	0.015
	0.002	*0.002*	*0.003*	*0.002*	*0.002*	*0.003*
0.25	0.021	0.034	0.021	0.019	0.032	0.018
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
0.3	0.026	0.040	0.022	0.023	0.038	0.019
	0.004	*0.004*	*0.005*	*0.004*	*0.004*	*0.005*
0.35	0.033	0.050	0.028	0.029	0.045	0.021
	0.004	*0.005*	*0.006*	*0.004*	*0.005*	*0.006*
0.4	0.039	0.057	0.031	0.033	0.050	0.022
	0.005	*0.005*	*0.007*	*0.005*	*0.005*	*0.007*
0.45	0.045	0.065	0.034	0.039	0.058	0.024
	0.006	*0.006*	*0.007*	*0.006*	*0.006*	*0.007*
0.5	0.051	0.072	0.035	0.044	0.064	0.026
	0.006	*0.007*	*0.008*	*0.006*	*0.006*	*0.008*
0.55	0.057	0.079	0.039	0.050	0.071	0.029
	0.007	*0.007*	*0.009*	*0.007*	*0.007*	*0.009*
0.6	0.061	0.083	0.037	0.054	0.074	0.026
	0.008	*0.008*	*0.011*	*0.008*	*0.008*	*0.011*
0.65	0.071	0.093	0.043	0.063	0.085	0.032
	0.009	*0.009*	*0.012*	*0.009*	*0.009*	*0.012*
0.7	0.083	0.105	0.053	0.075	0.096	0.040
	0.010	*0.011*	*0.014*	*0.010*	*0.011*	*0.013*
0.75	0.093	0.114	0.057	0.083	0.104	0.043
	0.011	*0.012*	*0.015*	*0.011*	*0.012*	*0.015*
0.8	0.099	0.120	0.058	0.089	0.108	0.042
	0.013	*0.013*	*0.017*	*0.012*	*0.013*	*0.017*
0.85	0.116	0.135	0.071	0.105	0.123	0.055
	0.014	*0.015*	*0.019*	*0.014*	*0.015*	*0.019*
0.9	0.114	0.129	0.060	0.102	0.117	0.043
	0.016	*0.017*	*0.021*	*0.015*	*0.016*	*0.020*
0.95	0.117	0.130	0.068	0.102	0.114	0.047
	0.017	*0.019*	*0.023*	*0.017*	*0.019*	*0.022*
0.99	0.072	0.080	0.049	0.065	0.072	0.037
	0.005	*0.006*	*0.004*	*0.005*	*0.006*	*0.004*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.10: The differences of the Ordinates of the Lorenz curve for Household Expenditure and the Concentration Curves

ρ=2	Payroll Tax					
Ordinates (p)	**V1**	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
0.05	**0.001**	0.007	0.006	**0.000**	0.007	0.006
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.1	**0.001**	0.015	0.012	**-0.001**	0.015	0.009
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.002*
0.15	**0.000**	0.019	0.010	**-0.001**	0.020	0.006
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.003*
0.2	**-0.001**	0.024	0.010	**-0.004**	0.024	**0.002**
	0.002	*0.002*	*0.003*	*0.002*	*0.003*	*0.003*
0.25	**-0.001**	0.030	0.011	**-0.004**	0.030	**0.000**
	0.003	*0.003*	*0.003*	*0.003*	*0.004*	*0.004*
0.3	**-0.001**	0.034	**0.007**	**-0.006**	0.032	**-0.009**
	0.003	*0.003*	*0.004*	*0.003*	*0.004*	*0.005*
0.35	**-0.001**	0.036	**0.001**	-0.009	0.030	-0.021
	0.003	*0.004*	*0.004*	*0.004*	*0.004*	*0.005*
0.4	**-0.003**	0.036	**-0.007**	-0.011	0.031	-0.033
	0.004	*0.004*	*0.005*	*0.004*	*0.005*	*0.005*
0.45	**-0.003**	0.040	**-0.009**	-0.012	0.034	-0.039
	0.004	*0.004*	*0.005*	*0.004*	*0.005*	*0.005*
0.5	**-0.005**	0.040	-0.016	-0.016	0.032	-0.050
	0.004	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
0.55	-0.012	0.034	-0.030	-0.027	0.022	-0.071
	0.004	*0.005*	*0.005*	*0.005*	*0.006*	*0.006*
0.6	-0.016	0.027	-0.047	-0.032	0.013	-0.092
	0.005	*0.005*	*0.006*	*0.005*	*0.006*	*0.006*
0.65	-0.016	0.027	-0.055	-0.031	0.015	-0.101
	0.005	*0.006*	*0.006*	*0.005*	*0.006*	*0.006*
0.7	-0.020	0.020	-0.071	-0.034	**0.009**	-0.118
	0.005	*0.006*	*0.006*	*0.006*	*0.007*	*0.006*
0.75	-0.018	0.020	-0.080	-0.032	**0.009**	-0.127
	0.006	*0.006*	*0.007*	*0.006*	*0.007*	*0.006*
0.8	-0.021	**0.013**	-0.096	-0.029	**0.008**	-0.137
	0.006	*0.007*	*0.007*	*0.006*	*0.007*	*0.006*
0.85	-0.021	**0.008**	-0.108	-0.027	**0.006**	-0.145
	0.006	*0.007*	*0.007*	*0.007*	*0.008*	*0.006*
0.9	-0.023	**-0.002**	-0.125	-0.019	**0.006**	-0.150
	0.006	*0.007*	*0.007*	*0.006*	*0.008*	*0.005*
0.95	-0.020	**-0.008**	-0.129	**-0.006**	**0.012**	-0.137
	0.006	*0.007*	*0.006*	*0.006*	*0.007*	*0.005*
0.99	-0.010	**-0.006**	-0.073	**0.000**	0.008	-0.072
	0.003	*0.003*	*0.001*	*0.003*	*0.004*	*0.001*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.11: The differences of the Ordinates of the Lorenz curve for Household Expenditure and the Concentration Curves

ρ=2	Property Taxes			
Ordinates (p)	**V1**		**V4**	
0.05	0.003		0.006	
		0.000		*0.000*
0.1	0.008		0.014	
		0.001		*0.001*
0.15	0.012		0.020	
		0.002		*0.002*
0.2	0.017		0.027	
		0.002		*0.002*
0.25	0.021		0.034	
		0.003		*0.003*
0.3	0.026		0.040	
		0.004		*0.004*
0.35	0.033		0.050	
		0.004		*0.005*
0.4	0.039		0.057	
		0.005		*0.005*
0.45	0.045		0.065	
		0.006		*0.006*
0.5	0.051		0.072	
		0.006		*0.007*
0.55	0.057		0.079	
		0.007		*0.007*
0.6	0.061		0.083	
		0.008		*0.008*
0.65	0.071		0.093	
		0.009		*0.009*
0.7	0.083		0.105	
		0.010		*0.011*
0.75	0.093		0.114	
		0.011		*0.012*
0.8	0.099		0.120	
		0.013		*0.013*
0.85	0.116		0.135	
		0.014		*0.015*
0.9	0.114		0.129	
		0.016		*0.017*
0.95	0.117		0.130	
		0.017		*0.019*
0.99	0.072		0.080	
		0.005		*0.006*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.12: The differences of Ordinates of the Lorenz curve for AE_EXP and Concentration Curves

ρ=2	Indirect Taxes under Statutory Tax Rates						
Ordinates (p)	**VAT1**	**VAT8**	**VAT18**	**VAT**	**PCT**	**PCOT**	**Total Indirect Taxes**
0.05	-0.0047	-0.0072	0.0031	0.0018	**0.0008**	0.0078	0.0016
	0.0006	*0.0004*	*0.0002*	*0.0002*	*0.0005*	*0.0005*	*0.0003*
0.1	-0.0129	-0.0171	0.0067	0.0037	**0.0007**	0.0182	0.0029
	0.0009	*0.0006*	*0.0003*	*0.0002*	*0.0008*	*0.0008*	*0.0004*
0.15	-0.0215	-0.0268	0.0100	0.0053	**0.0004**	0.0275	0.0040
	0.0012	*0.0008*	*0.0004*	*0.0003*	*0.0011*	*0.0013*	*0.0006*
0.2	-0.0313	-0.0376	0.0142	0.0076	**0.0018**	0.0367	0.0062
	0.0015	*0.0011*	*0.0005*	*0.0004*	*0.0014*	*0.0017*	*0.0008*
0.25	-0.0399	-0.0474	0.0179	0.0096	0.0036	0.0463	0.0083
	0.0019	*0.0013*	*0.0007*	*0.0005*	*0.0018*	*0.0022*	*0.0010*
0.3	-0.0478	-0.0567	0.0221	0.0121	0.0064	0.0562	0.0112
	0.0022	*0.0015*	*0.0008*	*0.0006*	*0.0021*	*0.0026*	*0.0011*
0.35	-0.0581	-0.0669	0.0260	0.0142	0.0078	0.0647	0.0132
	0.0024	*0.0016*	*0.0009*	*0.0007*	*0.0024*	*0.0029*	*0.0013*
0.4	-0.0675	-0.0755	0.0303	0.0168	0.0115	0.0730	0.0164
	0.0027	*0.0018*	*0.0010*	*0.0008*	*0.0027*	*0.0033*	*0.0014*
0.45	-0.0762	-0.0850	0.0337	0.0186	0.0130	0.0770	0.0181
	0.0029	*0.0019*	*0.0011*	*0.0009*	*0.0029*	*0.0034*	*0.0016*
0.5	-0.0847	-0.0945	0.0365	0.0198	0.0148	0.0773	0.0195
	0.0032	*0.0021*	*0.0012*	*0.0010*	*0.0033*	*0.0037*	*0.0018*
0.55	-0.0962	-0.1010	0.0406	0.0225	0.0208	0.0779	0.0235
	0.0035	*0.0023*	*0.0013*	*0.0011*	*0.0037*	*0.0039*	*0.0020*
0.6	-0.1062	-0.1062	0.0430	0.0239	0.0254	0.0847	0.0262
	0.0038	*0.0024*	*0.0015*	*0.0012*	*0.0041*	*0.0041*	*0.0022*
0.65	-0.1178	-0.1135	0.0458	0.0254	0.0301	0.0883	0.0290
	0.0042	*0.0026*	*0.0016*	*0.0014*	*0.0046*	*0.0044*	*0.0025*
0.7	-0.1205	-0.1177	0.0477	0.0265	0.0368	0.0876	0.0323
	0.0045	*0.0028*	*0.0018*	*0.0015*	*0.0051*	*0.0047*	*0.0027*
0.75	-0.1264	-0.1208	0.0495	0.0277	0.0430	0.0910	0.0355
	0.0049	*0.0030*	*0.0020*	*0.0017*	*0.0056*	*0.0049*	*0.0030*
0.8	-0.1321	-0.1213	0.0508	0.0287	0.0506	0.0823	0.0388
	0.0052	*0.0033*	*0.0023*	*0.0019*	*0.0062*	*0.0053*	*0.0034*
0.85	-0.1268	-0.1194	0.0507	0.0289	0.0608	0.0765	0.0427
	0.0055	*0.0035*	*0.0026*	*0.0021*	*0.0069*	*0.0056*	*0.0038*
0.9	-0.1278	-0.1096	0.0526	0.0317	0.0785	0.0542	0.0505
	0.0056	*0.0036*	*0.0029*	*0.0024*	*0.0077*	*0.0056*	*0.0043*
0.95	-0.1131	-0.0869	0.0505	0.0327	0.0992	0.0238	0.0583
	0.0056	*0.0036*	*0.0032*	*0.0027*	*0.0086*	*0.0051*	*0.0048*
0.99	-0.0457	-0.0306	0.0281	0.0206	0.0609	-0.0193	0.0350
	0.0022	*0.0028*	*0.0019*	*0.0015*	*0.0049*	*0.0019*	*0.0027*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Gross expenditure is per adult equivalent household expenditure (AE_EXP)

Table A 5.13: The differences of the Ordinates of the Lorenz curve for AE_INC and the Concentration Curves

ρ=2	Indirect Taxes under Statutory Tax Rates						
Ordinates (p)	**VAT1**	**VAT8**	**VAT18**	**VAT**	**PCT**	**PCOT**	**Total Indirect Taxes**
0.05	-0.0172	-0.0182	-0.0050	-0.0067	-0.0060	0.0032	-0.0062
	0.0012	*0.0009*	*0.0010*	*0.0009*	*0.0010*	*0.0014*	*0.0009*
0.1	-0.0317	-0.0341	-0.0077	-0.0111	-0.0111	0.0105	-0.0105
	0.0016	*0.0011*	*0.0012*	*0.0011*	*0.0013*	*0.0018*	*0.0011*
0.15	-0.0500	-0.0495	-0.0107	-0.0157	-0.0143	0.0163	-0.0142
	0.0020	*0.0014*	*0.0013*	*0.0012*	*0.0017*	*0.0020*	*0.0013*
0.2	-0.0656	-0.0656	-0.0138	-0.0204	-0.0178	0.0238	-0.0181
	0.0023	*0.0017*	*0.0015*	*0.0014*	*0.0020*	*0.0023*	*0.0015*
0.25	-0.0849	-0.0790	-0.0189	-0.0266	-0.0221	0.0281	-0.0232
	0.0029	*0.0020*	*0.0018*	*0.0017*	*0.0025*	*0.0028*	*0.0018*
0.3	-0.1042	-0.0927	-0.0230	-0.0320	-0.0264	0.0299	-0.0280
	0.0032	*0.0022*	*0.0021*	*0.0019*	*0.0029*	*0.0034*	*0.0021*
0.35	-0.1191	-0.1077	-0.0265	-0.0370	-0.0295	0.0370	-0.0320
	0.0034	*0.0024*	*0.0022*	*0.0020*	*0.0033*	*0.0035*	*0.0023*
0.4	-0.1333	-0.1204	-0.0283	-0.0402	-0.0295	0.0428	-0.0336
	0.0036	*0.0026*	*0.0024*	*0.0021*	*0.0037*	*0.0038*	*0.0025*
0.45	-0.1468	-0.1324	-0.0320	-0.0450	-0.0312	0.0489	-0.0369
	0.0038	*0.0028*	*0.0025*	*0.0023*	*0.0040*	*0.0040*	*0.0027*
0.5	-0.1620	-0.1447	-0.0339	-0.0482	-0.0320	0.0521	-0.0390
	0.0040	*0.0031*	*0.0027*	*0.0025*	*0.0045*	*0.0041*	*0.0030*
0.55	-0.1756	-0.1583	-0.0391	-0.0545	-0.0323	0.0499	-0.0428
	0.0042	*0.0034*	*0.0030*	*0.0027*	*0.0050*	*0.0043*	*0.0034*
0.6	-0.1874	-0.1675	-0.0430	-0.0591	-0.0313	0.0538	-0.0450
	0.0044	*0.0037*	*0.0032*	*0.0029*	*0.0056*	*0.0045*	*0.0037*
0.65	-0.1966	-0.1757	-0.0419	-0.0592	-0.0276	0.0575	-0.0435
	0.0046	*0.0040*	*0.0035*	*0.0032*	*0.0062*	*0.0048*	*0.0041*
0.7	-0.2054	-0.1783	-0.0414	-0.0592	-0.0222	0.0557	-0.0414
	0.0048	*0.0043*	*0.0038*	*0.0034*	*0.0067*	*0.0049*	*0.0045*
0.75	-0.2122	-0.1791	-0.0432	-0.0608	-0.0233	0.0539	-0.0429
	0.0049	*0.0046*	*0.0041*	*0.0037*	*0.0074*	*0.0052*	*0.0049*
0.8	-0.2112	-0.1781	-0.0450	-0.0623	-0.0212	0.0419	-0.0433
	0.0051	*0.0050*	*0.0044*	*0.0040*	*0.0081*	*0.0055*	*0.0053*
0.85	-0.2024	-0.1727	-0.0379	-0.0554	**-0.0072**	0.0318	-0.0341
	0.0052	*0.0053*	*0.0046*	*0.0042*	*0.0085*	*0.0056*	*0.0056*
0.9	-0.1878	-0.1570	-0.0352	-0.0510	**-0.0070**	0.0246	-0.0318
	0.0050	*0.0056*	*0.0048*	*0.0043*	*0.0088*	*0.0055*	*0.0058*
0.95	-0.1480	-0.1344	-0.0383	-0.0507	**-0.0131**	**-0.0014**	-0.0347
	0.0041	*0.0053*	*0.0046*	*0.0041*	*0.0085*	*0.0051*	*0.0056*
0.99	-0.0777	-0.0759	-0.0132	-0.0212	0.0131	-0.0270	-0.0081
	0.0022	*0.0022*	*0.0021*	*0.0020*	*0.0028*	*0.0023*	*0.0022*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Gross income is per adult equivalent household disposable income(AE_INC)

Table A 5.14: The differences of the Ordinates of the Lorenz curve for Household Expenditure and the Concentration Curves

ρ=2	Total Direct and Indirect Taxes					
Ordinates (p)	**V1**	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
0.05	0.003	0.005	0.004	0.002	0.005	0.004
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
0.1	0.007	0.011	0.009	0.005	0.012	0.009
	0.000	*0.000*	*0.001*	*0.001*	*0.001*	*0.001*
0.15	0.011	0.016	0.013	0.008	0.017	0.012
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.2	0.015	0.023	0.018	0.011	0.022	0.016
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.25	0.020	0.029	0.023	0.015	0.029	0.020
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.3	0.025	0.036	0.028	0.019	0.034	0.023
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.35	0.032	0.043	0.034	0.023	0.040	0.026
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.4	0.037	0.051	0.039	0.027	0.045	0.029
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.45	0.043	0.057	0.044	0.031	0.051	0.033
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.5	0.048	0.064	0.048	0.034	0.056	0.035
	0.002	*0.003*	*0.003*	*0.002*	*0.003*	*0.003*
0.55	0.054	0.070	0.053	0.037	0.060	0.038
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
0.6	0.058	0.074	0.055	0.039	0.062	0.038
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
0.65	0.063	0.079	0.058	0.044	0.066	0.039
	0.003	*0.004*	*0.004*	*0.003*	*0.003*	*0.004*
0.7	0.070	0.085	0.062	0.048	0.071	0.042
	0.004	*0.004*	*0.004*	*0.004*	*0.004*	*0.004*
0.75	0.076	0.091	0.065	0.054	0.075	0.044
	0.004	*0.004*	*0.005*	*0.004*	*0.004*	*0.004*
0.8	0.078	0.092	0.063	0.056	0.076	0.041
	0.005	*0.005*	*0.005*	*0.004*	*0.005*	*0.005*
0.85	0.079	0.092	0.060	0.058	0.076	0.038
	0.005	*0.006*	*0.006*	*0.005*	*0.005*	*0.006*
0.9	0.075	0.085	0.050	0.057	0.071	0.030
	0.006	*0.006*	*0.006*	*0.005*	*0.006*	*0.006*
0.95	0.070	0.077	0.044	0.055	0.066	0.026
	0.007	*0.007*	*0.007*	*0.006*	*0.006*	*0.007*
0.99	0.037	0.041	0.022	0.030	0.035	0.013
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.15: The differences of the Ordinates of the Lorenz curve for Household Income and the Concentration Curves

ρ=2	Total Direct and Indirect Taxes					
Ordinates (p)	**V1**	**V1&V3**	**V1&V4**	**V2**	**V2&V3**	**V2&V4**
0.05	**0.000**	0.002	**0.001**	**0.000**	0.002	**0.001**
	0.001	*0.001*	*0.001*	*0.000*	*0.000*	*0.001*
0.1	0.002	0.006	0.004	**0.001**	0.006	0.003
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.15	0.004	0.010	0.006	0.002	0.010	0.004
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.2	0.007	0.015	0.009	**0.001**	0.012	0.004
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.25	0.010	0.019	0.011	0.003	0.016	0.005
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
0.3	0.013	0.023	0.013	0.004	0.019	0.005
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.002*
0.35	0.017	0.029	0.017	0.006	0.023	0.006
	0.001	*0.001*	*0.001*	*0.002*	*0.002*	*0.002*
0.4	0.023	0.035	0.021	0.010	0.028	0.009
	0.001	*0.001*	*0.002*	*0.002*	*0.002*	*0.002*
0.45	0.028	0.041	0.025	0.013	0.032	0.010
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.5	0.034	0.048	0.029	0.017	0.037	0.012
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.55	0.038	0.053	0.031	0.020	0.040	0.013
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.6	0.043	0.058	0.034	0.024	0.045	0.014
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*
0.65	0.049	0.065	0.039	0.028	0.050	0.017
	0.002	*0.002*	*0.002*	*0.002*	*0.003*	*0.003*
0.7	0.055	0.071	0.043	0.032	0.055	0.020
	0.002	*0.002*	*0.003*	*0.003*	*0.003*	*0.003*
0.75	0.056	0.071	0.042	0.031	0.053	0.017
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
0.8	0.059	0.074	0.041	0.035	0.056	0.016
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
0.85	0.064	0.077	0.041	0.040	0.059	0.016
	0.003	*0.003*	*0.004*	*0.003*	*0.003*	*0.003*
0.9	0.065	0.076	0.037	0.044	0.060	0.014
	0.003	*0.003*	*0.004*	*0.003*	*0.004*	*0.003*
0.95	0.055	0.062	0.025	0.038	0.048	**0.004**
	0.003	*0.003*	*0.004*	*0.003*	*0.004*	*0.003*
0.99	0.041	0.043	0.021	0.031	0.034	0.009
	0.002	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.16: The differences of the Ordinates of the Concentration Curves for the Total Taxes under V1 and V2&V4

Ordinates (p)	Ranking Variable	Ranking Variable
ρ=2	**Household Expenditure(AE_EXP)**	**Household Income (AE_INC)**
0.05	0.0014	0.0006
	0.0002	*0.0002*
0.1	0.0024	0.0008
	0.0004	*0.0004*
0.15	0.0016	**-0.0002**
	0.0005	*0.0005*
0.2	**0.0007**	-0.0027
	0.0006	*0.0007*
0.25	**0.0002**	-0.0048
	0.0008	*0.0008*
0.3	-0.0021	-0.0076
	0.0009	*0.0009*
0.35	-0.0057	-0.0107
	0.0009	*0.0010*
0.4	-0.0083	-0.0141
	0.0010	*0.0010*
0.45	-0.0104	-0.0180
	0.0010	*0.0010*
0.5	-0.0130	-0.0215
	0.0011	*0.0011*
0.55	-0.0160	-0.0251
	0.0011	*0.0011*
0.6	-0.0207	-0.0291
	0.0012	*0.0011*
0.65	-0.0238	-0.0320
	0.0012	*0.0012*
0.7	-0.0279	-0.0351
	0.0013	*0.0012*
0.75	-0.0320	-0.0386
	0.0014	*0.0013*
0.8	-0.0361	-0.0430
	0.0015	*0.0014*
0.85	-0.0405	-0.0475
	0.0016	*0.0015*
0.9	-0.0446	-0.0509
	0.0017	*0.0016*
0.95	-0.0442	-0.0512
	0.0019	*0.0017*
0.99	-0.0241	-0.0325
	0.0014	*0.0012*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.17: S-Gini Indices of Progressivity and Redistribution for Income Tax (expenditure)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.008	0.007	0.0014	0.0009	0.0011	0.0006
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.150	0.139	0.028	0.018	0.022	0.013
	0.007	*0.011*	*0.002*	*0.002*	*0.002*	*0.002*
2	0.169	0.164	0.032	0.021	0.025	0.015
	0.007	*0.011*	*0.002*	*0.002*	*0.002*	*0.002*
2.5	0.171	0.172	0.032	0.022	0.026	0.016
	0.006	*0.009*	*0.002*	*0.002*	*0.002*	*0.002*
3	0.168	0.175	0.032	0.022	0.025	0.016
	0.005	*0.008*	*0.002*	*0.002*	*0.002*	*0.002*
3.5	0.164	0.176	0.031	0.022	0.025	0.017
	0.005	*0.007*	*0.002*	*0.002*	*0.002*	*0.002*
4	0.161	0.176	0.030	0.022	0.024	0.017
	0.005	*0.006*	*0.002*	*0.001*	*0.002*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP plus per adult equivalent total income tax

Table A 5.18: S-Gini Indices of Progressivity and Redistribution for Income Tax (income)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.008	0.008	0.0013	0.0008	0.0012	0.0008
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.158	0.151	0.024	0.016	0.023	0.014
	0.005	*0.008*	*0.001*	*0.001*	*0.001*	*0.001*
2	0.173	0.171	0.027	0.018	0.025	0.016
	0.004	*0.008*	*0.001*	*0.001*	*0.001*	*0.001*
2.5	0.170	0.173	0.026	0.018	0.024	0.016
	0.004	*0.006*	*0.001*	*0.001*	*0.001*	*0.001*
3	0.163	0.171	0.025	0.018	0.023	0.016
	0.003	*0.005*	*0.001*	*0.001*	*0.001*	*0.001*
3.5	0.157	0.167	0.024	0.017	0.022	0.016
	0.003	*0.005*	*0.001*	*0.001*	*0.001*	*0.001*
4	0.150	0.164	0.023	0.017	0.021	0.015
	0.003	*0.004*	*0.001*	*0.001*	*0.001*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC plus per adult equivalent total income tax

Table A 5.19: S-Gini Indices of Progressivity and Redistribution for Payroll Tax (expenditure)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.001	-0.002	0.0001	-0.0002	**0.0000**	-0.0003
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.040	**-0.009**	0.003	**-0.001**	**0.001**	-0.004
	0.006	*0.005*	*0.001*	*0.000*	*0.001*	*0.000*
2	0.064	0.039	0.006	0.003	0.002	-0.002
	0.007	*0.006*	*0.001*	*0.001*	*0.001*	*0.001*
2.5	0.079	0.082	0.007	0.007	0.003	**0.001**
	0.006	*0.006*	*0.001*	*0.001*	*0.001*	*0.001*
3	0.089	0.116	0.008	0.010	0.004	0.003
	0.006	*0.006*	*0.001*	*0.001*	*0.001*	*0.001*
3.5	0.096	0.142	0.008	0.012	0.004	0.005
	0.005	*0.006*	*0.001*	*0.001*	*0.001*	*0.001*
4	0.100	0.162	0.009	0.014	0.005	0.006
	0.005	*0.005*	*0.001*	*0.001*	*0.001*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP plus per adult equivalent payroll tax

Table A 5.20: S-Gini Indices of Progressivity and Redistribution for Payroll Tax (income)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	**0.000**	-0.004	**0.0000**	-0.0003	0.0000	-0.0003
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.015	-0.049	0.001	-0.003	**0.000**	-0.006
	0.006	*0.005*	*0.000*	*0.000*	*0.000*	*0.000*
2	0.031	-0.017	0.002	-0.001	**0.000**	-0.005
	0.006	*0.006*	*0.001*	*0.000*	*0.001*	*0.000*
2.5	0.040	0.018	0.003	0.001	0.001	-0.003
	0.006	*0.006*	*0.000*	*0.000*	*0.000*	*0.000*
3	0.046	0.047	0.003	0.003	0.001	-0.002
	0.006	*0.006*	*0.000*	*0.000*	*0.000*	*0.000*
3.5	0.049	0.071	0.003	0.005	0.001	**0.000**
	0.005	*0.006*	*0.000*	*0.000*	*0.000*	*0.000*
4	0.051	0.090	0.004	0.006	0.002	0.001
	0.005	*0.006*	*0.000*	*0.000*	*0.000*	*0.000*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC plus per adult equivalent payroll tax

Table A 5.21: S-Gini Indices of Progressivity and Redistribution for Property Taxes (expenditure)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V4**	**V1**	**V4**	**V1**	**V4**
1.01	0.006	0.005	0.0004	0.0004	0.0003	0.0003
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.198	0.184	0.015	0.016	0.012	0.012
	0.004	*0.004*	*0.001*	*0.001*	*0.000*	*0.000*
2	0.285	0.265	0.022	0.023	0.017	0.018
	0.004	*0.004*	*0.001*	*0.001*	*0.001*	*0.001*
2.5	0.321	0.298	0.025	0.025	0.020	0.022
	0.004	*0.004*	*0.001*	*0.001*	*0.001*	*0.001*
3	0.334	0.309	0.025	0.026	0.022	0.023
	0.003	*0.003*	*0.001*	*0.001*	*0.001*	*0.001*
3.5	0.336	0.311	0.026	0.027	0.022	0.024
	0.003	*0.003*	*0.001*	*0.001*	*0.001*	*0.001*
4	0.333	0.307	0.025	0.026	0.022	0.024
	0.003	*0.003*	*0.001*	*0.001*	*0.001*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP

Table A 5.22: S-Gini Indices of Progressivity and Redistribution for Property Taxes (income)

	TR-Progressivity		IR-Progressivity		Redistribution	
Parameter Values (ρ)	**V1**	**V4**	**V1**	**V4**	**V1**	**V4**
1.01	0.003	0.003	0.0002	0.0002	0.0001	0.0001
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.126	0.135	0.008	0.009	0.006	0.006
	0.004	*0.004*	*0.000*	*0.000*	*0.000*	*0.000*
2	0.186	0.199	0.012	0.013	0.009	0.009
	0.005	*0.005*	*0.000*	*0.000*	*0.000*	*0.000*
2.5	0.213	0.227	0.014	0.015	0.010	0.010
	0.005	*0.005*	*0.000*	*0.000*	*0.001*	*0.000*
3	0.225	0.240	0.015	0.015	0.010	0.011
	0.005	*0.005*	*0.000*	*0.000*	*0.001*	*0.001*
3.5	0.229	0.244	0.015	0.016	0.011	0.011
	0.005	*0.005*	*0.000*	*0.000*	*0.001*	*0.001*
4	0.229	0.245	0.015	0.016	0.011	0.011
	0.005	*0.005*	*0.000*	*0.000*	*0.001*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC

Table A 5.23: S-Gini Indices of TR-Progressivity for the Indirect Taxes (expenditure)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.0047	-0.0036	0.0025	0.0017	0.0038	0.0016	0.0025
	0.0003	*0.0003*	*0.0002*	*0.0001*	*0.0006*	*0.0002*	*0.0003*
1.5	-0.1143	-0.1076	0.0562	0.0347	0.0569	0.0752	0.0444
	0.0066	*0.0069*	*0.0043*	*0.0034*	*0.0134*	*0.0042*	*0.0073*
2	-0.1416	-0.1449	0.0690	0.0410	0.0515	0.1190	0.0473
	0.0074	*0.0077*	*0.0043*	*0.0034*	*0.0142*	*0.0048*	*0.0075*
2.5	-0.1495	-0.1609	0.0737	0.0430	0.0438	0.1433	0.0462
	0.0073	*0.0074*	*0.0039*	*0.0032*	*0.0130*	*0.0048*	*0.0068*
3	-0.1513	-0.1691	0.0759	0.0439	0.0382	0.1579	0.0450
	0.0071	*0.0071*	*0.0035*	*0.0030*	*0.0120*	*0.0048*	*0.0063*
3.5	-0.1508	-0.1736	0.0770	0.0443	0.0343	0.1673	0.0440
	0.0069	*0.0069*	*0.0033*	*0.0028*	*0.0113*	*0.0047*	*0.0059*
4	-0.1492	-0.1761	0.0775	0.0444	0.0315	0.1737	0.0431
	0.0068	*0.0067*	*0.0031*	*0.0027*	*0.0108*	*0.0047*	*0.0056*

Notes: Asymptotic standard errors are in italic. Gross expenditure is equal to AE_EXP
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.24: S-Gini Indices of IR-Progressivity for the Indirect Taxes (expenditure)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.000004	-0.00005	0.0003	0.0002	0.0003	0.0000	0.0006
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0001*
1.5	-0.0001	-0.0014	0.0058	0.0042	0.0044	0.0004	0.0100
	0.0000	*0.0001*	*0.0006*	*0.0005*	*0.0012*	*0.0000*	*0.0019*
2	-0.0001	-0.0019	0.0071	0.0049	0.0040	0.0006	0.0107
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0012*	*0.0000*	*0.0020*
2.5	-0.0001	-0.0022	0.0076	0.0052	0.0034	0.0008	0.0104
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0011*	*0.0000*	*0.0018*
3	-0.0001	-0.0023	0.0078	0.0053	0.0029	0.0008	0.0101
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0010*	*0.0000*	*0.0016*
3.5	-0.0001	-0.0023	0.0079	0.0053	0.0026	0.0009	0.0099
	0.0000	*0.0001*	*0.0005*	*0.0004*	*0.0009*	*0.0000*	*0.0015*
4	-0.0001	-0.0024	0.0080	0.0053	0.0024	0.0009	0.0097
	0.0000	*0.0001*	*0.0004*	*0.0004*	*0.0009*	*0.0000*	*0.0015*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP, net expenditure is equal to AE_EXP minus tax burden

Table A 5.25: S-Gini Indices of Redistribution for the Indirect Taxes (expenditure)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.000004	-0.000049	0.0002	0.0002	0.0002	0.0000	0.0003
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0001*
1.5	-0.0001	-0.0015	0.0055	0.0039	0.0032	0.0004	0.0067
	0.0000	*0.0001*	*0.0006*	*0.0005*	*0.0012*	*0.0000*	*0.0019*
2	-0.0001	-0.0020	0.0067	0.0046	0.0027	0.0006	0.0071
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0012*	*0.0000*	*0.0020*
2.5	-0.0001	-0.0022	0.0072	0.0048	**0.0020**	0.0008	0.0067
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0011*	*0.0000*	*0.0018*
3	-0.0001	-0.0023	0.0074	0.0049	**0.0015**	0.0008	0.0062
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0010*	*0.0000*	*0.0016*
3.5	-0.0001	-0.0023	0.0075	0.0049	**0.0011**	0.0009	0.0057
	0.0000	*0.0001*	*0.0005*	*0.0004*	*0.0010*	*0.0000*	*0.0015*
4	-0.0001	-0.0024	0.0075	0.0049	**0.0008**	0.0009	0.0054
	0.0000	*0.0001*	*0.0004*	*0.0004*	*0.0009*	*0.0000*	*0.0015*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP, net expenditure is equal to AE_EXP minus tax burden

Table A 5.26: S-Gini Indices of TR-Progressivity for the Indirect Taxes (income)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.0075	-0.0065	-0.0021	-0.0027	**-0.0012**	**0.0002**	-0.0020
	0.0003	*0.0003*	*0.0003*	*0.0003*	*0.0006*	*0.0002*	*0.0004*
1.5	-0.1954	-0.1718	-0.0453	-0.0621	-0.0323	0.0365	-0.0477
	0.0071	*0.0077*	*0.0071*	*0.0063*	*0.0159*	*0.0042*	*0.0098*
2	-0.2569	-0.2302	-0.0565	-0.0795	-0.0470	0.0662	-0.0627
	0.0083	*0.0089*	*0.0077*	*0.0069*	*0.0171*	*0.0050*	*0.0105*
2.5	-0.2842	-0.2594	-0.0616	-0.0878	-0.0572	0.0828	-0.0710
	0.0086	*0.0090*	*0.0073*	*0.0067*	*0.0161*	*0.0053*	*0.0100*
3	-0.2986	-0.2769	-0.0647	-0.0927	-0.0650	0.0923	-0.0766
	0.0087	*0.0089*	*0.0070*	*0.0064*	*0.0152*	*0.0054*	*0.0094*
3.5	-0.3068	-0.2885	-0.0667	-0.0960	-0.0711	0.0977	-0.0808
	0.0089	*0.0088*	*0.0068*	*0.0063*	*0.0145*	*0.0055*	*0.0090*
4	-0.3120	-0.2970	-0.0682	-0.0984	-0.0760	0.1009	-0.0839
	0.0090	*0.0087*	*0.0066*	*0.0062*	*0.0140*	*0.0057*	*0.0088*

Notes: Asymptotic standard errors are in italic. Gross income is equal to AE_INC
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.27: S-Gini Indices of IR-Progressivity for the Indirect Taxes (income)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.00001	-0.0001	-0.0002	-0.0003	**-0.0001**	**0.0000**	-0.0004
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0001*
1.5	-0.0001	-0.0019	-0.0037	-0.0060	-0.0020	0.0002	-0.0085
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0016*
2	-0.0002	-0.0025	-0.0047	-0.0077	-0.0029	0.0003	-0.0111
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0017*
2.5	-0.0002	-0.0028	-0.0051	-0.0084	-0.0036	0.0004	-0.0126
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0009*	*0.0000*	*0.0016*
3	-0.0002	-0.0030	-0.0053	-0.0089	-0.0040	0.0004	-0.0136
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0008*	*0.0000*	*0.0014*
3.5	-0.0002	-0.0031	-0.0055	-0.0092	-0.0044	0.0004	-0.0143
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0008*	*0.0000*	*0.0013*
4	-0.0002	-0.0032	-0.0056	-0.0095	-0.0047	0.0004	-0.0149
	0.0000	*0.0001*	*0.0005*	*0.0005*	*0.0007*	*0.0000*	*0.0013*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC, net expenditure is equal to AE_INC minus tax burden

Table A 5.28: S-Gini Indices of Redistribution for the Indirect Taxes (income)

Parameter Values (ρ)	VAT1	VAT8	VAT18	VAT	PCT	PCOT	Total Indirect Taxes
1.01	-0.00001	-0.0001	-0.0002	-0.0003	-0.0002	**0.0000**	-0.0007
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
1.5	-0.0001	-0.0019	-0.0051	-0.0074	-0.0046	0.0002	-0.0184
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0009*	*0.0000*	*0.0009*
2	-0.0002	-0.0025	-0.0067	-0.0098	-0.0066	0.0003	-0.0260
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0011*
2.5	-0.0002	-0.0029	-0.0075	-0.0110	-0.0078	0.0003	-0.0311
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0014*
3	-0.0002	-0.0031	-0.0080	-0.0118	-0.0088	0.0004	-0.0351
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0009*	*0.0000*	*0.0018*
3.5	-0.0002	-0.0032	-0.0085	-0.0124	-0.0096	0.0004	-0.0386
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0022*
4	-0.0002	-0.0033	-0.0088	-0.0129	-0.0103	0.0004	-0.0418
	0.0000	*0.0001*	*0.0006*	*0.0006*	*0.0010*	*0.0000*	*0.0026*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC, net expenditure is equal to AE_INC minus tax burden

Table A 5.29:The Differences of the Ordinates of the Lorenz Curves Before and After Total Taxes

ρ=2	Income		Expenditure	
Ordinates (p)	**V1**	**V2&V4**	**V1**	**V2&V4**
0.05	0.0085	0.0082	-0.0016	-0.0022
	0.0010	*0.0010*	*0.0002*	*0.0002*
0.1	0.0091	0.0082	-0.0043	-0.0054
	0.0010	*0.0010*	*0.0003*	*0.0002*
0.15	0.0091	0.0080	-0.0073	-0.0087
	0.0010	*0.0010*	*0.0003*	*0.0003*
0.2	0.0088	0.0078	-0.0106	-0.0121
	0.0010	*0.0010*	*0.0004*	*0.0004*
0.25	0.0083	0.0077	-0.0143	-0.0155
	0.0010	*0.0010*	*0.0005*	*0.0005*
0.3	0.0074	0.0077	-0.0181	-0.0186
	0.0010	*0.0010*	*0.0007*	*0.0007*
0.35	0.0062	0.0076	-0.0219	-0.0214
	0.0010	*0.0010*	*0.0008*	*0.0008*
0.4	0.0048	0.0074	-0.0257	-0.0239
	0.0010	*0.0010*	*0.0010*	*0.0009*
0.45	0.0031	0.0071	-0.0293	-0.0260
	0.0010	*0.0010*	*0.0011*	*0.0011*
0.5	**0.0013**	0.0069	-0.0324	-0.0273
	0.0010	*0.0010*	*0.0013*	*0.0013*
0.55	**-0.0004**	0.0067	-0.0351	-0.0284
	0.0010	*0.0011*	*0.0015*	*0.0015*
0.6	**-0.0021**	0.0064	-0.0375	-0.0291
	0.0011	*0.0011*	*0.0017*	*0.0017*
0.65	-0.0040	0.0060	-0.0396	-0.0293
	0.0011	*0.0012*	*0.0019*	*0.0019*
0.7	-0.0055	0.0059	-0.0411	-0.0291
	0.0012	*0.0013*	*0.0022*	*0.0021*
0.75	-0.0068	0.0059	-0.0417	-0.0279
	0.0013	*0.0014*	*0.0025*	*0.0024*
0.8	-0.0079	0.0059	-0.0415	-0.0260
	0.0014	*0.0015*	*0.0027*	*0.0026*
0.85	-0.0093	0.0057	-0.0404	-0.0234
	0.0016	*0.0017*	*0.0031*	*0.0029*
0.9	-0.0107	0.0054	-0.0386	-0.0203
	0.0017	*0.0018*	*0.0034*	*0.0032*
0.95	-0.0093	0.0063	-0.0337	-0.0155
	0.0019	*0.0020*	*0.0038*	*0.0036*
0.99	-0.0072	**0.0025**	-0.0171	**-0.0067**
	0.0018	*0.0020*	*0.0039*	*0.0037*

Notes: Asymptotic standard errors are in italic.
Gross income (expenditure) is equal to AE_INC (AE_EXP) plus per adult equivalent total income and payroll tax
Net income (expenditure) is equal to AE_INC (AE_EXP) minus per adult equivalent property taxes and total indirect tax

Table A 5.30: S-Gini Indices of Progressivity and Redistribution for Total Taxes (income)

	IR-Progressivity		Reranking		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0011	0.0004	0.0007	0.0007	0.0004	-0.0003
	0.0001	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*
1.5	0.0266	0.0143	0.0225	0.0230	0.0041	-0.0087
	0.0020	*0.0021*	*0.0017*	*0.0017*	*0.0015*	*0.0015*
2	0.0328	0.0214	0.0338	0.0350	**-0.0010**	-0.0135
	0.0021	*0.0022*	*0.0024*	*0.0024*	*0.0019*	*0.0019*
2.5	0.0340	0.0252	0.0412	0.0431	-0.0072	-0.0178
	0.0019	*0.0021*	*0.0030*	*0.0030*	*0.0023*	*0.0023*
3	0.0335	0.0273	0.0469	0.0493	-0.0134	-0.0220
	0.0018	*0.0019*	*0.0035*	*0.0035*	*0.0028*	*0.0028*
3.5	0.0324	0.0284	0.0518	0.0546	-0.0194	-0.0261
	0.0017	*0.0018*	*0.0040*	*0.0040*	*0.0033*	*0.0033*
4	0.0311	0.0290	0.0563	0.0593	-0.0252	-0.0302
	0.0017	*0.0018*	*0.0046*	*0.0046*	*0.0038*	*0.0038*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC plus per adult equivalent total income and payroll tax
Net income is equal to AE_INC minus per adult equivalent property taxes and total indirect tax

Table A 5.31: S-Gini Indices of Progressivity and Redistribution for Total Taxes (expenditure)

	IR-Progressivity		Reranking		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0026	0.0019	0.0009	0.0009	0.0017	0.0010
	0.0001	*0.0001*	*0.0000*	*0.0000*	*0.0001*	*0.0001*
1.5	0.0634	0.0490	0.0221	0.0214	0.0414	0.0276
	0.0029	*0.0028*	*0.0006*	*0.0005*	*0.0028*	*0.0027*
2	0.0793	0.0660	0.0270	0.0267	0.0523	0.0393
	0.0030	*0.0030*	*0.0007*	*0.0006*	*0.0030*	*0.0029*
2.5	0.0844	0.0742	0.0281	0.0282	0.0563	0.0460
	0.0028	*0.0027*	*0.0008*	*0.0007*	*0.0028*	*0.0027*
3	0.0858	0.0785	0.0279	0.0284	0.0579	0.0501
	0.0026	*0.0025*	*0.0009*	*0.0008*	*0.0026*	*0.0025*
3.5	0.0856	0.0808	0.0274	0.0281	0.0582	0.0527
	0.0024	*0.0024*	*0.0010*	*0.0008*	*0.0025*	*0.0024*
4	0.0848	0.0821	0.0268	0.0276	0.0580	0.0545
	0.0023	*0.0023*	*0.0011*	*0.0009*	*0.0024*	*0.0023*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP plus per adult equivalent total income and payroll tax
Net expenditure is equal to AE_EXP minus per adult equivalent property taxes and total indirect tax

Table A 5.32:The Differences of the Ordinates of the Lorenz curve for Household Expenditure and the Concentration Curves

ρ=2	Indirect Taxes under Effective Tax Rates				
Ordinates (p)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
0.05	-0.001	0.002	-0.003	0.002	0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
0.1	-0.002	0.004	-0.008	0.005	0.001
	0.000	*0.000*	*0.000*	*0.001*	*0.000*
0.15	-0.004	0.005	-0.013	0.008	0.001
	0.000	*0.000*	*0.001*	*0.001*	*0.000*
0.2	-0.006	0.008	-0.019	0.011	0.001
	0.000	*0.000*	*0.001*	*0.001*	*0.000*
0.25	-0.007	0.009	-0.025	0.014	0.001
	0.001	*0.000*	*0.001*	*0.001*	*0.000*
0.3	-0.008	0.012	-0.030	0.018	0.002
	0.001	*0.000*	*0.001*	*0.001*	*0.001*
0.35	-0.010	0.014	-0.036	0.022	0.002
	0.001	*0.001*	*0.001*	*0.002*	*0.001*
0.4	-0.010	0.016	-0.041	0.027	0.003
	0.001	*0.001*	*0.001*	*0.002*	*0.001*
0.45	-0.012	0.018	-0.047	0.029	0.003
	0.001	*0.001*	*0.001*	*0.002*	*0.001*
0.5	-0.014	0.020	-0.054	0.034	0.003
	0.001	*0.001*	*0.001*	*0.003*	*0.001*
0.55	-0.015	0.021	-0.060	0.038	0.004
	0.001	*0.001*	*0.001*	*0.003*	*0.001*
0.6	-0.017	0.022	-0.066	0.044	0.004
	0.001	*0.001*	*0.001*	*0.003*	*0.001*
0.65	-0.019	0.021	-0.074	0.048	0.003
	0.001	*0.001*	*0.002*	*0.004*	*0.001*
0.7	-0.020	0.021	-0.080	0.054	0.003
	0.001	*0.001*	*0.002*	*0.004*	*0.001*
0.75	-0.022	0.021	-0.086	0.061	**0.003**
	0.001	*0.001*	*0.002*	*0.005*	*0.002*
0.8	-0.023	0.020	-0.092	0.066	**0.003**
	0.002	*0.001*	*0.002*	*0.005*	*0.002*
0.85	-0.023	0.018	-0.096	0.072	**0.003**
	0.002	*0.002*	*0.002*	*0.006*	*0.002*
0.9	-0.021	0.016	-0.095	0.083	0.005
	0.002	*0.002*	*0.002*	*0.007*	*0.002*
0.95	-0.018	0.011	-0.089	0.095	0.007
	0.002	*0.002*	*0.002*	*0.008*	*0.002*
0.99	0.003	0.003	-0.007	0.038	0.009
	0.000	*0.000*	*0.000*	*0.000*	*0.000*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.33: The differences of the Ordinates of the Lorenz curve for Household Income and the Concentration Curves

ρ=2	Indirect Taxes under Effective Tax Rates				
Ordinates (p)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
0.05	-0.011	-0.007	-0.014	-0.004	-0.009
	0.001	*0.001*	*0.001*	*0.001*	*0.001*
0.1	-0.019	-0.012	-0.025	-0.006	-0.015
	0.001	*0.001*	*0.001*	*0.001*	*0.001*
0.15	-0.028	-0.018	-0.037	-0.008	-0.022
	0.001	*0.001*	*0.001*	*0.001*	*0.001*
0.2	-0.037	-0.023	-0.049	-0.010	-0.028
	0.001	*0.001*	*0.001*	*0.002*	*0.001*
0.25	-0.047	-0.030	-0.062	-0.013	-0.036
	0.002	*0.002*	*0.002*	*0.002*	*0.002*
0.3	-0.056	-0.036	-0.074	-0.014	-0.043
	0.002	*0.002*	*0.002*	*0.002*	*0.002*
0.35	-0.064	-0.041	-0.086	-0.016	-0.049
	0.002	*0.002*	*0.002*	*0.003*	*0.002*
0.4	-0.071	-0.046	-0.097	-0.015	-0.054
	0.002	*0.002*	*0.002*	*0.004*	*0.002*
0.45	-0.079	-0.051	-0.109	-0.016	-0.060
	0.002	*0.003*	*0.002*	*0.004*	*0.002*
0.5	-0.086	-0.055	-0.120	-0.016	-0.065
	0.003	*0.003*	*0.002*	*0.004*	*0.003*
0.55	-0.095	-0.063	-0.133	-0.017	-0.072
	0.003	*0.003*	*0.003*	*0.005*	*0.003*
0.6	-0.103	-0.070	-0.144	-0.016	-0.079
	0.003	*0.003*	*0.003*	*0.005*	*0.003*
0.65	-0.105	-0.071	-0.150	-0.014	-0.080
	0.003	*0.003*	*0.003*	*0.006*	*0.003*
0.7	-0.108	-0.072	-0.154	**-0.009**	-0.081
	0.004	*0.004*	*0.003*	*0.006*	*0.004*
0.75	-0.110	-0.074	-0.158	**-0.009**	-0.083
	0.004	*0.004*	*0.003*	*0.007*	*0.004*
0.8	-0.112	-0.076	-0.161	**-0.007**	-0.084
	0.004	*0.004*	*0.004*	*0.008*	*0.005*
0.85	-0.105	-0.071	-0.158	**0.004**	-0.077
	0.005	*0.005*	*0.004*	*0.009*	*0.005*
0.9	-0.098	-0.065	-0.152	**0.005**	-0.072
	0.005	*0.005*	*0.005*	*0.009*	*0.005*
0.95	-0.087	-0.062	-0.129	**-0.002**	-0.066
	0.005	*0.005*	*0.005*	*0.010*	*0.006*
0.99	-0.043	-0.031	-0.067	**0.013**	-0.030
	0.005	*0.005*	*0.004*	*0.010*	*0.005*

Notes: Asymptotic standard errors are in italic.

The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.34: S-Gini Indices of TR-Progressivity for the Indirect Taxes (household expenditure)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	0.000	0.001	-0.003	0.004	0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.015	0.026	-0.076	0.070	0.010
	0.002	*0.002*	*0.003*	*0.010*	*0.003*
2	-0.019	0.035	-0.089	0.075	0.011
	0.002	*0.002*	*0.003*	*0.010*	*0.003*
2.5	-0.021	0.039	-0.091	0.074	0.012
	0.002	*0.002*	*0.003*	*0.009*	*0.003*
3	-0.021	0.041	-0.090	0.072	0.012
	0.002	*0.002*	*0.003*	*0.008*	*0.003*
3.5	-0.021	0.042	-0.089	0.071	0.012
	0.002	*0.002*	*0.003*	*0.008*	*0.002*
4	-0.021	0.043	-0.088	0.069	0.012
	0.002	*0.001*	*0.003*	*0.007*	*0.002*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.35: S-Gini Indices of TR-Progressivity for the Indirect Taxes (household income)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	-0.004	-0.003	-0.006	-0.001	-0.003
	0.000	*0.000*	*0.000*	*0.001*	*0.000*
1.5	-0.107	-0.072	-0.149	-0.017	-0.082
	0.005	*0.005*	*0.004*	*0.012*	*0.006*
2	-0.140	-0.092	-0.191	-0.024	-0.106
	0.005	*0.005*	*0.004*	*0.013*	*0.006*
2.5	-0.155	-0.100	-0.208	-0.029	-0.118
	0.005	*0.005*	*0.004*	*0.012*	*0.006*
3	-0.163	-0.105	-0.218	-0.034	-0.124
	0.005	*0.005*	*0.004*	*0.011*	*0.006*
3.5	-0.169	-0.108	-0.224	-0.037	-0.129
	0.005	*0.005*	*0.004*	*0.011*	*0.005*
4	-0.173	-0.110	-0.227	-0.040	-0.132
	0.005	*0.005*	*0.004*	*0.010*	*0.005*

Notes: Asymptotic standard errors are in italic. Household income is household net disposable income
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.36: S-Gini Indices of IR-Progressivity for the Indirect Taxes (household expenditure)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	0.000	0.000	0.000	0.000	0.000
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.001	0.002	-0.001	0.002	0.002
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2	-0.002	0.002	-0.001	0.003	0.003
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2.5	-0.002	0.003	-0.001	0.003	0.003
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3	-0.002	0.003	-0.001	0.002	0.003
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3.5	-0.002	0.003	-0.001	0.002	0.003
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
4	-0.002	0.003	-0.001	0.002	0.003
	0.000	*0.000*	*0.000*	*0.000*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.37: S-Gini Indices of IR-Progressivity for the Indirect Taxes (household income)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	0.000	0.000	0.000	0.000	-0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.007	-0.004	-0.001	0.000	-0.015
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2	-0.010	-0.005	-0.002	-0.001	-0.019
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2.5	-0.011	-0.005	-0.002	-0.001	-0.021
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3	-0.011	-0.006	-0.002	-0.001	-0.022
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3.5	-0.012	-0.006	-0.002	-0.001	-0.023
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
4	-0.012	-0.006	-0.002	-0.001	-0.024
	0.000	*0.000*	*0.000*	*0.000*	*0.001*

Notes: Asymptotic standard errors are in italic. Household income is household net disposable income
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.38: S-Gini Indices of Redistribution for the Indirect Taxes (household expenditure)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	0.000	0.000	0.000	0.000	0.000
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.001	0.002	-0.001	0.002	0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2	-0.002	0.002	-0.001	0.002	0.002
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2.5	-0.002	0.002	-0.001	0.002	0.002
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3	-0.002	0.003	-0.001	0.002	0.002
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3.5	-0.002	0.003	-0.001	0.002	0.002
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
4	-0.002	0.003	-0.001	0.002	0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.001*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.39: S-Gini Indices of Redistribution for the Indirect Taxes (household income)

	Indirect Taxes under Effective Tax Rates				
Parameter Values (ρ)	**Domestic VAT**	**Import VAT**	**Import Duty**	**Domestic Excises**	**Total Indirect Taxes**
1.01	0.000	0.000	0.000	0.000	-0.001
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
1.5	-0.008	-0.004	-0.001	-0.001	-0.019
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2	-0.010	-0.005	-0.002	-0.001	-0.025
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
2.5	-0.012	-0.006	-0.002	-0.001	-0.028
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3	-0.012	-0.006	-0.002	-0.001	-0.031
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
3.5	-0.013	-0.007	-0.002	-0.002	-0.032
	0.000	*0.000*	*0.000*	*0.000*	*0.001*
4	-0.013	-0.007	-0.002	-0.002	-0.034
	0.000	*0.000*	*0.000*	*0.000*	*0.001*

Notes: Asymptotic standard errors are in italic. Household income is household net disposable income
The null hypothesis could not be rejected for the values in bold at 5% significance level

Table A 5.40:The differences of the Ordinates of the Lorenz Curves Before and After Total Taxes

	Indirect Taxes under Effective Tax Rates			
ρ=2	**Income**		**Expenditure**	
Ordinates (p)	**V1**	**V2&V4**	**V1**	**V2&V4**
0.05	0.0039	0.0036	-0.0017	-0.0022
	0.0003	*0.0003*	*0.0002*	*0.0002*
0.1	0.0047	0.0039	-0.0043	-0.0054
	0.0004	*0.0004*	*0.0002*	*0.0002*
0.15	0.0050	0.0039	-0.0072	-0.0086
	0.0004	*0.0004*	*0.0003*	*0.0003*
0.2	0.0051	0.0040	-0.0104	-0.0119
	0.0005	*0.0005*	*0.0004*	*0.0003*
0.25	0.0049	0.0043	-0.0139	-0.0151
	0.0005	*0.0005*	*0.0005*	*0.0004*
0.3	0.0042	0.0045	-0.0175	-0.0181
	0.0006	*0.0006*	*0.0006*	*0.0005*
0.35	0.0034	0.0047	-0.0212	-0.0208
	0.0006	*0.0006*	*0.0007*	*0.0007*
0.4	0.0023	0.0049	-0.0248	-0.0231
	0.0007	*0.0007*	*0.0008*	*0.0008*
0.45	**0.0010**	0.0050	-0.0281	-0.0249
	0.0007	*0.0008*	*0.0009*	*0.0009*
0.5	**-0.0004**	0.0052	-0.0309	-0.0259
	0.0008	*0.0008*	*0.0011*	*0.0010*
0.55	-0.0017	0.0054	-0.0332	-0.0266
	0.0009	*0.0009*	*0.0012*	*0.0012*
0.6	**-0.0028**	0.0057	-0.0351	-0.0267
	0.0009	*0.0010*	*0.0014*	*0.0013*
0.65	**-0.0041**	0.0059	-0.0367	-0.0265
	0.0010	*0.0011*	*0.0016*	*0.0015*
0.7	**-0.0053**	0.0061	-0.0376	-0.0256
	0.0011	*0.0012*	*0.0018*	*0.0017*
0.75	-0.0062	0.0065	-0.0374	-0.0236
	0.0012	*0.0013*	*0.0020*	*0.0019*
0.8	-0.0071	0.0068	-0.0363	-0.0209
	0.0013	*0.0014*	*0.0022*	*0.0020*
0.85	-0.0082	0.0068	-0.0346	-0.0176
	0.0014	*0.0015*	*0.0025*	*0.0023*
0.9	-0.0094	0.0067	-0.0324	-0.0141
	0.0015	*0.0016*	*0.0028*	*0.0025*
0.95	-0.0081	0.0075	-0.0277	-0.0095
	0.0017	*0.0018*	*0.0031*	*0.0027*
0.99	-0.0066	**0.0031**	-0.0150	**-0.0046**
	0.0017	*0.0019*	*0.0031*	*0.0028*

Notes: Asymptotic standard errors are in italic. Gross income (expenditure) is equal to AE_INC (AE_EXP) plus per adult equivalent total income and payroll tax Net income (expenditure) is equal to AE_INC (AE_EXP) minus per adult equivalent property taxes and total indirect tax with effective rates

Table A 5.41: S-Gini Indices of Progressivity and Redistribution for Total Taxes (expenditure)

	Indirect Taxes under Effective Tax Rates					
	IR-Progressivity		Reranking		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0022	0.0014	0.0007	0.0007	0.0015	0.0007
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.054	0.040	0.017	0.016	0.037	0.023
	0.002	*0.002*	*0.000*	*0.000*	*0.002*	*0.002*
2	0.069	0.056	0.021	0.021	0.048	0.035
	0.002	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*
2.5	0.074	0.064	0.022	0.022	0.052	0.042
	0.002	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*
3	0.076	0.069	0.021	0.022	0.055	0.047
	0.002	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*
3.5	0.076	0.071	0.021	0.021	0.055	0.050
	0.002	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*
4	0.075	0.073	0.020	0.021	0.056	0.052
	0.002	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP plus per adult equivalent total income and payroll tax
Net expenditure is equal to AE_EXP minus per adult equivalent property taxes and total indirect tax

Table A 5.42: S-Gini Indices of Progressivity and Redistribution for Total Taxes (income)

	Indirect Taxes under Effective Tax Rates					
	IR-Progressivity		Reranking		Redistribution	
Parameter Values (ρ)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0008	0.0002	0.0004	0.0004	0.0004	-0.0003
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
1.5	0.019	0.007	0.014	0.015	0.005	-0.008
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
2	0.024	0.012	0.021	0.023	**0.002**	-0.010
	0.001	*0.002*	*0.001*	*0.001*	*0.002*	*0.002*
2.5	0.024	0.015	0.026	0.028	**-0.002**	-0.012
	0.001	*0.001*	*0.001*	*0.001*	*0.002*	*0.002*
3	0.023	0.017	0.029	0.031	-0.005	-0.014
	0.001	*0.001*	*0.001*	*0.001*	*0.002*	*0.002*
3.5	0.022	0.018	0.031	0.034	-0.009	-0.015
	0.001	*0.001*	*0.001*	*0.001*	*0.002*	*0.002*
4	0.021	0.019	0.033	0.036	-0.012	-0.017
	0.001	*0.001*	*0.002*	*0.002*	*0.002*	*0.002*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC plus per adult equivalent total income and payroll tax
Net income is equal to AE_INC minus per adult equivalent property taxes and total indirect tax

Appendix 5.2: Calculations for Nominal Tax Rates

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

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

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

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

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_{TD} 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 A 5.43:Nominal and Effective Tax Rates, 1998 Turkey IO Table

	E	N	E	N	E	N	E	N
Industries	**VAT_D**	**VAT_D**	**S**	**S**	**VAT_M**	**VAT_M**	**D**	**D**
Cereals and crops n.e.c.	0.046	0.036	0.024	0.000	0.086	0.081	0.048	0.046
Vegetables,& nursery prod.	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, 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 & 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 of 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

Note: *E indicates effective rates; N indicates nominal rates*

Nominal and Effective Tax Rates, 1998 Turkey IO Table, Continued								
	E	N	E	N	E	N	E	N
Industries	VAT_D	VAT_D	S	S	VAT_M	VAT_M	D	D
Pesticides, agrochemicals &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, cosmatics&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
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

Nominal and Effective Tax Rates, 1998 Turkey IO Table, Continued								
	E	N	E	N	E	N	E	N
Industries	**VAT_D**	**VAT_D**	**S**	**S**	**VAT_M**	**VAT_M**	**D**	**D**
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 motorcyles	0.014	0.010	0.009	0.000	0.006	0.000	0.000	0.000
Retail trade and repair of personel & household goods, exc.motor vehicles and motorcyles	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 telecommnications	0.023	0.020	0.002	0.000	0.077	0.076	0.000	0.000
Financial intermedediation,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&personal&household goods	0.021	0.006	0.014	0.000	0.088	0.082	0.000	0.000
Computer&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
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

Table A 5.44: The Distribution of Social Security Membership of Employees by region (%)

	SSK	ES (Civil Servants)	Bag-Kur	Private	Unrecorded Employee
Istanbul	27.9	8.0	8.8	56.4	13.6
Marmara	17.6	11.1	16.4	4.1	12.3
Aegean	15.1	15.0	19.8	14.4	13.7
Black Sea	6.8	13.6	13.6	2.9	13.5
Central Anatolia	13.7	21.9	17.4	19.5	12.6
Mediterranean	10.1	13.8	16.4	1.5	16.0
East Anatolia	4.1	12.0	5.3	0.0	8.1
S. East Anatolia	4.7	4.6	2.2	1.2	10.1
Turkey	100	100	100	100	100

Table A 5.45: The Distribution of Social Security Membership of Employees in regions (%)

	SSK	ES (Civil Servants)	Bag-Kur	Private	Unrecorded Employee	Turkey
Istanbul	51.9	5.3	4.1	0.7	38.0	100
Marmara	39.9	9.0	9.2	0.1	41.9	100
Aegean	32.9	11.6	10.6	0.2	44.7	100
Black Sea	19.2	13.7	9.5	0.1	57.5	100
Central Anatolia	30.5	17.3	9.6	0.3	42.3	100
Mediterranean	23.5	11.4	9.4	0.0	55.7	100
East Anatolia	18.6	19.6	6.0	0.0	55.8	100
S. East Anatolia	21.4	7.4	2.5	0.0	68.6	100

Note: *SSK and Bag-Kur are social security institutions for workers and self-employed respetively*

Appendix 5.3: Figures

Figure A 5.1

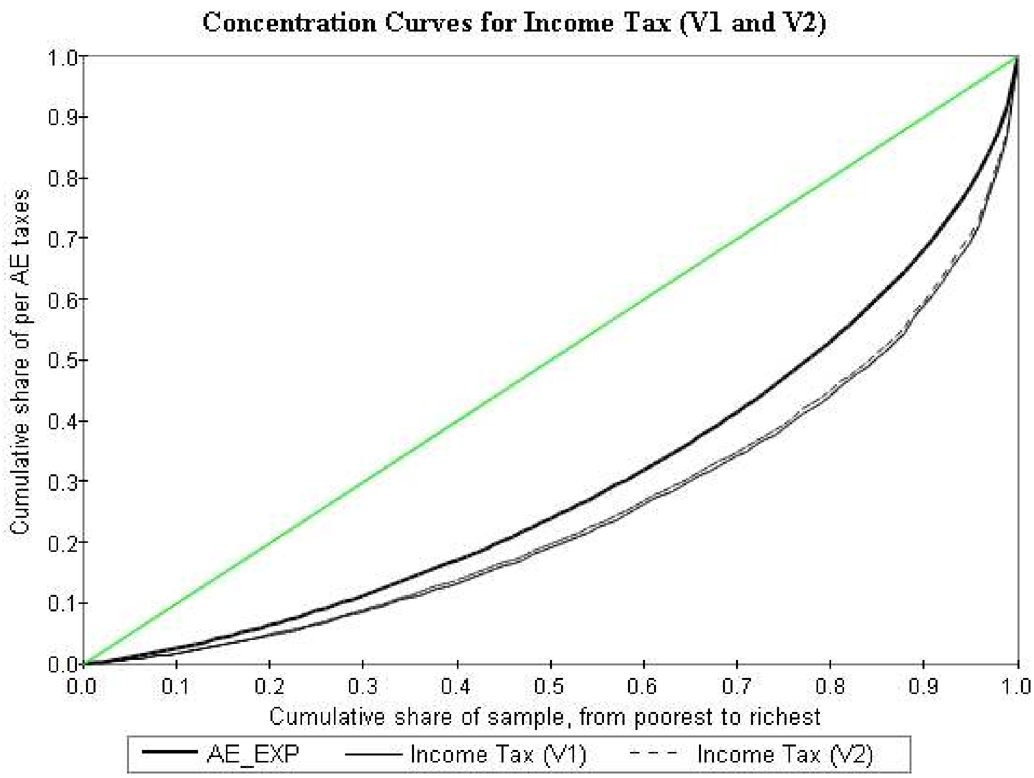


Figure A 5.2

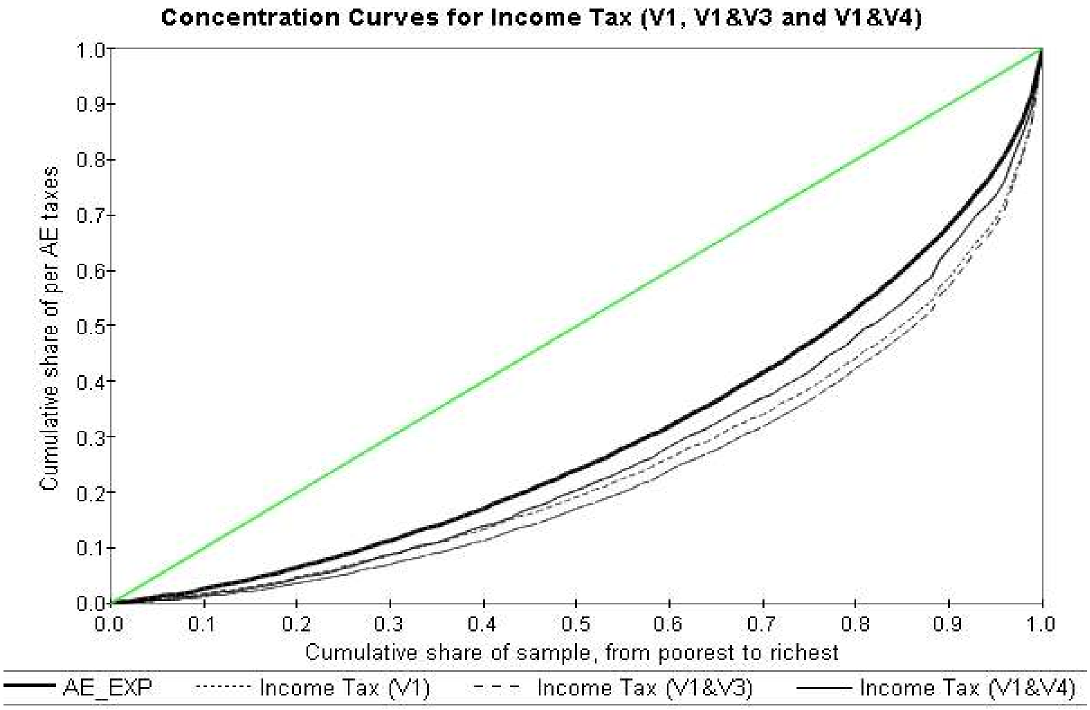


Figure A 5.3

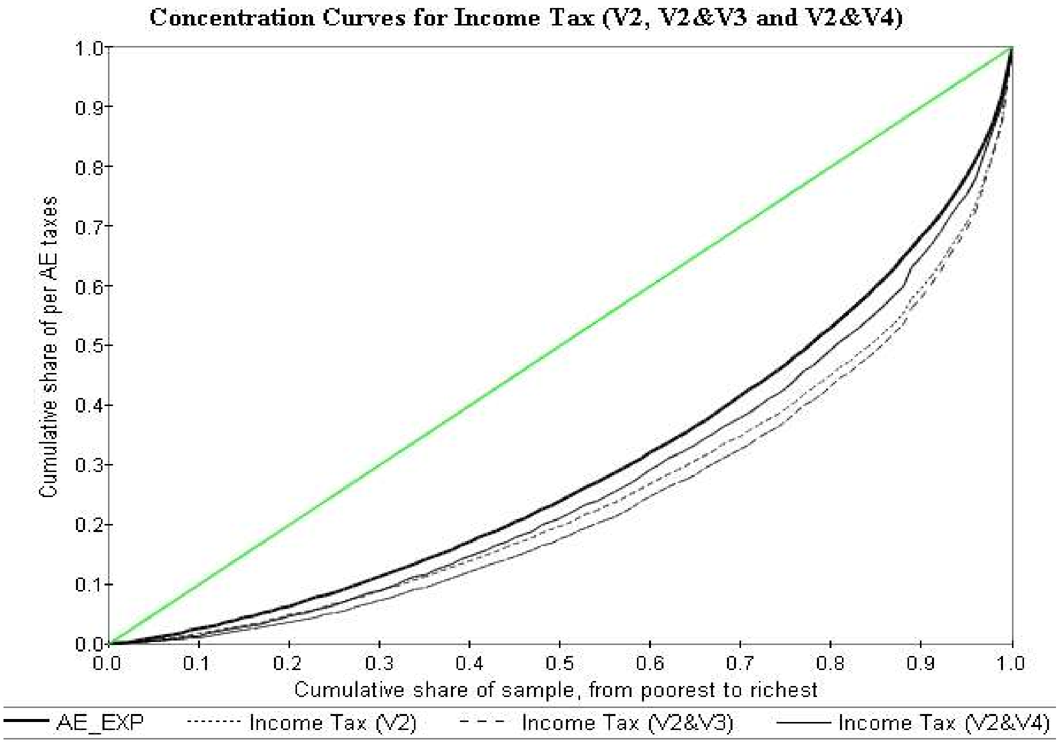


Figure A 5.4

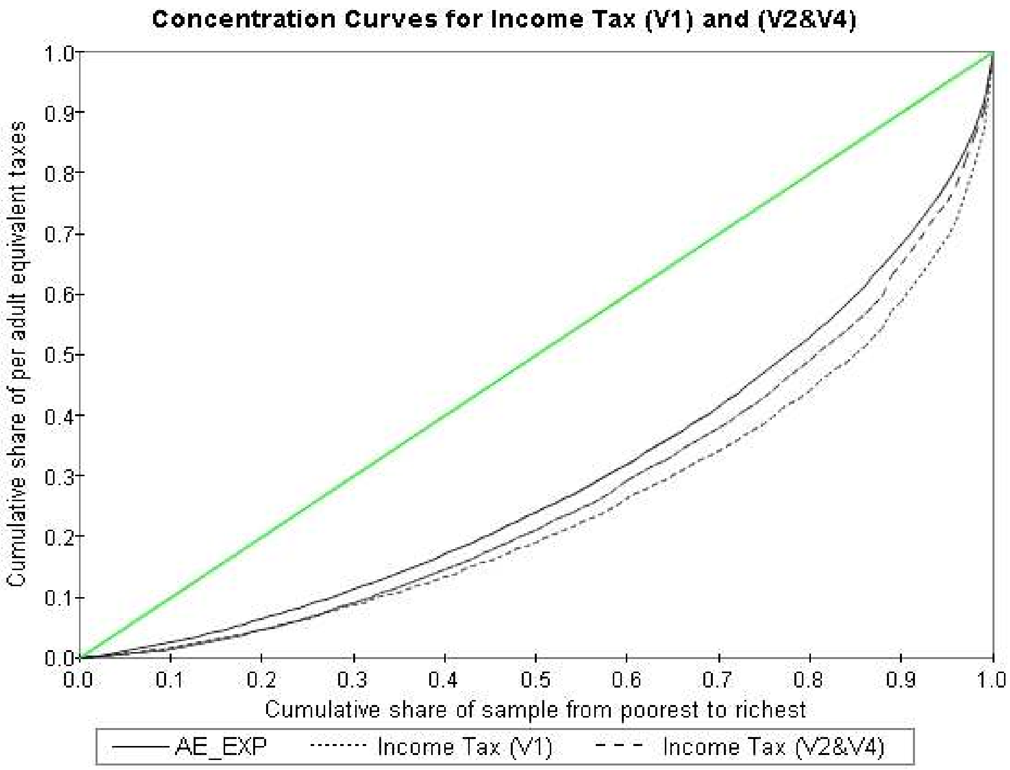


Figure A 5.5

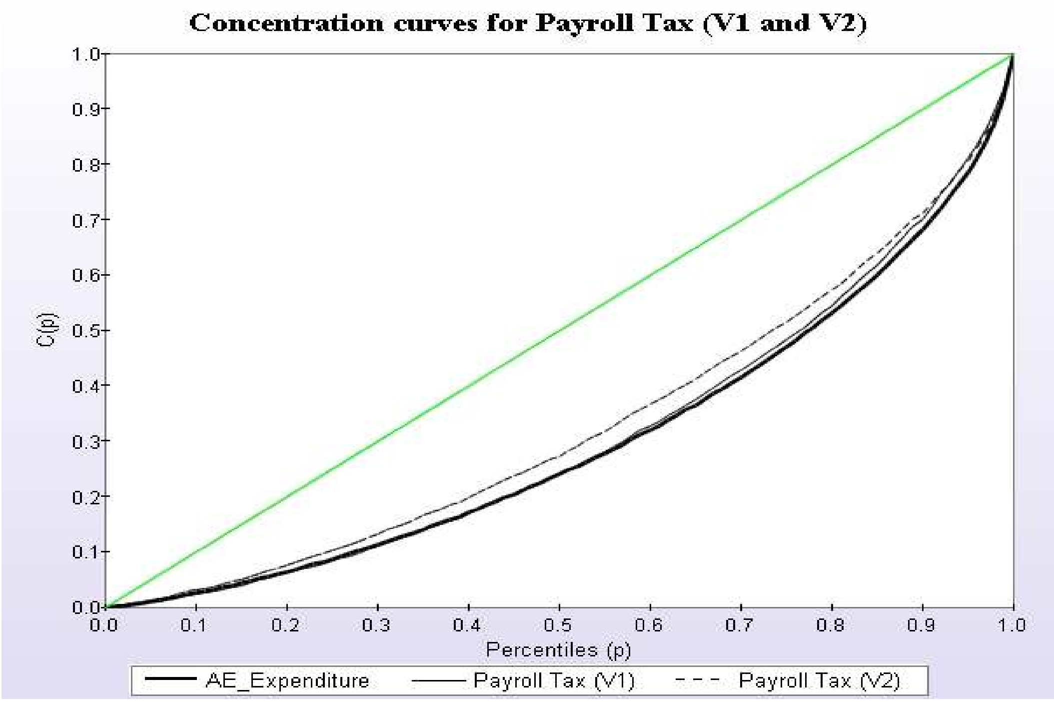


Figure A 5.6

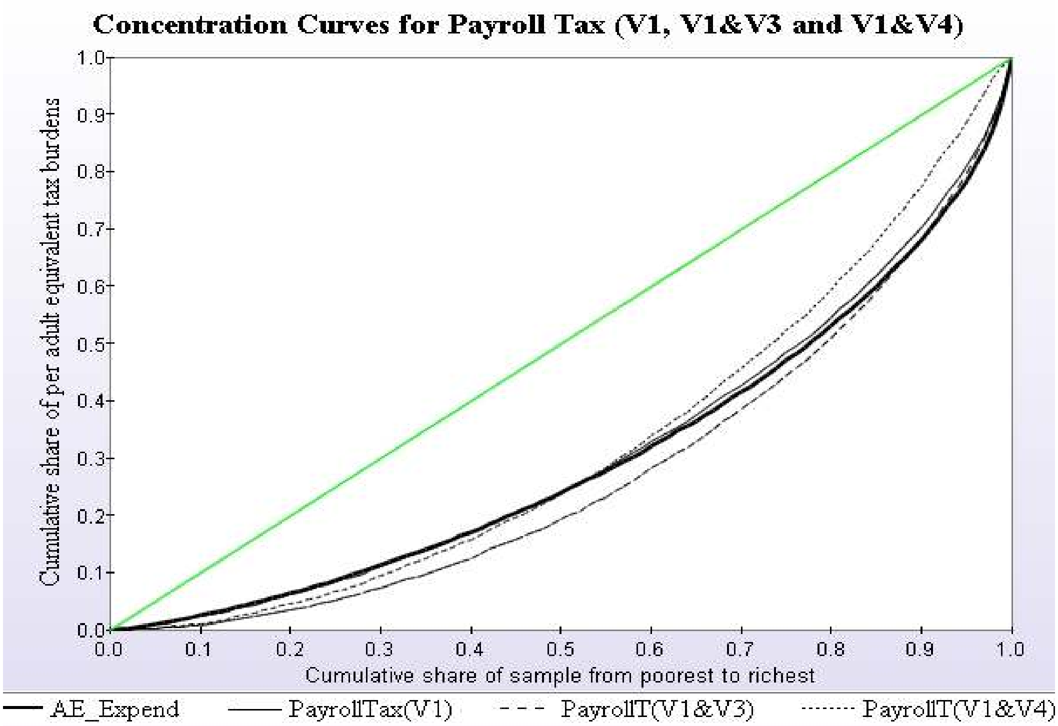


Figure A 5.7

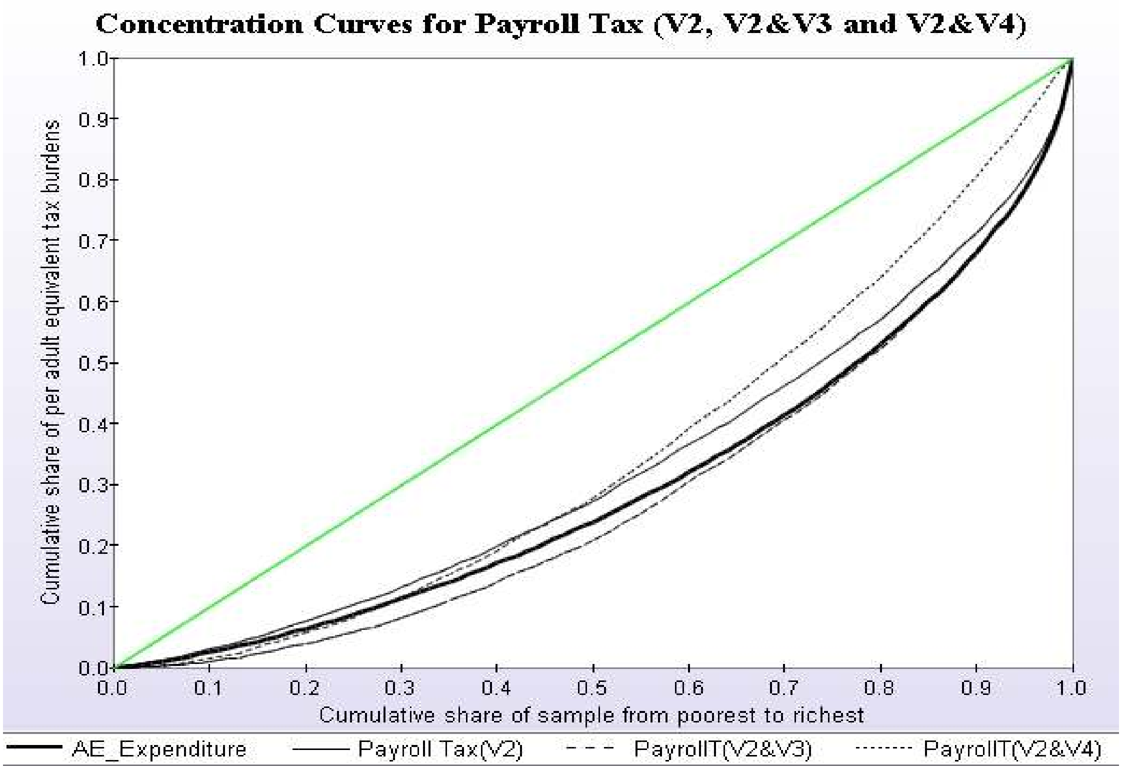


Figure A 5.8

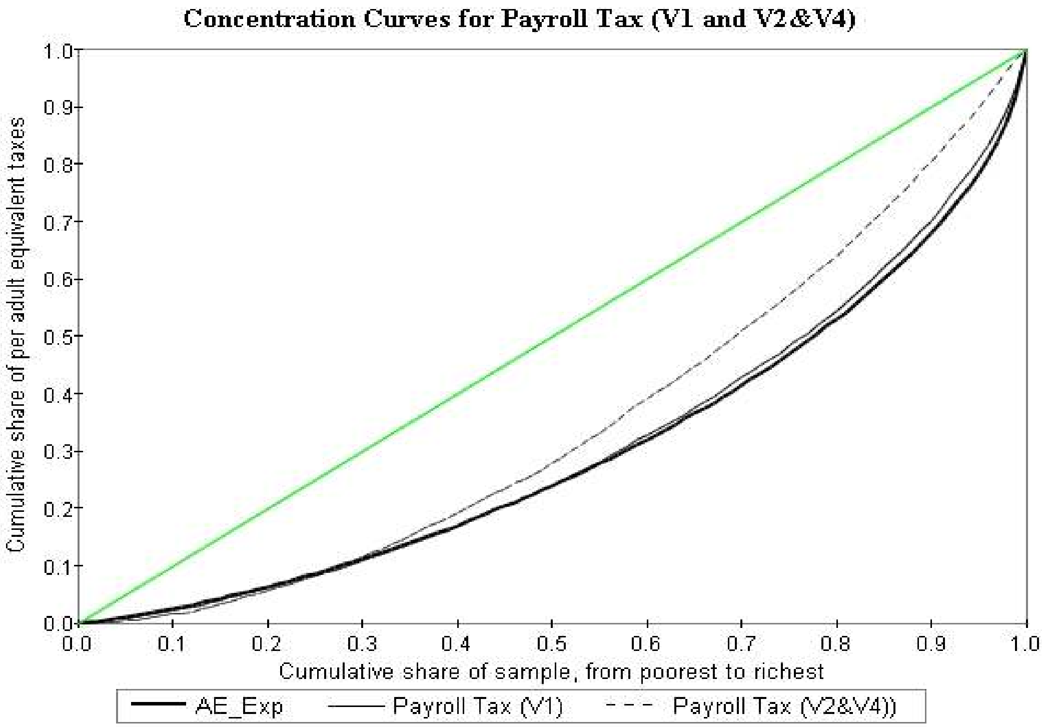


Figure A 5.9

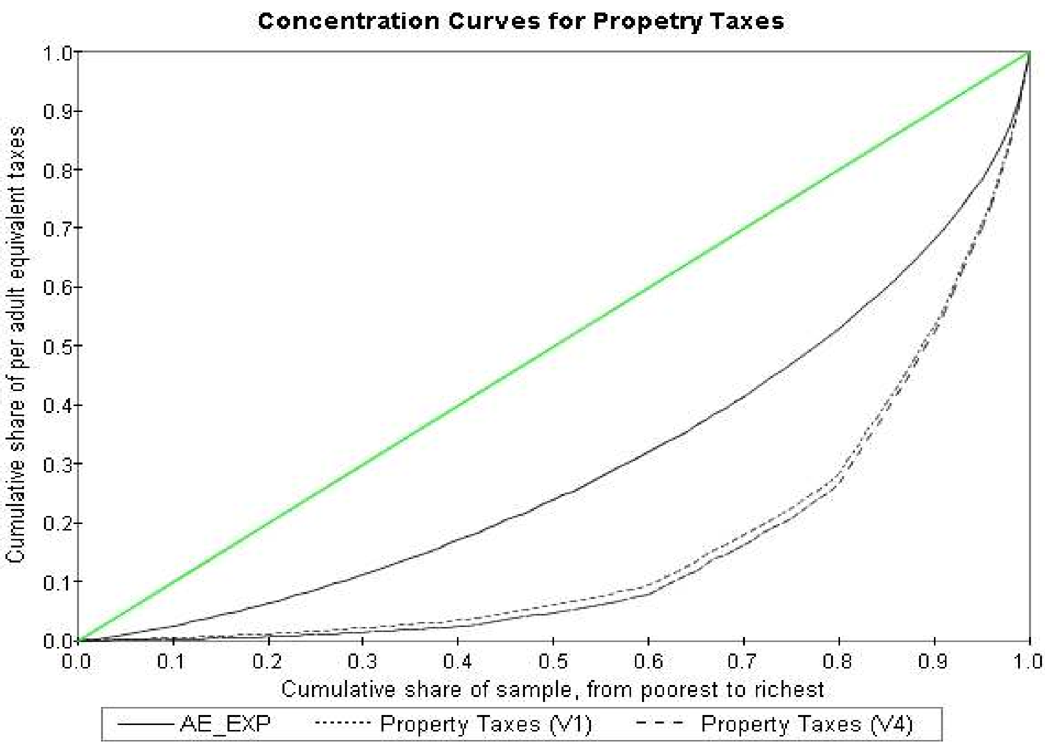


Figure A 5.10

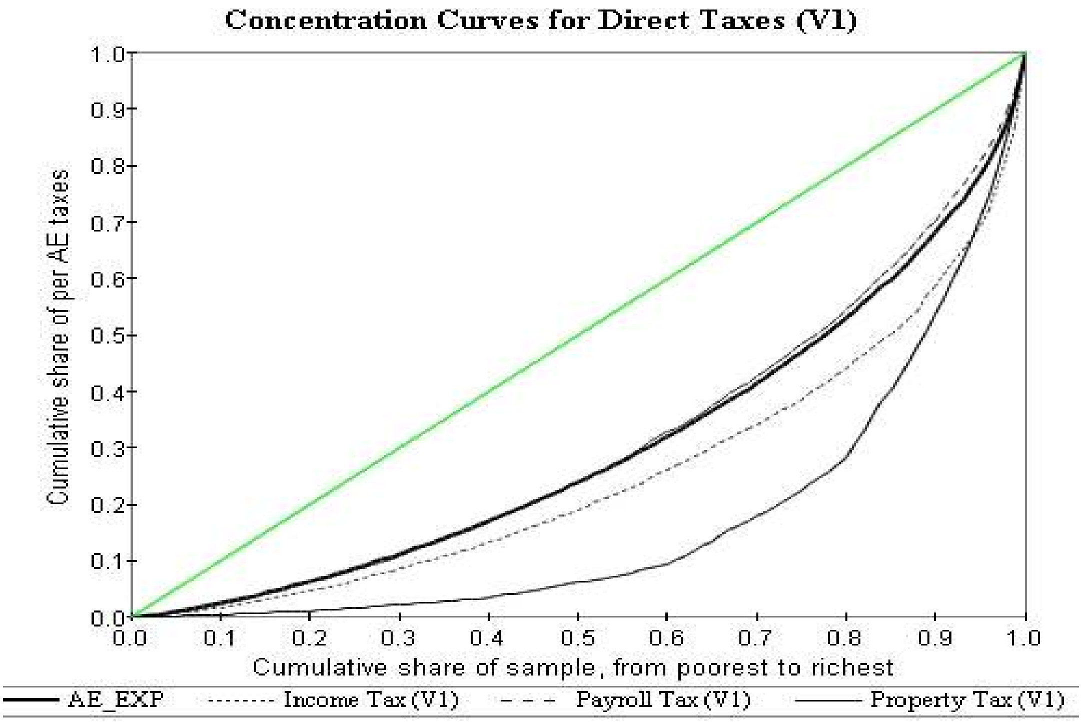


Figure A 5.11

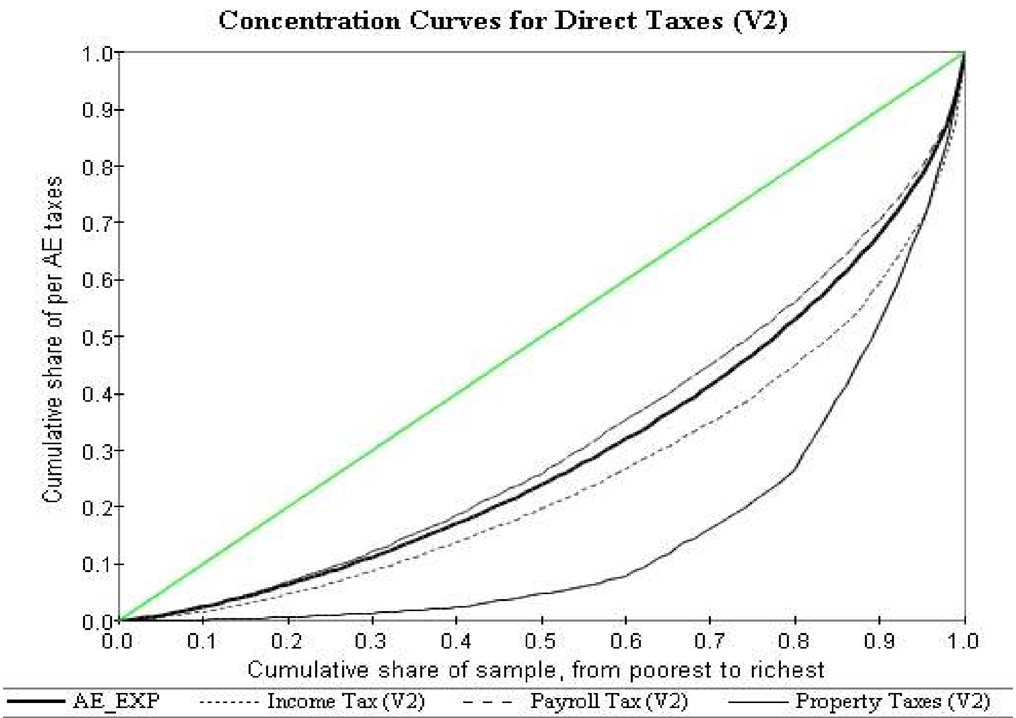


Figure A 5.12

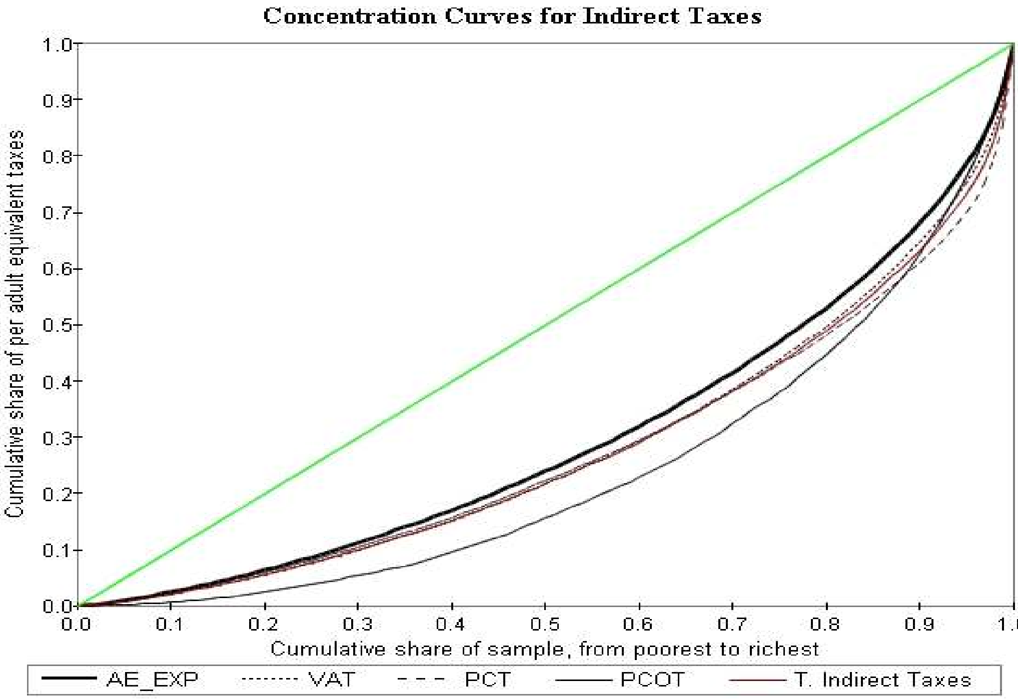


Figure A 5.13

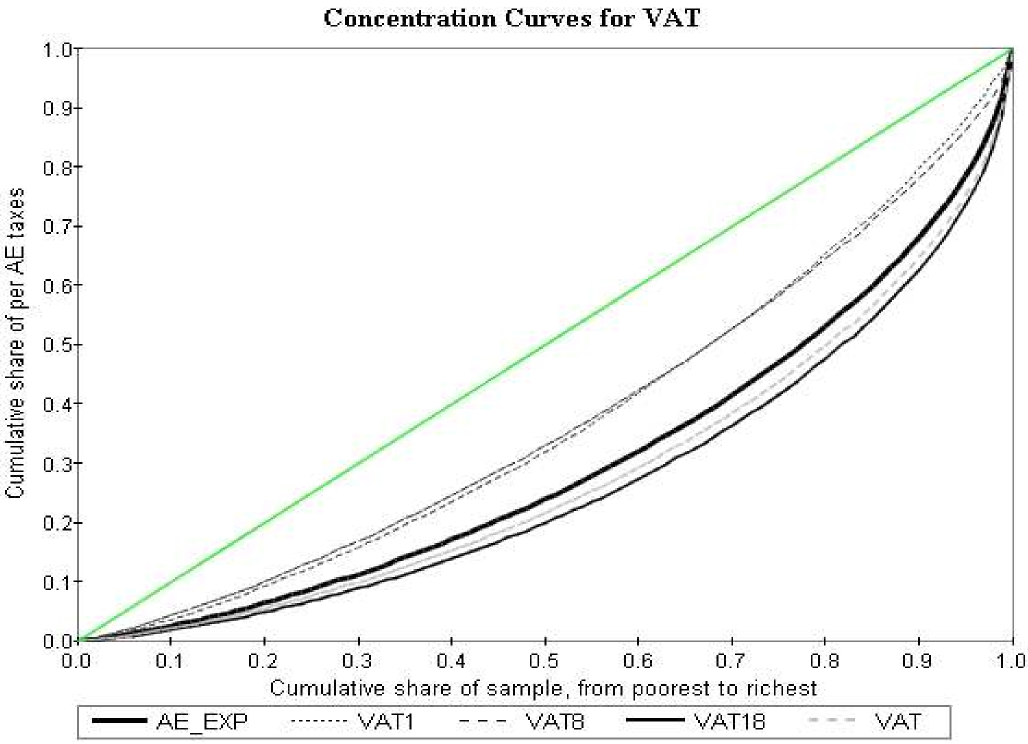


Figure A 5.14

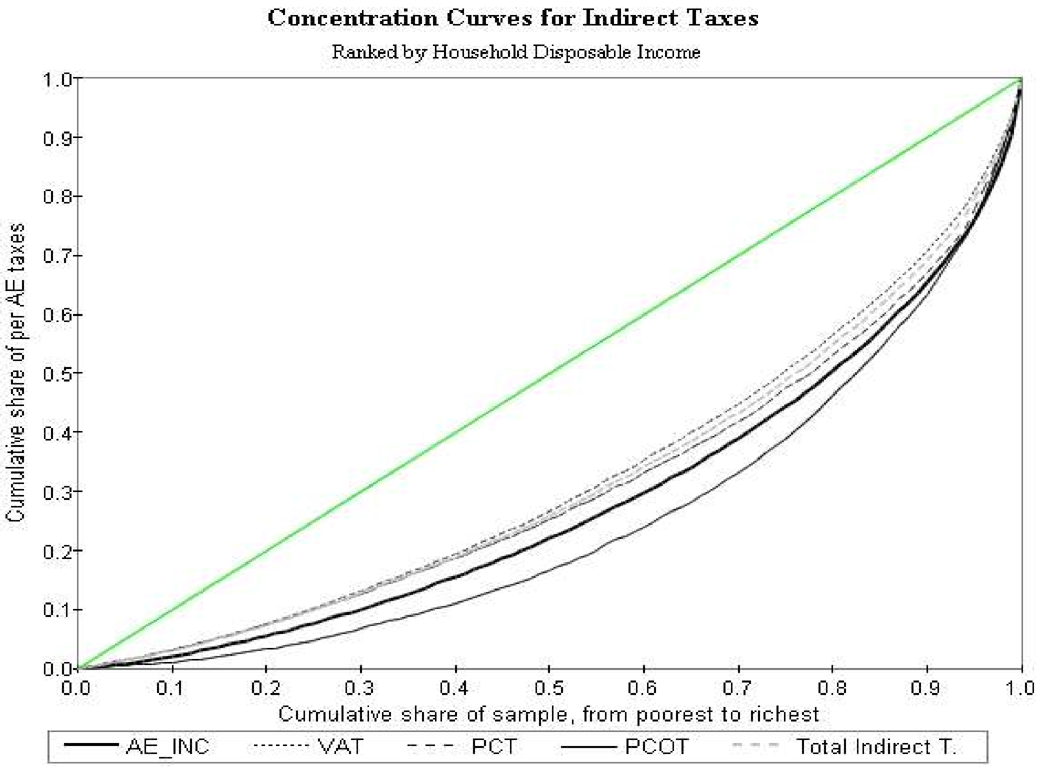


Figure A 5.15

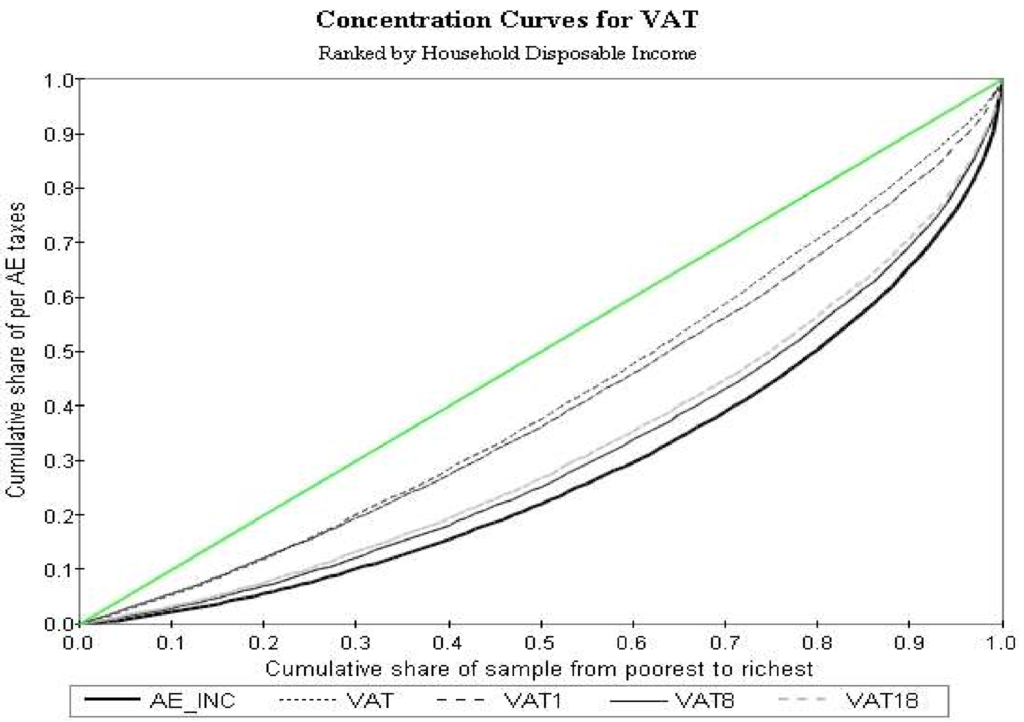


Figure A 5.16

Concentration Curves for Total Taxes (Variant1)

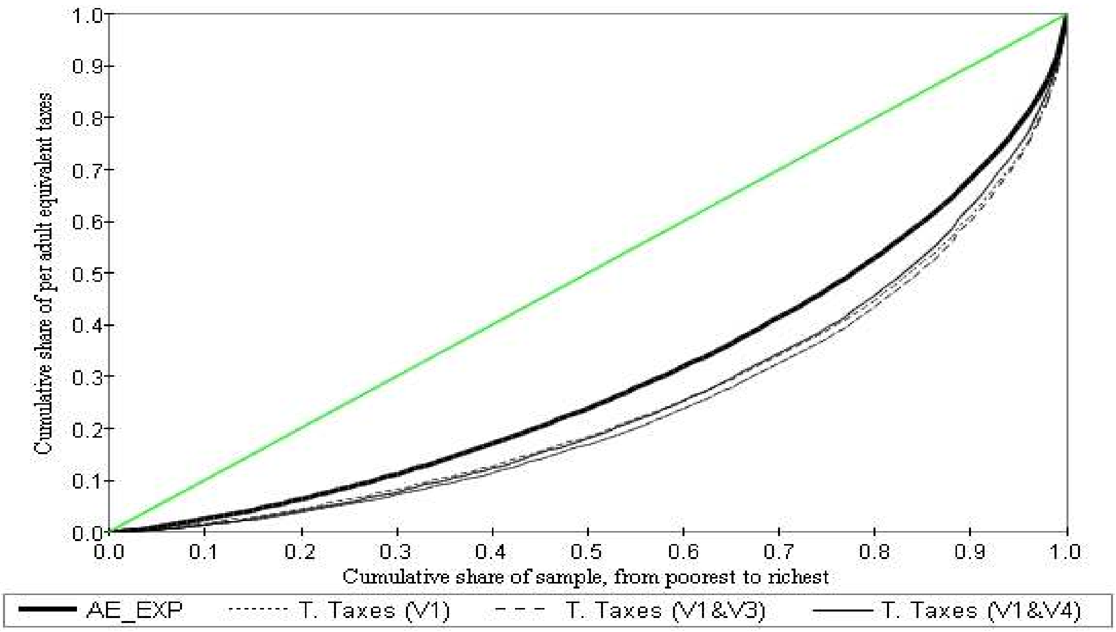


Figure A 5.17

Concentration Curves for the Total Taxes (Variant 2)

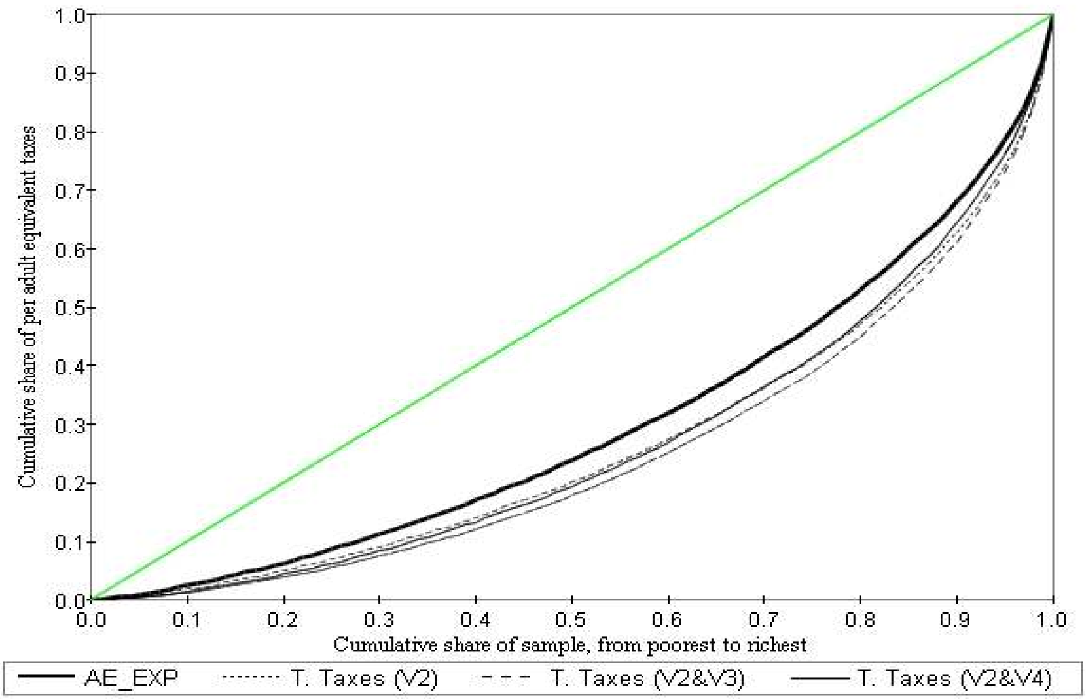


Figure A 5.18

Concentration Curves for the Total Taxes (V1 and V2&V4)

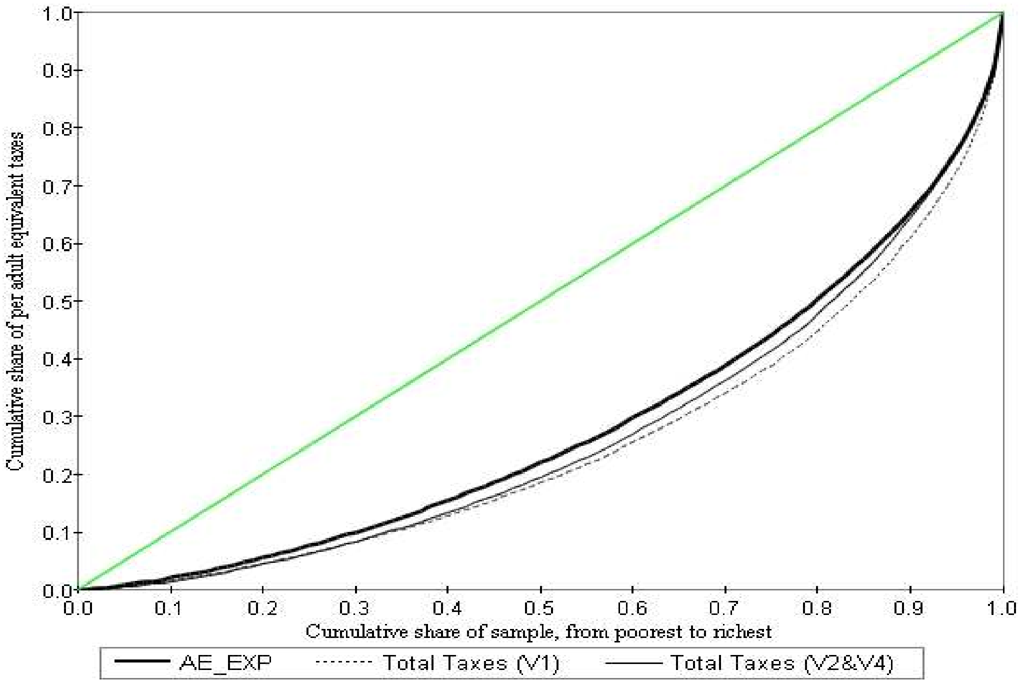


Figure A 5.19

Concentration Curves for the Total Taxes (Variant 1)

Ranked by Household Net Disposable Income

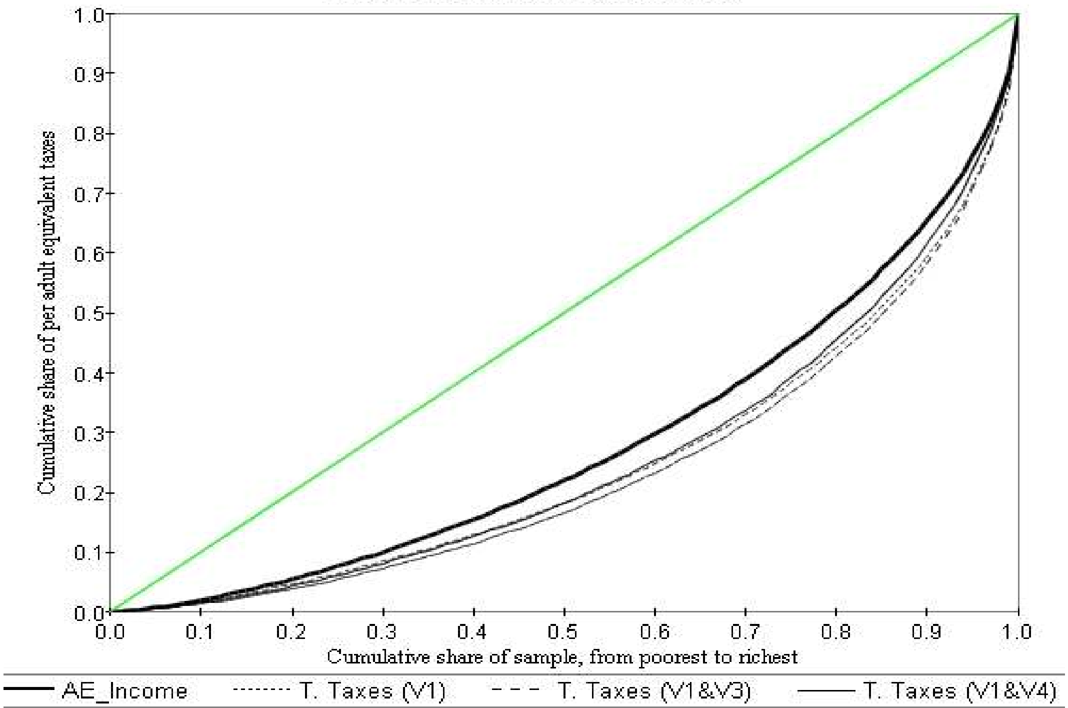


Figure A 5.20

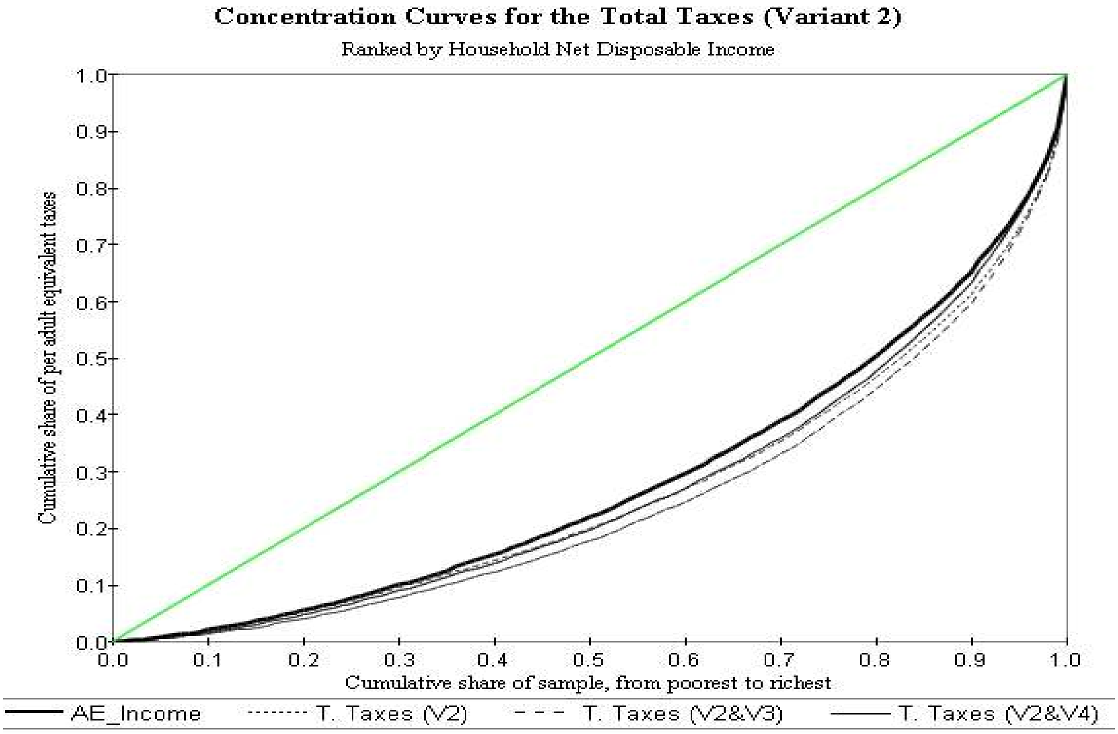


Figure A 5.21

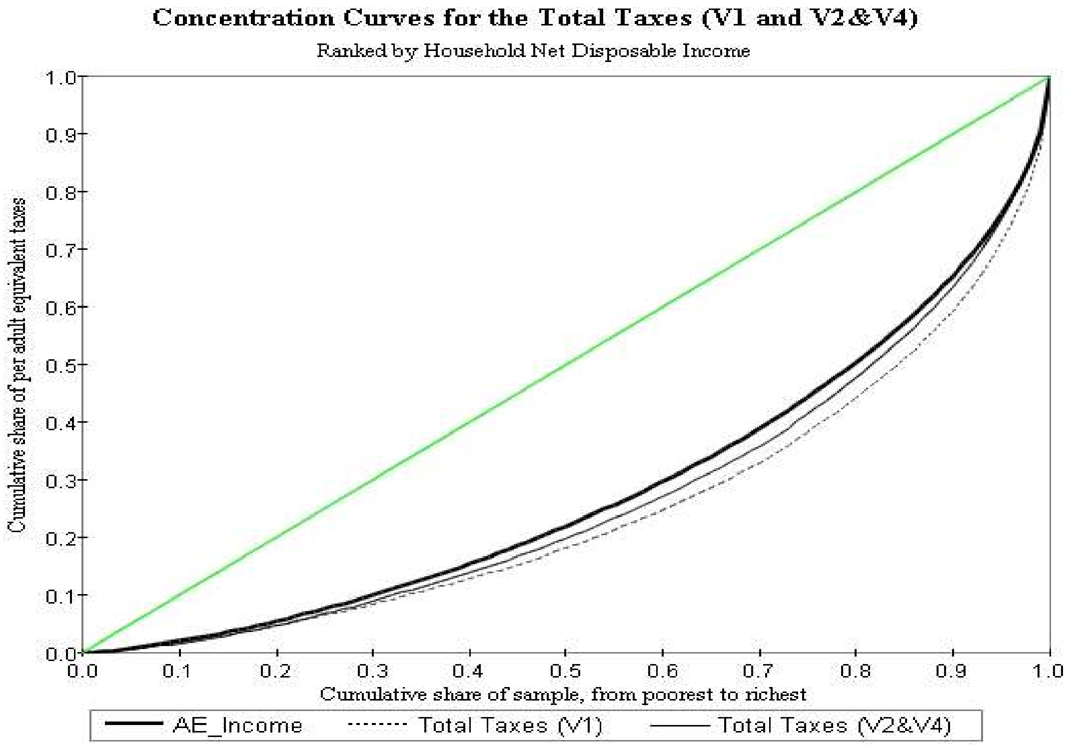


Figure A 5.22

Lorenz Curves for Household Expenditures (Total Tax Incidence) (V1)

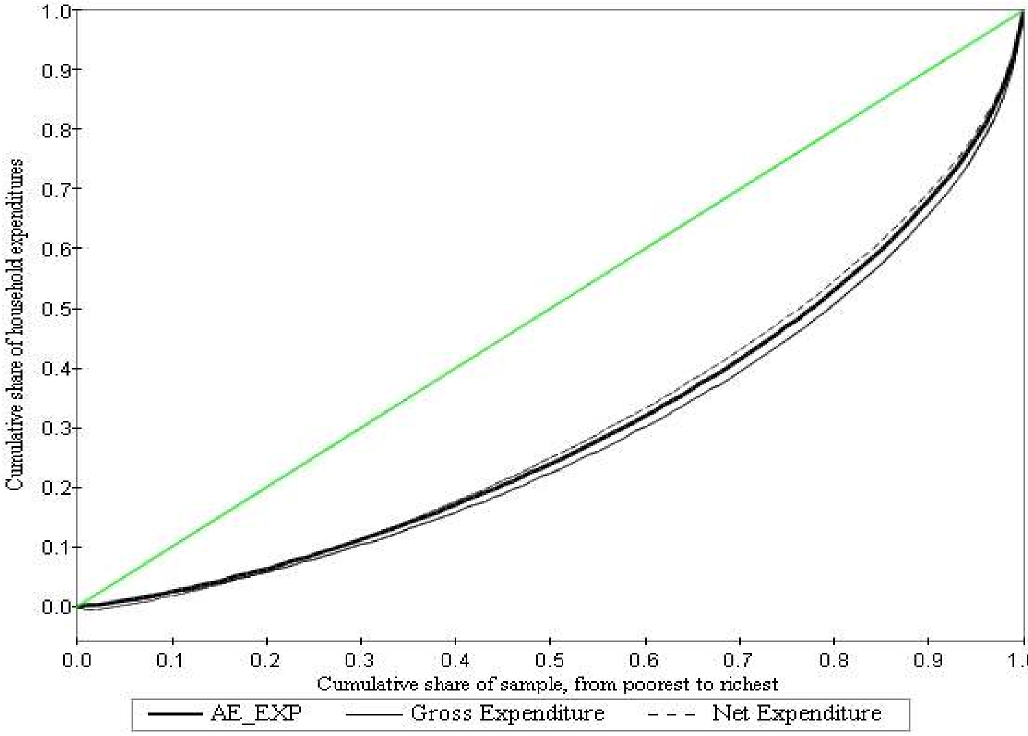


Figure A 5.23

Lorenz Curves for Household Expenditures (Total Tax Incidence) (V2&V4)

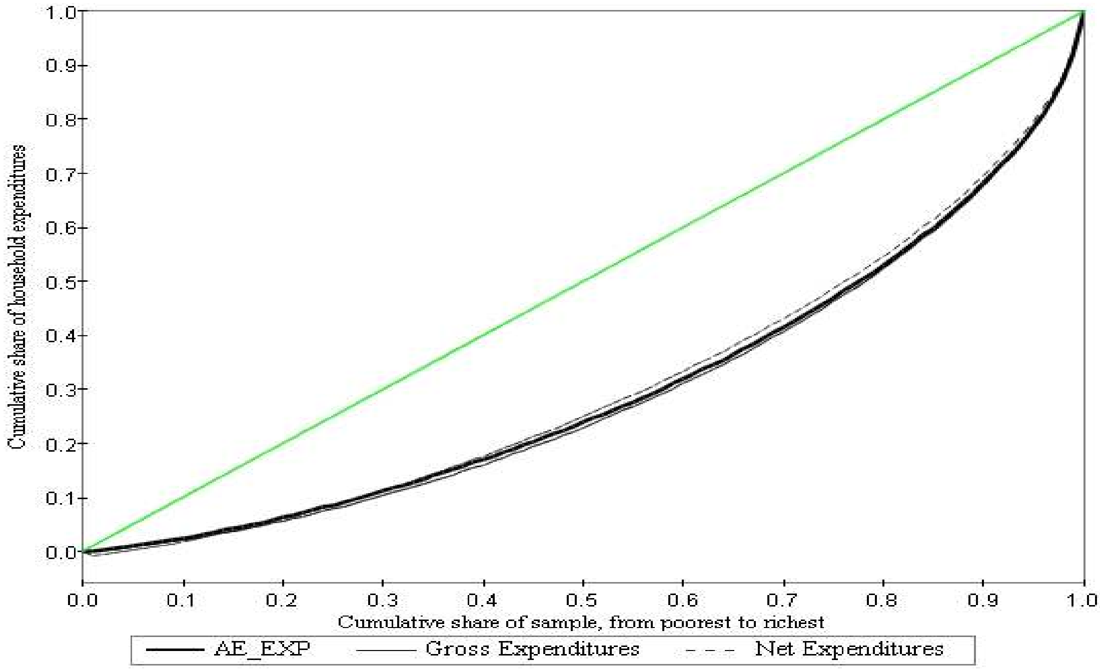


Figure A 5.24

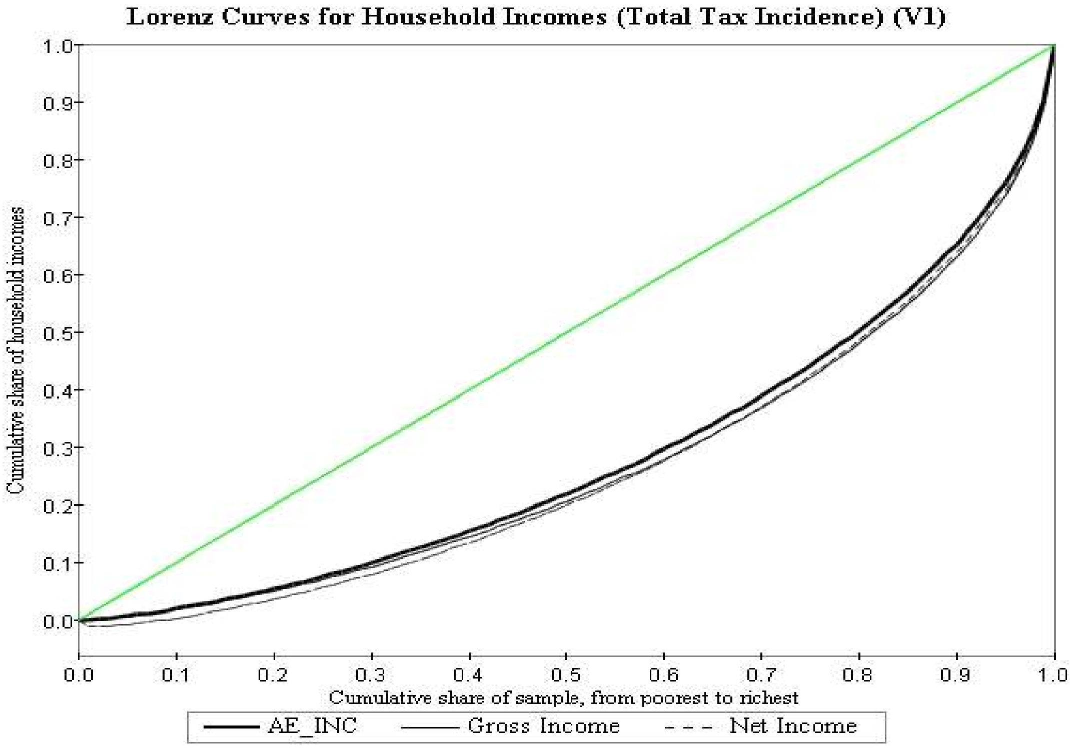


Figure A 5.25

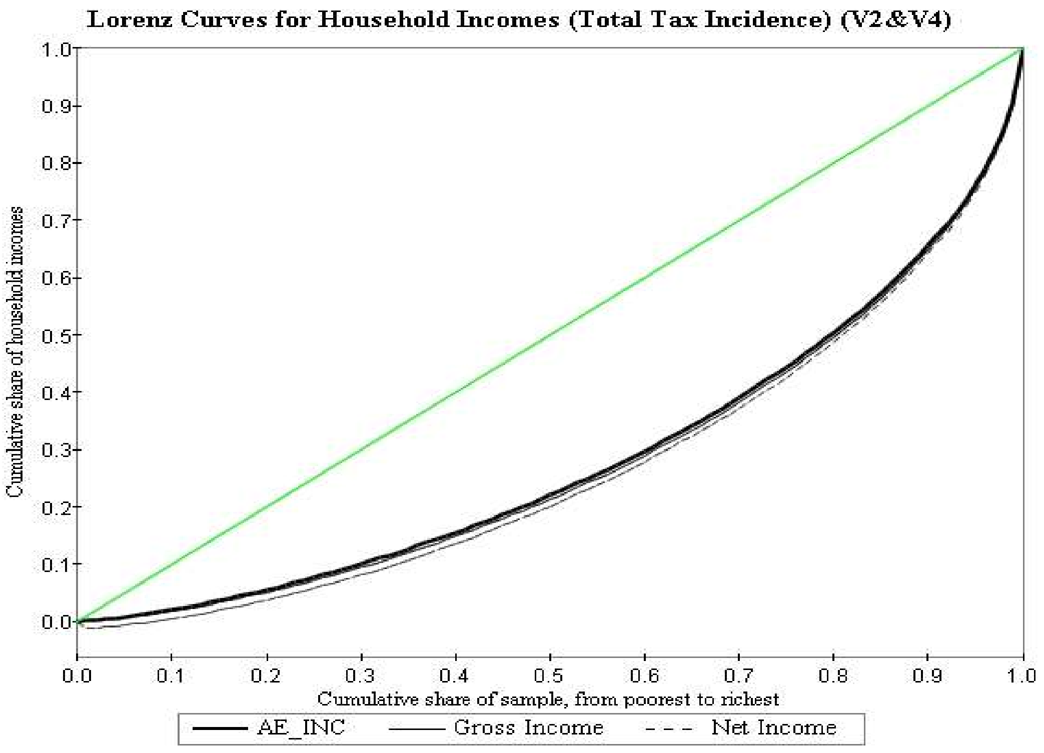


Figure A 5.26

Concentration Curves for Indirect Taxes

Under Effective Tax Rates

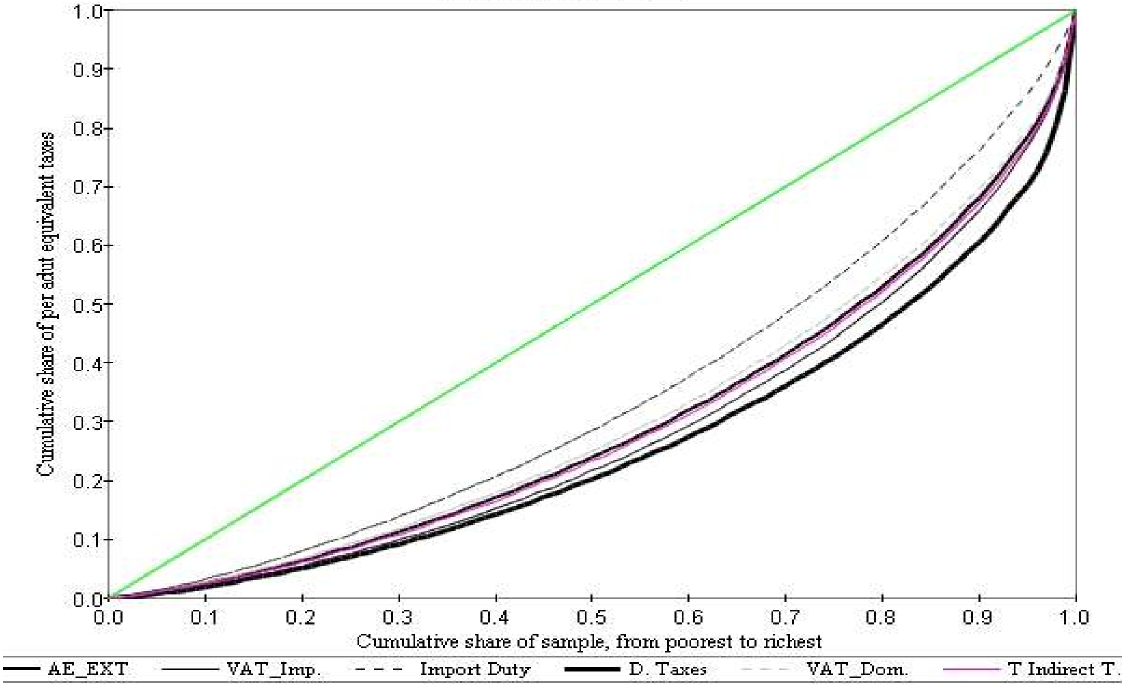


Figure A 5.27

Comparison of Concentration Curves for Indirect Taxes

with standard and effective tax rates

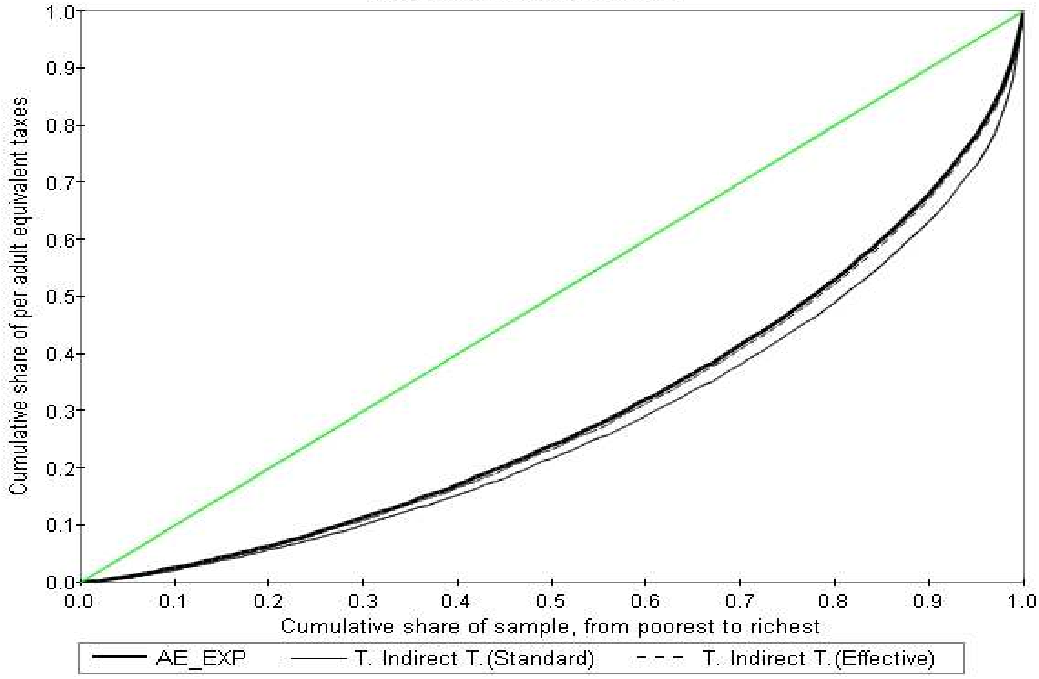


Figure A 5.28

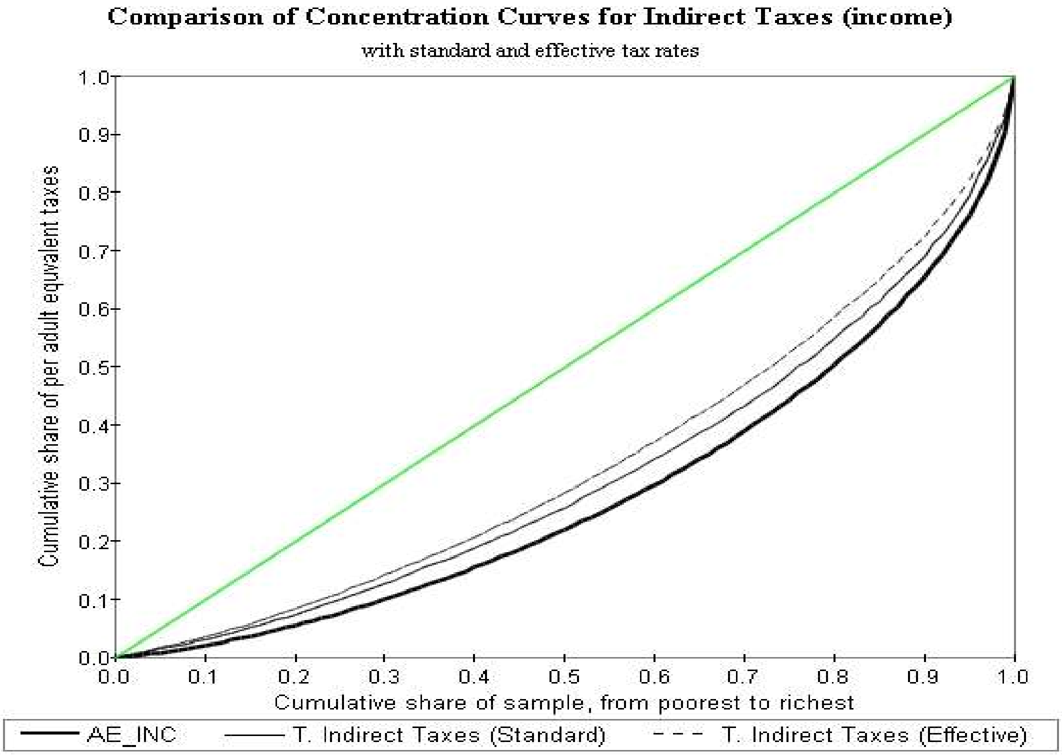


Figure A 5.29

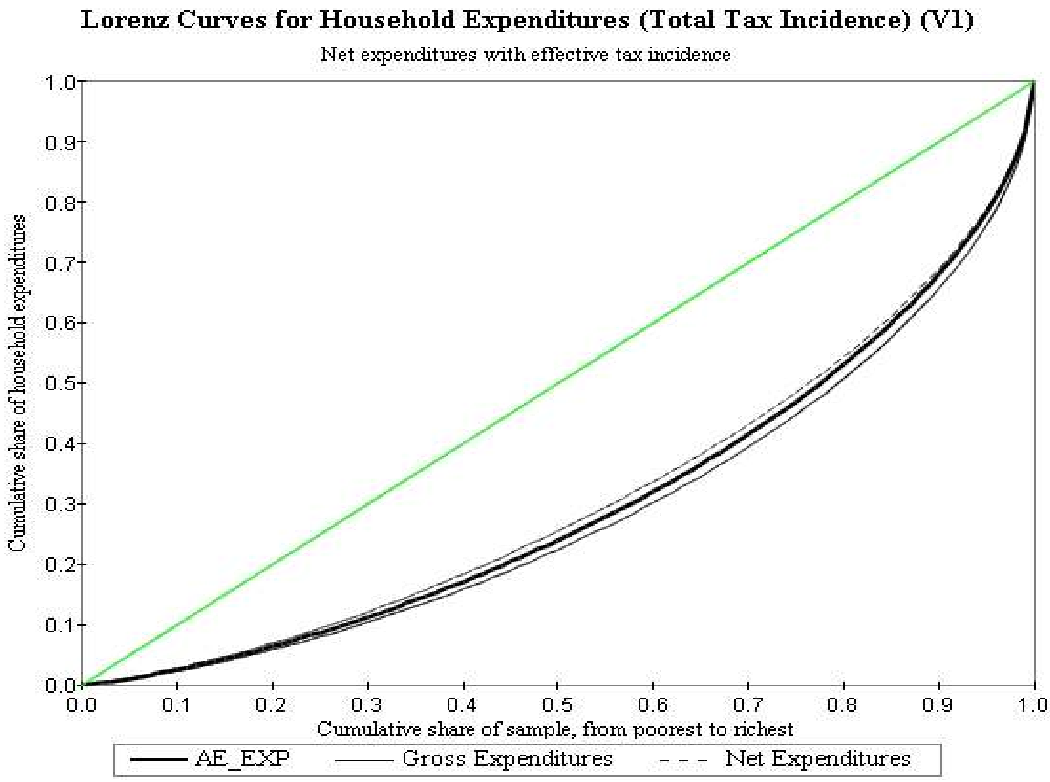


Figure A 5.30

Lorenz Curves for Household Expenditures (Total Tax Incidence) (V2&V4)

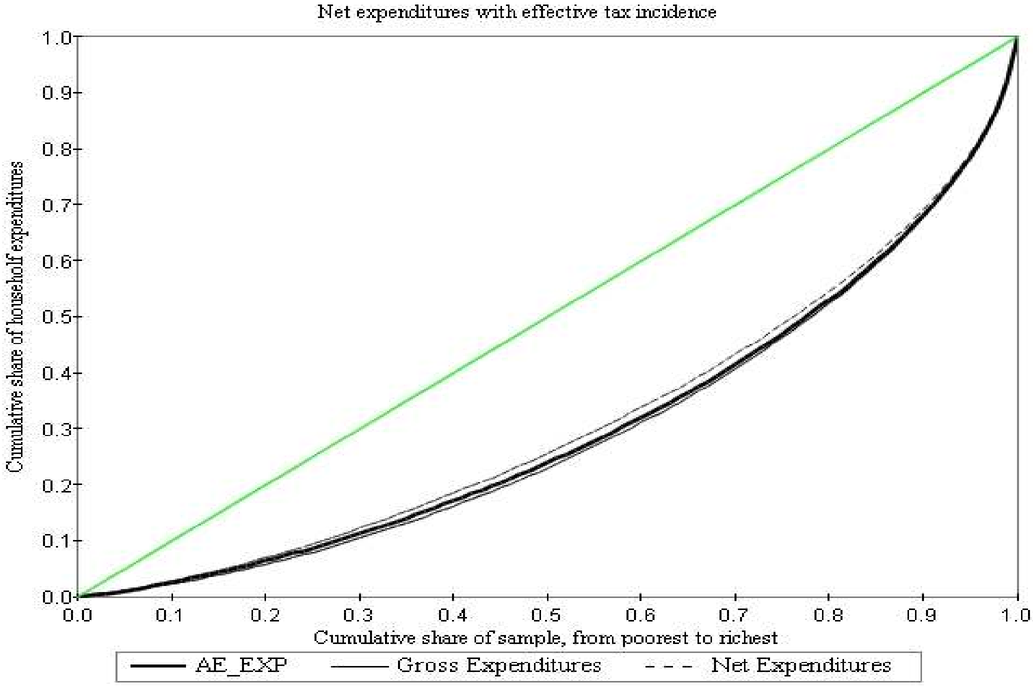


Figure A 5.31

Lorenz Curves for Household Incomes (Total Tax Incidence) (V1)

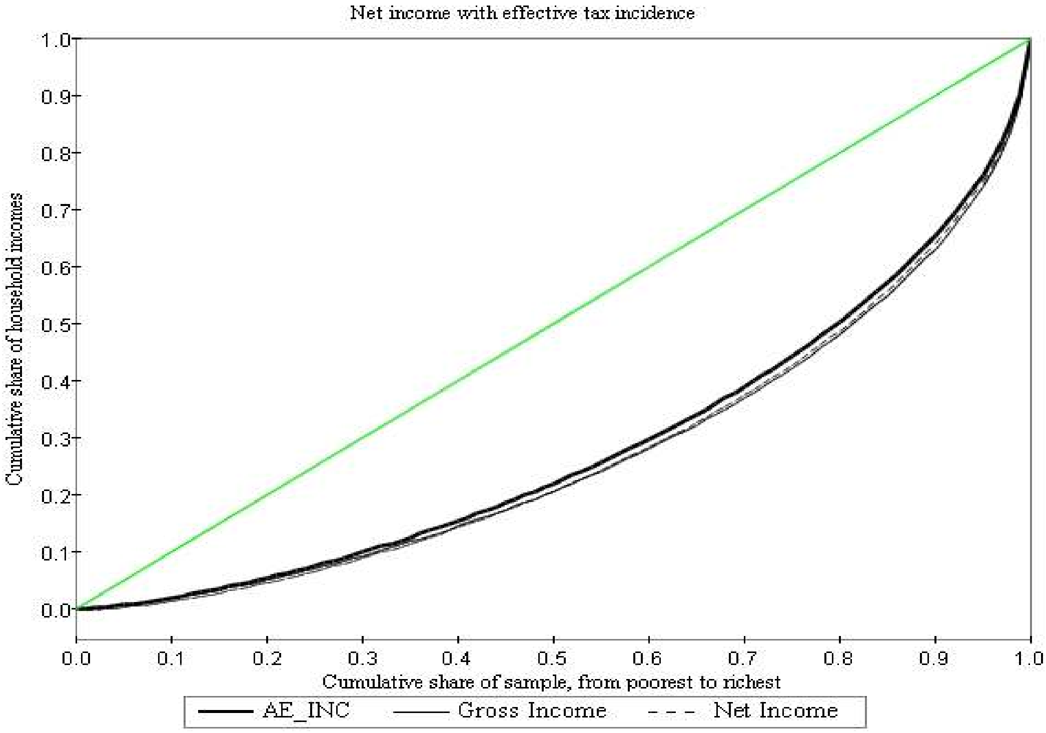
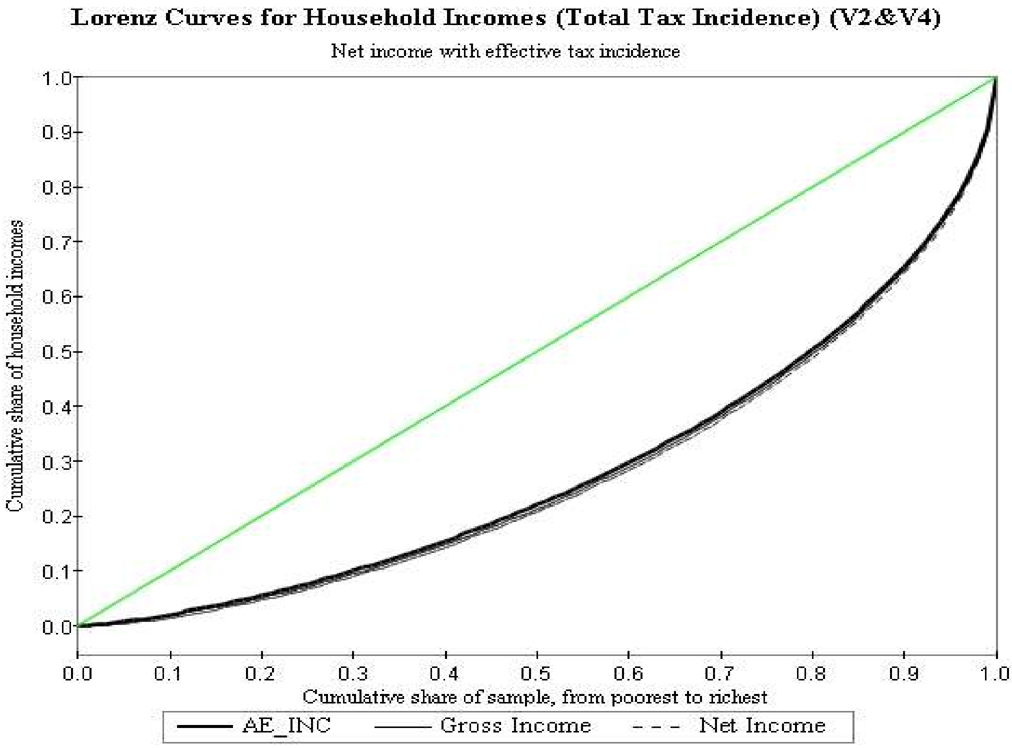


Figure A 5.32


Lorenz Curves for Household Incomes (Total Tax Incidence) (V2&V4)
Net income with effective tax incidence
Cumulative share of household incomes
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Cumulative share of sample, from poorest to richest
AE_INC
Gross Income
Net Income

CHAPTER 6: CONCLUSION

6.1 Introduction

The objective of this study has been to investigate the redistributive impacts of public fiscal policies in a middle income developing country, Turkey. As explained in Chapter 1, Turkey has been experiencing very high, persistent inequality in the distribution of income and public redistributive policies are one of the potential remedies for this high inequality. To date apart from only Pinar (2004), redistributive impacts of Turkish fiscal policies have not been investigated using recent literature on inequality and progressivity measures at household level. Using micro data for 2003 the thesis considers if the existing public finance and expenditure policies may be one of the reasons for discrepancies in welfare levels and/or public policies can be used as an effective instrument to mitigate inequalities and improve living standards of the poor. The method employed is the tax and benefit incidence analysis with different measures of progressivity and redistribution, utilizing the 2003 Household Income and Consumption Expenditures Survey from the Turkish Statistical Institute.

The chapter is organized as following. In the following section a summary of key findings for benefit and tax incidence is provided, including a discussion of limitations. Section 3 combines and relates tax and benefit incidence to assess net fiscal incidence-how does the system combine to affect redistribution. The final section deals with directions for future work.

6.2 Summary of the Key Findings

6.2.1 Benefit Incidence Analysis

Chapters 3 and 4 examined the expenditure side of Turkish government budget by focusing on public spending on the publicly provided services, intended to decrease income inequality and improve the well-being of the poor: education, health, infrastructure services and social cash and in kind transfers. The non-behavioural benefit incidence approach supposes that the value of benefit from a service to households/individuals can be approximated by the unit cost of the service for the government. Accepting this assumption, the total central government spending on education, health and infrastructure services are allocated to the users of the services to obtain per person benefits. In the case of social transfers, the HICES data have provided the information on the type and amount of public transfers to individuals.

The results of Chapters 3 and 4 have shown that only public primary education services are successful in targeting the poor (benefits are absolutely more concentrated on the poor). The pro-poor incidence occurs due to the greater number of children in lower-income households. While the secondary education services are progressive, the higher education services are regressive if our focus is on the poor. Primary, secondary and total education benefits cause 1.9, 0.7 and 2.2 percent inequality reduction respectively, whereas higher education increases inequality by 0.3 percent (for an inequality aversion parameter equal to two). Another important finding is that for secondary and higher education, the middle income households use more public education services. It seems that the poor struggle to send their children to school after 8-years compulsory primary level education. This is more the case for girls than for boys. According to the results of regional analysis, the poorer regions (South East and East Anatolia) receive the least share of the benefits. In addition to these poor regions, Istanbul is also having difficulty covering the educational needs of its huge population. The inequality decomposition analysis shows that both the primary and secondary education services decrease both within regions and between regions inequalities, whilst higher education increases within region inequalities, it decreases between regions inequalities.

Turkey does not have universal coverage for the public health services and only employees covered by any social security organisation, retired people and their dependants can utilise public health services. According to the results, the public health services seem to meet the needs of individuals with health insurance. Given the fact that unrecorded employment is concentrated in the poorer sections of the society (first four deciles), the public health services are not well targeted to the poor. Although the health services are not pro-poor, the health services have the highest positive redistributive impact in reducing inequality after the primary education services. There should be concern over the role of out-of pocket expenditures for public health services. As discussed in Chapter 4, the health system demands households spend money to reach better public health services, even though they have the right to use the services for free. It is well known that the poor hesitate to use the public health services, either due to the necessary out-of pocket expenditures or due to giving less importance to health conditions. This can be seen by the fact that the household private expenditures on health rise with expenditure deciles in Turkey. These household expenditures on health include spending on private health services, but the largest part of these expenditures still can be assessed as out-of pocket expenditures to reach the public health services. We have shown that when we take into account the private health expenditures, the public health services become less progressive.

Households have basic infrastructure services such as electricity, sewage and running water. However, there is still a need to pay more attention the needs of the lower deciles. To allocate the public infrastructure spending of the central government to the households, we created an index based on the value of residences. The logic of the index comes from the assumption that more valuable properties have better, or make more use of, infrastructure services. Since this index increases with the deciles as expected, the distributional impact of the services is moderate.

Social transfers either in cash or in kind have generally been found to be progressive in the literature. Since they are supposed to be targeting the poor directly, the social transfers are expected to be pro-poor as well. However, the HICES suggests that the most important social transfers are retirement pensions, and due to the high unrecorded employment in the lower deciles, pensions contribute to inequality instead of equality. Even total social transfers with pensions in cash and in kind are regressive for the lower deciles. Results from the S-Gini inequality decomposition analysis suggest that mean-tested transfers contribute to equality, but the effects in narrowing inequality are small; their targeted nature is offset by the low amount of expenditure.

Overall, the total benefit system decreases expenditure inequality between 3 and 5% even if they are not well targeted to the poor. The benefits are effective in narrowing inequalities between and within regions as well; public services except social transfers reduce both within and between regions inequalities. Total social transfers increase inequality in the poorest region, S. East Anatolia, although redistribution due to total benefits without pensions is from Istanbul, Mediterranean and S. East Anatolia to other regions. For urban and rural areas, health and infrastructure services improve inequalities but the impact is smaller for rural areas. Social transfers seem to have no effect in rural areas.

Limitations of the benefit incidence analysis

For the health and infrastructure services, we have not been able to identify the actual users of the services. This has forced us to create some approximate indicators to allocate the benefits to households. For infrastructure services, the index we created increases with welfare level, thus we have imposed a certain degree of regressivity to the services at the beginning of the analysis, which may have lead to underestimate redistributive effects of public infrastructure services. Moreover, we have included the possible impacts of the quality of the services by regionally disaggregated public expenditures, which is not enough to assess the quality differences completely.

In the case of the public health spending, we may have overestimated the progressivity of the services, as we have treated individuals with health insurance equally without differentiating the benefits received by members of different social security institutions. As explained in Chapter 3, there are considerable quality differences among the services, but we have not been able to account for these. Furthermore, we have used the total public health expenditures without disaggregating expenditures by facility or service (hospital, health centre/inpatient, outpatient etc.). It has been found that while outpatient care is progressive in developing countries, inpatient care or hospital services are regressive. The fact that we were not able to take into consideration the differences among different health services is another reason why we may have overestimated the progressivity of the health services. We have also shown that private expenditures on health, which are supposed to increase the quality of the services received by households, reduce the progressivity of the public health services. When taking into account these concerns, we may conclude that the progressivity of public health services has been overestimated to some extent.

We have assumed that the households would not change their economic decisions if there was no public service. In other words we have ignored the behavioural responses of households towards public services and assumed that pre-intervention welfare level is equal to their total household expenditure. This is an important drawback of non-behavioural benefit incidence.

Marginal Incidence for education

We have investigated the incidence of the services at one point in time and considered only the distribution of average benefits. As emphasized in the literature, from policymakers' point of view, marginal incidence may offer a better understanding for future policy recommendations. As reported in Appendix 6, we have applied the marginal incidence analysis for education following Lanjouw and Ravallion (1999). With the basic model explained in Chapter 3, equation (1) and given in Appendix 6, we regress the sample participation rates from the 26 provinces on the average participation rate from each of the seven regions[1] to estimate marginal incidence of education services for three education levels (primary, secondary and higher). In Turkey, there are significant differences in enrolment rates among provinces and regions[2] (Figure A 6.1, Figure A 6.2 and Figure A 6.3 in Appendix 6). We attempt to see who (which expenditure quintile) would benefit from an increase in the public spending on education services. The average odds of enrolment suggests (the ratio of quintile specific enrolment rate to the mean enrolment rate) that public spending in primary education mildly favours the non-poor, whereas for secondary and higher level education public spending favours largely richest quintiles (Table 6.1). According to marginal odds of enrolment rates estimated by the regression, the highest share of the increase in public expenditures on primary education goes to the 4th quintile, whereas the smallest share goes to the richest quintiles (Table 6.2). For secondary education the pattern is completely different. The largest share from the expenditure increase goes to the poorest and richest quintiles followed by middle income classes (3rd and 4th quintiles). For higher education, however, the largest share is received by the middle income classes. The estimates of the marginal odds of participation suggest that expanding primary schooling would not be pro-poor at the margin. The implication for the incidence of subsidies to

[1] See Appendix 6 for the details of the method.
[2] See Chapter 3 Section 3.3.1 for enrolment rates by regions

secondary education is clear. The average odds of participation suggest that the share of the total subsidy going to the poorest quintile is only 13.6 percent (0.68 times one-fifth). By contrast, the marginal odds of participation imply that the poorest quintile would obtain about 22.4 percent of an increase in the total subsidy going to secondary education. However, it is worth noting that the coefficient of 5^{th} quintile for higher education is not statistically significant whereas the coefficient for the first quintile is significant only at 10% level. The reason behind this result is that enrollment rates for the first two quintiles are very low for higher education. We may conclude that expanding public spending on secondary and primary education will be beneficial to the poor, but the expansion in higher education expenditures will benefit the middle income classes.

Table 6.1: Average Enrolment Rates in Turkey, 2003

Quintiles	Primary Ed.		Secondary Ed.		Higher Ed.	
	Enrolment Rate	Av. Odds of Enrolment	Enrolment Rate	Av. Odds of Enrolment	Enrolment Rate	Av. Odds of Enrolment
1	91.57	0.96	49.05	0.68	5.65	0.24
2	97.05	1.01	65.78	0.92	11.56	0.49
3	98.00	1.02	76.38	1.06	20.95	0.89
4	97.44	1.02	91.04	1.27	30.65	1.30
5	99.49	1.04	102.30	1.42	60.26	2.55
Turkey	95.69	1.00	71.83	1.00	23.67	1.00

Notes: The table gives the average enrolment rates as a percentage of children for each education level and the average odds of enrolment, defined as the ratio of the quintile specific enrolment rate to the mean enrolment rate. Households are ranked by total expenditure per adult equivalent in forming the quintiles.

Table 6.2: Marginal Odds of Enrolment in Turkey, 2003

Quintiles	Primary Ed.	Secondary Ed.	Higher Ed.
1	0.95*	1.12*	0.80**
	[3.76]	[3.87]	[1.75]
2	0.93*	0.74*	0.83*
	[2.58]	[3.05]	[2.24]
3	0.90*	1.08*	0.90*
	[2.67]	[6.1]	[2.97]
4	1.08*	1.10*	0.92*
	[2.92]	[4.86]	[3.07]
5	0.69*	1.12*	0.57***
	[2.65]	[4.76]	[1.64]

Notes: The table gives the instrumental variables estimates of the regression coefficients of the quintile-specific enrolment rates for each level of education across provinces on the average rate by region. The numbers in parentheses are t-ratios.
*significant at 5% level, ** significant at 10% level, ***not significant

6.2.2 Tax Incidence

Taxes are seen to have a smaller redistributive impact than public expenditures in developing countries. There are several reasons for this, such as the size of informal economy, tax evasion and administrative difficulties, which prevent developing countries having a wide tax base. However, due to the high share of indirect taxes in total tax revenues in developing countries, the redistributive impacts of taxes are an important empirical issue.

Chapter 5 investigated the distributional impact of the Turkish tax system. The standard tax incidence analysis has been applied for direct taxes in which tax burdens of households/individuals are calculated with the actual statutory tax rates. For indirect taxes, in addition to the estimation of tax burdens with the statutory tax rates, effective tax rates have been estimated by using input-output tables. Using input-output tables allowed us to take into account the taxes on intermediary and imported goods. We had two main sets of shifting assumptions to see the effect of different assumptions on the incidence of taxes. In order to allow for tax evasion and informal employment we introduced additional variants of the shifting assumptions.

The broad conclusions of the analysis are that the direct taxes have larger and positive redistributive impacts than indirect taxes thanks to the progressivity of personal income tax and property taxes. However, the redistributive impact of personal income tax mostly goes to middle income households. Indirect taxes narrow expenditure inequality, whereas they increase income inequality, even if the overall redistributive impact is small. This result shows that differential rates for VAT and indirect taxation on luxury goods through PCT and PCOT decrease potential larger regressive impact of indirect taxes in Turkey. Using estimated effective indirect tax rates has resulted in less progressive incidence with expenditure measure, and more regressive incidence with income measure. This additional analysis has shown the importance of taxation on imported and intermediate goods, which has been ignored by most tax incidence analyses. Given the fact that indirect taxes account for 70 percent of total tax revenues, these results are not very promising in terms of using taxes as an instrument to fight against inequality and poverty in Turkey.

The total direct and indirect taxes have also diverse impacts depending on the welfare indicator chosen and the shifting assumptions. The thesis has shown that the intended incidence of the direct taxes is progressive regardless of the welfare indicator. However, the incidence resulting from the shifting assumptions including the impacts of shifting the payroll tax to employees, PIT to tenants, informal employment and tax evasion is less progressive with expenditure measure and regressive with income measure. The overall impact from taxes reduces expenditure inequality, but increases income inequality under this second set of shifting assumptions. The results also highlight the negative effects of tax evasion not only on tax revenues but also on income/expenditure distribution, as households with higher welfare level have more opportunities to evade taxes than lower income households. This is very significant especially for wage earners whose tax is deducted from source despite the existence of certain levels of tax evasion for private sector employees. The impacts of informal economy are included in the analysis by unrecorded employment. As unrecorded employees are concentrated in the lower income/expenditure deciles, informal employment appears to be beneficial for the poor as they pay neither personal income tax nor payroll tax. However, since those unrecorded employees are also out of public services (particularly health services and pension system), this impact should not be seen as a positive side of the informal economy.

6.3 Policy implications

The first policy implication of our results from the benefit incidence analysis is that reallocating government resources toward primary education is likely to be pro-poor, as primary education is the only pro-poor public service in Turkey. However, it has been shown that education increases labour force participation, and this effect and the returns to education increase with the level of education in Turkey. Furthermore, the income share of workers with a low level of education in total incomes has reduced over time in Turkey, whereas earnings of people with a university degree have significantly increased in recent years (Duman, 2008; Tansel, 2004). We have found that after compulsory primary education, the poor have difficulties to send their children to secondary and higher education. Incorporating our findings with the findings cited above, we can say that the children of the poorer with only compulsory primary education may end up having low-paid jobs, which may lead to a so-called "poverty trap"[3] if more attention is not put towards increasing the opportunities of the poor for secondary and higher level education. The marginal incidence analysis for education also supports this for secondary education.

Another important issue concerning the public education services is the differences between the enrolment rates of girls and boys. From the enrolment rates we have seen that gender discrimination is still a significant problem in the poorer households and the poorer regions. This suggests that there should be particular policies encouraging parents to send their female children to school. According to the results, rural Turkey gets less benefit than urban Turkey for all services. S. East Anatolia and Istanbul are two regions requiring particular attention. This implies that even if the services are redistributive, the planning of the services should be more focused on the poorer parts of Turkey to be more effective.

The Turkish health system suffers from limited coverage and this prevents it being pro-poor: *Green Card* for the poor increases the opportunities for the health services to reach the poor, however, from our findings this instrument does not seem to be very effective. One of the

[3] See Barham et al. (1995) for an example investiagting the concept of poverty trap and its relation with education.

main reasons for this is the fact that the health system requires employees to be in recorded employment. Providing universal coverage for the health system is a solution.

Social security systems have two objectives: redistribute lifetime income (retirement pensions) and provide risk insurance (unemployment benefits). Turkey has a wide retirement pension system, however because of the high unrecorded employment employees in the poorest deciles appear not to engage in the system. The second part of the insurance system, unemployment benefits, is quite recent and suffers from unrecorded employment too. The share of means-tested transfers in total transfers and in households' income is negligible and even student grants benefit the middle classes most. So Turkish social transfer system does not seem to provide risk insurance role or cash income to the people in most need. Any policy to improve the role of the social security system is unlikely to be effective without policies to reduce the extent of informal employment.

The results from the tax incidence analysis indicate that direct taxes have the potential to mitigate inequality and poverty in Turkey if the tax base for personal income tax can be increased which may result in reduction in the share of indirect taxes in tax revenues which is the main tax revenue source for the central budget. To increase tax base is not easy task given the extent of informal economy and tax evasion. Increasing tax base would also decrease the extent of the need for other revenue sources such as debt.

In order to overcome tax evasion, it is accepted that not only applying higher penalties and/or increasing the frequency of audits, but also tax compliance of taxpayers is crucial. For example, rational individuals are expected to evade taxes to maximise their utility when penalty rates are not high and the possibility of auditing is low (Feld and Tyran, 2002). However, in reality, even if penalty rates are not high and the possibility of auditing is low, taxpayers have an incentive to pay taxes (Guth et al., 2005).

Alm, Jackson and McKee (1992) examined whether public good in exchange for the taxes paid increases compliance or not and they found that if taxpayers think they will receive something in exchange for the taxes they pay, they have a tendency to pay taxes. Hence, effective public services also may be very crucial to decrease tax evasion in Turkey, which are not well targeted to the poor.

6.4 Redistributive Effects of Fiscal Policies

Net fiscal analysis can be used to combine the results for tax and expenditure incidence. Not all government expenditures and taxes are included in the analysis: corporation taxes were excluded from the tax incidence, and the benefit incidence only included government expenditures having potential positive impacts on income distribution and poverty. Therefore, this summary does not claim to analyse the redistributive impact of the whole fiscal system but attempts to see if the tax policies affecting households directly and government expenditures targeted to the poor increase household and individuals' welfare and reduce inequality (redistribute income) in Turkey in 2003.

The idea behind net fiscal incidence analysis, or combined tax and expenditure incidence, comes from the fact that any fiscal policy may be regressive (e.g. taxes), but if revenues from a regressive tax have been used to build schools or hospitals for the poor, the total impact of the government policies may be progressive. Since the net fiscal incidence analysis demands data necessary for expenditure and tax incidence, the first studies of fiscal incidence generally focused on one side of the government budget. However, with increasing availability of household data including information on both income and expenditure for households/individuals and usage for government services, combined tax and expenditure analysis became feasible for developing countries (Devarajan an Hossain, 1998; Johannes et. al., 2006; Pinar 2005).

"Net fiscal incidence calculations aim to estimate what each household in any given income category receives from or pays to the public sector on a net basis, i.e., benefits less taxes" (Piggott and Whalley, 1987: 685). The first step in the net fiscal incidence analysis is to calculate tax and benefit incidence separately and in the second step estimated tax burdens and allocated government benefits for households are combined to obtain the net impact from the fiscal policies. After having examined public benefits and the tax system for Turkey separately, this section presents the combined impact for the four public services and the taxes examined on income and expenditure distribution.

As we have found in the previous chapter, tax incidence is sensitive to the welfare indicator chosen. In order see if this is the case for the net fiscal incidence we will report the results for both household income and expenditure. In order to obtain the net benefit to the households we simply deduct net taxes (taxes minus benefits) from gross expenditure/income[4]. We exclude social transfers from the analysis as they are included in household income (AE_INC) and expenditure (AE_EXP), thus we examine education, health and infrastructure benefits and the total taxes.

The figures from Figure 6.1 to Figure 6.4 provide the Lorenz curves for household expenditures (incomes) before and after net taxes and Table 6.3 presents the differences between the coordinates of Lorenz curves with asymptotic standard errors. All differences of the estimated ordinates are statistically significant (except for 0.1) for household incomes. As seen from the figures the Lorenz curves for net expenditures (incomes) are above the Lorenz curves for gross expenditures (incomes), revealing that the combined tax and benefit effects reduce both expenditure and income inequality. The incidence pattern of taxes based on household incomes is negative; it is the pattern of public benefits that drives the combined incidence, which is

[4] Gross expenditure/income for the net fiscal incidence is gross expenditure/income for the total tax system.

progressive. Table 6.4 and Table 6.5 provide S-Gini indices by inequality aversion parameters. As both the public benefits and the total taxes are progressive with expenditure measure, IR progressivity rates are positive for the whole range of ethical parameter values and the rates rise with ρ regardless of welfare indicator and shifting assumptions. However, the second set of shifting assumptions including the impacts of tax evasion and informal employment (*V2&V4*) generate lower progressivity as expected. The net taxes cause reranking for the whole range of ethical parameters, yet reranking rates are smaller than IR progressivity rates so the net taxes decrease both expenditure and income inequality. The extent of inequality reduction is measured by S-Gini indices of redistribution. Since both taxes and benefits are progressive and reduce expenditure inequality, S-Gini redistribution indices are very high and increase with inequality aversion parameters, suggesting that the net taxes favour the poor more. The redistribution rate is only 0.3% (0.2%) once ρ is 1.01 (which puts more weight to very rich), and it is 11.5% (11%) when ρ is 4 under *V1 (V2&V4)*. With household income, it has been found that the total taxes increase income inequality when ρ is greater than 2 under *V1* and the total taxes increase income inequality for the whole range of ρ under *V2&V4.* As a result of this negative impact of the total taxes, the redistributive impact of the net taxes on income inequality is much smaller than that on expenditure inequality. The equalising impact of the net taxes on income inequality is around 5% or 6% depending on the shifting assumptions if our focus is more on the poor.

Table 6.6 and Table 6.7 give regional redistributive impacts of the net taxes with expenditure and income measures respectively. The total impact of taxes and benefits is positive on both expenditure and income inequality in all regions and urban and rural areas. Istanbul with the highest income/expenditure level and highest inequality rate has the smallest equalising effect of the net taxes. Rural areas have higher inequality reducing impact than urban areas under *V2&V4,* reflecting the impact of informal employment, zero property tax rates on agricultural land and flat PIT rate for agricultural incomes. For the whole country equalising impact of the net taxes on expenditure (income) inequality is 10% (6%) under *V1* and around 9% (5%) under *V2&V4*. The impact is smaller with effective indirect tax incidence. Istanbul and S. East Anatolia are two regions having smaller redistributive impact than for the country.

These results should be assessed with caution because of the reasons regarding the problems of the benefit incidence analysis. Given the fact that we may have overestimated the incidence of the health and education benefits, we may expect the progressivity and redistributive power of the net benefits would be lower than we have estimated.

6.5 Scope of Further Research

Depending on data availability, comparison of behavioural benefit incidence and non-behavioural incidence should be done to see the impact of behavioural responses. To assess the real impact of the social expenditures, it would be useful to analyse how successful the public expenditures by using the outcomes of the policies such as health outcomes and student success. Also lifetime distribution of the social benefits can be helpful to examine the impacts of social transfers. The empirical literature on developed countries evaluates the extent to which the public transfers into social security institutions providing retirement pensions and the extent to which individuals contributed to the system during their working lives. This type of analysis would differentiate the extent of redistribution between individuals and redistribution over different phases of the lifecycle of the same individual (Whiteford, 2008). Although this type of analysis demands panel data, which is not available for Turkey, there is an alternative method using pseudo panel data. Pseudo panel data can be created if surveys have the same or similar structure and comprehension to generate cohorts based on some social indicators such as age, gender, region, and welfare deciles (Deaton, 2000).

This thesis has measured the incidence of fiscal policies at one point in time. For further research, it should be useful to see the comparisons over time. Although there are three more household surveys available for Turkey after 2003, they are not as comprehensive as the 2003 survey. However, Turkish Statistical Institute announced that it is planning to conduct a household survey for 2009 which is supposed to be as comprehensive as the 2003 survey. After this data becomes available, pseudo panel analysis will also be possible for Turkey.

Marginal tax incidence analysis in the sense of Ahmad and Stern (1991) would also be useful to see how tax policies can be more redistributive. We have seen that indirect taxes are regressive with income, and progressivity of indirect taxes with expenditure is limited. Direct taxes are progressive but progressivity is reduced by tax evasion and shifting opportunities. The impact of a tax reform to decrease the share of indirect taxes and increase the share of direct taxes can be investigated.

With conventional tax incidence analysis, behavioural responses are ignored. However, it is a well known fact that taxes have impacts on individuals work preferences and this is especially true for payroll taxes. As discussed in Chapter 5, in Turkey, high payroll tax burden has been found to be the main reason for informal employment. Thus, in terms of future research, investigating labour market interactions for payroll tax will enrich our analysis.

Table 6.3:The Differences of the Ordinates of the Lorenz Curves Before and After Net Taxes

ρ=2	Income		Expenditure	
Ordinates (p)	**V1**	**V2&V4**	**V1**	**V2&V4**
0.05	0.0026	0.0023	-0.0041	-0.0045
	0.0007	*0.0007*	*0.0002*	*0.0001*
0.1	**-0.0005**	**-0.0013**	-0.0095	-0.0105
	0.0008	*0.0008*	*0.0002*	*0.0002*
0.15	-0.0043	-0.0053	-0.0155	-0.0168
	0.0008	*0.0008*	*0.0003*	*0.0003*
0.2	-0.0084	-0.0094	-0.0221	-0.0234
	0.0008	*0.0008*	*0.0005*	*0.0004*
0.25	-0.0129	-0.0135	-0.0289	-0.0300
	0.0008	*0.0008*	*0.0006*	*0.0005*
0.3	-0.0178	-0.0174	-0.0358	-0.0362
	0.0008	*0.0008*	*0.0007*	*0.0007*
0.35	-0.0227	-0.0213	-0.0426	-0.0420
	0.0008	*0.0008*	*0.0008*	*0.0008*
0.4	-0.0275	-0.0249	-0.0493	-0.0474
	0.0008	*0.0008*	*0.0010*	*0.0009*
0.45	-0.0324	-0.0283	-0.0557	-0.0522
	0.0009	*0.0009*	*0.0012*	*0.0011*
0.5	-0.0372	-0.0316	-0.0617	-0.0564
	0.0009	*0.0009*	*0.0013*	*0.0013*
0.55	-0.0418	-0.0345	-0.0670	-0.0600
	0.0010	*0.0010*	*0.0015*	*0.0014*
0.6	-0.0459	-0.0372	-0.0718	-0.0630
	0.0011	*0.0011*	*0.0017*	*0.0016*
0.65	-0.0495	-0.0395	-0.0757	-0.0652
	0.0012	*0.0012*	*0.0020*	*0.0018*
0.7	-0.0524	-0.0409	-0.0787	-0.0663
	0.0013	*0.0013*	*0.0022*	*0.0021*
0.75	-0.0544	-0.0415	-0.0804	-0.0662
	0.0014	*0.0014*	*0.0025*	*0.0023*
0.8	-0.0551	-0.0411	-0.0808	-0.0650
	0.0016	*0.0016*	*0.0028*	*0.0026*
0.85	-0.0550	-0.0398	-0.0789	-0.0616
	0.0018	*0.0017*	*0.0031*	*0.0029*
0.9	-0.0525	-0.0363	-0.0741	-0.0555
	0.0021	*0.0019*	*0.0035*	*0.0032*
0.95	-0.0432	-0.0275	-0.0622	-0.0438
	0.0023	*0.0022*	*0.0039*	*0.0035*
0.99	-0.0239	-0.0142	-0.0312	-0.0206
	0.0023	*0.0023*	*0.0039*	*0.0035*

Notes: Asymptotic standard errors are in italic.
Gross income (expenditure) is equal to AE_INC (AE_EXP) plus per adult equivalent total income and payroll tax; Net income (expenditure) is equal to AE_INC (AE_EXP) minus per adult equivalent property taxes and total indirect tax plus total education, health and infrastructure benefits

Table 6.4: S-Gini Indices of Progressivity and Redistribution for Total Fiscal System (expenditure)

	IR-Progressivity		Reranking		Redistribution	
Parameter Values (Rho)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0040	0.0033	0.0009	0.0009	0.0032	0.0024
	0.0001	*0.0001*	*0.0000*	*0.0000*	*0.0001*	*0.0001*
1.5	0.1022	0.0872	0.0232	0.0221	0.0791	0.0650
	0.0029	*0.0027*	*0.0005*	*0.0005*	*0.0029*	*0.0026*
2	0.1325	0.1178	0.0316	0.0301	0.1010	0.0876
	0.0031	*0.0028*	*0.0006*	*0.0006*	*0.0030*	*0.0028*
2.5	0.1453	0.1328	0.0359	0.0342	0.1094	0.0986
	0.0028	*0.0027*	*0.0007*	*0.0006*	*0.0028*	*0.0026*
3	0.1516	0.1413	0.0386	0.0366	0.1130	0.1047
	0.0026	*0.0025*	*0.0008*	*0.0007*	*0.0026*	*0.0024*
3.5	0.1549	0.1465	0.0405	0.0382	0.1144	0.1084
	0.0025	*0.0024*	*0.0008*	*0.0008*	*0.0025*	*0.0023*
4	0.1566	0.1498	0.0419	0.0393	0.1146	0.1106
	0.0025	*0.0023*	*0.0009*	*0.0008*	*0.0024*	*0.0023*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross expenditure is equal to AE_EXP plus per adult equivalent total income and payroll tax
Net expenditure is equal to AE_EXP minus per adult equivalent property taxes and total indirect tax plus total benefits excluding social transfers

Table 6.5: S-Gini Indices of Progressivity and Redistribution for Total Fiscal System (income)

	IR-Progressivity		Reranking		Redistribution	
Parameter Values (Rho)	**V1**	**V2&V4**	**V1**	**V2&V4**	**V1**	**V2&V4**
1.01	0.0028	0.0021	0.0006	0.0006	0.0022	0.0015
	0.0001	*0.0001*	*0.0000*	*0.0000*	*0.0001*	*0.0001*
1.5	0.0724	0.0594	0.0209	0.0208	0.0515	0.0386
	0.0020	*0.0020*	*0.0013*	*0.0013*	*0.0016*	*0.0016*
2	0.0943	0.0816	0.0322	0.0322	0.0620	0.0494
	0.0021	*0.0021*	*0.0018*	*0.0018*	*0.0018*	*0.0018*
2.5	0.1036	0.0929	0.0400	0.0401	0.0636	0.0528
	0.0020	*0.0020*	*0.0023*	*0.0023*	*0.0019*	*0.0019*
3	0.1081	0.0994	0.0461	0.0461	0.0620	0.0533
	0.0019	*0.0019*	*0.0027*	*0.0027*	*0.0022*	*0.0022*
3.5	0.1105	0.1034	0.0512	0.0510	0.0593	0.0524
	0.0018	*0.0019*	*0.0031*	*0.0030*	*0.0025*	*0.0025*
4	0.1116	0.1061	0.0557	0.0553	0.0560	0.0507
	0.0018	*0.0018*	*0.0034*	*0.0034*	*0.0028*	*0.0028*

Notes: Asymptotic standard errors are in italic.
The null hypothesis could not be rejected for the values in bold at 5% significance level
Gross income is equal to AE_INC plus per adult equivalent total income and payroll tax
Net income is equal to AE_INC minus per adult equivalent property taxes and total indirect tax plus total benefits excluding social transfers

Table 6.6: Redistribution Index by regions (Expenditure)

Regions	Net Incidence (V1)	Net Incidence (V2&V4)	Net Incidence (V1) (Effective)	Net Incidence (V2&V4)(Effective)
Istanbul	0.0737	0.0469	0.0684	0.0416
	0.0080	*0.0080*	*0.0063*	*0.0057*
Marmara	0.0954	0.0879	0.0927	0.0851
	0.0095	*0.0093*	*0.0085*	*0.0083*
Aegean	0.0815	0.0723	0.0824	0.0733
	0.0043	*0.0040*	*0.0039*	*0.0036*
Black Sea	0.1054	0.1010	0.1046	0.1003
	0.0061	*0.0054*	*0.0059*	*0.0053*
Central Anatolia	0.0958	0.0854	0.0948	0.0844
	0.0042	*0.0038*	*0.0039*	*0.0035*
Mediterranean	0.1017	0.0986	0.0973	0.0943
	0.0065	*0.0060*	*0.0058*	*0.0052*
East Anatolia	0.0973	0.0976	0.0950	0.0954
	0.0058	*0.0055*	*0.0051*	*0.0048*
S. East Anatolia	0.0731	0.0861	0.0657	0.0788
	0.0053	*0.0052*	*0.0042*	*0.0041*
Turkey	0.1010	0.0876	0.0972	0.0839
	0.0030	*0.0028*	*0.0025*	*0.0022*
Urban	0.0989	0.0804	0.0953	0.0767
	0.0038	*0.0036*	*0.0031*	*0.0028*
Rural	0.0949	0.0969	0.0938	0.0958
	0.0047	*0.0043*	*0.0040*	*0.0036*

Table 6.7: Redistribution Index by regions (Income)

Regions	Net Incidence (V1)	Net Incidence (V2&V4)	Net Incidence (V1) (Effective)	Net Incidence (V2&V4)(Effective)
Istanbul	0.0333	0.0096	0.0398	0.0161
	0.0043	*0.0047*	*0.0037*	*0.0041*
Marmara	0.0479	0.0376	0.0530	0.0427
	0.0058	*0.0059*	*0.0047*	*0.0049*
Aegean	0.0497	0.0400	0.0495	0.0398
	0.0032	*0.0032*	*0.0031*	*0.0030*
Black Sea	0.0746	0.0697	0.0729	0.0680
	0.0041	*0.0038*	*0.0039*	*0.0036*
Central Anatolia	0.0657	0.0553	0.0677	0.0573
	0.0032	*0.0030*	*0.0028*	*0.0026*
Mediterranean	0.0461	0.0418	0.0536	0.0492
	0.0053	*0.0051*	*0.0042*	*0.0039*
East Anatolia	0.0828	0.0811	0.0816	0.0800
	0.0047	*0.0045*	*0.0042*	*0.0040*
S. East Anatolia	0.0598	0.0722	0.0533	0.0656
	0.0044	*0.0042*	*0.0042*	*0.0040*
Turkey	0.0620	0.0494	0.0642	0.0516
	0.0018	*0.0018*	*0.0016*	*0.0016*
Urban	0.0588	0.0419	0.0631	0.0462
	0.0022	*0.0022*	*0.0019*	*0.0019*
Rural	0.0571	0.0566	0.0557	0.0551
	0.0034	*0.0032*	*0.0030*	*0.0027*

Figure 6.1

Lorenz Curves for Household Expenditures (Net Fiscal Incidence) (V1)

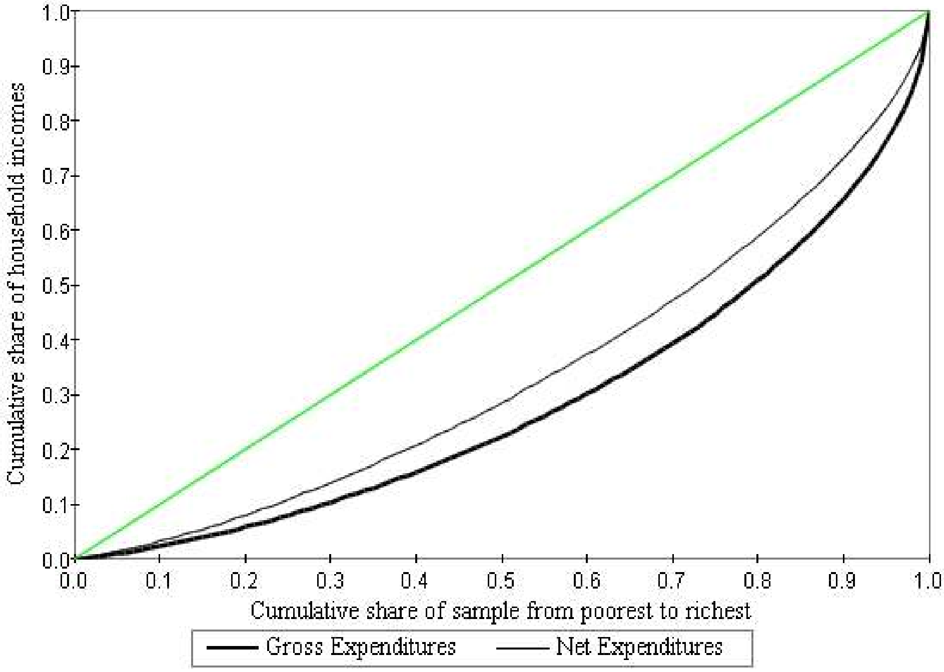


Figure 6.2

Lorenz Curves for Household Expenditures (Net Fiscal Incidence) (V2&V4)

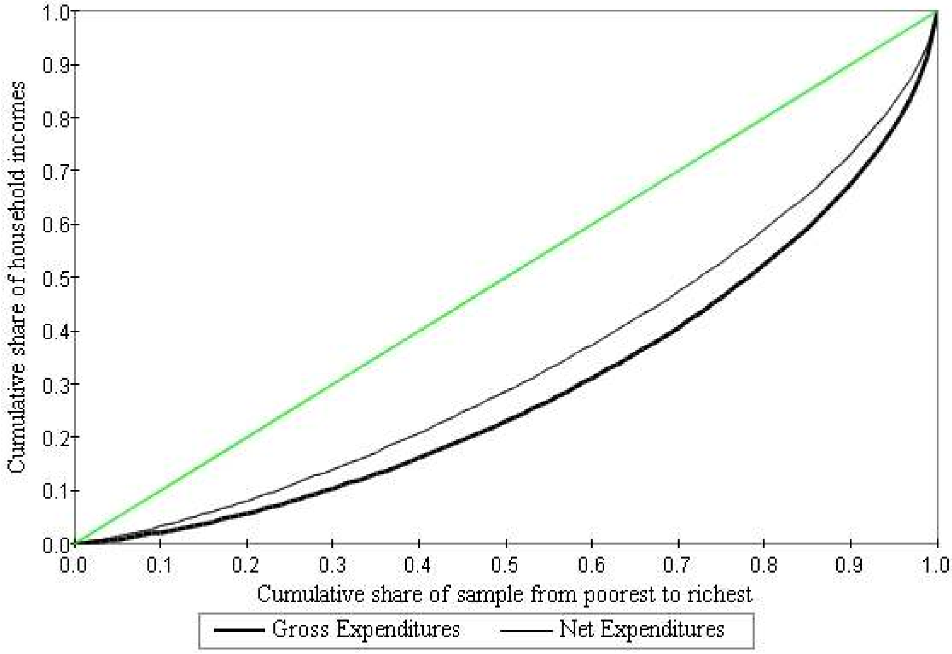


Figure 6.3

Lorenz Curves for Household Incomes (Net Fiscal Incidence) (V1)

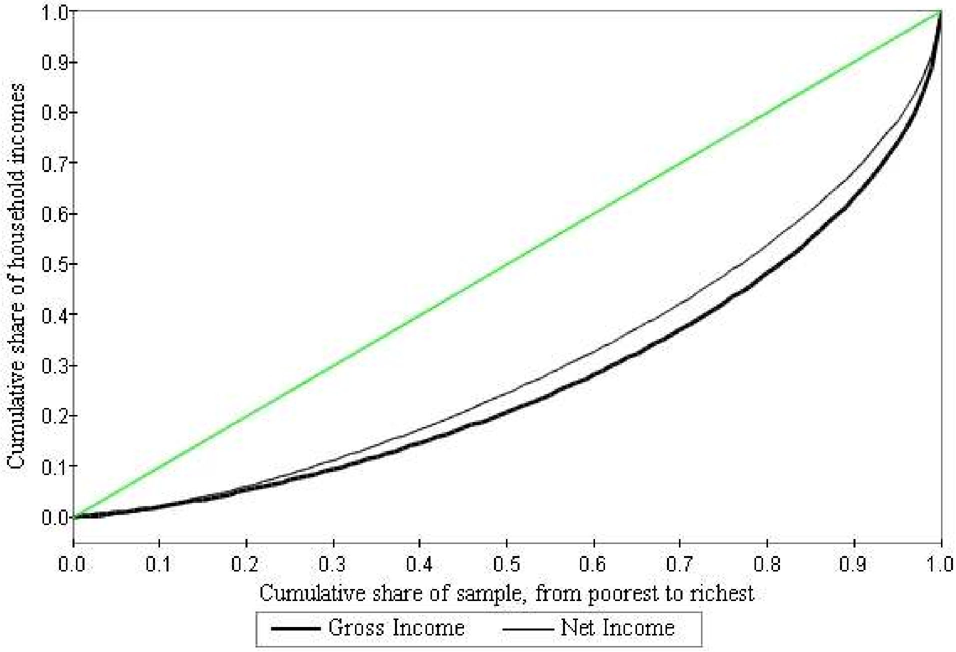
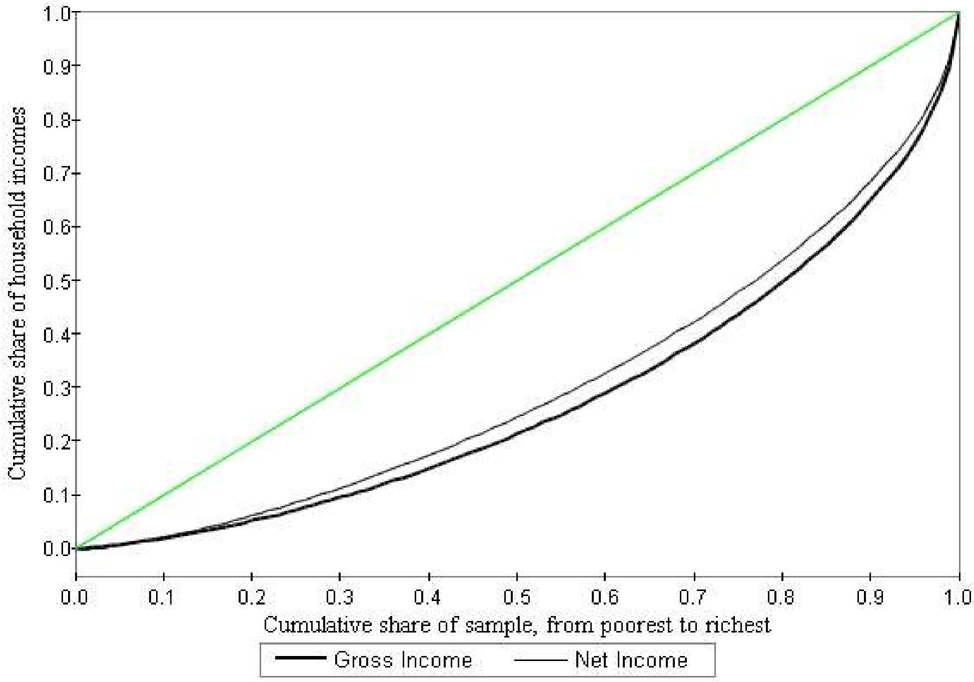


Figure 6.4

Lorenz Curves for Household Incomes (Net Fiscal Incidence) (V2&V4)



Appendix 6: The Marginal Incidence Analysis

The basic regression that Lanjouw and Ravallion (1999) estimates is as following:

$$p_{i,k,q} = a_q + \beta_q p_k + u_q \qquad (1)$$

where i indexes a small geographical unit (62 regions in their case), k indexes a larger one (19 states in their case) which contains small geographical units and q indicates the welfare quintile. The method requires some information on service participation at the household level and sufficient regional disaggregation and variance in participation for estimation to be possible.

The data that we use is regionally representative. We have codes for 7 geographical regions (larger geographical unit) and 26 provinces (small geographical unit) of Turkey. In the basic model we regress for any given combination of quintile and public service, we regress the sample participation rates from the 26 provinces on the average participation rate (irrespective of quintiles) from each of the 7 regions.

We rank sampled households by total household expenditure per adult equivalent and define quintiles over the entire population. We estimate the regression in (1). Hence, i takes values from 1 to 26, k from 1 to 7 and q from 1 to 5. The left-hand variable is the enrollment rate for a given province and quintile. The regressor is the participation rate for the region in which that province is located. β_q is the marginal effect of an increase in the program which is called marginal odds of participation by Lanjouw and Ravallion (1999).

The authors estimate the regression by using two-stage least-squares (Instrumental Variables) to avoid biased estimations from ordinary least squares. We follow them and use the "leave-out mean" as an instrumental variable for regions' average participation rates. The leave-out mean is the mean for a region excluding the specific province in the region and quintile in estimating average participation rate for that region. For example we exclude quintile 3 and province 2 for region 1 to estimate leave-out mean.

We also define average odds ratio of participation as the ratio of the participation rate of one quintile to the overall average and think that differences between the marginal and average odds of participation reflect differences in the incidence of inframarginal spending. We also assume that the cost to the government is the same for all participants of the services.

Figure A 6.1: Enrolment Rates for Primary Education by provinces

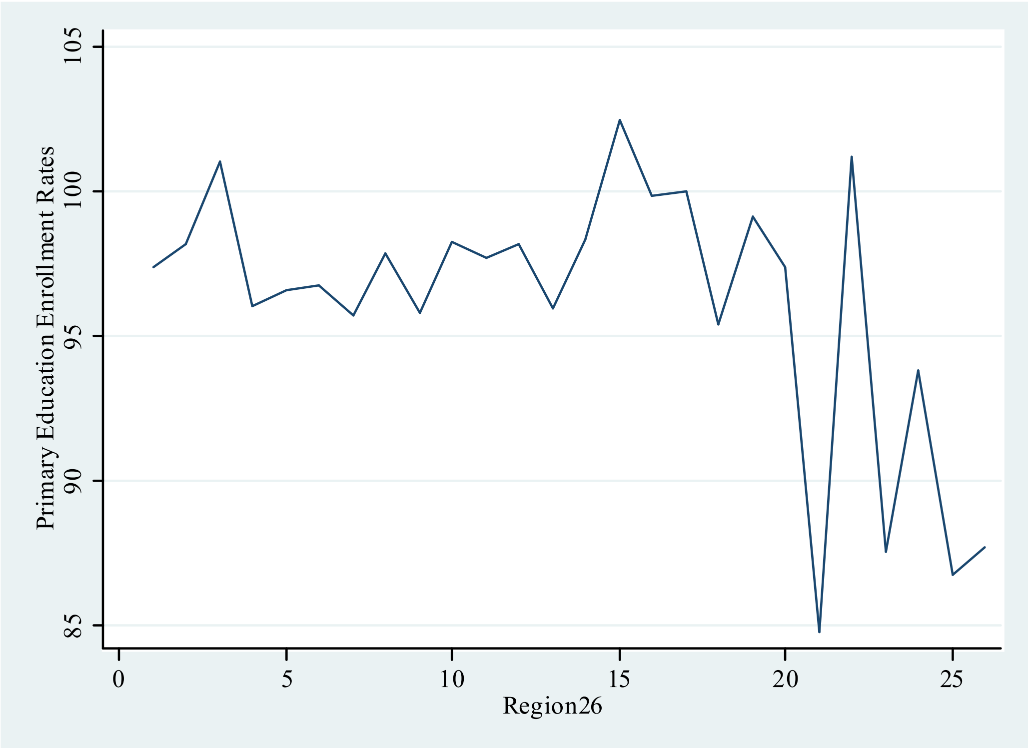


Figure A 6.2: Enrolment Rates for Secondary Education by provinces

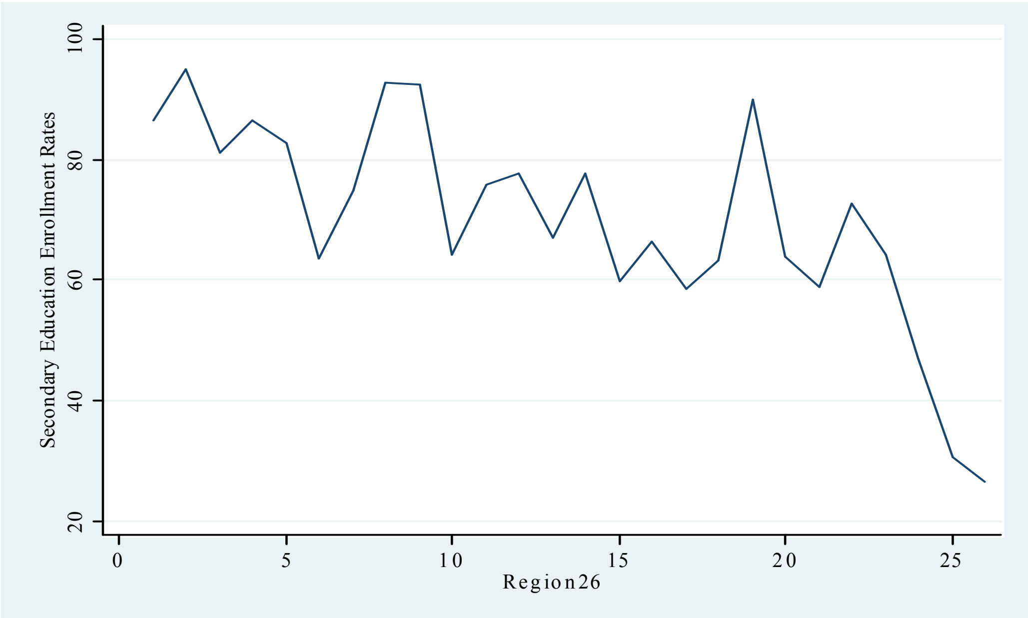
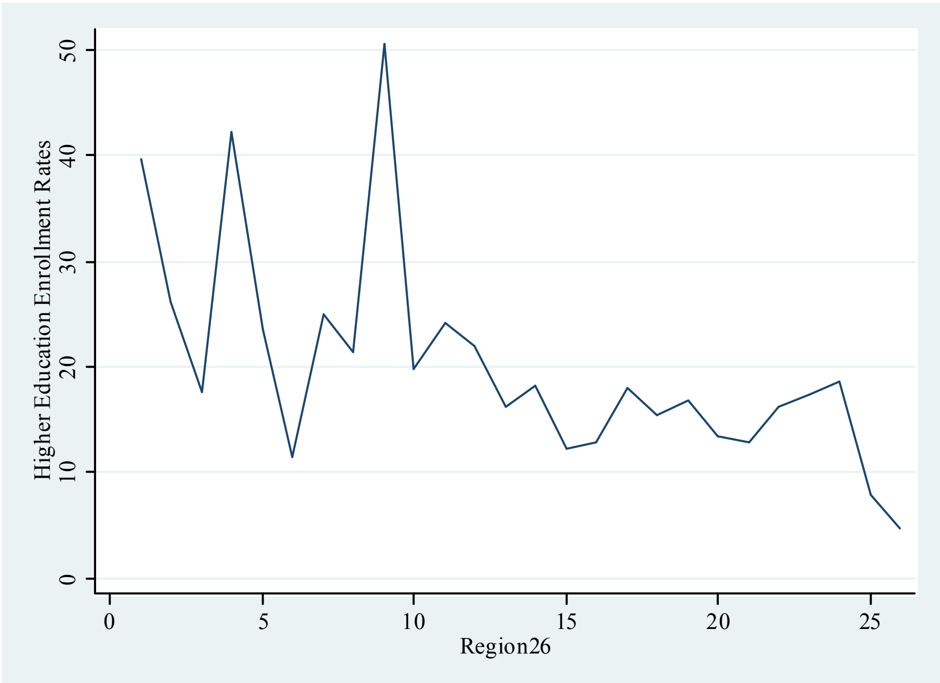


Figure A 6.3: Enrolment Rates for Secondary Education by provinces



REFERENCES

Aaberge, R. (2008), “Ranking Intersecting Lorenz Curves”, *IZA DP Working Papers*, No. 3852, available at http://ftp.iza.org/dp3852.pdf, (accessed on 18.01.2008)

Aaron, H. and M. McGuire (1970), “Public Goods and Income Distribution”, *Econometrica*, Vol. 38, No. 6, pp.907

Aghion, P . and P. Bolton (1997) “A Theory of Trickle-down Growth and Development”, *The Review of Economic Studies*, Vol. 64, pp. 151-172

Ağartan, T. I. (2005), “Health Sector Reform in Turkey: Old Policies, New Politics”, 2005 ESPANET Young Researchers Workshop, available at http://www.cevipof.msh-paris.fr/rencontres/jours/200509-ante/palier/clegg/YR_papers/Agartan.pdf

Ahmad, E. and N. Stern, (1991), The Theory and Practice of Tax reform in Developing Countries, Cambridge University Press

Alesina A. and D. Rodrik (1994), “Distributive politics and economic growth”, *The Quarterly Journal of Economics*, Vol.109 ,No.2, pp.465-490

Allison, P. D. (1978), “Measures of Inequality”, *American Sociological Review*, Vol. 43, No. 6, pp. 865-880

Alm, J., B. R. Jackson, and M. Mckee (1992), “Estimating the Determinants of Taxpayer Compliance with Experimental Data”, *National Tax Journal*, Vol. 45, No.1, pp.107

Altug, S. and A. Filiztekin (2006) (Ed.), *The Turkish Economy: The Real Economy, Corporate Governance and Reform and Stabilization Policy*, Routledge Curzon Studies in Middle Eastern Economies

Annand, S. and M. Ravallion (1993), "Human Development in Poor Countries: On the Role of Private Incomes and Public Services", *Journal of Economic Perspectives*, Vol. 7, No. 1, pp. 133-150

Araar A. and Jean-Yves. Duclos (2007), "DASP version 1.4: Distributive Analysis Stata Package", University Laval, PEP, CIRPEE, World Bank, available at http://132.203.59.36/DASP/modules/DASP_V1.4/DASP_MANUAL_V1.4.pdf (accessed on 18.11.2008)

Atkinson, A. B. (1970), "On the Measurement of Inequality", *Journal of Economic Theory*, Vol. 2, pp. 244-263

Atkinson, A. B. (1995), Incomes and the Welfare State: Essays on Britain and Europe, Cambridge University Press

Bagachwa M. S. D. and A. Naho (1995), "Estimating the Second Economy in Tanzania", *World Development*, Vol. 23, No.8, pp. 1387-1399

Bakış, O., H. Levent, A. İnsel, and S. Polat (2009), "The determinants of Schooling in Turkey", (in Turkish), The report of Education Reform Initiative, Sabanci University, available at http://su-erg.advancity.net/uploads/pdf/GSURapor.pdf

Baldemir, E., M. F. Gökalp and M. Avcı (2005), "The Estimation of Informal Economy in Turkey with Mimic Model" *(in Turkish),* Conference Paper, 7th National Econometric and Statistics Conference, Istanbul University, http://www. Ekonometridernegiorg/bildiriler/o23s1.pdf. (Accessed on: 20.04.2008)

Baslevent C., and M. Dayioglu (2005), “A Household Level Examination of Regional Income Disparity in Turkey”, *METU Studies in Development*, Vol. 32, No. 2

Barham, V., R. Broadway, M. Marchand, and P. Pestieau (1995), “Education and Poverty Trap”, *European Economic Review*, Vol. 39, pp. 1257-1275

Barr, N. A. (2001), *Economic Theory and the Welfare State*, Edward Elgar Publication

Barro, R. J. (2000), “Inequality and Growth in a Panel of Countries”, *Journal of Economic Growth*, Vol. 5, pp. 5-32

Becker, B. S. (1993), Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, The University of Chicago Press, Third Edition

Besley, Y., (1990), “Means Testing versus Universal Provision in Poverty Alleviation Programs”, *Economica*, Vol. 57, No. 225, pp. 119-129

Besley, T., (1995), “Nonmarket Institutions for Credit and Risk Sharing in Low-Income Countries”, *Journal of Economic Perspectives*, Vol. 9, No. 3, pp.115-127

Bird R. M. and E. M. Zolt (2005), “Redistribution via Taxation: The Limited Role of the Personal Income Taxation in Developing Countries”, *Journal of Asian Economics*, Vol. 16, pp. 928-946

Bourguignon F. And L. A. P. da Silva (2003) (ed), *The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools*, Washington, DC: World Bank and Oxford University Press

Bourguignon, F. and B. Pleskovic (2007) (ed.), *Beyond Transition: Annual World Bank Conference on Development Economics, Regional*, the World Bank, Washington D.C.

Brennan, G. (1967), “The Distributional Implications of Public Goods”, *Econometrica*, Vol. 44, No. 2, pp. 391

Bruno, M., M. Ravallion and L. Squire (1999), “Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues”, *World Bank Policy Research Working Paper*, No. 1563

Buğra, A. and S. Adar (2008), “Social Policy Change in Countries without Mature Welfare States: The Case of Turkey”, *New Perspectives on Turkey,* No. 38, Spring

Bulutoglu, K. and W. Thirsk (1997), “Turkey’s Struggle for a Better Tax System” in Thirsk (1997) (ed.), pp. 361-409

Calderón, C. and Luis Servé (2004), “The Effects of Infrastructure Development on Growth and Income Distribution”, *World Bank Policy Research Working Paper*, No. 3400, available at http://web.nchu.edu.tw/~ccl/4_WPS3400.pdf

Castro-Leal et al. (1999), “Public Social Spending in Africa: Do the Poor benefit”, *The World Bank Research Observer*, Vol. 14, No. 1, pp. 49-72

Chawla, M. (2005), “How Much Does Turkey Spend on Education? Development of National Education Accounts to Measure and Evaluate Education Expenditures” in World Bank (2006), Turkey: Education Sector Study, Background Papers and Studies

Chennery, H. and T. N. Srinivasan (ed.) (1988), *Handbook of Development Economics*, Yale University Press

Chu, K., H. Davoodi and S. Gupta (2000), “Income Distribution and Tax and Government Policies in Developing Countries”, *IMF Working Paper*, WP/00/62

Cornes, R. (1995), “Measuring the Distributional Impact of Public Goods”, in Van de Walle and Nead (ed.) (1995)

Creedy, J. (1998), *The Dynamics of Inequality and Povert*y, Edward Elgar, Cheltenham, UK

Crisp B. F., and M. J. Kelly (1999), "The Socioeconomic Impacts of Structural Adjustment" *International Studies Quarterly*, Vol. 43, No. 3, pp. 533-552

Davidson, R. and J.Y. Duclos (1997), "Statistical Inference for the Measurement of the Incidence of Taxes and Transfers", *Econometrica*, Vol. 65, No. 6, pp. 1453-1466

Davoodi, H. R., E. R. Tiongson, S. S. Asawanuchit (2003), "How Useful Are Benefit Incidence Analyses of Public Education and Health Spending?", IMF Working Paper, No. 227, available at http://www.imf.org/external/pubs/ft/wp/2003/wp03227.pdf (accessed on 14.02.2009)

Davies, J and M. Hoy (1995), "Making Inequality Comparisons When Lorenz Curves Intersect", *American Economic Review*, Vol. 85, No.4, pp. 980-986

Deaton, A. (2000), *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, The Johns Hopkins University Press for The World Bank, Washington D.C.

Deaton, A. and S. Zaidi (2002), Guidelines for Constructing Consumption Aggregates for Welfare Analysis, *Living Standards Measurement Study (LSMS) Working Paper, No. 15*, The World Bank, Washington D.C.

Demery, L. (2000), "Benefit Incidence: Practitioner's Guide", Poverty and Social Development Group, Africa Region, World Bank, available at, http://siteresources.worldbank.org/INTPGI/Resources/Pro-Poor-Growth/practitioner.doc, (accessed on 15.02.2009).

Demery, L. (2003), "Analyzing the Incidence of Public Spending", in Bourguignon and da Silva (ed.) (2003)

Devarajan, S. and S. I. Hossain (1998). "The Combined Incidence of Taxes and Public Expenditures in the Philippines." *World Development,* Vol. 26, No. 6, pp. 963-977.

Dilnot, A. and C. N. Morris (1981), "What Do We Know about Black Economy", *Fiscal Studies*, Vol. 2, No. 1, pp. 58-73

Dollar and Kraay, 2002, "Growth is good for the poor", *Journal of Economic Growth*, Vol. 7, No. 3, pp. 195-225

Duclos, J-Y. (2000), "Gini Indices and the Redistribution of Income", *International Tax and Public Finance*, Vol. 7, No.2 pp. 141-162

Duclos, J. Y. and A. Arrar (2006), *Poverty and Equity: Measurement, Policy and Estimation with DAD,* Springer and International Development Research Centre. It is also an open book, available at , http://www.idrc.ca/en/ev-97152-201-1-DO_TOPIC.html

Duman, A. (2008), "Education and Income Inequality in Turkey: Does Schooling Matter?", *Financial Theory and Practice*, Vol. 32, No. 3, pp. 368-385

Duygan, B. and N. Guner (2006), "Income and Consumption Inequality in Turkey: What Role Does Education Play?", in S. Altuğ and A. Filiztekin (Ed.), Chapter 2.

Eichhorn, W. (1988) (ed.), Measurement in Economics: Theory and Applications of Economic Indices, Heidelberg: Physica-Verlag, New York

Emran, M. S. and J. E. Stiglitz (2007), "Equity and Efficiency in Tax Reform in Developing Countries",available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1001269

Esping-Andersen, G., (1991), *The Three Worlds of Welfare Capitalism*, Polity Press

Feld, L. P. and J-R. Tyran (2002), "Tax Evasion and Voting: An Experimental Analysis", *Kyklos*, Vol. 55, 2, 197-222

Fellman, J. (1976), “The Effect of Transformations of Lorenz Curves”, *Econometrica*, Vol. 44, No. 4, pp.823-824

Fields, G. S. and C. H. Fei (1978), “On Inequality Comparisons”, *Econometrica*, Vol. 46, No.2, pp. 303-316

Fields, G. S. (1980), *Poverty, Inequality, and Development*, Cambridge University Press

Fields, G. S. (2001), Distribution and Development: A New Look at the Developing World, The MIT Press

Friedman, M. (1957), *A Theory of the Consumption Function*, Princeton University Press

Gemmel N., and O. Morrissey (2003), “Tax structure and the Incidence on the Poor in Developing Countries”, CREDIT Research Paper, No.03/18, available at, http://venus.icre.go.kr/metadata/31628_CP03-18.pdf, (accessed on 12.03.3008)

Gertler, P. and P. Glewwe (1990), “The Willingness to Pay for Education for Daughters in Contrast to Sons: Evidence from Rural Peru”, *Journal of Public Economics*, Vol. 42, pp.251-275

Gertler, P. and J. van der Gaag (1990), The willingness to pay for medical care: evidence from two developing countries, Baltimore, Maryland, Johns Hospital University Press

Giray, A. U. (2003), “Health System in Turkey, 2002”, The Ministry of Health (MoH), The Report, available at, http://www.saglik.gov.tr/EN/dosyagoster.aspx?DIL=2&BELGEANAH=409&DOSYAISIM=0135_35.pdf, (accessed on 15.02.2009)

Glick, P. and M. Razakamanantsoa (2002), “The Distribution of Social Services in Madagascar, 1993-1999”, Strategies and Analysis for Growth and Access (SAGA) Working Paper, available at http://www.saga.cornell.edu/images/wp128.pdf (accessed on 18.02.2009)

Gottschalk, P., and T. M. Smeeding (1997), “Cross-National Comparisons of Earnings and Income Inequality”, *Journal of Economic Literature*, Vol. 35, pp. 633-687

Gursel, S., H. Levent, R. Selim, and O. Sarıca (2000), *“Individual Income Distribution in Turkey”*. Istanbul, Turkey: Turkish Industrialists' and Businessmen's Association (TUSIAD), available at http://www.tusiad.org/tusiad_cms.nsf/LHome/5165D0CFA9FB2117C225733E00254734/$FILE/tbgdyabk.pdf, (accessed on 15.02.2009)

Güth, W., V. Levati, and R. Sausgruber (2005), “Tax Morale and (De-centralisation: An Experimental Study, *Public Choice,* Vol. 125, pp. 171

Hacettepe University (2003), “Turkey Demography and Health Survey 2003 (TDHS)”, available at http://www.hips.hacettepe.edu.tr/tnsa2003eng/index.htm

Heady C., T. Mitrakos and P. Tsakloglu, (2001), “The Distributional Impact of Social Transfers in the European Union: Evidence from the ECHP”, *Fiscal Studies*, Vol. 22. no.4, pp.547-565

Heltberg, R., K. Simler, and F. Tarp (2003), “Public Spending and Poverty in Mozambique”, International Food Policy Research Institute, Food Consumption and Nutrision Division (FCND) Discussion Paper, No. 167, avaialable at http://ageconsearch.umn.edu/bitstream/16462/1/fc030167.pdf (accessed on 18.02.2008)

Hoşgör, A. G. and J. Smits (2006), "Effects of family background characteristics on educational participation in Turkey", *International Journal of Educational Development*, Vol. 26, pp. 545-560

Jacobson, U. (1976), "On the Measurement of the Degree of Progressivity", *Journal of Public Economics*, Vol. 5, pp. 161-168

Jenkins, S. (1991), "The Measurement of Inequality", in Osberg (1991) (ed.), pp. 3-39

Jorgenson, D. W. (1998), "Did We Lose the War on Poverty", *Journal of Economic Perspectives*, Vol. 12, No. 1,pp. 79-96

Kakwani, N. (1977), "Applications to Lorenz Curves in Economic Analysis", *Econometrica*, No. 45, pp. 719-727

Kakwani, N. (1984), "Welfare Ranking of Income Distributions", *Advances in Econometrics*, No. 3, pp. 191-213

Kakwani, N. (1986), Analyzing Redistribution Policies: A Study Using Australian Data, Cambridge University Press

Kose, A. H., and Y. Karahanoğulları (2005), "Observations on the Class-Based Distribution of Factoral and Asset Incomes in Turkey" in Turkish, *Toplum ve Bilim*, No 104

Lambert, P. J. (1993), *The Distribution and Redistribution of Income*, Second Edition, Manchester University Press

Lanjouw, P. and M. Ravallion (1999), "Benefit Incidence, Public Spending Reforms, and the Timing of Program Capture", *The World Bank Economic Review*, Vol. 13, No.2, pp.257

Lanjouw, P., M. Pradhan, F. Saadah, H. Sayed, and R. Sparrow (2002), "Poverty, Education and Health in Indonesia: Who Benefits from Public Spending?", in Morrisson(ed.) 2002

Leipziger, D., M. Fay, Q. Wodon and T. Yepes (2003), “Achieving the Millenium Development Goals: The Role of Infrastructure” *World Bank Policy Research Working Paper*, No. 3163

Liberati, P. (2001), Three Essays on the Redistributive Effects of Taxes and Benefits, PhD Thesis, Darwin College, The University of Cambridge

Liu, P-W. (1985), “Lorenz Domination and Global Tax Progressivity*”, The Canadian Journal of Economics / Revue Canadienne d'Economique,* Vol. 18, No. 2 (May, 1985), pp. 395-399

Martinez-Vazquez, J., (2001), “The Impact of Budgets on the Poor: Tax and Benefit Incidence”, *Georgia State University ISP Working Paper Series*, 01-10, available at http://isp-aysps.gsu.edu/papers/ispwp0110.pdf

Mayshar, J. and S. Yitzhaki (1995), "Dalton-Improving Indirect Tax Reform", *The American Economic Review*, Vol.85, No.4, pp. 793-807.

Meerman, J. (1979), *Public Expenditure in Malaysia: Who Benefits and Why*. New York: Oxford University Press

Mete, C. (2006), “Education Finance and Equity in Turkey” in World Bank (2006), Turkey: Education Sector Study, Background Papers and Studies

Ministry of Finance, Turkey, Statistics, http://www.muhasebat.gov.tr/

Ministry of Finance, Turkey, Tax Inspectors Board Statistics, http://www.huk.gov.tr/istatistikler.html

Ministry of Finance, Turkey, Statistics on Consolidate Budget, http://www.muhasebat.gov.tr/mbulten/index.php

Mitra, P. and R. Yemtsov (2007), "Increasing Inequality in Transition Economies: Is There More to Come?", in Bourguignon, F. and B. Pleskovic (ed.) (2007), pp. 59-103

MoH, (2004), "Turkey Health Report", Refik Saydam Hygiene Center, School of Public Health, http://eng.hm.saglik.gov.tr/pdf/kitaplar/turkeyhealthreport.pdf

MoH 2005, Health Statistics 2004, http://www.saglik.gov.tr/TR/BelgeGoster.aspx?F6E10F8892433CFF8FE9074FF19B000585ACA374B1116107

MoH (2006), "Turkey National Health Accounts Household Health Expenditures 2002-2003", Refik Saydam Hygiene Center, School of Public Health, http://eng.hm.saglik.gov.tr/pdf/kitaplar/NHAHouseholdHealthExpenditures.pdf

MONE (2003), "National Education Statistics 2003-2004", http://sgb.meb.gov.tr/istatistik/index.htm (accessed on 18.11.2008)

Morrisson, C. (2002), *Education and Health Expenditure, and Development: The Cases of Indonesia and Peru*, OECD Development Centre Studies

Neşecan, B and S. Savran (ed.) (2002), *Economy, Society and Gender in Turkey,* Nova Publisher, New York

Nejatkan, C. (2003), "A Research on Taxation and Potential of Taxation on Agriculture", available at http://www.alomaliye.com/cavit_nejatkan_tarim_vergileme.htm

O'Donnell, O., E. van Doorslaer, A. Wagstaff and M. Lindelow (2008), *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation*, World Bank Institute Development Studies, 42480, World Bank Publications, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2008/02/13/000020953_200

80213141830/Rendered/PDF/424800ISBN978011OFFICIAL0USE0ONLY10.pdf (accessed on 03.02.2009)

OECD (2008), *Growing Unequal? Income Distribution and Poverty in OECD Countries*, OECD

Osberg, L. (1991) (ed.), *Economic Inequality and Poverty*, M. E. Sharpe, Inc. London

Öğünç, F. and G. Yilmaz (2000), "Estimating the Underground Economy in Turkey", The Central Bank of The Republic of Turkey, Discussion Paper, available at http://www.tcmb.gov.tr/research/discus/dpaper43.pdf

Psacharopoulos, G. and H. A. Patrinos (2002), "Returns to Investment in Education: A Further Update" *World Bank Policy Research Working Paper,* No. 2881. available at SSRN: http://ssrn.com/abstract=367780 (Accessed on 15.02.2008)

Pinar, A. (2002), "Unrecorded Economy and Tax Loss: A Municipal-Based Estimation for Turkey", *Economic Approach*, Vol.13, No. 45, *in Turkish*

Pinar, A., (2004a), Who Pay Taxes and Who Benefit from Government Spending *(in Turkish),* Research Report for TESEV

Pinar, A., (2004b), "The Redistributive Impact of Fiscal Policy in Turkey: A Micro-Data Analysis", Paper Submitted to the 2005 Annual Meeting of the European Public Society in Durham, (EPCS2005), available at http://www.dur.ac.uk/john.ashworth/EPCS/Papers/Pinar.pdf, (accessed on 15.02.2009)

Piggott, J., and J. Whalley (1987), "Interpreting Net Fiscal Incidence Calculations", *The Review of Economics and Statistics*, Vol. 69, No.4, pp. 685-694

Rajemison, H., S. Haggblade and S. D. Younger (2003), "Indirect Tax Incidence in Madagascar: Uptaded Estimates Using the Input-Output Table", Cornell Food and Nutrition

Policy Program Working Paper No. 147, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=452120, (Accessed on 15.02.2009)

Ravallion, M., D. Van de Walle, and M. Gautam (1995), "Testing a Social Safety Net", *Journal of Public Economics*, Vol. 57, No. 2, pp. 175-99

Sahn, D., E.Paul A. Dorosh and Stephen D. Younger, (1999), *Structural Adjustment Reconsidered: Economic Policy and Poverty in Africa*, Cambridge University Press

Sahn , D. E., and S. D. Younger (1999), "Fiscal Incidence in Africa, Micro Economic Evidence", Cornell Food and Nutrition Policy Program Working Paper No. 91, Ithaca, NY, available at http://pdf.dec.org/pdf_docs/Pnacm774.pdf, (accessed on 15.02.2009)

Sahn, D. E., and S. Younger (2000), "Expenditure Incidence in Africa: Microeconomic Evidence", *Fiscal Studies*, Vol. 21, No. 3, pp. 329-347

Sahn, D. E. and S. D. Younger (2003), "Estimating the Incidence of Indirect Taxes in Developing Countries", in Bourguignon and Pereira da Silva (2003), pp.

Sahn, E. D., S. D. Younger and K. Simler (2000), "Dominance Testing of Transfers in Romania", *Review of Income and Wealth,* Series 46, No. 3, pp. 309-327

Schneider, F. (2005), "Shadow Economies around the World: What Do We really Know?", *European Journal of Political Economy*, Vol. 21, pp. 598-642

Schneider, F., and D. Enste (1999), "Shadow Economies around the World: Size, Causes and Determinants", *CESInfo Working Paper Series*, No. 196

Schneider, F., and F. Savasan (2006), "The Size of Shadow Economies of Turkey and of her Neighboring Countries from 1999 to 2005", available at http://www.economics.uni-linz.ac.at/Schneider/Turkey_neighbour_18072006.pdf

Schultz, T. P. (1988), "Education investments and returns", in Chennery and Srinivasan (ed.) (1988), Handbook of Development Economics, Chapter 13

Selden T. M. and M. J. Wasylenko (1995), "Measuring the Distribution of Public Education in Peru" in Van de Walle and Nead (ed.) (1995)

Selowsky, M. (1979), *Who benefits fro Government Expenditures?,* Oxford University Press fro the World Bank, Washington D. C.

Sen, A. K. (1984), "The Living Standard", *Oxford Economic Papers*, Vol. 36, pp. 74-90

Sen, A. K. (1985), *Commodities and Capabilities*, Amsterdam, North-Holland

Sen, A. K. (1997), *On Economic Inequality*, Clarendon Press, Oxford

Shah, A., and J. Whalley (1991), "Tax Incidence Analysis of Developing Countries: An Alternative View", *The World Bank Economic Review*, Vol. 5, No. 3

Shorrocks, A. F., (1983), "Ranking Income Distributions", *Economica*, Vol. 50, No. 197, pp. 3-17

Shorrocks, A. F., (1988), "Aggregation Issues in Inequality Measurements", http://www.integra2000.unifi.it/dpssec/sviluppo/doc/Shorrocks1_Shorrocks.pdf (accessed on 23.01.2009). also in: W. Eichhorn, (ed.), Measurement of Inequality in Economics: Theory and Applications of Economic Indices (SpringerVerlag. New York)

Shorrocks, A. F. and J. E. Foster, (1987), "Transfer Sensitivity Inequality Measures", *Review of Economic Studies*, Vol. 54, pp. 485-497

Silber J., and S. Ozmucur (2000), "Decomposition of Income Inequality: Evidence from Turkey", Topics in Middle Eastern and North African Economics, Electronic Journal 2. Economic Association and Loyola University, Chicago., also available at http://www.luc.edu/orgs/meea/volume2/ozmucur2.pdf

Social Security Institution (SSK), (2003), “Annual Statistics”, “http://www.ssk.gov.tr/wps/sskroot/istatistikk/istatistik2003/default.jsp

State Planning Organisation (SPO), “9th Development Report (2007-2013), The Commission Report on Taxation”, available at http://plan9.dpt.gov.tr/oik09_vergi/vergi.pdf, in *Turkish*

State Planning Organisation, “Economic and Social Indicators 1950-2006”, http://ekutup.dpt.gov.tr/ekonomi/gosterge/tr/esg.asp

Stiglitz, J. E. (2000), Economics of the Public Sector, W.W. Norton&Co, New York and London

Sylwester, K. (2002), “Can Education Expenditure Reduce Inequality”, *Economics of Education Review*, Vol.21, pp. 43-52

Tansel, A (1994), “Wage Employment, Earnings and Returns to Schooling for Men and Women in Turkey”, *Economics of Education Review*, Vol. 13, No. 4, pp. 305-320

Tansel, A. (2002), “Determinants of school attainment of boys and girls in Turkey: individual, household and community factors”, *Economics of Education Review*, Vol. 21, pp. 455-470.

Tansel, A. (2004), “Education and Labor Market Outcomes in Turkey”, Background Report for World Bank (2006), available at http://siteresources.worldbank.org/INTTURKEY/Resources/361616-142415001082/Education_Labor_by_Tansel.pdf

Tansel, A. and F. Bircan (2004), “Private tutoring expenditures in Turkey”, *IZA Discussion Paper,* No. 1255.

Tansel, A. and F. Bircan (2008), “Private supplementary tutoring in Turkey: recent evidence on its various aspects”, *IZA Discussion Paper,* No. 3471

Taylor, L., (2004), Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream, Harvard University Press.

The Presidency of Revenue Administration Department of Taxpayer Services (2006), “Taxation in Turkey”, Publication No. 21, http://www.gib.gov.tr/fileadmin/user_upload/yayinlar/Taxation.pdf

Thirsk, W. (1997) (ed.), *Tax Reform in Developing Countries*, World Bank, Regional and Sectoral Studies

Turkish Statistical Institute (Turkstat) (2002), “General Census of Industry and Establishments”, www.turkstat.gov.tr, (accessed on 31.10.2008)

Turkish Statistical Institute (Turkstat) (2003), “Final Accounts, Municipalities and Special Provincial Administrations 2003”, Ankara

Turkish Statistical Institute (Turkstat) (1994-2003), Households Income and Consumption Expenditure Survey (HICES), Ankara

Undersecretariat of the Prime Ministry for Foreign Trade, “Foreign Trade Statistics”, http://www.dtm.gov.tr/dtmweb/index.cfm?action=detayrk&yayinID=1116&icerikID=1225&dil=TR

Van de Walle, D. and K. Nead (ed) (1995), *Public Spending and the Poor, World Bank*, The John Hopkins University Press, Baltimore and London

Van de Walle, D. (1995), “The Distribution of Subsidies through Public Health Services in Indonesia, 1978-87”, in Van de Walle and Nead (ed.) (1995)

Van de Walle, D. (1998), “Assessing the Welfare Impacts of Public Spending”, *World Development*, Vol. 26, No. 3, pp. 365-379

Van de Walle, D. (2003), “Behavioral Incidence Analysis of Public Spending and Programs”, in Bourguignon and da Silva (ed.), pp. 69-85

Van de Walle, D. (2004), “Testing Vietnam’s Public Safety Net”, *Journal of Comparative Economics*, Vol 32, No. 4, pp. 661-679

Whiteford, P. (2008), “How Much Redistribution Do Governments Achieve? The Role of Cash Transfers and Household Taxes”, in OECD (2008) (ed.), Chapter 4

World Bank (2001), “Turkey: Public Expenditure and Institutional Review (PEIR)”, www. worldbank.org.tr

World Bank (2003), “Turkey Poverty and Coping After Crises (in Two Volumes)”, http://wdsbeta.worldbank.org/external/default/WDSContentServer/IW3P/IB/2003/08/20/000160016_20030820130639/Rendered/PDF/241850TR0SR.pdf

World Bank (2005), “Turkey Joint Poverty Assessment Report”, http://www.worldbank.org.tr/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TURKEYEXTN/0,,contentMDK:20697414~pagePK:141137~piPK:141127~theSitePK:361712,00.html

World Bank (2006), “Turkey: Education Sector Study (2006) Sustainable Pathways to an Effective, Equitable, and Efficient Education System for Preschool through Secondary School Education”, http://www.worldbank.org.tr/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TURKEYEXTN/0,,contentMDK:20848223~pagePK:141137~piPK:141127~theSitePK:361712,00.html

Yeldan, A. Erinc (2002), “On the IMF-Directed Disinflation Program in Turkey: A Program for Stabilization and austerity or a Recipe for Impoverishment and Financial Chaos?”, in Neşecan and Savran (ed.) (2002), also available at SSRN: http://ssrn.com/abstract=290539

Yılmaz H. (1996), “Turkish Tax Structure and Developments in Tax Burden of Sectors after 1980”, The Thesis of Specialisation for Turkey State Planning Organisation, http://ekutup.dpt.gov.tr/vergi/yilmazh/vergi.html, *in Turkish*

Yitzhaki, S. (1983), “On an Extension of the Gini Inequality Index”, *International Economic Review*, Vol. 24, No. 3, pp. 617-628

Yitzhaki, S. and J. D. Lewis (1996), "Guidelines on Searching for a Dalton-Improving Tax Reform: An Illustration with Data for Indonesia", *The World Bank Economic Review*, Vol.10, No.3, pp. 541-62.

Yitzhaki, S. and J. Slemrod (1991). "Welfare Dominance: An Application to Commodity Taxation." *The American Economic Review,* Vol. 81, No. 3, pp. 480-496.

Yitzhaki, S. and W. Thirsk (1990), "Welfare Dominance and the Design of Excise Taxation in the Cote D'Ivoire, *Journal of Development Economics*, Vol. 33, pp. 1-18.

Younger, S. D., D. E. Sahn, et al. (1999). "Tax Incidence in Madagascar: An Analysis Using Household Data." *The World Bank Economic Review*, Vol. 13, No. 2, pp. 303-331.

Younger, S. D. (1999), “The Relative Progressivity of Social Services in Ecuador”, *Public Finance Review*, pp. 310-351

Younger, S. (2002), “Public Sector Expenditures and Poverty in Peru”, in Morrisson (ed.) (2002)

Yükseler, Z. and E. Türkan (2008), "Households in Turkey: An Analysis on Income, Consumption, Labour Force and Poverty", TÜSİAD-T/2008-03/455, (in Turkish), available at http://www.ku.edu.tr/ku/images/EAF/hh.pdf