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YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS
ECONOMICS M.A. PROGRAM**

MASTER THESIS

MEASURING PRO-POOR GROWTH IN TURKEY

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**THESIS SUPERVISOR
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ÖZ

TÜRKİYE İÇİN YOKSUL YANLISI BÜYÜMENİN HESAPLANMASI

Hikmet Kaya

Eylül, 2017

Bu çalışma Türkiye’de 2003-2014 dönemi arasında yaşanan büyüme sürecinin yoksul yanlısı olup olmadığı sorusunu cevaplamayı amaçlamaktadır. Bu amaca yönelik olarak öncelikle yoksul yanlısı büyüme kavramının ne olduğu incelenmiştir. Daha sonra dört farklı şekilde hesaplanan ve sırasıyla yoksul yanlısı büyüme endeksi (Kakwani ve Pernia, 2000), yoksul yanlısı büyüme oranı (Ravallion ve Chen, 2003), yoksulluk büyüme eğrisi (Son, 2004) ve yoksulluk eşdeğer büyüme oranı (Kakwani ve Son, 2008) olarak adlandırılan yoksul yanlısı büyüme hesaplama yöntemleri tanıtılmıştır. Bu yöntemler Türkiye İstatistik Kurumu’nun yapmış olduğu Hanehalkı Bütçe Anketleri kullanılarak Türkiye’ye uygulanmıştır. Bunun sonucunda yıllık dönemlerin çoğunda mutlak manada yoksul yanlısı büyüme olduğu görülmüştür. Görelî olarak ise farklı yoksulluk hesaplamalarının kullanımına bağlı olarak aynı yıl için dahi farklı sonuçlara ulaşılmıştır. Bununla birlikte, dikkat çeken bir bulgu ise toplumun en yoksul kesiminin daha az yoksul kesime göre büyümeden daha az faydalandığı olmuştur. Son olarak, yoksulluktaki değişimi büyüme ve yeniden dağıtım olmak üzere iki bileşene göre çözümlediğimizde yoksulluktaki değişimin ardındaki temel faktörün büyüme olduğunu buluyoruz ve yoksulluğu yoksulluk açığı endeksi ve yoksulluk açığının karesi endeksleriyle hesapladığımızda büyümenin etkisinin arttığını gösteriyoruz. Bunun yanında yeniden dağıtım açısından ise en yoksul kesimin bundan en fazla zarar gören kesim olduğu bulgusuna ulaşıyoruz.

Anahtar Kelimeler: Yoksulluk, eşitsizlik, yoksul yanlısı büyüme, iktisadi büyüme

ABSTRACT

MEASURING PRO-POOR GROWTH IN TURKEY

Hikmet Kaya

September, 2017

This study aims to answer to the question of whether the growth process in Turkey has been pro-poor for the 2003-2014 period. Towards this end, we first introduce the concept of pro-poor growth and then, we present four ways of measuring pro-poor growth, namely pro-poor growth index (Kakwani and Pernia, 2000), rate of pro-poor growth (Ravallion and Chen, 2003), poverty growth curve (Son, 2004), and poverty equivalent growth rate (Kakwani and Son, 2008). We apply these measures to Turkey by utilizing household budget surveys conducted by Turkish Statistical Institution. We found that growth has been pro-poor in absolute sense for most of the yearly periods. In terms of relative approach, we made varied conclusions even for the same year based on the usage of different poverty measures. However, there is one striking finding that ultra-poor people has gained less from growth when compared to less poor people. Lastly, we decomposed the change in poverty into growth and redistribution components and we found that the main factor of the change in poverty has been derived by the growth component and the effect of growth gets higher if we use PGI and SPGI to measure poverty. Besides, in terms of redistribution, the results suggest that redistribution has hurt the ultra-poor people most compared to less poor people.

Key Words: Poverty, inequality, pro-poor growth, economic growth

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İstanbul; September, 2017

Hikmet Kaya

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ABBREVIATIONS

ABPRS	: Address Based Population Registration System
CBN	: Cost of Basic Needs
CBRT	: Central Bank of the Republic of Turkey
CDF	: Cumulative Distribution Function
CPI	: Consumer Price Index
FEI	: Food-Energy Intake
FGT	: Foster-Greer-Thorbecke
GE	: Growth Effect
GIC	: Growth Incidence Curve
HI	: Headcount Index
HBS	: Household Budget Surveys
IE	: Inequality Effect
OECD	: The Organization for Economic Co-operation and Development
PEGR	: Poverty Equivalent Growth Curve
PGC	: Poverty Growth Curve
PGI	: Poverty Gap Index
PPGI	: Pro-Poor Growth Index
RPPG	: Rate of Pro-Poor Growth
SILC	: Survey of Income and Living Conditions
SPGI	: Squared Poverty Gap Index
SST	: Sen-Shorrocks-Thon
TURKSTAT	: Turkish Statistical Institution

1. INTRODUCTION

Poverty reduction is one of the main objectives of development strategies of all countries. As a reflection and sign of the importance of these strategies, when United Nations introduced eight goals within the context of the Millennium Development Goals, the number one goal was to “eradicate extreme hunger and poverty”. They revised the goals and targets in 2015 under a new name called as Sustainable Development Goals and poverty kept its first place on the goal list as “ending poverty in all its forms everywhere”. This means that there is worldwide consensus about ending poverty. However, the question of how to achieve this goal leads one to many directions.

It is believed that the most efficient way of tackling and eliminating poverty is economic growth. As World Development Report 2017 demonstrates, during the past 20 years, there has been decreasing trend in poverty due to rapid economic growth. On the other hand, inequality has been on the rise and has become one of the most serious threats of some countries because, it has led to uprisings in some countries and created social tensions. Though, decreasing trend of poverty in world scale should not take for granted and mislead us. That was mostly due to the enormous rates of growth in East Asia economies, in particular, it was driven by China. If we analyze individual country cases, we still encounter with serious challenges. For instance, according to the World Bank, number of people living extreme poverty in 1990 was 1.841 millions of people and it decreased to 766 millions of people in 2013. However, approximately 83% of this decrease came from East Asia and Pacific region. During the same period in Sub-Saharan Africa, although, the percent of poor people has declined from 54% to 41%, number of poor people has risen from 276 million to 389 million. If we could have data for Middle East and North Africa, it would not be surprise to encounter a similar scenario. In terms of individual cases, for instance, we see that the number of poor people in Democratic Republic of the Congo more than doubled from 24 million to 55 million and in Nigeria, it increased from 51 million in 1990 to 86 million in 2013.

Poverty and inequality has never been one of the main priorities of governments in Turkey at least if we put aside the discourses of policy makers and investigate the policies that have been implemented. For the last four decades, this is mainly a result of structural transformation of Turkish economy after 1980 because there has been given a minimal role to the public sector in the new era. Without intervention of public sector and in the absence of proactive strategies towards poverty and inequality, these social problems cannot be eradicated only with the motivation of economic growth. These problems also have a dimension of redistribution of income and it is not possible to implement this policy without exposure to resistance from top classes of the society. This is the case not only in Turkey but also in other countries all over the world. Therefore, this might be another reason of negligence towards poverty and income inequality. In terms of academic environment, there was also a technical barrier in terms of analyzing these topics. Detailed yearly surveys regarding the income and consumption patterns of households were lacked until 2002 and the period between subsequent surveys was too long. For instance, the last survey before 2002 was in 1994. Therefore, this was an obstacle to analyze poverty in a very detailed manner.

The motivation of this study is to analyze the growth process of Turkey over 2003-2014 period in terms of whether poor people has benefited from this growth. Towards this end, we make use of pro-poor growth concept. There has been disagreement regarding the definition of the concept and as a reflection of this debate, various pro-poor growth indices have been offered in the literature. These definitions and indices are generally centered on two approaches as absolute on one side and relative on the other. We explain both approaches and also present their advantageous and disadvantageous aspects. Besides, we also analyze decomposition of change in poverty by growth and redistribution components. Thereby, we can understand how much of the change in poverty resulted from growth and redistribution.

The organization of the study is as follows: The study consist of 6 chapters. Following this chapter, we introduce the main concepts in the field of poverty. These concepts will lay the groundwork of our analysis. We try to explain the pros and cons of every concept when it is possible. These are mainly approaches to poverty, indicator of well-being, unit of analysis, equivalence scales, poverty lines, poverty axioms, and various poverty measures. In the third chapter, we present literature review on pro-poor growth

by dividing it as theoretical and empirical. In the theoretical part, we explain the most widely used four measures of pro-poor growth and in the empirical part, we present empirical studies based on the usage of these four measures. In Chapter 4, we introduce Household Budget Surveys collected by Turkstat, which the data that we will utilize for our empirical study. We also explain our methodology in this chapter. In chapter 5, we present the results that we found based on the data and methodology in the previous chapter and in chapter 6, we conclude.

2. CONCEPTUAL FRAMEWORK

In social sciences, it is possible to encounter with various definitions of the same term or concept. Therefore, we need to present the concepts and terms that are being used in the study so as to avoid confusion. Towards this end, we will introduce some main concepts and methods such as the indicator of well-being, poverty line, poverty axioms, and poverty measures in this chapter. In a sense, this chapter will lay the groundwork for the analysis in the rest of the study. However, before introducing the concepts and methods, we will make a brief introduction of poverty term per se. The question is what one means by poverty.

2.1. Four Approaches to Poverty

There is a broad consensus on poverty reduction. In other words, every economists and policy makers would agree that poverty is an undesirable situation for people so that it must be tackled and eliminated. However, when the issue comes down to the definition of poverty, the consensus disappears and we face with various approaches to poverty. Laderchi, Saith, and Stewart (2003) state that clarification of the poverty approach is critical because it determines which poverty measure to use, who is counted as poor and which policies to implement in poverty reduction. On the other hand, as Caizhen (2010) puts it, there is not much empirical evidence regarding if results differ or not based on different approaches.

There are mainly four major approaches to poverty: the monetary, the capability, social exclusion and the participatory approach. Notwithstanding the recent focus on the multidimensional aspect of poverty, the monetary approach is still the most widely used and dominant one. According to this approach, as its name implies, a monetary indicator, which is income or expenditure, is considered as the best representative of a person's wellbeing. If the income or expenditure of the person is less than the poverty line, which is set based on a predetermined basket of goods and services that are needed to survive, the person is said to be poor. However, this approach has been

subjected to criticism on the grounds that minimum needs might differ from one person to another and people face different prices across countries (Sen, 1981, p. 28). \$1.25 dollar-a-day is an instance of this approach and people whose income or consumption is less than this amount is considered as poor and this is widely used by the World Bank to compare international poverty rates.

The second approach, the capabilities, is a tool to evaluate and understand the concepts of poverty and inequality rather than being a theory (Robeyns, 2005). The conceptualization of poverty through this way is pioneered by the studies of Amartya Sen who won the Nobel Prize in economics for his works on famines and poverty. He defines the poverty as the deprivation in essential capabilities which are proposed to separate poor from the non-poor through the way if he or she satisfies predetermined crucial functionings so long as minimal levels are achieved (Sen, 1980). At this point, it is of much significance to make the distinction between capability and functioning. In a nutshell, the former represents what one can do or be with his current abilities, whereas the latter refers to these possible functionings set that one can freely choose to have a valuable life (Kwadzo, 2015). Sen (2011, p. 253) illustrates the difference between monetary and his approach by distinguishing between a wealthy with a physical disability and a physically capable poor. Sen does not reject the importance of resource-based indicators, but according to him, they are imperfect proxies to assess the well-being of a person. In the light of above exemplification of Sen, it can be said that raising income or consumption is critical as long as they extend the functioning set, i.e., the capabilities.¹

The third approach, social exclusion, has been the subject of many disciplines including economic, social, and political (Kwadzo, 2015). However, when we focus on the repercussion of the concept on poverty context, it addresses to the deprivation and lack of opportunity for poor people in areas such as education, health, politics, labor market, and financial markets. Laderchi et al. (2003) note that it was mostly developed for industrialized countries. Because of the fact that these are affluent societies, when poverty, in particular, extreme poverty, is evaluated in terms of

¹ The recent focus and attention on Human Development Index find its roots on the capability approach. That is, Sen and his successors' studies paved the way for the HDI.

monetary approach in these countries, it is likely to have the perception that poverty is not a serious matter due to the low number of people having income or consumption less than the poverty line. Therefore, social exclusion offers a multidimensional aspect to the poverty issue so that it sheds light on many aspects and problems of poor people in society other than just having insufficient resources. Additionally, as Silver and Miller (2002) points out, while some consider social exclusion as a broader term than poverty, others establish a cause-effect relationship between the two concepts.

Last but not least among the approaches is the participatory approach. Preliminary works on the method were undertaken by Robert Chambers. The main property of the approach is that it takes into account the views, perspectives, and experiences of poor people on how they evaluate their own situations. Rather than assessing poverty based on some predetermined generalized criteria for all poor people, we can make benefit of testimonies of poor people. Thereby, it is more likely to implement more realistic and suitable policies to end poverty. The World Bank has begun to include participatory components into poverty assessments since the early 1990s with the purpose to contemplate the statistical data, which are mostly based on monetary indicators (Narayan, Patel, Schafft, Rademacher, & Koch-Schulte, 2000, p. 16). Participation of the poor to the process is generally provided by means of interviews and field studies. In this regard, because of the nature of the information, which is very likely to differ from one person to another, derived from these processes, comparative poverty analyses on an international or intra-national scale are not applicable. In that sense, social exclusion approach has the same property as well with obvious reasons. Despite this, Laderchi et al. (2003) claim that the most distinctive property of participatory approach is that, to some extent, it has the advantage of not having ‘externally imposed standards’.

Every approach presented above has its own advantages and disadvantages. We will not introduce a comparison of the approaches because it is beyond the scope of this thesis.² My empirical arguments throughout the thesis will be based on the monetary

² Laderchi et al. (2003) provide a detailed comparison of the four approaches in terms of many indicators. Caizhen (2010) offers an empirical evidence if same population is counted as poor or not if assessed based on different approaches.

approach due to the characteristics of the data that will be utilized. Though, it is critical to bear in mind that these approaches are not mutually exclusive. In other words, any researcher resting his analysis on one approach does not exclude the suppositions of the other approaches. It is generally the data or the context issue that leads one to one of the approaches.

2.2. Indicator of Well-Being

To estimate a poverty measure, first, we need to determine which indicators to use as the representatives of the material well-being of an individual. This has been a controversial issue in the poverty measurement literature. So far, income and consumption have been used to that end. These are collected through nationally representative living-standards household surveys approximately in all countries. It is noteworthy to point out that these are indicators solely related to above-mentioned monetary approach. Needless to say, this does not mean that consumption and income are the only indicators of well-being. Based on different poverty approaches, literature proposes a wide range of non-monetary indicators. Nevertheless, as mentioned earlier, we will follow the monetary approach. Hence, this study does not present a review of non-monetary indicators of well-being.

According to Meyer and Sullivan (2003, 2009, and 2011), the choice between consumption and income has been subjected to comparison in terms of two perspectives: conceptual arguments and data issues. In terms of the former perspective, it is widely accepted that consumption is a better indicator of welfare. Because, as it is also put forward by World Bank (2001), consumption reflects the long-run average levels of well-being in a better way than income. To put it differently, the fluctuation in consumption will be less than that of income because people have a tendency to smooth their consumption by means of borrowing and dissaving even though there are temporary decreases and increases in their incomes. This phenomenon was called as permanent income hypothesis by Milton Friedman in 1957. Though, it is unlikely to assume that this is a fact taken for granted, in particular in less developed countries where extreme poverty still prevails and one of the major social and economic problems. This is mainly due to the fact that not only do the poor people in those countries not have enough savings to compensate the income loss, they also do not

have access or have limited access to credit markets. Secondly, another merit of consumption as an indicator of well-being is that it has the ability to reflect the private and official transfers. For instance, if a poor person occasionally provides in-kind or financial benefits from neighbors or charities, a poverty analysis based on only income data will be misleading and therefore, the poverty measurement will be overstated. Furthermore, Johnson (2004) states that individuals do not derive utility from the receipt of income per se. The income needs to be transformed to actual consumption to speak of material well-being. Therefore, he suggests measuring consumption data in poverty context.

On the other hand, in terms of data and reporting perspective, Haughton and Khandker (2009, p. 30) argue that most of the rich countries are using income whereas consumption is preferred mostly by poor countries. This preference does not mean that income is evaluated as a better indicator by the official institutions. According to Haughton and Khandker, the underlying reason for this choice is that people do not have many types of income resources in rich countries. Monthly salary or wages are the only sources of income for most of the households. However, consumption pattern is complex and therefore, it is easier and cheaper to collect income data. Even if there are other sources, the effort to collect those data will be incomparable with the consumption data that requires the household to record information for tens of consumption items. On the other hand, the sources of income in less-developed countries might vary even for a single household. Furthermore, it is widespread to encounter informal sector, self-employment and own production in these countries and it makes the income data hard to measure and less reliable.

Despite the fact that it is favored to use consumption in terms of conceptual arguments, in this regard, income has the advantage that some people might not prefer to consume even though they have the enough resources to live a reasonable life, regardless of the factors leading to this behavior. In other words, if an individual has income at least as much as the level of the poverty line, but prefers to consume below the threshold, counting him as a poor person would lead to overestimation of poverty. Though, one might object to this argument on the grounds that the probability of facing to this situation is very limited so that it does not distort the general inclination of data.

There are also two problems related to income data. One of the problems is that people have a tendency to underreport their income levels, which is something inherent in household living conditions surveys. The other problem is that, as Cutler and Katz (1991) argue, income fails to reflect differences in consumption resulting from having durable goods such as houses and cars and in financial wealth.

All in all, it is obvious from the above arguments that both of the indicators have its own pros and cons. Furthermore, there are empirical studies that find different poverty rates whether one uses income or consumption as an indicator of material well-being. Hence, if both income and consumption data are available, poverty measurement based on the comparison of these two data would be more reliable and sounder. Even if this is not possible, one needs to be quite cautious and aware of the deficiencies of each of the indicators and data while assessing the results of the analysis.

There are also two other concepts in poverty context that is needed to address when evaluating the poverty measures: Unit of analysis and equivalence scales. We will present a brief review of these concepts in the subsequent subsection.

2.3. Unit of Analysis and Equivalence Scales

Along with indicator of well-being, unit of analysis is also another prerequisite to analyze poverty. We can come up with very different poverty rates for a specific society with respect to the usage of different units. Hence, this issue is of much significance and has been subjected to scrutiny in the literature of poverty measurement.

In terms of setting a unit of analysis, one might be constrained by the research area or data. If a researcher analyzes child poverty, the unit chosen will undoubtedly be a child. However, if the researcher is measuring poverty for a whole society, he has a few options such as individual, family, or household. This list can be extended according to the context of the analysis but these are the most frequently used units in the literature. Moreover, what I mean by data constraint is that sometimes the data is not available for the level on which the poverty measurement will be exercised. For instance, the available data might be collected on household level and if one prefers to

measure poverty at the individual level, he or she needs to use extra methods such as using individual sampling weights.

Using individual as unit of analysis has the following advantages: Firstly, it has been agreed upon that not every member of the household is equal and therefore individual as unit of analysis provides convenience that allows us to calculate inequality and poverty among household members and secondly, by the same reason, it helps us to decompose poverty by age, gender, etc. On the other hand, although individual has the mentioned advantages, household as the unit of analysis takes into account intra-household sharing. It means that some costs in the household do not change as the number of household member increases or decreases. For instance, house rent or, to some extent, monthly bills are examples of this situation. As a second advantage of the household as the unit of analysis, governments mostly target households in the challenge of poverty elimination. Therefore, monitoring and evaluation of government policies in poverty tackling would be sounder and more reliable if poverty measured at the household level.

It should be noted that poverty measurements in most of the countries are carried out by household surveys. It is not common to find data based on national surveys in which individual is the unit of analysis because it is harder and costlier to collect data at this level.

Another methodological concern pertaining to poverty measurement is that how to compare different household members. There is no doubt that we cannot assume that members of two different households have the same level of prosperity even if the incomes (expenditures) of these two households are the same without regarding the characteristics of the households. For instance, it is likely to encounter such a case that the total expenditure and member of two or more households are the same. This does not mean that per capita expenditure (income) is equal in these households because we have to take into account age structures of the households. Therefore, to tackle this problem, equivalence scales have been proposed. Basically, this scale regards the age and member of the households to measure per capita income (expenditure) and as it is understood, theoretically, the logic behind this scale relies on the economies of scale. In other words, as mentioned before, as the member of the household increases, the per capita expenditure does not increase accordingly.

The measures of these scales are important because it affects poverty rates. In the literature, there is sensitivity analysis of poverty rates based on the different specifications of equivalence scales. Öztornacı and Demirdöğen (2015) analyzed Turkey case and they found that both number of poor people and poverty rates differ significantly based on the usage of ten different equivalence scales. On the other hand, Short, Garner, Johnson, and Doyle (1999) change the parameters in the OECD scale for the sensitivity analysis for the US and demonstrate that there are not any considerable differences between the poverty rates for each case.

There is a wide range of equivalence scales in the literature, but to understand the formation of a scale, we will only present the OECD scale which has also been used by Turkish Statistical Institute. In this scale, the first adult in the household is weighted as 1 and subsequent members aged 14 or older are weighted 0.5 and remaining members take the weight of 0.3. For instance, for a household with two adults and 1 child aged less than 14, the scale is 1.8. Therefore, to find the per capita income, we will divide the total income of the household by 1.8 and this income will be called as equivalent or equivalised per capita income. If we divide total income of the household by the number of household members, we would underestimate the per capita income and this would lead to overestimation of poverty rates.

2.4. Poverty Line

Sen (1976) argues that there are two problems in the measurement of poverty: identification of the poor and the choice of a single summary statistic. What is meant by identification of the poor is that setting a poverty line for the reason to discriminate poor from the non-poor. Any person below this threshold will be considered as poor. The other problem is also called as aggregation problem and it uses the information from the identification process. In other words, first, we need to decide on who is poor and then we should use an index to demonstrate the severity of the problem. However, the categorization of the problem to two parts by Sen does not mean that other methodological concerns such as indicator of well-being, unit of analysis and equivalence scales that I have mentioned are not justified by him. In fact, these concepts are intrinsic in the problem of setting a poverty line. One cannot define a poverty line without agreeing on the unit of analysis or indicator of well-being.

There have been different approaches to the estimation of the poverty line but much of the debate has been centered on the absoluteness or relativeness of the line. There have also been suggestions that it must be a hybrid of absolute and relative approach in a way that it must be sensitive to the changes in the standards of living in the society but not as much sensitive as a relative approach. Indeed, whether it must be absolute or relative is not only an approach to the poverty line problem but also to the poverty concept in general. Moreover, these poverty lines might be based on monetary or non-monetary approaches but as I mentioned before, non-monetary poverty lines will be out of the scope of this study.

2.4.1. Absolute Poverty Line

Absolute poverty is a situation that one cannot maintain a reasonably healthy life because he lacks the minimum basic needs of a reference individual. It remains fixed over time or to put it differently, the purchasing power corresponding to the line is constant over time. There are two methods to set a poverty line: The cost of basic needs (CBN) method and food energy intake (FEI) method. The CBN method involves four steps: First step is to determine the nutritional requirements of a person to provide the food security. This is generally accepted as 2,100 calories per day per person in line with the calculations of the Food and Agriculture Organization of the United Nations (FAO). Other calorie intakes used in the country-specific cases are also around this value. The next step is to use a diet to meet this calorie intake per day. This is provided by using the diet of individuals living around the poverty line. The cost of this diet is measured at prevailing prices so that the food component of the line is calculated. Because people, even the extremely poor, do not only consume food items, it is needed to add some basic nonfood items. This process constructs the third step of setting a poverty line. Lastly, the cost of food and nonfood items in the consumption bundle is added and this is defined as the poverty line. The monetary value of this bundle is also called as the cost of escaping from poverty.

As it is seen, the CBN method requires the information of the price data for each item in the consumption bundle. When this is not available, the FEI method can be used to construct the poverty line. In fact, both methods rely on the nutritional requirement approach. Their difference comes from the estimation of the cost needed to meet this

requirement. The purpose of FEI method is to reach to the consumption or income level at which pre-determined food requirements are met. Therefore, firstly, a threshold in terms of calories must be determined, say 2,100, and then corresponding consumption or income to this calorie intake can be derived from calorie income function (Ravallion, 1998). The formation of this function is as follows:

$$f(y) = k \quad (1)$$

Because the function is monotonically increasing,

$$f^{-1}(k) = y \quad (2)$$

Once we determine on the minimum calorie intake, k_{min} , we have

$$f^{-1}(k_{min}) = z \quad (3)$$

where k is the food energy intake, y is income or expenditure (consumption), and z is the income or expenditure corresponding to the poverty line. Figure 1 demonstrates this graphically and that there is a unique poverty line for every level of calorie intake. For instance, if we determine that $k_{min} = 2100$ and then by using this curve, we can find the poverty line, z . If we assume that $z = \$100$, the interpretation is that an individual with a \$100 income is expected to have at least 2100 calorie intake.

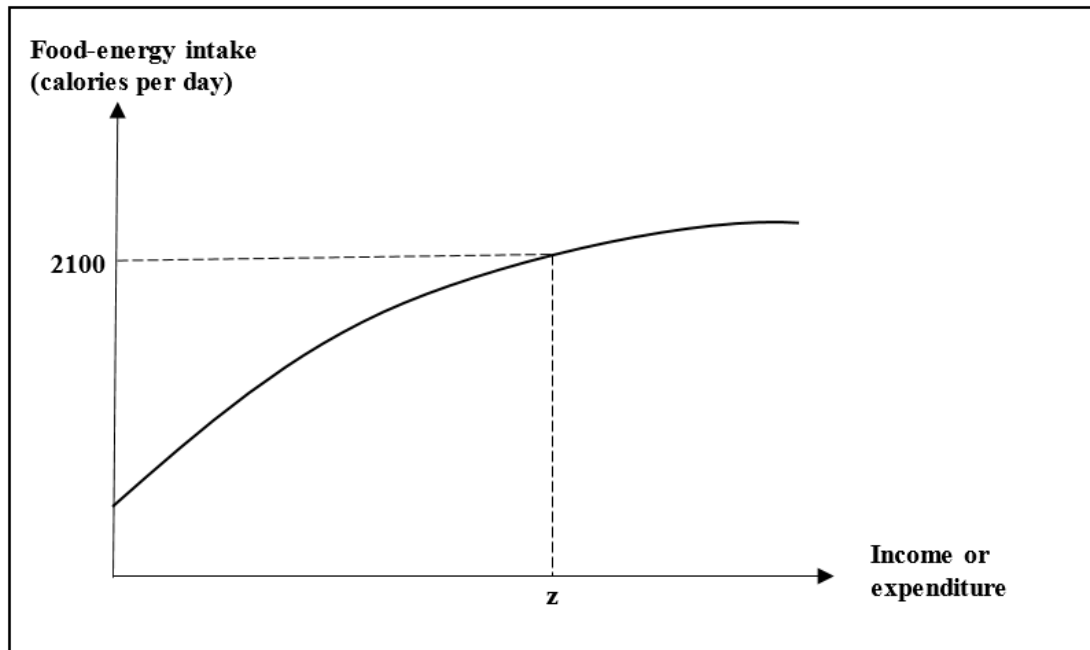


Figure 1: The Food-Energy Intake Method

Source: Ravallion, 1998

This method has been subjected to much criticism because it only takes into account income as the determinant of calorie intake. It rules out the importance of gender, age, rural or urban located individuals and many other determinants of calorie intake. Therefore, as it is pointed out before, this method should be used when only the price data is not available.

The CBN and FEI methods introduced so far can be categorized under objective poverty lines. There are also subjective poverty lines. In this approach, people are asked to define their own poverty line. There is no doubt that there will be different poverty lines as the number of participants. Some econometric methods might be used to construct a unique poverty line from these data. However, there has not been much effort to collect these type data in the literature so far.

There are two ways to update an absolute poverty line over years (Ravallion, 2016, p. 203). First is the repetition of the method used in the base date and the other one is to use a consumer price index (CPI) over the period. However, one needs to be cautious when using CPI because the good coverage of CPI might not be compatible with the bundle used in the base date. Therefore, it may lead biases in the poverty rates.

2.4.2. Relative Poverty Line

There has been substantial difference on the perception of poverty between developing and developed countries. While poor countries consider poverty as absolute, rich countries preferred to regard it a relative concept (Ravallion & Chen, 2011). The use of absolute and relative poverty lines in developing and developed countries respectively is a reflection of this phenomenon. It has been argued, in particular in developed countries, that poverty measures should take into account the standard of living in the society. Therefore, the relative poverty line is constructed as a proportion of the mean or median of the income distribution. These proportions generally vary from 40% to 70% of the mean or median. However, this does not mean that a specific portion of the society will always be poor. Its interpretation differs from poverty measures based on the absolute poverty line. In parallel with this interpretation, the European Union countries do not prefer to call households as the poor but as at risk of poverty if their equivalent income is less than the 60% of the median household

equivalent income. Because whatever the level of the poverty line is, a portion of the society will always have an income less than poverty line even though there are huge increases in the incomes of all individuals. Hence, it is invariant to scale in this sense. In other words, if the incomes of every individual and the poverty line are multiplied by the same, the poverty measure will be unchanged.

The reason that it is principally preferred by rich countries is that the number of poor people living in extreme poverty in these countries is so less that a measure based on absolute poverty line will lead to the perception that poverty is not a social problem for these countries.

Lastly, the difference between the use of absolute and relative poverty is important because it not only affects the result of poverty rates but also the measures needed to be taken in tackling poverty problem will differ.

2.5. Poverty Measurement

The last step in the poverty measurement process is finding a summary statistic or an index by using all concepts that have been presented so far and the data collected with surveys. A proper index is mandatory on the grounds that it provides a better understanding of the poverty problem. Besides, it is necessary to evaluate the efficacy of anti-poverty policies by following the index over the years of policies (Zheng, 1997). Before presenting the indexes proposed and used in the literature, we will explain the poverty axioms that provide the background of what makes an index better when compared to the others.

2.5.1. Poverty Axioms

Zheng (1997) points out that the axiomatic approach to the poverty measurement has begun with the seminal work of Sen (1976). Sen begins with his article by criticizing the most common poverty measures, namely headcount ratio and poverty gap index, in terms of their lack of satisfying some basic axioms such as monotonicity and transfer axioms. Since then, lots of axioms and measures based on these axioms have been developed. Below, we will not present these axioms theoretically but verbally because, by doing so, it will be enough to serve my purpose when poverty measures are evaluated in terms of satisfying these axioms in the next sub-section.

Focus axiom is the one that is most basic and widely accepted in the literature. It implies that a poverty measure must be insensitive to the income distribution among the non-poor. In other words, the measure should not change in case of a change in the income of the non-poor. This axiom does not require poverty measure to be independent of the number of non-poor people.

Monotonicity axiom means that any income loss (gain) of the poor people should lead to an increase (decrease) in the measure. There are some extensions of monotonicity axiom such as weak, strong and subgroup. According to the subgroup monotonicity, if we split the population into two groups, a change in poverty in one of the groups should reflect the poverty of total population in the same direction. There is a slight difference between weak and strong monotonicity. If there is an increase in the income of the poor, weak monotonicity implies that poverty index should decrease under the condition that the poor must stay as poor after the increase. Strong monotonicity does not require this condition. Therefore, strong monotonicity implies weak monotonicity.

According to the *transfer axiom*, any income transfers within the poor people should change the poverty measure. However, Donaldson and Weymark (1986) points out that there have been four versions of transfer axiom and it has been subjected to debate on which one of these are more suitable for a poverty measure. In fact, all forms of transfer axiom require the poverty measure to decrease (increase) after a progressive (regressive) transfer. What is different between four forms is the position of the donor or recipient before and after the transfer. While minimal transfer axiom requires the transfer between two poor individuals, weak transfer axiom lets the donor be anyone above the poverty line, provided that the number of poor people stays the same after the transfer in both forms. In the other two forms, strong upward and strong downward transfer axioms that are also used as regressive and progressive transfer axioms, respectively, in the literature, there is no restriction such that no one will cross the poverty line after the transfer. After a strong upward transfer, while the recipient is poor before and after the transfer, the donor might fall below the poverty line or stay as rich. On the contrary, a strong downward transfer that means a transfer from a richer person, who might be below or above the poverty line, to a poor person can lead to the latter to cross the poverty line. Nevertheless, if the recipient crosses the line after the transfer, the donor should not fall below the poverty line.

Aside from these most widely used axioms, there are a number of axioms that are proposed in the literature. *Replication invariance axiom* refers to the replication of the income distribution in that if current population is replicated and there is no change in the poverty line, the poverty measure should be unchanged. A poverty measure satisfies *scale invariance axiom* if the measure is constant in the case of scaling up or down the all incomes and poverty line by the same factor. There is also another symmetric axiom similar to the scale invariance that is called as *translation invariance axiom*. In this case, the decrease or increase is carried out in absolute terms. Therefore, while any scale invariant poverty index is categorized under relevant poverty measures, a translation invariant index is related to the absolute poverty measures.

2.5.2. Poverty Measures

As it is mentioned before for various reasons, the measurement of poverty is important for understanding the intensity and incidence of poverty. This is crucial for policy makers in alleviation or elimination of poverty. An index is needed to follow the effects and reflections of the policies as well as to know who will be subjected to these policies for efficiency reasons. Because of the importance of the subject, there is a wide literature on the measurement of poverty. Nevertheless, we will only present the most widely used indexes in the literature without delving into the history of poverty measurement.

i. Headcount Index

Headcount index (HI) is the most known and used index so far. In particular, it is mostly preferred by officials because of its ease of calculation and interpretation. The ratio represents the percentage of people whose income level (Y) is less than poverty line (Z) within a given population. It is formulated as $H = q / N$ where q is the number of poor people and N is the population. If there are 20 million of people and 5 million of them are poor, then the headcount ratio is 0.25, which is interpreted as 25% of the population is poor. The only strength of the index is that it has a meaning by itself. Besides, its usage for official purposes can be misleading such that when comparing poverty over times, one might have a perception that the government is so successful in tackling poverty problem if the government prefers to transfer income to the poor

people just below the poverty line to help them cross the line. This issue also reveals another problem of the HI. It treats poverty as if it is a discrete phenomenon. In other words, if the income level corresponding to the poverty line is 100, two persons with incomes 99 and 101 should not be treated differently in terms of living conditions. Therefore, it would be plausible to use different levels of poverty lines at the same time to compare poverty over time.

Another problem with the index is that it does not show the intensity of the poverty. Suppose a population of 4 people and the poverty line is 100, if the incomes of the four people are 50, 90, 120, 200, the headcount ratio is 0.50. The index would be the same whatever the income levels of the poor people in the example. This instance also shows that this index does not satisfy monotonicity and transfer axioms. Because, any income loss or gain as well as transfers to these poor people, provided that they are still poor, leave the headcount ratio as unchanged.

ii. Poverty Gap Index

Unlike from the headcount index, poverty gap index (PGI) takes into account the depth of poverty. It is defined as the ratio of poverty gap to the poverty line where poverty gap is the difference between the poverty line and the income of the each poor. Then, this ratio is normalized by the total population. The poverty gap of the people above the poverty line is assumed to be zero. It is formulated as follows;

$$PGI: \frac{1}{N} \sum_{i=1}^q \frac{z - y_i}{z} \quad (4)$$

where q is the number of people below the poverty line, z is the poverty line and y is the income. The value of the PGI has two meanings: Firstly, it is the percentage of income shortfall for the poor on average. For instance, if PGI is 12 percent, it means that poor people have an income shortfall of 12 percent on average. The other meaning of the index is that it shows the minimum cost of eliminating poverty relative to the poverty line. That is to say, if we assume that poverty line is 2000 liras, the minimum per capita cost of eliminating poverty is 240 liras ($=2000*0.12$).

The shortcoming of this index is that it does not reflect the severity of poverty because it is based on the average income below the poverty line. If there are two different

income distributions with the same mean income among the poor, this index will be similar for both distributions without regarding the characteristics of the distributions. There might be people living in extreme poverty in one of the distributions, even though the average income of the poor is same in both distributions, the PGI, however, will not reflect this situation. Therefore, any income transfer between the poor people will not change the index, which means that the PGI does not satisfy transfer axiom, despite the fact that there is an improvement compared to the HI in terms of PGI's satisfying monotonicity axiom.

Because of the shortcoming that the PGI does not reflect transfer axiom, *squared poverty gap index* (SPGI) has been proposed. Its calculation is very similar to the PGI with the exception that the ratio of poverty gap to the poverty line will be squared.

$$SPGI: \frac{1}{N} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^2 \quad (5)$$

By squaring the poverty gap, the position of the poor, which is how far from the poverty line, will have an effect on the level of the index. A poor person who is so far from the poverty line will have a greater weight compared to another poor who is closer to the poverty line. Therefore, this index satisfies transfer axiom. Any transfer among poor people from a relatively richer person to another poor will decrease the index. A drawback of SPGI is that it is difficult to interpret the value of the index, unlike from the HI and PGI. It could be used for comparing poverty across countries or following the poverty through time.

iii. Sen Index

Sen (1976) remarked the deficiencies of the most popular indexes (HI and PGI) back then because they do not satisfy the monotonicity and transfer axioms, both of which are classified as very crucial for poverty measurement. Therefore, he proposed an alternative measure. Its importance comes from the property that it takes into account the inequality among the poor people in addition to reflecting the prevalence and severity of poverty. There are various ways of formulating the Sen index. Literally, it is the average of the headcount and poverty gap indexes weighted by the Gini coefficient for the poor people. Therefore, the index has three components as shown below:

$$P_{Sen} = HI.G^p + PGI(1 - G^p) \quad (6)$$

G^p refers to the Gini coefficient of the people only below the poverty line, where HI and PGI are headcount index and poverty gap index, respectively. Shorrocks (1995) argues that Sen's seminal work in 1976 paved the way for numerous alternative poverty measures. However, he points out that Sen's measure lacks following properties: First, it does not satisfy above-mentioned replication invariance axiom. Secondly, it is not a continuous function of individual incomes. Thirdly, because of the formation of Gini coefficient, Sen Index cannot be used to decompose poverty so as to understand what contributes to the level of poverty. Last and most importantly, it does not satisfy transfer axiom. Following Sen's measure, including himself, lots of studies have been proposed to make up for the shortcomings of the Sen Index, while recognizing Sen's path-breaking study.

iv. Sen-Shorrocks-Thon Index

Sen-Shorrocks-Thon (SST) index is one of the modifications of the Sen Index by Dominique Thon and Anthony F. Shorrocks. The deficiencies of the Sen Index are eliminated in the new index. Most importantly, SST satisfies transfer axiom and also helps to understand the sources of change in poverty over time, a process called decomposition of poverty.

$$SST: HI.PGI^p(1 + G_p) \quad (7)$$

PGI^p is the poverty gap index measured only for the poor people and G_p is the Gini coefficient of the poverty gap ratios for the whole population. This last term differs from the standard Gini coefficient (G) for a population. While G is the income inequality, G_p refers to the poverty inequality. SST index is normalized so that it takes values between zero and one. When there is no individual below the poverty line, SST index is zero whereas it is one when every individual in the society is poor and has zero income.

As it is understood from equation 7, the SST index has three components as headcount index, poverty gap index and Gini coefficient, therefore, it shows the incidence, intensity and inequality of the poverty at the same time.

v. Foster-Greer-Thorbecke (FGT) Index

The FGT index is developed by Foster, Greer, and Thorbecke (1984) to have a decomposable poverty measure. Its formulation is as follows:

$$FGT: \frac{1}{N} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^\alpha \quad (8)$$

α is the inequality aversion parameter among the poor people. The more it gets bigger, the more the inequality among the poor people is penalized. In fact, headcount, poverty gap, and squared poverty gap indexes introduced before can be classified under FGT class of measures. FGT index is the HI when the aversion parameter is zero, PGI when it is one and SPGI when it is two.

One of the main properties of the index is that it is additively decomposable aside from the property that it takes into account the inequality among the poor people. Additivity property means that when the population is divided into subgroups, population poverty rate can be measured from the population-weighted mean of the subgroup poverty rates. This helps to understand the effect of each group to the overall poverty rate. Another important property of the FGT index is that it is subgroup consistent. In other words, if there is decrease or increase in any of the subgroups, the poverty rate will change according to the direction of the change.

vi. Watts Index

Watts (1968) argues that poverty concept is not a discrete condition. The well-being of a person who is just below the poverty line does not differ significantly from the person just above the line. Therefore, he defends that a poverty measure must ensure the continuum of the poverty concept. Towards this end, he proposes to use the ratio of the poverty line to the income of the individual so as to reflect both continuum and situation of different households. He also points out that a poverty measure should take into account the reality that poverty gets more severe when approached to the bottom of income distribution. Hence, he uses the logarithm of the ratio introduced above.

$$W: \frac{1}{N} \sum_{i=1}^q \ln \left(\frac{z}{y_i} \right) \quad (9)$$

where q is the number of poor people, z is the poverty line, y_i is the income of the i th individual, and N is the population.

Although the Watts index is the first measure that recognizes and penalizes the inequality among the poor people as well as has many desirable properties, it has been out of the sight of the poverty measurement literature until Zheng (1993) gives an axiomatic characterization to the index. It satisfies almost every axiom that has been proposed in the literature so far. Ravallion (2016, p. 235) expresses this situation as “an old measure nobody paid much attention turns out to be the best”.

3. LITERATURE REVIEW

There is an apparent fact that the prevalence of poverty in a country is related to the distribution of income and economic growth in that country. Therefore, the poverty-inequality-growth nexus has been scrutinized thoroughly in development literature. Thorbecke (2013) also points out that a better understanding of the process of development in all societies necessitates the understanding of how these three macroeconomic concepts interact over time.

According to Bourguignon (2004), the poverty-growth and the poverty-inequality causalities are clear and in line with the expectations but the effect of the relationship between growth and income distribution on poverty reduction is not clear. He argues that there has been consensus on that economic growth leads to reduction in poverty, providing that income inequality is stable or decreases and an increase in the income inequality increases poverty. These causalities are proven by the empirical studies. However, empirical studies related to both the impact of growth on inequality and inequality on growth indicate mixed results or in some cases no relationship at all.

In light of this preamble, the question is whether poor people benefit from economic growth or even if they do, is it higher than the population average. Whether one pursue an absolute or relative approach, the formation of the question differs. These questions now bring us to the concept of pro-poor growth.

Although pro-poor growth has been considered as one of the key instruments for poverty reduction strategies since the early 2000s, there is still no consensus on the definition of pro-poor growth. Some use the term interchangeably with the terms *inclusive growth*, *shared growth*, and *broad-based growth*.

There are mainly two definitions of pro-poor growth based on one's approach to poverty whether it is an absolute or relative concept. The absolute definition states that growth is pro-poor if average income of the poor people increase and consequently a reduction in the poverty measure without taking into account the change in average

income of non-poor people (Ravallion & Chen, 2003). On the other hand, the relative approach necessitates the increase in average income of the poor people to be higher than that of non-poor people. Therefore, there is a redistribution of income in favor of poor people (Kakwani & Pernia, 2000). Both definitions agree only on that growth is pro-poor when there is an increase in the average income of the poor but it differs in terms of the level of this increase.

The absolute approach can be criticized on the grounds that even a very slight increase in average income of the poor vis-à-vis a substantial increase in the incomes of non-poor would still be considered as pro-poor. In terms of relative approach, it is subjected to criticism because such a case where the average income growth of the poor is 2% and of the non-poor is 1% would be preferable to a case where income growth of the poor and non-poor is 4% and 6%, subsequently. Ravallion (2004) also argues that relative definition of pro-poor growth has the drawback that any distributional shift with no gain or income loss for the poor could still be pro-poor. On the contrary, he also adds that a pro-rich distributional shift as a result of economic growth could bring substantial income gain for the poor people.

The measurement of pro-poor growth in the literature varies but there are mainly four measures that have been used widely. We will present each of them in detail and this will construct the theoretical part of the literature. Subsequently, empirical literature will be offered based on the measures in the theoretical literature.

Before introducing the indexes, it is crucial to note that economic growth in this context is not the increase in the national income of the country in macroeconomic terms. It is the average increase in the consumption or income of the household or individual data that is collected mostly through household surveys.

3.1. Theoretical Literature

There have been various attempts to measure pro-poor growth along with definitions. Still, there is no consensus on the definition and measurement of the concept. In this subchapter, we will only present four of these measurement attempts in a chronological way. By doing so, first, we will try to introduce most widely measures and secondly, every new measure introduced will be the criticism of the previous measure and reveal

its limitations. Later, in the subsequent chapter, we will review empirical studies that utilized these measures.

3.1.1. Pro-Poor Growth Index

Kakwani and Pernia (2000) offered one of the first indexes in the literature. They use pro-poor growth term synonymously with inclusive growth and their approach to poverty in general based on that of Amartya Sen's capability approach. They argue that there should be biased policies towards poor people to help them satisfy their basic needs as well as increasing standard of living in many areas such as health and education. The authors are aware of the fact that it is difficult to reach a single indicator of pro-poor growth due to the nature of poverty. In terms of measuring the pro-poor growth, they firstly underline the importance of inequality in the poverty-growth nexus. In other words, poverty is sensitive to both economic growth and income inequality. Therefore, their index is based on the decomposition of the total change in poverty into two parts as growth effect (GE) and inequality effect (IE). Growth effect is the change in poverty as a consequence of the change in mean income when the distribution of income is unchanged. Likewise, inequality effect is the change in poverty when the income distribution changes but mean income remains fixed. By this way, one can separately see the impact of economic growth and income distribution on poverty. Based on this consideration, the derivation of the pro-poor growth index (PPGI) is as follows:

$$\theta = \theta(z, \mu, L(p)) \quad (10)$$

where θ is the poverty measure and is a function of the poverty line (z), mean income in the society (μ), and the Lorenz curve ($L(p)$). The Lorenz curve is a measure of income inequality in the society and also it is assumed that poverty line is fixed over time. Hence, the proportional change in poverty between period 1 and period 2:

$$P_{12} = \ln \theta(z, \mu_2, L_2(p)) - \ln \theta(z, \mu_1, L_1(p)) \quad (11)$$

where μ_1 and μ_2 are mean income in years 1 and 2, respectively, and $L_1(p)$ and $L_2(p)$ are the Lorenz curves in years 1 and 2, respectively. The GE and IE is formulated as

$$GE = \frac{1}{2} [\ln \theta(z, \mu_2, L_1(p)) - \ln \theta(z, \mu_1, L_1(p)) + \ln \theta(z, \mu_2, L_2(p)) - \ln \theta(z, \mu_1, L_2(p))] \quad (12)$$

$$IE = \frac{1}{2} [\ln \theta(z, \mu_1, L_2(p)) - \ln \theta(z, \mu_1, L_1(p)) + \ln \theta(z, \mu_2, L_2(p)) - \ln \theta(z, \mu_2, L_1(p))] \quad (13)$$

The sum of GE and IE gives us the P_{12} in equation 11, namely the change in poverty between two periods. If there is positive growth rate between the periods and this growth rate is denoted as g_{12} , then total elasticity of poverty with respect to growth is

$$\eta = \frac{P_{12}}{g_{12}} \quad (14)$$

η is interpreted as the percentage change in poverty when there is one percent change in mean income. Because $P_{12} = GE + IE$, we can define

$$\begin{aligned} \eta_g &= \frac{GE}{g_{12}} \\ \eta_i &= \frac{IE}{g_{12}} \end{aligned} \quad (15)$$

where η_g is the growth elasticity of poverty and interpreted as the percentage change in poverty when there is one percent change in mean income on condition that income distribution remains unchanged. Similarly, η_i is the inequality elasticity of poverty and interpreted as the percentage change in poverty when there is one percent change in income inequality provided that mean income is constant. Therefore,

$$\eta = \eta_g + \eta_i \quad (16)$$

The interpretation is that growth elasticity of poverty is the sum of income effect of growth on poverty and inequality effect of growth on poverty. By the nature of its formulation, η_g will always be negative. It means that under the condition that inequality is fixed, growth will always reduce poverty. On the other hand, the sign of η_i means the change in inequality as a result of economic growth is in favor of the non-poor. On the contrary, if the inequality elasticity of poverty is negative, then growth resulted in a change in inequality is favorable for the poor and when combined with the growth effect, it can be said that this type of growth is pro-poor. All things considered, the pro-poor growth index (PPGI) that is offered by Kakwani and Son is defined as

$$PPGI = \frac{\eta}{\eta_g} = 1 + \frac{\eta_i}{\eta_g} \quad (17)$$

There are three possibilities in terms of the value that PPGI can take and each one of them has different interpretations. If $PPGI > 1$, because $\eta_g < 0$, η_i is also negative. Hence, it means that growth is pro-poor. In other words, both poverty and inequality decreases as the consequence of growth so that the poor benefits from growth more than the non-poor. This is compatible with the above-mentioned definition of pro-poor growth. Because it requires not only the decrease in poverty but also a decrease in inequality.

If $PPGI < 0$, then η_i is positive and $|\eta_i| > |\eta_g|$. It means that as the consequence growth, both poverty and inequality increases. In other words, the inequality effect is greater than the growth effect. Hence, this type of growth is called as immiserizing growth.

Lastly, if $0 \leq PPGI \leq 1$, then η_i is positive and $|\eta_g| > |\eta_i|$. This is the case where inequality increases but poverty decreases. So, the growth effect is bigger than the inequality effect. Growth effect more than compensates the undesirable effect of inequality on poverty. This is called as trickle-down growth. In this case, the poor benefits from growth but less than the non-poor. Therefore, if one pursues a relative approach to pro-poor growth, this situation will be considered as pro-rich. However, in terms absolute approach, because poverty decreases by all manner of means, this type of growth is pro-poor.

Thus far, we have made the supposition that g_{12} is positive, namely there is positive growth between two periods. What if there is recession and g_{12} is negative? Kakwani and Pernia (2000) also formulate PPGI for this case.

$$PPGI = \frac{\eta_g}{\eta} \quad (18)$$

In case of recession, if $PPGI > 1$, because $\eta_g > 0$, then $\eta_i < 0$. It means that poverty increases but the decrease in the income of non-poor is greater than that of poor. Therefore, recession is pro-poor. If $PPGI < 1$, then $\eta_i > 0$. This is the case when both poverty and inequality increases in the society so that recession will be pro-rich.

3.1.2. Rate of Pro-Poor Growth

Ravallion and Chen (2003) offer another way of measuring pro-poor growth and it is called as the rate of pro-poor growth (RPPG). They regard pro-poor growth as an absolute concept. Their main opposition to relative approach as mentioned before is on the grounds that while a pro-poor growth might come with no absolute gains for the poor, there might be significant gains in case of pro-rich growth. They argue that any measure of pro-poor growth should satisfy two axioms: First, the direction of the change in poverty must be compatible with the measure, implying that positive (negative) RPPG leads to poverty reduction (increase). Secondly, the measure of poverty should satisfy the fundamental axioms. The authors mention focus, monotonicity, transfer, and sub-group consistency axioms in this respect. However, as we presented in the previous chapter, Watts index satisfies not only these axioms but also all other axioms that have been offered in the literature. Therefore, they prefer Watts index as the poverty indicator in their measurement.

As Ravallion (2004) points out, the location of a poverty line always includes some uncertainty. Therefore, in constructing the RPPG, a way of understanding the impacts of economic growth over a wide range of the income distribution is to use growth incidence curve (GIC). The curve shows the mean growth rate for each quantile in any income distribution. The derivation of the GIC is as follows: Let $F_t(y)$ be the cumulative distribution function (CDF) of the well-being indicator, namely income or consumption, say income henceforth. There is income of the individuals or households ranked in ascending order on the horizontal axis and income percentile on the vertical axis of the CDF. Any point on the curve indicates the proportion of the population whose income is lower than y at time t . Also, it can be easily showed that the inversion of CDF at the p th quantile gives the income of that quantile:

$$y_t(p) = F_t^{-1}(p) = L'_t(p)\mu_t \quad (y'_t(p) > 0) \quad (19)$$

where $L_t(p)$ is the Lorenz curve, $L'_t(p)$ is its slope and μ_t is the mean income. The p varies from 0 to 1, and therefore, $y_t(p)$ can be called as quantile function. It is the level below which we find the percentage p of the population. The growth rate of the $y_t(p)$ between two periods is denoted with $g_t(p)$ and formulated as:

$$g_t(p) = \frac{y_t(p)}{y_{t-1}(p)} - 1 \quad (20)$$

If we substitute equation (19) into equation (20);

$$g_t(p) = \frac{L'_t(p)}{L'_{t-1}(p)} (\gamma_t + 1) - 1 \quad (21)$$

where γ_t is the growth rate in the mean income $((\mu_t/\mu_{t-1}) - 1)$. If we sketch $g_t(p)$ for values of p , varying from zero to one, we end up with GIC. It is obvious from equation (21) that if there is no change in the income distribution, then $g_t(p) = \gamma_t$. To express in words, the mean growth rate for the poor is equal to the growth rate in the mean for the poor. We can understand whether inequality rises or falling by looking at the GIC. If $g_t(p)$ is increasing (decreasing) function for all p , then inequality is rising (falling) over the specified period. To have a relative pro-poor growth, $g_t(p)$ must be a decreasing function. If $g_t(p) > 0$ for all p , then it is said that there is first order dominance of the income distribution at date t over the income distribution at date $t-1$. When this is the case, there is absolute pro-poor growth. If $g_t(p)$ switches signs over its domain, then it is not possible to reach a conclusion on the pro-poorness of growth just by looking at the GIC alone.

The RPPG is measured in a way that the area under the GIC is calculated up to the headcount index. This area is equal to the change in Watts index. If we write the Watts index at time t as:

$$W_t = \int_0^{H_t} \log[z/y_t(p)] dp \quad (22)$$

where $H_t = F_t(z)$ is the headcount index. Differentiating W_t with respect to time;

$$-\frac{dW_t}{dt} = \int_0^{H_t} \frac{d \log y_t(p)}{dt} dp = \int_0^{H_t} g_t(p) dp \quad (23)$$

By normalizing the equation (23) with the headcount ratio, we can reach to the mean growth rate for the poor:

$$g_t^p = \frac{1}{H_t} \int_0^{H_t} g_t(p) dp \quad (24)$$

If there is no change in the income distribution, the mean growth rate for the poor, g_t^p , will be equal to overall growth rate, γ_t . Besides, the change in Watts index in this case, i.e. if all income levels grow at the same rate, will be as:

$$-\frac{dW_t}{dt} = \gamma_t H_t \quad (25)$$

Therefore, one can also formulate the RPPG in equation (24) as:

$$g_t^p = \frac{dW_t}{dW_t^*} \gamma_t \quad (26)$$

In words, the rate of pro-poor growth is the ordinary growth rate (γ_t) multiplied by the ratio of actual change in Watts Index (dW_t) to the change in Watts index with the same growth rate provided that there is no change in inequality (i.e., distribution-neutral growth, dW_t^*). One can notice that if there is distributional shift favoring the poor, then the RPPG will be higher than ordinary growth rate for the whole society.

3.1.3. Poverty Growth Curve

Son (2004) offered poverty growth curve (PGC) to determine the pro-pooriness of a growth process. The author follows Kakwani and Pernia (2000) approach to prop-poor growth, which is the relative one. Hence, growth is pro-poor if it is accompanied by a reduction in income inequality, which is tracked by the Lorenz curve. In this case, growth is unequivocally pro-poor if $\Delta L(p) > 0$ for all p .

PGC is based on the Atkinson theorem (Atkinson, 1987). If we suppose that μ denotes the mean income, then $\mu L(p)$ is the generalized Lorenz curve. This is useful when we need to compare two different income distribution in the case of intersected Lorenz curves. When the entire generalized Lorenz curve shifts upward, it is considered that the new income distribution has second-order stochastic dominance over the old income distribution. Atkinson shows the linkage between second-order dominance and changes in poverty. If $\Delta(\mu L(p)) > 0$ for all p , it means that the entire generalized Lorenz curve shifted upward, then poverty unambiguously decreased. When income is considered as a continuous variable, Lorenz curve is formulated as follows:

$$L(p) = \frac{1}{\mu} \int_0^x y f(y) dy \quad (27)$$

where

$$p = \int_0^x f(y) dy \quad (28)$$

y is the income of the individual and $f(y)$ is the probability density function. From equation (27), it can be derived that

$$L(p) = \frac{\mu_p p}{\mu} \quad (29)$$

where μ_p is the mean income of the bottom p percent of the population. If we take the natural logarithm of the both side of the equation (29) and then take its first difference, we can write:

$$\Delta \ln(\mu_p) = \Delta \ln((\mu L(p))) \quad (30)$$

$\Delta \ln(\mu_p)$ is denoted as $g(p)$ and called as poverty growth curve. In other words, it is the growth rate of the mean income of the bottom p percent of the population. $g(p)$ varies with p ranging from 0 to 100. Based on Atkinson's theorem, if $g(p) > 0$ for all p , then poverty has decreased unambiguously between the periods. Besides, equation (30) can be written as

$$g(p) = g + \Delta \ln(L(p)) \quad (31)$$

where $g = \Delta \ln(\mu)$. It is the growth rate of the mean income of the whole society. Based on the equation (31), we can make the following inferences:

- If $g(p) > g$ for all $p < 100$, then $L(p) > 0$ for all p . That is, inequality declined and therefore growth is pro-poor.
- If $g(p)$ is positive but less than g for all $p < 100$, then $L(p) < 0$ for all p . It means that inequality increased but growth reduced poverty. This is called as trickle-down growth as mentioned before.
- If $g(p) < 0$ for all $p < 100$ and $g > 0$, then this is called as immiserizing growth because growth increases poverty.

3.1.4. Poverty Equivalent Growth Rate

Kakwani and Son (2008) argue that reduction in poverty depends on both the growth in mean income and the distribution of benefits from growth that the poor people receive. Therefore, they offer to use the poverty equivalent growth rate (PEGR) because it takes account of either aspect of the poverty reduction. PEGR is verbally defined as the growth rate that would have the same effect on poverty reduction as that of actual growth rate, provided that the benefits of the growth have been distributed proportionally over all income percentiles. PEGR is denoted by γ^* and formulated as:

$$\gamma^* = \left(\frac{\delta}{\eta}\right)\gamma = \varphi\gamma \quad (32)$$

where $\varphi = \delta/\eta$ is the PPGI derived by Kakwani and Pernia (2000) that is introduced in former subchapter, γ is the growth rate in mean income, δ is the growth elasticity of poverty and η is the neutral relative growth elasticity. The logic behind the derivation of the index comes from the definition of the PEGR. The actual proportional change in poverty is $\delta\gamma$ whereas the proportional change in poverty when there is zero change in income inequality is $\gamma^*\eta$. Equalization of the two gives us the PEGR. Growth is pro-poor if $\gamma^* > \gamma$. If $0 < \gamma^* < \gamma$, then poverty is reducing with increasing inequality. This is called as ‘trickle-down’ growth in which the poor acquires proportionally less benefits from growth than the non-poor. Lastly, if PEGR is negative, then this situation is defined as ‘immiserizing growth’. This condition might be encountered when the negative effects of increasing inequality is higher than the positive effects of economic growth. In case of recession ($\gamma < 0$), the negative growth is pro-poor if $\gamma < \gamma^* < 0$. Recession increases poverty but non-poor people are affected more than poor people, which leads to improvement in the income distribution.

One of two main properties of the PEGR is that it takes account of the growth rate in mean income and the distributions of benefits from growth between the poor and the non-poor to understand the effects of growth on poverty reduction. The other one is that proportional reduction in poverty is monotonically increasing function of the PEGR. Therefore, maximization of PEGR will lead to the maximum reduction in poverty.

3.2. Empirical Literature

Poverty and growth have always been one of the main priorities of the developing as well as developed countries. However, these two phenomena have been analyzed separately because the prevailing view was the so-called ‘trickle-down’ approach. Neglecting and to some extent the denial of the importance of the distribution of benefits from growth among the society has survived up to a certain period. Because, the poverty and inequality had been on the rise even if there were economic growth. Later, it has been acknowledged that poverty and economic growth cannot be analyzed separately and this paved the way for pro-poor growth literature in the first decade of this century while its roots are much earlier.

There are a large number of empirical studies regarding the poverty-growth-inequality nexus. There is still no consensus on this matter whether growth unconditionally leads to a reduction in poverty or what role inequality has on the poverty-growth linkage, because, the empirical studies based on country cases reveal confusing results. Therefore, this causes a huge literature on the matter. However, we will mainly focus on the studies drawing upon the measures we presented, namely, PPGI, RPPG, PGC, and PEGR.

Kakwani and Pernia (2000) applied their own index (PPGI) for South Korea, Lao PDR, and Thailand. There is weakly pro-poor growth because the value of the index is 0.21 in the 1992-1998 period in Lao PDR when poverty is measured with headcount ratio.³ The reason of the low PPGI value is that the positive effect of economic growth has been offset by the negative effect of increasing inequality for the whole period. The values decrease even more when poverty gap ratio and severity of poverty are used for measuring poverty. The values of the indexes are 0.09 and 0.07 for poverty gap and severity of poverty, respectively. According to the severity of poverty index, the further the poor people from the poverty line, the more weight they are given in poverty

³ Theoretically, there is no pro-poor growth in Lao PDR. However, Kakwani and Pernia (2000) points out that having an index value greater than 1 is the ideal case, but it is not widespread in empirical results. Therefore, they suggest the following index ranges to judge the pro-pooriness of growth processes. There is weakly pro-poor growth if $0 < PPGI \leq 0.33$, moderately pro-poor growth if $0.33 < PPGI \leq 0.66$, pro-poor growth if $0.66 < PPGI < 1$, highly pro-poor if $1 \leq PPGI$.

measure. This indicates that, in Lao PDR, the poor people far below the poverty line has benefited less from growth compared to less poor people. There is a similar situation in Thailand for 1988-1998 period. There was trickle-down growth between 1988 and 1996 and also because of the negative growth rates for the last two years, both poverty and inequality has increased during that period. All three poverty measures offer similar results in Thailand. For South Korea, they found that growth was generally highly pro-poor between 1990 and 1998.

Ravallion and Chen (2003) estimated China's GIC for 1990-1999 period. There was first order dominance so that the poverty certainly declined irrespective of the level of the poverty line and which poverty measure was used. Moreover, the curve is strictly increasing, that is to say, that the inequality was rising over the period. They found that growth was pro-poor in China over the period in that the RPPG was 3.6%, 3.9%, and 4% for the poorest 10%, 15%, and 20% of the population, respectively, whereas growth rate in the mean was 6.2%. Ravallion (2004) also estimated India's GIC for 1993/1994-1999/2000 period based on 40% headcount ratio. Unlike from China, there is a slight U-shaped GIC for India. Growth rates for the poorest people were slightly over 1 percent and for the richest around 2 percent whereas it is around 1 percent for all other percentiles. Compared with the China's %3.6 RPPG, though India's growth was pro-poor, its magnitude is so lower than that of China with 0.8% RPPG and %1.3 ordinary growth rate.

Hashemi (2016) applied GIC and PEGR to Egypt for 1999-2010 period, to Jordan for 2002-2010 period, and to Palestine for 1998-2010 period. Growth was pro-poor in Egypt for all types of poverty measures. In Jordan, growth was pro-poor when poverty is measured with headcount ratio for the 2002-2006 period. There was trickle down growth for the same period when poverty is measured with poverty gap and poverty severity measures. However, Jordan's growth in 2006-2010 period was pro-poor for all three types of poverty measures. In Palestine, the growth was anti-poor from 1998 to 2004 and trickle down from 2004 to 2010.

Son (2004) calculated PGC for Thailand over 1988-2000 period. The growth was pro-poor only in the 1992-1994 and 1994-1996 sub-periods. The poverty declined over 1988-1996 period, but as a consequence of Asian financial crisis, there were increases in poverty in 1996-2000 period. Moreover, poor people were hurt more than the non-

poor from the financial crisis. They also estimated PGC for 87 countries and 241 growth spells based on World Bank data. The growth was pro-poor only in 95 cases out of 241. Esso (2012) computed PGC and GIC for Cote d'Ivoire from 1992 to 2002. PGC is positive in all deciles but less than the growth of mean expenditure level. It means that poverty declined over the period with increasing inequality. GIC is also positive in all deciles and strictly increasing. Therefore, both reach the same conclusion that growth was trickle-down over the period in Cote d'Ivoire.

Kakwani and Son (2008) applied PEGR to Brazil national household survey data covering the period from 1995 to 2005. When poverty is calculated with headcount ratio, growth was pro-poor over all other years except for 1995-1996 period, even though there were negative growth rates in 1998-1999 and 2002-2003 years. Moreover, in positive growth years, PEGR value for poverty severity index is higher than other poverty measures. Therefore, this indicates that poor people far from the poverty line gained from growth more than non-poor people. For negative growth rates, the situation is reversed in that ultra-poor people were hurt more.

Sboui (2012) calculated Tunisia's PPGI and PEGR for 1985-2005 period. PPGI results indicate that growth is trickle-down when poverty is measured with headcount index for the 1985-1995 period. In terms of poverty gap and poverty severity measures, growth is anti-poor for the same period. For the 1995-2005 period, for all three types of poverty measures, PPGI values suggest that there was trickle-down growth. On the other hand, according to PEGR values for the same period, there was immiserizing growth.

Chotikapanich, Griffiths, Rao, and Karunaratne (2014) analyzed 1992-2010 period for China, India, and Indonesia by means of RPPG, PPGI, and PEGR. The growth was pro-poor in China between 2000 and 2005. In Indonesia and India, it was pro-poor between 1992 and 2000. Wang, Xu, and Shang (2014) also estimated and compared PPGI, RPPG, and PEGR for rural China from 1989 to 2009. The growth was not pro-poor in the 1989-2006 period whereas it was pro-poor in the 2006-2009 period based on PPGI. According to RPPG results, growth was pro-poor only in 1994-1997, 2004-2006, and 2006-2009 periods. PEGR results are almost same as those of PPGI results.

Duclos and Verdier-Chouchane (2011) applied PPGI, RPPG, and PEGR to South Africa and Mauritius for the periods 1995-2010 and 2001-2006, respectively. They found growth is pro-poor in absolute terms in Mauritius based on RPPG. In the relative sense, the growth was trickle-down as PPGI and PEGR values suggest. In South Africa, though very slight, there was absolute pro-poor growth and trickle-down growth over the period.

Deutsch and Silber (2011) applied PPGI, PGC, and PEGR to Israel for 1990-2006 period under three different scenarios concerning the construction of the poverty line. They reached the conclusion that the results were sensitive to how one constructs the poverty line and whether the relative or absolute approach was adopted. Moreover, notwithstanding pro-poor subperiods, the growth was not pro-poor in Israel when the 1990-2006 period is evaluated based on GIC and PGC as a whole. A similar conclusion was drawn for PEGR results.

Harmáček, Syrovátka, Schlossarek, and Pavlík (2016) applied all four measures to Bangladesh for 2000-2010 period. They found that the results are almost similar for four measures in that Bangladesh's economic growth was pro-poor during the period. Moreover, less poor people benefited more from growth compared to people on the bottom of the income distribution.

There has been only one study pertaining to pro-poorness of growth in Turkey, which is conducted by Selim and Yıldız (2013). They analyzed Turkey's growth from 2003 to 2009 based on PPGI and PEGR results. They found that both measures mostly presented similar results. The growth was pro-poor in Turkey from 2005 to 2007. This mainly resulted from the positive effect of inequality on poverty reduction. According to PPGI and PEGR results for all other years, except for 2008-2009 period based on PEGR, there was trickle-down growth in Turkey. The 2008-2009 period was anti-poor as PEGR is -4.8. However, it is not surprising because Turkish economy shrank 4.8 percent in that period. The main reason for anti-poor periods is the deteriorating effect of inequality on poverty reduction.

Şeker and Jenkins (2015) decomposed poverty change in Turkey for 2003-2008 and 2008-2012 subperiods. The authors only presented the results of the decomposition without referring to pro-poor growth. However, we can estimate the RPPG and PPGI

results from their calculations. According to the results of decomposition, although distribution component had a positive effect on poverty reduction for the 2003-2008 period, growth component accounted for the bigger part of the change in poverty. Therefore, the growth was both relatively and absolutely pro-poor in this period for three FGT indices. Growth in 2008-2012 subperiod was pro-poor in absolute terms whereas, in relative terms, it differs based on different poverty indices. PPGI is less than one when poverty is measured with headcount ratio, which is the indicator of trickle-down growth. On the other hand, results of both poverty gap and poverty severity indices offer that growth was pro-poor in that period. We can make an inference that poorest people benefited more from growth than less poor people.

4. DATA AND METHODOLOGY

4.1. Data Description

Our study utilizes micro data obtained from Household Budget Surveys (HBS). Turkish Statistical Institution (Turkstat) carries out HBS annually since 2002. Turkstat first conducted this survey in 1987 and then repeated in 1994. Although we have 1994 and 2002 micro data, sample period in this study spans from 2003 to 2014. Because, as Şeker and Jenkins (2015) point out, 2003 is the benchmark year in terms of two aspects. First, the consumption bundle that provides a basis for the measurement of inflation was determined based on the consumption pattern of households surveyed in 2003. Secondly, the food component in the measurement of official poverty line is also based on the 2003 HBS data. As we will explain shortly, we are bound to these two aspects in terms of transformation of data when expressing them in real terms.

Turkstat used stratified two-stage cluster sampling method. In the first stage, clusters were selected and subsequently in the next stage household were selected systematically from each clusters that are selected in the first stage. Both observations and sampling frames were weighted by the population projections and these projections were based on the general censuses until 2009. A new system called as Address Based Population Registration System (ABPRS) was established in 2007 and since 2009 household weights and sampling frames are based on this new system.

According to the Turkstat, the main objective of HBS is to attain information regarding to the consumption pattern of households. The data contain annual incomes and monthly consumption expenditures as well as other information about the socioeconomic status of the households. Surveys were conducted to 720 households changing every month, totaling to 8640 households for the whole year until 2009 except for the 2003 survey. Sample size in 2003 was large as 25920 households for the reasons explained above. Sample size was expanded to 1050 household per month and 12600 household per year in 2009. Since 2010, the sample size is constant as 1104

household per month and 13248 household per year, although the number of households responding to the questionnaire is different for every year.

On the other hand, HBS was utilized for poverty and income distribution purposes until 2006, in which year Turkstat began to conduct a new survey, called as Survey of Income and Living Conditions (SILC). Compared to HBS which is consumption oriented, SILC provides more detailed income data about the household and its individuals. Therefore, depending on the indicator of well-being, SILC or HBS might be preferred to the other.

It is also noteworthy to point out that our data include household weights. Weight is the inverse of probability of selection and it demonstrates the number of household in the population that is represented by the surveyed household. For instance, if we have a household weight of 1000 for one observation, then there are 1000 households in the whole population that has the same characteristics with this observation. We have to use household weights in addition to household size to avoid biased estimates.

4.2. Methodology

We used consumption as the indicator of well-being of the household. Consumption expenditure in our data is defined as the monthly average expenditure values of the following components: total purchase of goods and services, consumption from own production, consumption from income in-kind, goods and services that are purchased by the household to be given to the private persons or bodies as gifts or allowances, imputed rent. All consumption data for the previous years are adjusted for inflation to express them in 2014 prices. The calculation is based on the percentage changes in prices and measured as dividing the annual average CPI for 2014 by annual average CPI for earlier years.

Unit of analysis in our study is adult equivalent per capita consumption, which equivalised with using OECD scale. As explained before, in this scale, the first adult in the household is weighted as 1 and subsequent members aged 14 or older are weighted 0.5 and remaining members take the weight of 0.3. Adult equivalent per capita consumption is calculated in a way that total household consumption is divided by the number of adult equivalent members.

We use relative definition of poverty line and compare the results based on the usage of different poverty lines as 40%, 50%, 60%, and 70% of the median consumption. Besides, we also demonstrate the results for absolute definition of poverty line which is constructed in a way that we first find the value corresponding to the 50% of the median for the initial year and consider that the line is fixed over the whole period. In terms of poverty indices, we estimate the results for three indices within FGT class of poverty measures such as headcount ratio, poverty gap ratio, and squared poverty gap also known as poverty severity index. Therefore, we can understand the extent to which the benefits of growth have been distributed over the bottom of the income distribution.

We calculated three pro-poor growth indices as PPGI, RPPG, and PEGR by using Distributive Analysis Stata Package (DASP) written by Araar and Duclos (2007). The pro-pooriness of growth in absolute term can be followed from RPPG results and in relative term from PPGI and PEGR results. How to evaluate the results of the indices are explained in the previous chapter. These indices are called as full or complete approach because they require a poverty line and poverty measure and we reach to conclusive results whether growth is pro-poor or not. However, PGC is considered within partial approach because we can estimate without specifying a poverty line and poverty measure. Therefore, we do not estimate PGC because it is mainly useful when the researcher only has aggregate data and also it is based on the satisfaction of dominance conditions. However, we have micro data obtained from HBS, which allows us to follow full approach and reach conclusive results. Besides, PGC is considered within relative definitions of pro-poor growth but we already able to demonstrate and compare the results of two pro-poor growth indices from relative approach, namely PPGI and PEGR.

5. RESULTS

In this section, first, we calculate some poverty and inequality measures in Turkey over 2003-2014 period. Subsequently, we estimate pro-poor growth measures using three poverty measures and four different poverty lines for the same period and evaluate the results.

5.1. Poverty and Inequality in Turkey

As Özatay (2015) summarized, after the 2001 crisis, Turkey implemented a series of fiscal and monetary reforms under the name of ‘Transition Program for Strengthening the Economy’ to soften the blow of the economic crisis as well as to create a sound economic environment for future possible crises. Consequently, Turkey experienced substantial growth rates over 2002-2007 period that is higher than the historical averages. The average growth rate was 6.8⁴ between 2002 and 2007. Concurrently, there were significant improvement in many macroeconomic indicators such as declines in inflation and real interest rate. Moreover, both public debt and budget deficit became less concern compared to the beginning of the period. However, Turkish economy has begun to feel the impact of the global economic crises beginning from the second quarter of 2008 and Turkey witnessed 0.7 and -4.7 growth rates in 2008 and 2009, respectively. Advanced economies adopted quantitative easing programs to tackle with the global crises and this has led to the abundance in global liquidity and capital flows into developing countries. Therefore, Turkey benefited from these flows and grew 9.2% in 2010 and 8.8% in 2011. However, these huge growth rates were not the sign of strong economic fundamentals. Rather, it caused alarm bells to start ringing for the economy, for instance, the current account deficit

⁴ Turkstat recently changed the way of measuring GDP and announced a new series of growth rates. Although, the trend between two series is almost same, there are substantial differences in terms of growth values, in particular in post-2010 period. The growth rates in the main text are based on the old series.

reached approximately 10% of GDP in 2011. Therefore, policymakers has taken some measures to cool down the economy so that growth rates between 2012 and 2014 hovered between 2% and 4%, reaching to 3.1% in average.

Having such an economic environment for our analysis period, we will estimate and track record of poverty and inequality rates year by year. We will demonstrate inequality with Gini index and poverty with all three indexes within FGT class of poverty measures.

**Table 1: Poverty and Inequality Rates in Turkey Over 2003-2014 Period
(Poverty Line: 50% of the Median)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI	GINI
2003	698	11.55 (0.0026)	2.74 (0.0008)	0.010 (0.0004)	0.37 (0.0038)
2004	790	12.17 (0.0044)	2.91 (0.0014)	0.011 (0.0006)	0.36 (0.0056)
2005	905	12.72 (0.0045)	3.22 (0.0015)	0.013 (0.0008)	0.36 (0.0046)
2006	956	12.71 (0.0047)	3.25 (0.0015)	0.012 (0.0007)	0.35 (0.0048)
2007	987	11.38 (0.0042)	2.79 (0.0013)	0.010 (0.0006)	0.34 (0.0045)
2008	1089	12.99 (0.0045)	3.34 (0.0014)	0.013 (0.0007)	0.34 (0.0044)
2009	1066	12.43 (0.0040)	3.25 (0.0013)	0.013 (0.0007)	0.34 (0.0040)
2010	1066	11.45 (0.0037)	2.98 (0.0012)	0.012 (0.0006)	0.33 (0.0038)
2011	1124	11.17 (0.0037)	2.72 (0.0011)	0.010 (0.0005)	0.34 (0.0039)
2012	1142	12.20 (0.0039)	3.06 (0.0012)	0.012 (0.0006)	0.36 (0.0045)
2013	1181	12.00 (0.0037)	3.11 (0.0012)	0.012 (0.0006)	0.34 (0.0035)
2014	1209	10.85 (0.0038)	2.77 (0.0011)	0.011 (0.0005)	0.35 (0.0039)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Note: Poverty line is the half of the median expenditure for the year in which poverty measures are calculated. The values in the parentheses are standard errors.

Table 1 shows our results based on HBS data. We found that Gini index slightly decreased from 0.37 to 0.33 over 2003-2010 period and it hovered around 0.34 in the rest of the whole period. Therefore, when 2003-2014 period is evaluated as a whole, rather than speaking of a declining trend, there has been slight improvement in income inequality. In terms of poverty, as in the case of inequality, there is no a trend but

decreases in some years and increases in others without following any pattern compatible with growth rates in GDP. We repeated the same analysis for different poverty lines such as 40%, 60%, and 70% of the median consumption and found very similar results (see appendix table A1, A2, and A3).

We also estimate poverty rates following absolute definition poverty line. We used two different thresholds and they differ in terms of the year in which the line is measured. In the first poverty line, we calculated 50% of the median consumption in 2003 year and used this value over the whole period. As explained before, because all our consumption data is expressed in real terms, there is no need for any further transformation of poverty line. In the second case, we used 50% of the median consumption in 2014 as the threshold for the whole period. This method, using two different poverty lines to measure poverty rates, to some extent, can be considered as robust analysis.

**Table 2: Poverty Rates in Turkey Over 2003-2014 Period
(Poverty Line: 50% of the Median Consumption in 2003)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI
2003	698	11.55 (0.0025)	2.74 (0.0007)	0.0102 (0.0004)
2004	698	8.55 (0.0037)	1.92 (0.0010)	0.0068 (0.0005)
2005	698	5.96 (0.0033)	1.47 (0.0010)	0.0056 (0.0005)
2006	698	5.26 (0.0031)	1.18 (0.0008)	0.0043 (0.0004)
2007	698	3.80 (0.0024)	0.87 (0.0006)	0.0033 (0.0003)
2008	698	3.56 (0.0023)	0.88 (0.0007)	0.0036 (0.0004)
2009	698	3.61 (0.0021)	0.96 (0.0006)	0.0040 (0.0003)
2010	698	3.57 (0.0021)	0.85 (0.0006)	0.0032 (0.0003)
2011	698	2.35 (0.0016)	0.54 (0.0004)	0.0020 (0.0002)
2012	698	2.84 (0.0018)	0.68 (0.0005)	0.0025 (0.0002)
2013	698	2.61 (0.0017)	0.63 (0.0004)	0.0024 (0.0002)
2014	698	2.14 (0.0013)	0.51 (0.0003)	0.0020 (0.0002)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Table 2 shows that there have been substantial decreases in the incidence of poverty from 11.55% to 2.14%. The speed of the decrease is so higher in 2003-2007 period when Turkish economy also grew over its historical averages compared to 2008-2014 period. Therefore, much of the decline in poverty has been accomplished in the former period. Although it is not very high, we see that incidence of poverty increased in 2009 because there was negative economic growth in that year. Moreover, we demonstrate that inequality among poor people worsened in 2008-2009 period as the consequence of the global economic crisis because while SPGI in 2007 was 0.0033, it reached to 0.0040 in 2009. On the other hand, when 2003-2014 examined as a whole, there have been significant improvements in inequality among poor people as can be seen from the value of SPGI has fallen from 0.010 to 0.002.

**Table 3: Poverty Rates in Turkey Over 2003-2014 Period
(Poverty Line: 50% of the Median Consumption in 2014)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI
2003	1209	40.66 (0.0040)	12.45 (0.0016)	0.0539 (0.0009)
2004	1209	32.43 (0.0063)	9.50 (0.0023)	0.0400 (0.0013)
2005	1209	25.27 (0.0060)	7.10 (0.0022)	0.0297 (0.0012)
2006	1209	22.07 (0.0059)	6.20 (0.0020)	0.0254 (0.0010)
2007	1209	19.73 (0.0053)	5.15 (0.0017)	0.0201 (0.0008)
2008	1209	16.68 (0.0052)	4.49 (0.0017)	0.0183 (0.0009)
2009	1209	17.20 (0.0047)	4.62 (0.0015)	0.0191 (0.0008)
2010	1209	15.65 (0.0042)	4.21 (0.0014)	0.0173 (0.0007)
2011	1209	13.85 (0.0042)	3.42 (0.0012)	0.0130 (0.0006)
2012	1209	13.95 (0.0042)	3.62 (0.0013)	0.0144 (0.0006)
2013	1209	12.74 (0.0038)	3.34 (0.0012)	0.0133 (0.0006)
2014	1209	10.84 (0.0035)	2.77 (0.0010)	0.0110 (0.0005)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Likewise, table 3 shows the estimates if we repeat the same analysis when we set the poverty line as half of the median consumption in 2014. We find that incidence of poverty has fallen from 40.66% to 10.84%. Besides, PGI and SPGI decreased to

around one-fifth of its value in 2003, meaning that there were substantial improvements in inequality among poor people.

In a nutshell, we found two different poverty estimates based on the usage of different poverty lines. In the first case, we used relative definition of poverty line for different proportions of the median consumption per month and found that poverty is almost constant over our analysis period. In the second case, we used absolute definition of poverty line and estimated poverty rates for two different poverty lines and found that there were considerable decreases in poverty rates.

5.2. Measuring Pro-Poor Growth in Turkey

In this section, we analyze pro-poorness of growth process in Turkey over 2003-2014 period by three indices we introduced before: PPGI, RPPG, and PEGR. Measuring pro-poor growth indices necessitate the use of both a poverty index and a poverty line. Towards this end, we estimate the results for all three poverty measures (HI, PGI, and SPGI) and follow absolute definition of poverty line.

Table 4 and 5 shows the estimates of pro-poor growth indices and the assessments of this measurements based on the criteria of pro-poorness for each indices year by year. We use RPPG to follow the pro-poorness of growth in absolute sense and PPGI and PEGR in relative sense. The growth rate in the table 4 is the growth in mean consumption from one year to the other. We use growth rate to compare its value with that of PEGR to understand if growth is pro-poor in relative sense.

We see that growth is pro-poor in 8 of 11 periods in absolute sense because the value of RPPG is greater than zero. One surprising finding regarding RPPG results is that even though there was 8.30% growth rate in mean consumption in 2007-2008 period, results show that growth was anti-poor. We encounter a similar situation in 2011-2012 period. Likewise, there was 3.95% growth rate in mean consumption, but we see that growth was anti-poor not only in absolute sense but also in relative sense for all poverty measures. In terms of relative approach to pro-poor growth, PPGI results show that 6 periods were pro-poor, 4 periods were trickle-down, and one was anti-poor in case poverty is measured with headcount index. Except for 2008-2010 period, values of PPGI are always less when poverty is measured with PGI and SPGI compared to HI.

Therefore, its evaluation is that ultra-poor people has benefited less from growth compared to less poor people.

The evaluation of PEGR results is almost same with that of PPGI. There is only one period, in which Turkey experienced negative growth rate in mean consumption, where two indices offer different results. According to PPGI, the growth was trickle down in 2008-2009 period for all three poverty measures while it was pro-poor based on PEGR results. Aside from this period, the assessment of all other periods for all poverty measures is the same. More importantly, we find that when poverty is measured with higher degrees of FGT class of poverty measures, a general inclination of the results is that the values of PEGR get lesser. This was also the case with PPGI results and it means that poor people just below the poverty line are benefited more from growth compared to poor people far from the poverty line.

When we analyze 2003-2014 as a whole (see table A4), there were unsurprisingly pro-poor growth in absolute sense. However, we found the threshold values for both PPGI and PEGR, 1.00 and 68.21, respectively, where growth rate in mean consumption is 68.22% and poverty is measured with headcount index. Similar to previous results, when poverty is measured with PGI and SPGI, both PPGI and PEGR values decrease and we conclude that Turkey experienced trickle-down growth in 2003-2014 period. We also estimated results for two subperiods, 2003-2007 and 2007-2014. The former period is where Turkish economy experienced high growth rates compared to the latter as explained before. Results show that growth process was pro-poor over 2003-2007 period in both absolute and relative senses when poverty is measured with headcount index. However, there was trickle-down growth for other measures of poverty. On the other hand, we found that 2007-2014 period was trickle down with decreasing values for PPGI and PEGR as the degree of FGT poverty measures increase.

One general assessment of the estimates is that there is no trend in results, meaning that the periods that are pro-poor, anti-poor or trickle-down do not follow any growth pattern. Secondly, because poverty decreased over the whole period, there was pro-poor growth if we follow absolute approach. However, in terms of relative approach, there were different results even for the same year based on the usage of poverty measures. But, we can definitely conclude that ultra-poor people has benefited less from growth compared to less poor people.

Table 4: Pro-Poor Growth Estimates (by years and indices)

			Headcount Index		Poverty Gap Index		Squared PGI	
Period	Growth Rate (%)	RPPG (%)	PPGI	PEGR (%)	PPGI	PEGR (%)	PPGI	PEGR (%)
2003-2004	10.56	9.54	1.01	10.67	0.85	8.99	0.78	8.24
2004-2005	13.74	6.19	0.89	12.28	0.54	7.43	0.36	4.91
2005-2006	3.59	6.50	1.68	6.05	1.41	5.08	1.37	4.92
2006-2007	3.42	7.14	3.74	12.79	1.87	6.41	1.36	4.65
2007-2008	8.30	-0.87	0.33	2.72	-0.03	-0.24	-0.27	-2.25
2008-2009	-2.78	-3.33	0.14	-0.40	0.79	-2.21	0.80	-2.22
2009-2010	0.75	5.13	0.74	0.56	4.17	3.12	5.87	4.39
2010-2011	7.82	11.16	1.82	14.21	1.29	10.11	1.08	8.43
2011-2012	3.95	-7.25	-2.06	-8.15	-1.63	-6.43	-1.27	-5.01
2012-2013	0.48	2.25	9.29	4.46	3.80	1.82	2.25	1.08
2013-2014	4.52	5.57	1.48	6.69	1.12	5.06	0.78	3.51

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Notes: All pro-poor growth indices are based on TL698.43 poverty line, which is the value of half of the median consumption in 2003. RPPG is measured only for Watts Index, therefore, its rate does not change whether one uses HI, PGI or SPGI when measures poverty.

Table 5: Assessment of Pro-Poor Growth Estimates

		Headcount Index		Poverty Gap Index		Squared PGI	
Period	RPPG	PPGI	PEGR	PPGI	PEGR	PPGI	PEGR
2003-2004	Pro-poor	Pro-poor	Pro-poor	Trickle-down	Trickle-down	Trickle-down	Trickle-down
2004-2005	Pro-poor	Trickle-down	Trickle-down	Trickle-down	Trickle-down	Trickle-down	Trickle-down
2005-2006	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor
2006-2007	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor
2007-2008	Anti-poor	Trickle-down	Trickle-down	Anti-poor	Anti-poor	Anti-poor	Anti-poor
2008-2009	Anti-poor	Trickle-down	Pro-poor	Trickle-down	Pro-poor	Trickle-down	Pro-poor
2009-2010	Pro-poor	Trickle-down	Trickle-down	Pro-poor	Pro-poor	Pro-poor	Pro-poor
2010-2011	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor
2011-2012	Anti-poor	Anti-poor	Anti-poor	Anti-poor	Anti-poor	Anti-poor	Anti-poor
2012-2013	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor
2013-2014	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Pro-poor	Trickle-down	Trickle-down

Source: Authors' own assessments based on the criteria of pro-pooriness for each pro-poor growth indices

5.3. Decomposition of Change in Poverty

Table 6 shows the results of decomposition of change in poverty by growth and redistribution components year by year over 2003-2014 period. We also estimated 2003-2007 and 2007-2014 subperiods as well as 2003-2014 period as a whole and presented the results at the last three rows of Table 6. We use this analysis to understand which component contributed to the change in poverty in what way.

The first assessment regarding the results is that contribution of growth is larger than that of redistribution for most of the years when poverty is measured with headcount index. We see that except for 2008-2009 period, growth has always contributed to change in poverty while redistribution effect is positive in some years, meaning that it lessened the positive effect of growth on poverty change between periods. Besides, for most of the years in which the redistribution component is negative, the effect of redistribution becomes larger as the degree of FGT poverty measures increase. This means that poorest people has relatively benefited the most from redistribution.

When we analyze 2003-2014 period as a whole, growth component explains around 92% change in poverty and this ratio gets bigger if we use PGI and SPGI as poverty measure. Also, while redistribution component has contributed to poverty change for HI, its relative effect decreases for PGI and we see that redistribution component has a positive sign in case poverty is measured with SPGI, which means that redistribution component has mitigated the positive effect of growth on poverty change. This situation also means that redistribution has hurt the poorest people most.

Around 82% of total change in poverty between 2003 and 2014 was in 2003-2007 period. Findings for this subperiod are almost same with the above analysis of 2003-2014 period with the exception that redistribution has always contributed to poverty change for all three FGT class of poverty measures. Likewise, its effect decreases as we move from HI to SPGI, therefore, we again conclude that poorest people has benefited less from redistribution compared to less poor people. On the other hand, in 2007-2014 period, redistribution has adversely affected the change in poverty and mitigated the positive effect of growth for all three poverty measures.

Table 6: Decomposition of Change in Poverty

		Headcount Index			Poverty Gap Index			Squared PGI	
Period	Change in Poverty (%)	GC	RC	Change in Poverty (%)	GC	RC	Change in Poverty	GC	RC
2003-2004	-3.00	-3.00	0	-0.82	-0.77	-0.04	-0.0033	-0.0030	-0.0004
2004-2005	-2.59	-2.85	0.26	-0.46	-0.71	0.25	-0.0013	-0.0027	0.0015
2005-2006	-0.70	-0.53	-0.17	-0.28	-0.15	-0.13	-0.0013	-0.0006	-0.0007
2006-2007	-1.46	-0.47	-0.99	-0.31	-0.12	-0.19	-0.0010	-0.0004	-0.0006
2007-2008	-0.25	-0.92	0.68	0.01	-0.23	0.24	0.0003	-0.0009	0.0012
2008-2009	0.05	0.30	-0.25	0.08	0.08	0.01	0.0004	0.0003	0.0001
2009-2010	-0.04	-0.07	0.04	-0.11	-0.02	-0.09	-0.0008	-0.0001	-0.0007
2010-2011	-1.22	-0.74	-0.48	-0.31	-0.17	-0.13	-0.0011	-0.0006	-0.0005
2011-2012	0.49	-0.30	0.79	0.14	-0.08	0.22	0.0005	-0.0003	0.0008
2012-2013	-0.22	-0.03	-0.19	-0.05	-0.01	-0.04	-0.0001	0	-0.0001
2013-2014	-0.47	-0.34	-0.13	-0.12	-0.08	-0.04	-0.0004	-0.0003	-0.0001
2003-2007	-7.75	-6.71	-1.04	-1.87	-1.63	-0.24	-0.0069	-0.0061	-0.0008
2007-2014	-1.66	-2.09	0.43	-0.36	-0.50	0.14	-0.0013	-0.0018	0.0006
2003-2014	-9.41	-8.70	-0.71	-2.23	-2.16	-0.07	-0.0082	-0.0083	0.0002

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Notes: GC= Growth component, RC= Redistribution component. All poverty indices are based on TL698.43 poverty line, which is the value of half of the median consumption in 2003. Change in poverty is the sum of GC and RC but may not sum to total due to rounding.

6. CONCLUSION

This study aimed at understanding the growth process of Turkey over 2003-2014 period whether it was pro-poor. We utilized micro data obtained from HBS collected by Turkstat and we calculated three pro-poor growth measures: Pro-Poor Growth Index, Rate of Pro-Poor Growth, and Poverty Equivalent Growth Rate. Before measuring these indices, we calculated inequality and, in particular, poverty rates for Turkey over the whole period year by year based on the HBS data. We measured poverty for both absolute and relative poverty lines. In terms inequality, which we used Gini as indicator of it, we found that Gini index decreased from 0.37 to 0.33 over 2003-2010 period. In the rest of the period, it was around 0.34 on average. Therefore, when we examined 2003-2014 period as a whole, we found that there have been slight improvements in terms of inequality in the society, although it is not possible to speak of a declining trend. When we measured poverty with a relative poverty line, half of the median consumption, we found that there were decreases in some years and increases in other with no trend like inequality. We repeated this analysis for different levels of poverty lines such as 40%, 60%, and 70% of the median consumption and found very similar results. On the other hand, when we measure poverty with an absolute poverty line as half of the median consumption in 2003 and use this value for all years, we found that there have been significant declines in poverty for all three FGT class of poverty measures. We also calculated poverty rates by utilizing a different absolute poverty line as half of the median consumption in 2014. Because this value corresponds to a higher poverty line compared to the previous, we found higher poverty rates, but the declining trend was the same.

Subsequently, we calculated above-mentioned three pro-poor growth indices using DASP. The results that we found suggest that there is no trend in yearly results. It means that some growth years were pro-poor, some were trickle down, and some others were anti-poor, which is not compatible with GDP growth pattern of Turkey over 2003-2014 period. On the other hand, if we follow absolute approach to pro-poor

growth, Turkey experienced pro-poor growth in 8 periods of 11. In terms of relative approach, we made different conclusions even for the same year based on the usage of different poverty measures. However, there is one striking finding that ultra-poor people has gained less from growth when compared to less poor people because when we measure poverty with SPGI, which takes into account the inequality among poor people, we found smaller values for pro-poor growth indices.

Lastly, we decomposed the change in poverty into growth and redistribution components to understand the impacts of these on poverty change. First, we found that growth explains a considerable rate of change in poverty more than redistribution if we measure poverty with headcount index. Next, yearly results also suggest that poorest people has benefited most from redistribution in the years that redistribution has contributed to poverty change, meaning that it has a negative sign. On the other hand, when we examine 2003-2014 period as a whole rather than year by year, growth component explains around 92% change in poverty and this ratio gets higher as the degree of FGT measure increase. Besides, in terms of redistribution component over the whole period, we found that it changes sign when we change the poverty measure from headcount index to SPGI. Therefore, this result suggest that redistribution has hurt the ultra-poor people most compared to less poor people.

On the other hand, we need to be cautious when assessing the declining trend in poverty and investigate the impetus behind this ‘success’. CBRT publishes financial stability and financial accounts reports periodically and among many other things, these reports inform us regarding the financial assets and liabilities of households. We see that there have been enormous increases in the ratio of households’ debt to the disposable income. While this ratio was around 7% in 2003, it reaches to 25% in 2006 and to 50% in 2014. Without taking into account the increasing trend in the over-indebtedness of the households and jumping to the conclusion that Turkey has succeeded in tackling poverty would lead us to inconclusive policies for the future.

Another concern is that combatting poverty in Turkey has mainly performed by the efforts of non-governmental organizations. We know that some policies such as distribution of packets of foods and coal to the poor people have being implemented. However, this policy is subjected to criticism by many people on the grounds that it is not within the context of challenging with poverty, on the contrary they are being

performed by politicians with the motivation of increasing their votes. Even if we put aside these critics, we are sure that public sector has not done its job and non-governmental organizations has filled this gap. Nevertheless, we should become aware of the fact that this is not sustainable in the long run.

The findings that there has not been pro-poor growth in relative sense when 2003-2014 period examined as a whole and the poorest people has benefited less from growth than that of less poor people as well as redistribution has hurt the poorest people more suggest that Turkey has not implemented pro-poor policies over 2003-2014 period. Therefore, policy makers should realize that even though the percentage of poor people has declined, the benefits of growth have not been distributed evenly and the fact that the speed of the decline in poverty has slowed down should prompt the public sector in terms of implementing pro-poor policies rather than focusing on economic growth alone. Last but not least, although we followed monetary approach in this study because of data restrictions, further researches regarding the non-income dimensions of pro-poor growth must be carried out. We all admit that being-poor or not is not just a matter of having insufficient income or consumption. Likewise, when there is economic growth, not only does it lead to material well-being but we also expect improvements in many fields such as health, education, financial system, etc. Therefore, how poor people has benefited from growth in terms of non-income indicators are worth to analyze.

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APPENDICES

**Table A1: Poverty Rates in Turkey Over 2003-2014 Period
(Poverty Line: 40% of the Median)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI
2003	559	5.83 (0.0019)	1.30 (0.0005)	0.0047 (0.0002)
2004	632	6.22 (0.0033)	1.36 (0.0009)	0.0047 (0.0004)
2005	724	6.81 (0.0035)	1.64 (0.0011)	0.0063 (0.0005)
2006	764	6.95 (0.0037)	1.61 (0.0010)	0.0059 (0.0005)
2007	790	5.86 (0.0032)	1.33 (0.0008)	0.0049 (0.0004)
2008	871	7.04 (0.0035)	1.74 (0.0010)	0.069 (0.0005)
2009	853	6.60 (0.0030)	1.70 (0.0009)	0.007 (0.0005)
2010	853	6.21 (0.0028)	1.56 (0.0008)	0.0061 (0.0004)
2011	899	5.86 (0.0028)	1.31 (0.0007)	0.0048 (0.0003)
2012	913	6.35 (0.0029)	1.56 (0.0008)	0.0060 (0.0004)
2013	944	6.42 (0.0028)	1.60 (0.0008)	0.0062 (0.0004)
2014	967	5.69 (0.0027)	1.42 (0.0007)	0.0056 (0.0003)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

**Table A2: Poverty Rates in Turkey Over 2003-2014 Period
(Poverty Line: 60% of the Median)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI
2003	838	18.91 (0.0031)	4.80 (0.0010)	0.0185 (0.0005)
2004	948	19.31 (0.0050)	5.03 (0.0018)	0.0195 (0.0009)
2005	1086	19.74 (0.0051)	5.36 (0.0019)	0.0219 (0.0011)
2006	1147	19.56 (0.0053)	5.39 (0.0019)	0.0218 (0.0010)
2007	1184	18.97 (0.0050)	4.85 (0.0017)	0.0188 (0.0008)
2008	1306	19.88 (0.0049)	5.51 (0.0018)	0.0229 (0.0010)
2009	1279	19.51 (0.0045)	5.37 (0.0016)	0.0224 (0.0009)
2010	1279	18.34 (0.0043)	4.91 (0.0015)	0.0203 (0.0008)
2011	1348	18.69 (0.0044)	4.73 (0.0015)	0.0184 (0.0007)
2012	1370	19.00 (0.0045)	5.12 (0.0016)	0.0209 (0.0008)
2013	1417	18.61 (0.0043)	5.12 (0.0015)	0.0212 (0.0008)
2014	1451	18.17 (0.0047)	4.71 (0.0015)	0.0190 (0.0007)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

**Table A3: Poverty Rates in Turkey Over 2003-2014 Period
(Poverty Line: 70% of the Median)**

Year	Poverty Line (TL per month)	HI (%)	PGI (%)	SPGI
2003	978	27.18 (0.0031)	7.38 (0.0013)	0.0298 (0.0007)
2004	1106	27.09 (0.0052)	7.61 (0.0021)	0.0311 (0.0011)
2005	1267	27.98 (0.0052)	7.99 (0.0022)	0.0338 (0.0013)
2006	1338	27.40 (0.0055)	7.99 (0.0023)	0.0338 (0.0013)
2007	1382	26.74 (0.0052)	7.41 (0.0021)	0.0301 (0.0011)
2008	1524	27.58 (0.0050)	8.09 (0.0021)	0.0349 (0.0012)
2009	1492	26.83 (0.0046)	7.93 (0.0019)	0.0341 (0.0011)
2010	1492	26.20 (0.0046)	7.38 (0.0018)	0.0312 (0.0010)
2011	1573	26.47 (0.0045)	7.26 (0.0018)	0.0295 (0.0009)
2012	1598	26.55 (0.0046)	7.63 (0.0019)	0.0323 (0.0010)
2013	1653	26.44 (0.0045)	7.61 (0.0018)	0.0324 (0.0010)
2014	1693	26.73 (0.0049)	7.21 (0.0019)	0.0297 (0.0010)

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Table A4: Pro-Poor Growth Estimates (by subperiods and indices)

			Headcount Index		Poverty Gap Index		Squared PGI	
Period	Growth Rate (%)	RPPG (%)	PPGI	PEGR (%)	PPGI	PEGR (%)	PPGI	PEGR (%)
2003-2007	34.72	20.73	1.10	38.14	0.94	32.51	0.84	29.19
2007-2014	24.86	12.40	0.79	19.68	0.65	16.23	0.58	14.34
2003-2014	68.22	24.81	1.00	68.21	0.90	61.48	0.85	58.09

Source: Authors' own calculations from 2003-2014 HBS data (using DASP)

Notes: All pro-poor growth indices are based on TL698.43 poverty line, which is the value of half of the median consumption in 2003. RPPG is measured only for Watts Index, therefore, its rate does not change whether one uses HI, PGI or SPGI when measures poverty.

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