INFLATION ACROSS INCOME GROUPS: THE CASE OF TURKEY

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ABSTRACT

INFLATION ACROSS INCOME GROUPS: THE CASE OF TURKEY

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This study, covering the period from 2004 to 2018, investigates the inflation differentials across income groups and the determinants of group-specific inflation in Turkey. We use the micro-data from the Household Budget Survey and consumer price data to calculate group-specific inflation rates. We find that inflation differentials across income groups vary throughout time in Turkey. Lower-income groups have higher inflation exposures in first half the period under investigation, especially between 2008-2010, whereas the higher income groups face higher inflation rates in the second half of the period, especially after 2014. Over the period under investigation, higher-income groups experience a higher inflation rate by 0.25% relative to lower-income groups in Turkey. The main contributors to the lowest income group inflation are "food and non-alcoholic beverages" and "housing." Contrarily, "transport," "cafes, restaurants and hotels," and "miscellaneous goods and services" accelerate the highest income group inflation. After investigating inflation differentials, we focus on the determinants of group-specific inflation rates in Turkey. For this purpose, we use the VAR (Vector Autoregression) model. Our findings demonstrate that exchange rate changes have a higher impact on both the lowest and

the highest income group inflation, whereas world energy price changes have an impact only on the highest income group inflation. However, the magnitude of the impact of exchange rate varies across these groups; the highest income group inflation is more sensitive to the exchange rate changes than the lowest income group inflation.

Keywords: Income groups, inflation differentials, developing countries, Turkey, VAR model

ÖZ

GELİR GRUPLARINA GÖRE ENFLASYON: TÜRKİYE ÖRNEĞİ

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Bu çalışmada 2004-2018 yılları arasında Türkiye'deki gelir grupları arasındaki enflasyon farklılıkları ve gelir gruplarına özgü enflasyonların belirleyicileri analiz edilmektedir. Gelir gruplarına özgü enflasyonların hesaplanmasında Hanehalkı Bütçe Anketi'nden elde edilen mikro-veri ve tüketici fiyat verisi kullanılmıştır. Bu çalışma gelir grupları arasındaki enflasyon farklılıklarının zaman içerisinde değiştiğini ortaya koymaktadır. Özellikle gıda fiyatlarının artış gösterdiği küresel finansal kriz döneminde düşük gelir grupları daha yüksek enflasyonla karşı karşıya kalmıştır. Son yıllardaki döviz kuru şokları, yüksek gelir gruplarının daha yüksek enflasyonlar karşılaşmasına neden olmuştur. Uzun vadede yüksek gelir grupları, düşük gelir grubuna göre 0.25 puan daha fazla enflasyon oranlarına sahiptir. Düşük gelir grubuna özgü enflasyona en büyük katkıyı sağlayan harcama kalemleri gıda ve alkolsüz içecekler ile konut harcamalarıdır. Buna karşılık ulaşım, kafeler, restoranlar ve oteller, çeşitli mal ve hizmetler gibi harcama kalemleri ise yüksek gelir grubu enflasyonunu artıran kalemlerdir. Bu analizlerin yanısıra, bu çalışma gelir gruplarına özgü enflasyonun belirleyicilerini de araştırmaktadır. Bu amaçla Vektör Otoregresyon

modeli kullanılmaktadır. Bulgularımız, döviz kuru değişimlerinin hem düşük hem de yüksek gelir gruplarına özgü enflasyonun üzerindeki önemli bir etkisi olduğunu göstermektedir. Ayrıca dünya enerji enflasyonunun ise yalnızca yüksek gelir grubu enflasyonu üzerinde etkisi vardır. Ancak, döviz kuru etkisinin büyüklüğü bu gruplar arasında farklılık göstermektedir; yüksek gelir grubu enflasyonu, döviz kuru değişikliklerine düşük gelir grubu enflasyonuna göre daha duyarlıdır.

Anahtar Kelimeler: Gelir grupları, enflasyon farklılıkları, gelişmekte olan ülkeler, Türkiye, VAR modeli

To My Family

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LIST OF ABBREVIATIONS

CBRT	Central Bank of Republic of Turkey
CES	Consumer Expenditure Survey
COICOP	Classification of Individual Consumption According to Purpose
CPI	Consumer Price Index
ERPT	Exchange Rate Pass-Through
EUROSTAT	European Statistics
EVS	Income and Expenditure Survey
HBS	Household Budget Survey
HICP	Harmonised Indices of Consumer Prices
KNCP	Kilts-Nielsen Consumer Panel
NEER	Nominal Effective Exchange Rate
TURKSTAT	Turkish Statistical Institute
VAR	Vector Autoregression

CHAPTER 1

INTRODUCTION

Inflation indicates the increase in the general price level of goods and services, and also it shows the changes in the households' cost of living and their purchasing power. In this respect, any change in inflation without any change in income can affect households' purchasing power. For example, in a period in which inflation goes up fast, and the level of income stays the same, households start to lose their purchasing power and can buy much fewer goods with their income. Also, inflation determines the economic decisions of households by affecting the cost of living. Since inflation has different effects on households' consumption patterns and the cost of living, it is crucial to investigate inflation at the household level (Kaplan and Schulhofer-Wohl, 2017).

Besides, the government uses inflation for different macroeconomic policies, such as determining minimum wages, social benefits, the transfer payments in the economy, etc. Although these policies are sensitive to the overall inflation rate in the economy, these policies are related to different households. Accordingly, the differences between the sub-group inflation can guide policymakers in various policymaking processes, like the indexation of social benefits (Janský and Hait, 2016). Understanding the changes in the cost of living for a specific group is important to make policies about these groups and their welfare. For instance, policymakers can use inflation for the lower-income groups to determine minimum wages since most of them typically earn minimum wages. Besides, the transfer payments are means of redistribution of income and purchasing power in the economy. In this respect, the purchasing power changes in different households are important for these types of policies. To understand these changes, we need to examine inflation at the household level.

The dynamics of inflation and the changes in these dynamics can explain inflation differences across both countries and income groups. For instance, developing

countries have still witnessed higher inflation rates than developed countries, although the world economy has witnessed lower inflation rates in the recent period. We can benefit from the determinants of inflation in explaining the reason behind these differences. Countries' income levels also play a crucial role in inflation by affecting consumption patterns in the country, and accordingly, the consumption bundle for Consumer Price Index (CPI). The consumption bundle differences give messages about which country's inflation is sensitive to which prices' changes. In developing countries, the larger shares in the consumption bundle belong to the food and energy sectors. Thus, any change in food and energy prices affects developing countries' price levels more than the price level in developed countries. Considering the volatility of these prices in developing countries, the impact of these price changes is more considerable in developing counties than those in developed countries.

While inflation dynamics vary according to countries' structural features, income levels, and even the period examined, inflation may not disperse homogeneously across households. Countries' structural features and income levels are influential in their inflation rates; correspondingly, households' demographic features and income levels are decisive in household inflation. The overall inflation rate announced by the National Statistics Offices does not intend to capture the heterogeneity of inflation exposures at the household level. They generally use CPI, showing the change in prices of a consumption bundle for a representative household. However, there is no single household in the economy; a household's consumption bundle can differ depending on the households' income levels or demographic features. Hence, the official inflation rate may not reflect changes in the cost of living across different household types. Inflation at the household level should be examined to see the changes in the cost of living for different household types.

The inflation across different households is investigated from two different angles in the literature. While some economists explore inflation across different demographic groups, some others focus on inflation across income groups. Different demographic groups have different consumption patterns; therefore, their consumption bundles are different from one another. For instance, older people spend more on health care; correspondingly, the movements in healthcare services' prices affect older people more than younger people. Also, the consumption of health care services is not like buying

a refrigerator; older people cannot postpone or give up their consumption on these services. In the end, the price changes in health services are influential for older people's cost of living. Accordingly, the impact of inflation differs across these demographic groups: while some face higher inflation exposures, others witness lower inflation exposures. Hobijn and Lagakos (2005) find that older people face higher inflation rates in the United States. On the other hand, Crawford and Smith (2002) argue that households without children can face higher rates in the U.K. Demographic differences give messages about households' priorities, necessities, and accordingly, their spending patterns. Therefore, a change in the price of specific goods may affect one demographic groups' cost of living more if these goods are their necessities, and they cannot switch their consumption quickly.

One strand of the literature focuses on inflation across income groups. Although some studies find that there are no significant differences in inflation differentials across income groups (Garner et al., 1996; Taktek, 1998), another group of studies claims the opposite (Fritzer and Glatzer, 2009; Kaplan and Schulhofer-Wohl, 2017; Mehrhoff and Breuer, 2010; Muellbauer, 1974). However, these studies focus on developed countries typically characterised by the low inflation rate and lower-income inequality levels. Hence, it is important to take country characteristics into account when considering the differences between income groups. To this end, studies on developing countries show that inflation across income groups varies such that lower-income groups face higher inflation exposures (Cardoso, 1992; Nachane & Chaubal, 2017; Oosthuizen, 2007). Since the developing countries are characterised by higher income inequality and higher inflation rates, inflation differentials in these countries would be different from those in developed countries. As income inequalities are getting larger, the variety of spending patterns across income groups also increases. Therefore, it affects the magnitude of inflation differentials across these groups. Combined with higher inflation rates, developing countries may face significant inflation differentials, especially across income groups.

Having relatively higher inflation rates and income inequality are the characteristic of Turkey. Relatively higher and volatile inflation rates both reduce households' purchasing power and cause uncertainty for the economy. Also, income inequality plays a role in differing the impact of inflation on income groups by changing the

consumption bundles. Thus, inflation may be heterogeneously dispersed across these groups in Turkey. Previous studies demonstrate that inflation differentials are present for most of the time in Turkey (Akçelik, 2016; Gürsel and Acar, 2015; Gürsel and Kavuncu, 2019; Gürsel and Şak, 2008). However, there are very few studies on this subject, and these studies do not give a comprehensive analysis of the inflation differentials.[1] These studies focus on inflation differentials and the main contributors to these differentials. Akçelik (2016) is the most comprehensive study for Turkish income groups since it uses the most detailed data for the analysis and investigates the determinants of inflation differentials across income groups. However, he could explain only the highest income group inflation. Therefore, we need to more comprehensive analysis that explains the lowest and the highest income group inflation determinants and compares them with the determinants of overall inflation. This study aims to fill this gap to understand the differentials and their determinants from a theoretical perspective. Therefore, this thesis's main objective is to investigate the inflation differentials across income groups and the determinants of these differentials in Turkey. The analysis covers the period from 2004 to 2018. Our study seeks to answer these questions: What is the magnitude of the inflation differentials across income groups? What are the determinants of inflation differentials? Under which conditions, we observe inflation differentials across income groups? Does one group have inflation exposure all the time, or it changes throughout time? This thesis's most significant contribution is to examine the determinants of group-specific inflation rates and compare them with the overall inflation rate dynamics. Another contribution is expanding the period; it will be useful to see the changes in the dynamics of inflation differentials and Turkey's consumption pattern.

In this study, we calculate inflation for different income groups from 2004 to 2018. The source of the expenditure weights of 5-digit COICOP (Classification of Individual Consumption According to Purpose) level goods and services is the Household Budget Survey. By combining these weights with their price indexes at the 5-digit COICOP level, we obtain inflation for different income groups as the most aggregated price index. Our classifications of income groups consist of quintiles, deciles, and ventiles[2].

[1] Except (Akçelik, 2016)
[2] There are 5, 10 and 20 equal groups, respectively.

These income groups are determined by equivalised annual disposable income[3]. For the first half of the period, the lower-income groups face higher inflation rates, since the increase in food prices affects inflation differentials. And, the higher income groups have higher inflation exposures for the second half of the period. Hence, the inflation differentials can change throughout time; no income group always has higher inflation exposures. We find that the highest quintile income group experiences a 0.25 percentage point higher inflation compared to the lowest quintile income group on average for the entire period. The inflation differential decreases to 0.21 percentage points when we examine the different decile income groups. Then it falls to 0.19 for the case of ventile income groups. The inflation differences between the lowest and the highest income quintiles are statistically insignificant on average. Also, we tested the significance of inflation differentials by using the 36-month averages method. Therefore, our result shows that the significance of inflation differentials vary periodically. Besides that, the volatility of inflation differential increases as the income gap rises. Standard deviations of inflation differentials across quintiles, deciles, and ventiles are 1.80, 2.17, and 2.40, respectively.

We also calculate the contributors to the inflation differentials across the lowest and the highest income quintile groups. We find that "food and non-alcoholic beverages" and "housing" accelerate the lowest income group inflation from 2004 to 2018. As we expected, the prices of necessities are influential in the inflation of the lowest income groups. "Transportation, hotels, restaurants, and cafes," "miscellaneous goods and services," increase the inflation differentials at the expense of the highest income group during the period. The prices of luxury goods and services are also important contributors to the highest income groups' inflation.

According to our empirical findings, higher-income groups face higher inflation rates than lower-income groups on average. However, there are some limitations to this analysis. Since we use the average prices of goods and services due to the lack of data, we cannot capture the inflation differentials arising from the prices paid. Therefore, this study only measures the inflation differentials originated from the differences in consumption patterns. On the other hand, different household types cope with inflation

[3] Equivalised annual disposable income is calculated considering the size of the household.

in different ways. To be clear, higher-income groups have several opportunities to cope with inflation: purchasing cheaper but similar goods, switching outlets, etc. However, the lower-income group mostly cannot find cheaper goods since they have already purchased the cheapest goods (Argente and Lee, 2020). In the end, we need more detailed price data, such as scanner data, to thoroughly understand the inflation differentials.

Besides calculating inflation differentials, we investigate inflation determinants for three different inflation types: overall inflation, the lowest income group inflation, and the highest income group inflation. We use the Vector Autoregressive model and set up three different VAR (Vector Autoregression) models. According to the VAR estimation results, the exchange rate determines the inflation in Turkey, for all inflation types. And, the highest income group inflation is more sensitive to exchange rate changes and world energy inflation. On the other hand, the lowest income group inflation is only sensitive to the exchange rates' changes.

This thesis's structure is as follows: Chapter 2 discusses inflation from two different strands: the literature on drivers of inflation and inflation across different households. The first-strand of the literature mainly focuses on the determinants of inflation across countries. There are various arguments on the determinants of inflation. These differences come from specific features of countries and periods of analysis. The literature on inflation differentials across different households is discussed as in developed and developing countries separately. For developed countries, there are three different results on the inflation differentials. While some countries do not have significant inflation differences among households, some others witness different inflation exposures at the household level. In this chapter, the literature about foreign countries is discussed since the related literature in Turkey's case is discussed in Chapter 3.

Chapter 3 examines how inflation behaves across income groups and how it changes in time in Turkey. Firstly, we discuss the related literature in Turkey. After that, we use descriptive statistics about inflation and income groups to understand the dynamics of inflation and the consumption patterns among income groups in Turkey. Then, we explain the data and the methodology used in this study. Finally, we analyse our

empirical findings of the inflation differentials across income groups and the contributors to these differentials in Turkey.

Chapter 4 investigates the determinants of inflation for different income groups and the overall inflation rate separately. We use the Vector Autoregression model to estimate the determinants. We use two tools of the VAR model: variance decompositions and impulse response functions. And the last chapter concludes.

CHAPTER 2

THE LITERATURE ON INFLATION

2.1 Introduction

Sources of inflation have always been one of the controversial topics in monetary economics literature. The most famous and contentious debate is whether supply-side factors and demand-side factors have more importance in determining inflation. Throughout history, sources of inflation have changed in line with the global economic outlook and the economic structure. Different shocks in the international and domestic environments define the sources of inflation differently. As the dynamics of inflation change across countries and throughout time, the dynamics of inflation differentials may also change. Also, the differences in the determinants of inflation across countries may explain why some countries do not have significant inflation differentials while some others have considerable inflation differences across income groups. Also, our study mainly focuses on the inflation differentials and the determinants of group-specific inflation in Turkey. For this reason, we review the literature from two different strands: the literature on the drivers of inflation and the literature on inflation across income groups.

Since the literature on inflation across income groups mainly focuses on the inflation differentials and contributors to these differentials, this literature cannot give information about the determinants of the group-specific inflation rates. In this respect, we examine the determinants of inflation at the country level. This literature guides our analysis on the drivers of overall and group-specific inflations in Turkey, as discussed in Chapter 4.

This chapter's outline is as follows: the next section reviews the literature on drivers of inflation. Section 2 reviews the literature on inflation across income groups. The

literature about developed and developing countries is discussed separately in this section. The last chapter concludes.

2.2 Literature Review on Drivers of Inflation

In earlier studies, money growth is accepted as the main driver of inflation. As the money supply increases, aggregate demand increases; thus, aggregate demand triggers inflation. Mishkin (1984) finds a positive relationship between money growth and inflation in the analysis between 1972 and 1982 for 52 countries. He also states that the budget deficits would be the source of inflationary monetary policies since the government covers her deficit via increasing high-powered money or issuing bonds. As a relatively recent study, Canova and Nicolo (2002) study the importance of monetary disturbances on inflation in G-7 countries[4]. This study covers the years between 1973 and 1995. These disturbances contribute to the inflation variability in these countries, especially in the U.S., the U.K., Italy, and Japan. The magnitude of contributions is higher than fifty percent in those four countries. Monetary shocks still maintain their importance in inflation for some advanced economies. Gambetti et al. (2005) investigate the structural dynamics of output and inflation in the U.S. economy from 1970 to 2003. They state that real demand and monetary shocks account for inflation largely in the U.S. economy. Demand shocks explain 17% of inflation variability, and monetary shocks explain 14% of inflation variability. According to this study, the influence of monetary shocks in inflation increases throughout time, while the impact of demand shocks in inflation stays the same. The literature on developed countries shows that monetary variables maintain their importance from the beginning of the 1970s to the 2000s.

On the other hand, the studies about developing countries show that the determinants of inflation may differ from those of developed countries. Also, these determinants may differ from each other among developing countries. Loungani and Swagel (2001) investigate sources of inflation for 53 developing countries from 1964 to 1998. They examine these countries in four groups: African, Asian, Mediterranean, and South American countries. They then categorize the determinants as money growth and

[4] G-7 is the international economic organization consisting of seven biggest world economies; United States, Germany, Japan, United Kingdom, France, Italy, Canada.

exchange rates, the output gap, changes in oil and non-oil prices, and past realizations of inflation. For African and Asian countries, the inflation inertia has more importance on inflation, while the money growth and exchange rates play an important role in inflation in South American countries. The difference comes from the exchange rate regimes; past realizations are important in the fixed exchange rate regimes, while monetary growth and exchange rates are crucial in the floating exchange rate regimes. Besides, he criticises the conventional determinants of inflation, such as the output gap, monetary variables, etc., since many developing economies are fragile in domestic and external sectors. Thus, the conventional determinants of inflation lose their importance in these economies.

Many studies on developing countries report that supply-side factors are more influential on inflation than demand-side factors. When Mohanty and Klau (2001) examine the determinants of inflation for 14 emerging market economies in the 1980s and 1990s, they argue that the conventional determinants of inflation would not be relevant for all economies[5]. Their findings suggest that supply factors affect inflation in most of these economies rather than demand-side factors. In addition to supply factors, inflation is driven by exchange rates and agricultural prices to a large extent. The dependence on imported products results in the sensitivity of inflation to exchange rate shocks. This dependence manifests itself in two ways: dependence on finished goods and dependence on intermediate goods. Most developing countries cannot produce some products, and they must buy from abroad. Therefore, these goods have a larger share in developing countries' consumption bundles; exchange rate shocks transmit to the prices of the goods in a country. Since some developing countries need to import some intermediate goods, exchange rate shocks directly affect the cost of the goods. Accordingly, input prices in the production process changes, it also affects the prices of the goods produced with these intermediate goods. In the end, exchange rate shocks affect imported goods' prices and some goods produced in a country.

[5] The emerging economies are Thailand, the Philippines, Taiwan (China), the Czech Republic, Hungary, Peru, Mexico, Chile, Brazil, Malaysia, South Africa, India, Korea, Poland.

Exchange Rate Pass-Through (ERPT)[6] is crucial for countries that have a dependence on imported goods. The price level of imported goods and some domestically produced goods can be affected by exchange rate changes. Thus, these changes generally affect the movements in inflation in developing countries. There are important empirical studies consistent with these statements: Mohanty and Klau (2001) find a close relationship between exchange rate changes and movements in inflation rates for emerging market economies for the 1990s. And, Kara et al. (2005) investigate the ERPT in domestic prices for the Turkish case. By the 2000s, inflation started to decline, and they find that ERPT to domestic prices has declined with the help of floating exchange rate regimes. However, they also state that the effect of exchange rate movements on domestic prices, especially on the tradable sector, will be important in the long run since Turkey is an import-dependent country in its domestic production process. The impact of the exchange rate on tradable sectors is still large enough to affect prices in these sectors.

Over time the determinant role of the exchange rate on inflation has declined. This decline period fits with the time of appreciation of the domestic currency. The value of domestic currencies increases; the sensitivity to exchange rate shock also declines in developing countries. Jongwanich and Park (2011) examine the ERPT in the presence of a spike in food and oil prices in 2007-08. They mention that its impact on inflation weakened through government policy measures such as price controls, subsidies. Although Asian countries witnessed a vital supply shock, the demand-pull factors gained importance on inflation with government measures. In other words, the government has controlled the old supply shocks that affect inflation. However, the authors of the article accept that if the economy has witnessed a new price shock, it will affect inflation because of the mitigation of government policy measures after the shock came up.

Additionally, having a larger share of agricultural production brings along the volatility in agricultural products' prices. Weather conditions play a crucial role in the volatility of prices of agricultural products. Especially volatility of food prices is influential in inflation rates because food prices have a larger percentage in CPI in

[6] Exchange Rate Pass Through is the measure of the effectiveness of the changes in international prices on consumer and retail price in a country.

emerging market economies. Hence, any shock in food prices easily transmits to inflation (Mohanty & Klau, 2001). Walsh (2011) investigates the effect of food prices on inflation for 91 countries[7]. The volatility of food prices is much larger than non-food prices in poorer countries; thus, these countries' inflation rates are relatively higher than in richer countries.

Apart from these, drivers of inflation may vary at different times, even for the same country. The factors such as macroeconomic policies, the exchange rate regimes, and global dynamics affect drivers of inflation. For example, the change in monetary policies shapes households and businesses behaviours in the United Kingdom. Mumtaz et al. (2011) investigate the changes in the drivers of inflation from 1964 to 2005 in the U.K. with a time-varying factor augmented VAR. 1992 is a significant turning point for the U.K. economy since they moved to an inflation-targeting regime, and their domestic currency exited from the European exchange rate mechanism. These specific changes in monetary policies lead to changes in the structure of inflation. Their findings suggest that supply shocks and monetary policy shocks gained importance in the post-1992 period, while demand shocks are an important determinant of inflation in the pre-1992 period. The credibility of monetary policy plays a crucial role in lessening the effect of demand shocks. As distinct from the United Kingdom case, global dynamics gain more importance in changes in drivers of inflation for Asian countries. Osorio and Unsal (2013) examine these changes over time in Asian countries; hence, they divided it into two sub-periods as 1986-99 and 2000-09. They set up the global VAR model with country-specific endogenous variables like the real output, consumer and producer price inflation, real money balances, the nominal exchange rate, and the short-term interest rate. They use these country-specific variables as proxies of unobserved global factors, and they also use observed global factors in their analysis. They find that demand-driven inflation has become more prevalent in the second sub-period, mainly because of China's inflationary process. Besides, the output gap plays a crucial role in inflation in higher-income countries in the second sub-period, such as Japan, New Zealand, Australia and

[7] Walsh (2011) study on consumer price indices for 91 countries.

Hong Kong. In contrast, ASEAN countries are exposed to supply shocks and commodity price shocks since they are import-dependent countries on food and oil.

Globalization, especially, increases the importance of external factors on inflation and accordingly, inflation is determined by not only the domestic factors but also the external factors. The global economic conditions, exchange rate movements are also effective on the economies. However, developing countries are more sensitive to these changes in the world economy. Accordingly, the dynamics in the economies may change frequently. Under conditions where the economy is so exposed to external influences, it may be inevitable that official inflation and even the inflation dispersion among different groups will be changeable according to these influences.

Depending on the differences in the literature among developed and developing countries, we can easily say that the dynamics of inflation change across these countries. Both the consumption and production processes in developing countries depend on external changes. Consequently, many macroeconomic variables in these counties are affected by the changes in the global economy. In addition to that, the main economic activity for many developing countries is still agricultural production. In this regard, the volatility problem in inflation is still present for those countries. On the other hand, developed countries generally do not face these types of problems. As inflation dynamics vary across countries, inflation dynamics may also change across income groups within a country.

In addition to that, mostly developing countries have unequal inflation distribution across income groups. The reason for this unequal distribution can be explained by the drivers of inflation in developing countries. Since lower-income groups mostly spend on food, and the food prices are highly volatile in these countries, the food price changes increase the lower-income group inflation more than the highest income group inflation and increase inflation differentials. Contrarily, the exchange rate shocks are influential in the inflation of developing countries. These exchange rates shocks are transmitted mostly to a specific group with higher expenditure shares on imported goods—accordingly, the inflation differences across income groups increase. The determinants of inflation may explain why Canada does not have substantial

differences in the inflation exposures, whereas South Africa has a problem with the distribution of inflation across income groups.

2.3 Literature Review on Inflation across Income Groups

While there are many studies on inflation dynamics, research on inflation differentials using the micro-data has been sparse. Nevertheless, there are some studies about inflation across different groups by using micro-data. There are two angles to elaborate: inflation across demographic groups and inflation across income groups. The findings of these studies differ based on the analysing period and the countries. Some economists claim that there are no important differences between some economic or demographic groups. In contrast, others claim a big difference in inflation exposures, which also generates inequality between them.

Inflation across demographic groups is quite popular in developed countries than those in developing countries. Inflation differences across income groups are not as large as among demographic groups. Since developed countries generally do not have income inequality as much as developing countries, the inflation differentials across income groups are lower than those observed in developing countries. However, the studies about inflation differentials across demographic groups seem more important in developed countries. Since the differences across demographic groups are not about economic development, we can see the different consumption patterns across demographic groups both in developed and developing countries.

On the other hand, inflation across income groups should be an important concern in developing countries characterised by a higher income inequality level. Since the income level is one of the crucial determinants of consumption patterns, there are many differences in consumption bundles of different income groups in developing countries. Besides, the developing countries have more fragile economies compared to developed ones; they are more likely to be exposed to the changes in both domestic and global economies. Accordingly, inflation differentials can also be affected easily by these changes.

To capture the differences in developed and developing countries, I divided this section into two parts. In the first part, I examine the literature on inflation differentials

across demographic groups and income groups in the developed countries. The second part discusses the literature on this subject in developing countries.

2.3.1 Inflation across different households in the developed countries

Inflation differentials depend on not only specific characteristics of a country but also the period examined. Accordingly, there are several empirical studies on inflation across income groups with different results. The period is one of the reasons behind different results. The period may be a low or stable inflation period, and the studies claim that the inflation differentials are not present for this period. Most of the studies seem to find inflation differentials in high and volatile inflation periods. Also, a country's specific characteristics matter, since these characteristics affect the variety in the consumption bundles across different household types.

The studies on inflation across income groups in developed countries can be divided into two strands according to their results. One strand of these studies reports no significant differences in inflation exposure across different households for specific periods. According to Garner et al. (1996), the inflation differential is not more volatile between different income groups. The U.S. The Bureau of Labour Statistics Consumer Price Index from 1984 to 1994 and the Consumer Expenditure Survey (CES) data from 1982-1984 and 1992-1994 are used in this research. The CES is used to calculate the weights of different expenditure categories. Their study identifies the poor in three ways: income poor, expenditure poor, and program participants[8]. Then, they calculate Laspeyres indexes, Paasche indexes, and Fisher Indexes for those poor people according to the Consumer Expenditure Survey. They report that there are small differences between poor people and the whole population. However, there is a lack of data for rural regions; these results may not be reliable for the entire population. The study may give different results with the data for rural areas since the households living in rural areas have different income levels than those living in urban areas. Inflation differentials for the rural and urban areas can be different since the economic activities across these two areas differ.

[8] Income poor refers to the people whose income is below the poverty threshold. Expenditure poor refers to the people spend in a year below the annual poverty thresholds. Program participants have medicaid, housing assistance or food stamps.

Taktek (1998) studies Canadian data between 1993 and 1996, and she investigates the movements of the overall index and price indexes for three different income groups. These are low-income households, senior citizen households, and low-income senior citizen households. She calculates the consumer price indexes for those household groups based on the reference population index[9]. Then she argues that they move together, and there is no significant difference across households. She mentions that the reference population could not cover all regions. Hence, the results may not include the whole population. Households living in different areas may have different spending and consumption patterns, even in the same country. These differences affect the inflation differentials. However, this Canadian data does not allow us to capture the inflation differentials for the whole population.

However, some economists come up with significant inflation differentials. According to these studies, inflation differentials become a generator of inequality, even in developed countries. The lower-income groups have higher inflation exposure than the higher income groups, which deepens welfare differences across income groups. There are some empirical studies on European economies. For the U.K. case, Muellbauer (1974) studies the prices and inequality from 1964 to 1972. He calculates different price indices for different income groups and finds that the impacts of price changes on income groups differ. Lower-income groups have higher expenditure shares of food, and there was an increasing trend in food prices in the analysing period. Accordingly, inflation is distributed across income groups unequally and deepen inequality.

As a relatively recent study, Fritzer and Glatzer (2009) also find that households with a lower income face inflation rates more than the average inflation rate in Austria. They use the group-specific inflation rates for the Austrian data between 1999 and 2006[10]. They examine the plutocratic gap, which refers to the difference between

[9] Reference population consists of families and individuals living in private households either rural or urban. For detailed information, see Taktek (1998).

[10] Group specific inflation rates are determined according to the income groups in the economy. All groups have their own consumption bundles; accordingly, their inflation is calculated based on these bundles.

official CPI and CPI with democratic weights[11]. Plutocratic bias is negative in the period except in 2002. The negative plutocratic bias refers to that household with lower expenditure face higher inflation rates than the household with average expenditure. On average, the plutocratic gap between 2001 and 2006 is -0.09 percentage points. This gap fluctuates between +0.04 and -0.18 percentage points. According to this study, the inflation calculation with democratic weights gives more information about how inflation affects the cost of living of households. If they can calculate inflation rates at each household level, the magnitude of plutocratic bias will be much higher in absolute terms.

Mehrhoff and Breuer (2010) study the household level micro-data with 42,744 household books on German Income and Expenditure Survey 2003 (EVS) [12]. Using the micro-data, they divide households into thirteen income groups and calculate their expenditure weights in German EVS 2003 and CPI. The expenditure data is on the four-digit COICOP level. According to these weights, they calculate the group-specific inflation rates. Then they examine the Lorenz curve in the economy to understand the relationship between inflation differentials and income inequality. After that, they calculate the Gini coefficient as 23.2%. We can see the inflation exposures differ, and the magnitude of these exposures causes inequality in the economies, even in developed countries[13].

In addition to the European studies, some studies about the U.S. economy report that inflation differentials in the U.S. Along with the Great Recession, the commodity prices fluctuated. Then these fluctuations affected the inflation differentials in advanced economies. Some studies cover the impact of such movements in commodity

[11] There are two different types of weights: plutocratic and democratic weights. Plutocratic weights are calculated by taking sum of expenditures on specific group and dividing it by all expenditure in the economy. Thus, plutocratic weights represent the expenditures of households that make more expenditure, since the monetary effect of them is higher than those making less expenditure. On the other hand, democratic weights are calculated by assigning the same weight to all households. Thus, the representativeness of democratic weights is higher than plutocratic weights. And plutocratic gap is the difference between the official index and the index that is calculated by democratic weights.

[12] EVS is the household income and expenditure survey in Germany. The Federal Statistics Office of Germany serves the EVS data for different household types.

[13] Although the main aim of this study is to investigate inflation differential, these results give messages about the distribution of income. The official inflation rate does not represent the lower-income groups inflation. The question of "Whose inflation?" maintains its importance.

prices for the inflation differentials. For example, Kaplan and Schulhofer-Wohl (2017) study inflation differentials across different income groups using U.S. household data from Kilts-Nielsen Consumer Panel (KNCP)[14] the period between 2004 and 2013. This study's main contribution to the literature is to analyse inflation differentials comparing prices paid by consumers. Both the differences in consumption bundles and the prices paid for the goods may be the reason for inflation differentials. To make a comprehensive analysis, they use the Universal Price Codes scanning devices such as a barcode[15]. Each barcode's prices are recorded by taking an average of them or directly entering the prices. Then, they calculate the Laspeyres index with barcode-average prices. Differences at the household inflation rates come from two reasons: change in prices of the same barcodes and differences of barcodes each household buys. According to the study, between the 4th quarter of 2004 and 2005, the difference between the 10th and 90th percentiles equals 14.8 percentage points. 66.9 percent of the variation in household-level price indexes comes from prices paid for given barcodes, and 30.6 percent of the variation comes from the barcode choices[16]. According to these results, lower-income households face higher inflation exposure. When they take the whole period into account, the effect of inflation on lower-income groups is getting bigger. From 2004 to 2013, households with income below $20,000 face higher cumulative inflation rates around 8-9 percentage than households with income above $100,000.

Argente and Lee (2020) examine the cost of living inequality during the Great Recession, specifically from 2004 to 2010 in the U.S. data. The income groups are divided according to the annual income, and then their exact price indexes are calculated. They report that the difference between the lowest and highest quartile annual inflation equals to 0.59 percentage points in the period. They pointed out that the ignorance of income-group level inflation in the literature misguides the

[14] The KNCP covers the prices, quantities and specific goods purchased by approximately 50,000 households.

[15] Scanning devices give the details about date and stores in which goods are purchased and scan the barcode and the number of these goods.

[16] The choice of barcodes within item strata refers to the choice of consumption bundles in earlier studies; and the variation comes from the difference of consumption bundles across income groups. However, there is a one important point: these barcodes do not cover all goods in the economy.

policymakers about poverty and inequality in the economy, as we have seen in the literature. This research finds that high-income households face lower inflation rates than low-income households during the Great Recession.

On the other hand, Izquierdo et al. (2003) report that prices have behaved against the richer households on average, not poorer ones. Izquierdo et al. (2003) use the Spanish data: the 1990-1991 Household Budget Survey (HBS) and price sub-indices for a certain level from 1992 to 1997. The main aim of this study is to calculate the plutocratic gap from 1992 to 1997 in Spain. They use the 1990-1991 HBS to calculate expenditure weights, after assigning all households the same weight in the survey, they can get the democratic weights for the goods and services. Then, they combine these weights with the sub-indices, they get the democratic-weighted consumer price index. When they do this calculation, they use two aggregated indexes: necessities index and luxury index. Those indexes determine the way of the plutocratic gap. After that, they calculate the plutocratic gap. According to the results of Izquierdo et al.'s study, the plutocratic gap oscillates from a minimum of 0.08 percentage points to a maximum of 0.15 percentage points. It is 0.055 on average. Accordingly, the plutocratic gap is positive on average. It means that the richer households are more exposed to inflation rates. During the analysis period, the average inflation for the necessity goods and luxury good is 4.33 and 2.59 percent a year, respectively. The price trend on these goods explains why the plutocratic gap is positive. Besides, the gap is not always positive for the entire analysing period. the poorer households are more exposed to inflation during 1994 and 1995.

The inflation differential literature in developed countries is divided into two in terms of their results: those who say that there is no significant difference across income groups, those who say that there is a considerable difference. The second group comes up with two different results: inflation behaves in an anti-poor manner, and inflation behaves in an anti-rich manner. Hence, we cannot make a common statement as inflation always affects a specific group more. This effect may vary according to the country's current economic conditions, specific characteristics, and global developments. Even within a certain period, the group affected more by inflation may differ. These inflation differentials may cancel out each other. At this point, what should be considered is whether the group, which is more affected by inflation, has an

area to escape from these price changes. Another concern is whether we eliminate these differences by doing the appropriate policies in the short run. In addition to the literature on income groups, there is also a literature on demographic groups with different results.

Some studies imply that demographic features of households are influential in their spending patterns. To be clear, the same age groups tend to make more expenditure on specific sectors such that older people may spend on health care services. Accordingly, the price fluctuations in health care services can affect older people's cost of living more than younger people's cost of living. Alternatively, marriage status or having children is also influential in the consumption decisions of households. For example, a household with children may tend to spend more on education, and their cost of living becomes sensitive to the price changes in the education sector. These different tendencies on consumption decisions result in the different consumption bundles for various demographic groups. These bundles become a source of inflation differentials.

Crawford and Smith (2002) use the U.K. Family Expenditure Survey between 1976 and 2000 to investigate inflation differentials across demographic groups. The result is that households like non-pensioners and mortgagors face higher inflation rates than the calculated average inflation rates. Mortgagors face higher inflation exposures than those groups are renters and have no housing costs. Because mortgage payments have a larger share of total household expenditures and a change in prices affects mortgagors more than renters. Hobijn and Lagakos (2005) study the inflation differentials in terms of age, and they use the U.S. data from 1987 to 2001. This study has a more extended period and covers more recent times than Crawford and Smith (2002). When they calculate the household-specific inflation rates, they revise the expenditure weights for all periods. They find elder households are exposed to higher inflation since they benefit from health care more than non-elderly households. The difference between inflation rates across elderly and non-elderly households is about 0.2 to 0.3 percentage points. The former has an approximately 10 percent expenditure share for health services, while this share is almost half of it.

In contrast to Crawford and Smith (2002), Hobijn and Lagakos (2005) state that inflation differentials do not associate with the inflationary period; there is no

systematic relation between inflation pressures and inflation differential[17]. In addition to age groups, the level of education and having children also affect the direction of inflation exposures. For the Austrian case, households without children and with a low or medium level of education have inflation rates above the average inflation rates. Those households generally have low or medium-size of income. (Fritzer and Glatzer, 2009).

2.3.2 Inflation across different households in the developing countries

The difference in inflation across income groups would deepen inequality in developing countries. Some studies imply low-income households face more exposure than high-income households in developing countries in the literature. Developing countries have higher rates of inflation than advanced countries. Therefore, increasing inflation appears as an engine of inequality. Hyperinflation examples have a substantial impact on income inequality. Hyperinflation damage the economy; its effect on the cost of living is also detrimental for the households**.** Bulir (2001) study the relationship between income inequality and inflation. He finds that hyperinflation episodes deepen this inequality via expanding inflation differentials across income groups in developing countries. While the decline in inflation reduces income inequality in the hyperinflationary periods, it has almost no effect on the inequality level in low-inflation periods. Albanesi (2007) also states that the correlation between inequality and inflation is positive and explains this correlation via a model with two types of households with different productivity levels. She says that differences in labour productivity cause higher inequalities and rising vulnerabilities of low-income households to inflation. In this model, government policy is seen as a bargaining game, and low-income households have less power in this game. The inequality arises from these bargaining games; the higher vulnerability of low-income households causes higher inflation exposure. Higher inflation rates decrease the bargaining power of low-income households. These studies are important to reveal the relationship between inflation and inequality in developing countries, although their aim is not to examine inflation differentials. However, the studies pave the way to investigate the

[17] Crawford and Smith (2002) find that the inflation differentials are mostly observed in the inflationary process.

relationship between inflationary period and the impact on inflation differentials in developing countries.

The literature's important weakness is to have few empirical studies on inflation differentials in developing countries than those in developed countries. Nevertheless, there are important studies that motivate the subject of this thesis. For example, Kahn (1984) examines inflation differentials according to race, location, and income in South Africa between 1975 and 1982. Using the expenditure survey data, he calculates consumer price indexes for different groups, then concludes that lower-income groups encounter relatively high price changes. Then, he also examines the differences in the specific regions. In Cape Town, indexes for the three lowest income groups are 246.0, 237.8, and 237.9, while the consumer price index is 231.7 for the highest income group. According to these results, the lowest income groups experience a higher increase in their cost of living than the highest income group.

In addition to Kahn (1984), Oosthuizen (2007) study consumer price indexes and its relationship between income distribution between 1998 and 2006 in South Africa. He uses the price data from January 1997 to December 2006 and Income and Expenditure Survey (2000), covering more than 26,000 households[18]. Then, he divides households into ten deciles to investigate the inflation differentials because of the variation in spending patterns. The results show the plutocratic gap fluctuates around +1.391 percentage points and -1.805 percentage points. From 1998 to September 2001, decile-specific inflation rates move relatively together. After September 2001, these rates started to differ from one another, especially decile 1 (for poorer households) witness higher inflation rates until June 2003. Then, inflation rates declined for all income groups, especially for poorer households; this decline is originated from the downward trend in food prices. Towards the end of the period, all inflation rates have a rising trend, especially for poorer households, because of the increase in oil and commodity prices. He reports that housing and services are important contributors to inflation for upper-income groups, while food products and paraffin are important sources of inflation for poor households. However, there is no persistent difference in inflation rates between poorer and richer households; inflation does not hurt one specific

[18] Statistics South Africa collects and publish this price data.

income group all the time. As the author mentioned, even calculating inflation rates with democratic weights could not give the proper inflation rates at the household level unless all households are considered equally.

The story is not specific for African countries; Latin American countries also face inflation differentials. Cardoso (1992) studies the inflation tax on households depending on the Brazilian data between 1970 and 1990. Because of seigniorage, people are exposed to higher inflation rates and their cost of living increases. The period analysed is highly inflationary; income increases could not compensate for inflation. The regressive inflation tax's impact seems more on the middle class, and the impact on the lowest-income groups seems negligible. However, these taxes push most of the middle-income groups into the lowest income groups. Thus, poor people have been affected by inflation via real wages changes; inflationary periods pull down real wages, and poverty in the Latin American economies rose (p.8). Even though this study reveals the regressive stance of inflation tax, it is not enough to explain inflation differentials in Latin American countries. Hyperinflation periods put pressure on the lowest income groups' inflation more; this study may underestimate the impact hyperinflation on lower-income groups.

Contrarily, most existing studies do not take household size into account in calculating democratic indexes. Since the household size makes differences in consumption and income distribution in the household, it is important for the calculations. Thus, it can create new inflation biases between higher and lower-income groups since the lower-income groups are more likely to have more members. To capture these biases, Nachane and Chaubal (2017) calculate democratic and super-democratic indexes and examine the plutocratic bias[19]. There are three CPI indexes as urban CPI, rural CPI, and combined CPI in India from 2012 to 2015. They observe negative plutocratic bias for urban and combined CPI in 2012, 2013, and 2015; inflation is higher for the poorer households. Besides, the super-democratic plutocratic bias is much higher in absolute terms; adjusting household size increases the relative impact of inflation on the poor people. After considering household size, positive democratic biases turn into negative super-democratic biases for the urban and combined CPI. According to this study,

[19] Super-democratic index takes household size into account and gives full weightage for all household members.

"food and beverages," "fuel and lighting" are the major contributors to the negative bias, while "housing" and "miscellaneous goods" are the major contributors to the positive bias.

While determinants of inflation differ across countries, expecting different inflation determinants for different income groups is meaningful. Ryan and Milne (1994) examine inflation in Kenya from 1973 to 1989[20]. They also explore the determinants of inflation for different income groups by using the regression analysis. According to this study, the important point for the Kenyan economy in that period is that the share of controlled prices changes according to income groups: 0.192 for lower-income households, 0.220 for middle-income households, 0.123 for upper-income households. Correspondingly, the impact of controlled prices in these groups differs from one another. The gas-oil price growth rate has a greater impact on lower-income households, while the growth rate of gas-oil price and exchange rate affect more middle-income households. In contrast, the interest rate and exchange rate play an important role in the inflation of upper-income households. The difference in determinants for different income groups seems like differences in drivers of inflation across countries.

2.4 Conclusion

Different economic policies, different country-characteristics, and important events in specific periods shape inflation differently. For example, before the increase in global integration, domestic factors were more important determinants of inflation; however, global factors have become crucial for inflation along with the globalization. The earlier studies show the importance of demand-side factors for inflation. With some crucial events in economic history, such as the oil crisis, supply-side factors gained prominence. The sharp changes in oil prices affect inflation strongly, and many oil-importer countries face skyrocketed inflation rates. As another example, exchange rates gained importance in determining inflation, especially in developing countries, along with the collapse of the Bretton Woods system. Global trends in inflation and

[20] They make a regression analysis for the inflation rate in Kenya between the years 1973 and 1989. The main starting point is the quantity theory of money. They extend the variables depending on this theory. There are five different types of variables: monetary variables, supply side variables, demand side variables, institutional variables, survey measurement.

external factors become determinant in inflation rates in conjunction with the globalization attempts.

The determinants of inflation also vary across different country groups. The existing literature states that mostly demand-side factors determine inflation in advanced countries. Supply-side factors have less impact on the inflation of higher-income countries. Also, the volatility of inflation is less in these countries because highly volatile prices (such as food and energy prices) have relatively less share in advanced countries' consumption bundles. Contrarily, developing countries have more volatile prices and their vulnerability to external shocks increases the volatility of prices. In this respect, exchange rates play a crucial role in their inflation; they depend on imported intermediate goods and final goods as well. Also, developing countries have relatively lower income; thus, their spending patterns are different from developed countries. They have a larger share of necessities in their consumption bundles, and the prices of necessities are generally volatile in developing countries. These differences across countries affect inflation across income groups. When developing countries have volatile prices of necessities, lower income groups may face higher inflation exposures. Contrarily, the exchange rate changes affect higher income group inflation more through affecting the prices of imported goods.

While there are many studies about inflation differentials for developed countries, the studies for developing countries have been sparse. As well, the studies on developed countries generally investigate inflation differentials across demographic groups. The consumption patterns of income groups are close to each other in most developed countries since income differences are less in these counties than in developing ones.

The literature on developed countries has different empirical findings for the inflation differentials across income and demographic groups. The existing studies show that there are inflation differentials across demographic groups. Since there are different demographic classifications, the results vary among themselves. But what is certain is that inflation continues to affect demographic groups differently. Therefore, various policies may be needed to reduce these differences, and these studies could be a starting point for policymakers.

On the other hand, there are different results for the inflation differentials across income groups. Some studies state that inflation differentials across income groups are not an essential issue since it is not large enough to create problems among these groups (Garner et al., 1996; Taktek, 1998). In contrast, more recent studies generally prove that income groups have different inflation rates. The lower-income groups face higher inflation rates regarding higher-income groups (Fritzer and Glatzer, 2009; Kaplan and Schulhofer-Wohl, 2017). According to some studies, higher-income groups have more inflation exposures (Izquierdo et al., 2003). Hence, it does not seem possible to make a common judgment about the inflation differences between income groups.

The literature on developing countries shows that inflation differentials are present for developing countries, and lower-income face higher inflation exposures than higher-income groups. Since lower-income groups allocate their budget more on necessary goods and their prices are more volatile in developing countries, the higher inflation exposure for lower-income groups is expected. On the other hand, the existing literature has two different views on the relationship between inflationary periods and inflation differentials across income groups. Some studies report that the inflationary periods hurt lower-income groups by increasing their cost of living more. Some others do not correlate inflationary periods and inflation differentials at the expense of poor households.

We need to remember that the dynamics of inflation can change in different periods. Even in developing countries, we can see different results depending on the changes in domestic and global economies. For example, exchange rate shocks may affect higher-income groups more, since imported goods have higher weights in their consumption bundles. In contrast, lower-income groups may have higher inflation rates because of food price shock in the country. All these can change the direction of inflation differentials. In the end, we know that different income groups have various sensitivities to price changes. The source of the price changes determines the direction of the inflation differentials.

CHAPTER 3

INFLATION ACROSS INCOME GROUPS: THE CASE OF TURKEY

3.1 Introduction

The Turkish Statistical Institute (TURKSTAT) calculates the Consumer Price Index for a representative household; accordingly, the official inflation rate does not intend to explain the change in the purchasing power of different household types. However, the official inflation rate's representativeness is questioned from time to time in Turkey. Since income inequality is relatively higher in Turkey, we can expect that the consumption bundles of different income groups may differ from one another[21]. As mentioned in Chapter 2, the difference in the consumption patterns across income groups changes the impacts of inflation on these groups. The importance attached to some goods by different income groups determines the effect of price changes on the cost of living for these groups. Accordingly, we need group-specific inflation rates to see whether inflation differences are present in Turkey. Developing countries have higher and volatile food and energy inflation, as discussed in Chapter 2. The dynamics of inflation in developing countries may increase the inflation differentials across income groups.

Many studies examine the inflation differentials across households, such as income groups, demographic groups, etc. The studies on developing countries, are unfortunately very few, show that the inflation differentials across income groups are important in those economies. Since the differences in households' income level and consumption patterns are more apparent in Turkey, inflation differentials across income groups become an important issue for researchers. The studies on inflation differentials across income groups in Turkey demonstrate that the lower-income

[21] The Gini index in Turkey is 41.9 in 2018. Gini index of 0 refers to perfect equality, while Gini index of 100 refers to perfect inequality.

groups face higher inflation rates than higher-income groups in Turkey. However, these studies cover shorter periods, and accordingly, they do not allow to capture differences throughout time. For this purpose, extending the analysis period is crucial for understanding the dynamics behind these differences in inflation exposures across income groups.

In this chapter, we calculate the quintile-specific, decile-specific, and ventile-specific inflation rates. According to our results, the lower-income groups face higher inflation exposures during the first half of the period. Furthermore, the higher income groups have higher inflation for the second half of the period. However, the higher income groups face higher inflation exposure on average in all inflation types. The mean of inflation difference between the lowest and the highest income quintile is -0.25 percentage points. In addition, the inflation difference between the lowest and the highest income quintile is statistically insignificant on average. Nevertheless, there are statistically significant inflation differentials across income groups when we investigate different periods. Besides, the contributors to the positive inflation difference are food and non-alcoholic beverages, and housing. In contrast, contributors to the negative inflation difference are transportation, hotels, restaurants, cafés, and miscellaneous goods and services.

The outline of this chapter is as follows: the next section examines the related literature about inflation differentials in Turkey. The third section explains the data and methodology. Some descriptive statistics demonstrate the consumption pattern of the Turkish people in this section. The fourth section documents empirical findings regarding inflation across income groups. The last section concludes.

3.2 Related Literature

There are very few studies on inflation differentials across income groups in Turkey. Some studies are related to different topics, such as households' income, consumption, labour force, and wealth, but they also mention the effect of inflation on different households. The starting point of these studies is to examine households' structure in Turkey, but they also investigate the impact of inflation on their consumption expenditures. For instance, Yükseler and Türkan (2008) analyse households in Turkey, and they find that inflation differs across income groups from 2003 to 2006. They look

at the inflation differentials across the lowest and the highest income quintiles. Inflation rates in 2004 are closer to each other (8.25 for the lowest quintile, 8.67 for the highest quintile). According to their findings, the highest income groups faced a 9.25 percentage point increase in prices, while the lowest income groups face a 7.70 percentage point increase in prices in 2005. However, the lowest income groups witness 10.28 percent increases in prices in 2006, which is relatively higher than in 2005, while the highest income groups face a 9.94 percentage point increase in prices. They state that the differences come from the higher importance of mandatory expenditures on lower-income groups and the increase in the prices of mandatory expenditure in 2006. This study analyzes the first and the fifth quintiles only, analyzing all quintiles and increasing the analysed income groups (such as deciles) will give more information about the inflation differentials. For instance, analyzing decile-specific inflation rates may provide information about the relationship between the income gap and inflation differentials across households. To see the relationship between these two, we examine more detailed income groups in this study.

On the other hand, there are several reports about the inflation differences across poor and rich households in Turkey. Gürsel and Şak (2008) investigate the inflation at every level of expenditure from 2003 to 2008. They find that the first quintiles' cumulative inflation is 57.2 percentage points, while the fifth quintile's cumulative inflation is 52 percentage points during the period. According to this study, the price changes in necessity goods like food and non-alcoholic beverages contribute to poorer a household's inflation more than a richer household’s inflation. In contrast, luxury goods and services have more contribution to a richer household's inflation. Besides, Gürsel and Acar (2015) extend the analyzing period. They look at the inflation differentials from 2003 to 2014. The index for poorer households is equal to 265, while the index for richer households is 246,9. The difference between these indices is 18.1, while it is 5.2 percentage points in Gürsel and Şak (2008). Hence, we can interpret that the difference is getting larger throughout time. Gürsel and Kavuncu (2017) support the previous studies, and they state that there is still a difference between the poorest and the richest quintiles. However, they point out that the increase in the inflation differences started to slow down in May 2017. This reversal is important for our analysis. According to these reports, the difference is getting larger until 2015, it started to slow down in 2017. Is it a turning point for these studies? Does the direction

of inflation differentials changes throughout time? What would be the reason behind the changes throughout time? We extend our period of analysis to answer the questions mentioned above.

Furthermore, these reports about the inflation differentials use the aggregated data. To be clear, they use the weights of main group expenditure given in the Household Budget Survey and the published price indexes for these groups. Hence, there could be an aggregation bias; we use more detailed data in this study to eliminate these types of biases. The heterogeneity in the consumption patterns across income groups cannot be captured by using the indexes and weights for the main expenditure groups. For instance, the food and non-alcoholic beverages cover 134 different goods as of 2019. These goods may be the source of differences in the consumption bundles, and accordingly, in inflation. Also, some goods have relatively volatile prices, such as potatoes, onions, etc. To capture the heterogeneity in both consumption bundles and the price volatility, we need to use more detailed price and expenditure data.

As a study with more detailed data, Yunculer (2013) also investigates the differences in inflation across income groups from January 2003 to June 2013. The dataset of this study is quite similar to our study. Yunculer (2013) uses the Household Budget Survey as a source for expenditure weights for five equal income groups and 3-digit COICOP level price indexes for price data. At that time, TURKSTAT shares these price indexes as a most detailed price index. The results of Yunculer's study show that the difference between the lowest income groups and the highest income groups is 0.87 percentage points on average, which means that the former mostly face higher inflation exposure than the latter. Also, he analyzes inflation differences in urban and rural areas differently. He finds that the inflation differential across urban households is 1 percentage point and the inflation differential across rural households is 0.6 percentage points on average. His explanation of this variation is that urban households are more likely to make expenditure on rent. These differences are statistically significant.

On the other hand, Akçelik (2016) is the most comprehensive analysis of inflation differentials in Turkey. He investigates the inflation across income groups, as being different from other studies, eliminates the aggregation bias by using a 5-digit COICOP level. It gives more detailed information about products, and the

methodology is closer to TURKSTAT's methodology. Household size is also important when we divide households into different income groups. In this study, equivalised annual disposable income is used for the analysis of the income groups.[22] According to Akçelik (2016), there is a negative relationship between the equivalised income and the increase in CPI. As income rises, the inflation that is felt by households is slowing down. The inflation of the poorest groups is generally higher than the richest group. On average, the poorest quintiles face higher inflation rates during this period.

Akçelik (2016) calculates the contributors to the inflation differentials in the main expenditure and class levels[23]. The results show that the lowest income group faces higher inflation rates because of the price increases in food and non-alcoholic beverages, housing, alcoholic beverages, and tobacco. However, the price changes in transport, hotels, cafes, restaurants, education, and miscellaneous goods are more influential in higher income group inflation. In the class level, bread and cereals, vegetables, tobacco, and solid fuels accelerate the lowest income group inflation. In contrast, automobile, motor fuel, restaurant services, housework services increase the highest income group inflation.

3.3 Descriptive Statistics

As in other developing countries, Turkey has witnessed relatively higher and volatile inflation rates throughout time. After hyperinflation episodes in the 1990s, Turkey started to implement an implicit inflation targeting policy. Then, it turned out the explicit inflation targeting. Alongside the changes in the world economy, Turkey also succeeded in bringing down inflation. One of the main reasons for this success is that Turkey's inflation depends on the movements in international prices and exchange rates.[24] The Central Bank of the Republic of Turkey (CBRT) aims to maintain price stability and to keep inflation at the target level. Although CBRT kept inflation below

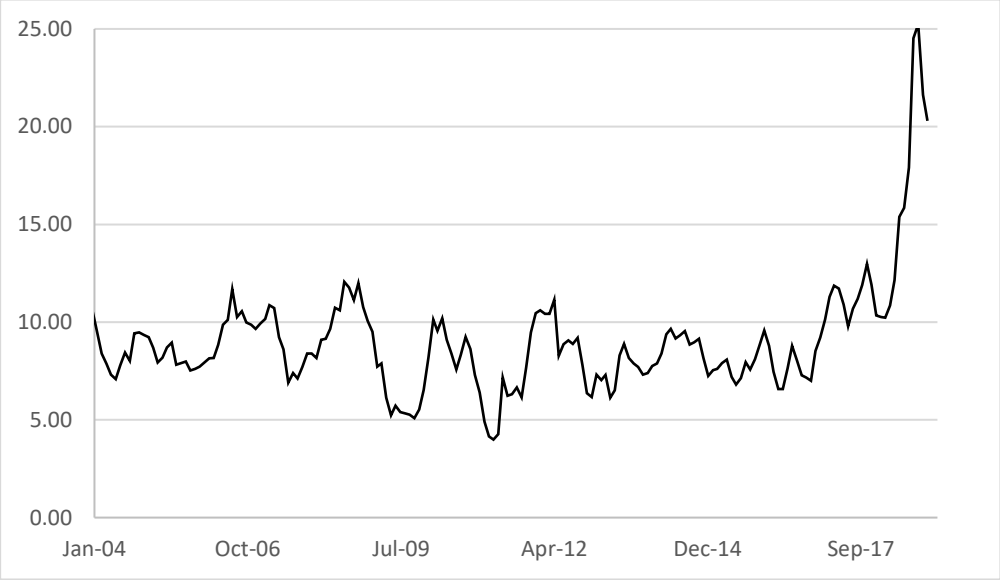
[22] Let's consider two households that have the same income level; one of them is a household with two adults, and the other is a household with two adults and two children. We cannot consider these two households at the same income level. Both the number of a household member and their ages makes a difference; we need to make some adjustments regarding the household size. Both the distribution of income within a household and the spending patterns are different from each other.

[23] Class level refers to the 4-digit COICOP level. The COICOP will be explained in the next section.

[24] See also Benlialper and Cömert (2014), Boratav (2015; pg:217)

the target level for the first four years, Turkey has inflation rates above the target, except 2009 and 2010. It started to have 2-digit level inflation rates in 2017. The success of inflation targeting has often been questioned in recent years.

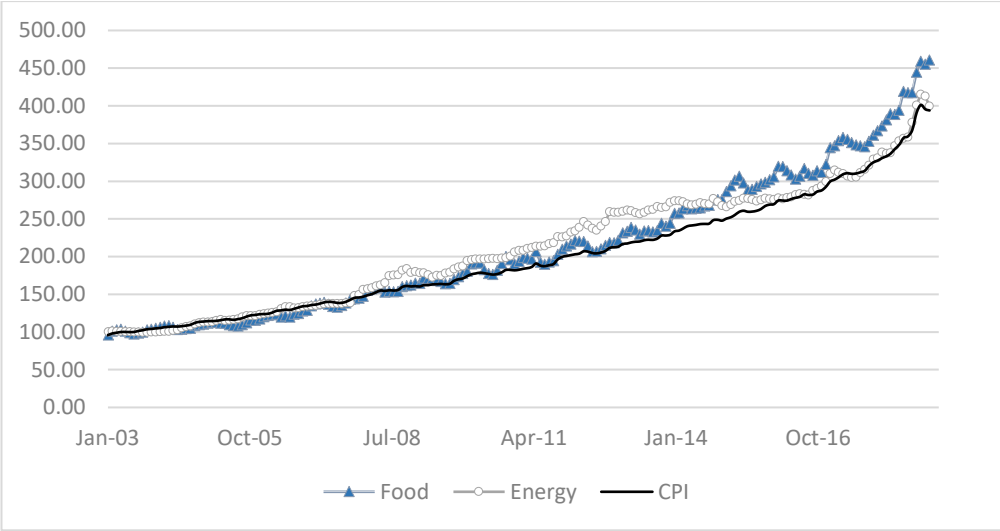
Then again, the characteristic of inflation in Turkey is generally volatile. Even when showing a downward trend, inflation remains volatile. Hence, this volatility creates uncertainties in the economy. Both the economy as a whole and the households are negatively affected by these movements.



Source: TURKSTAT

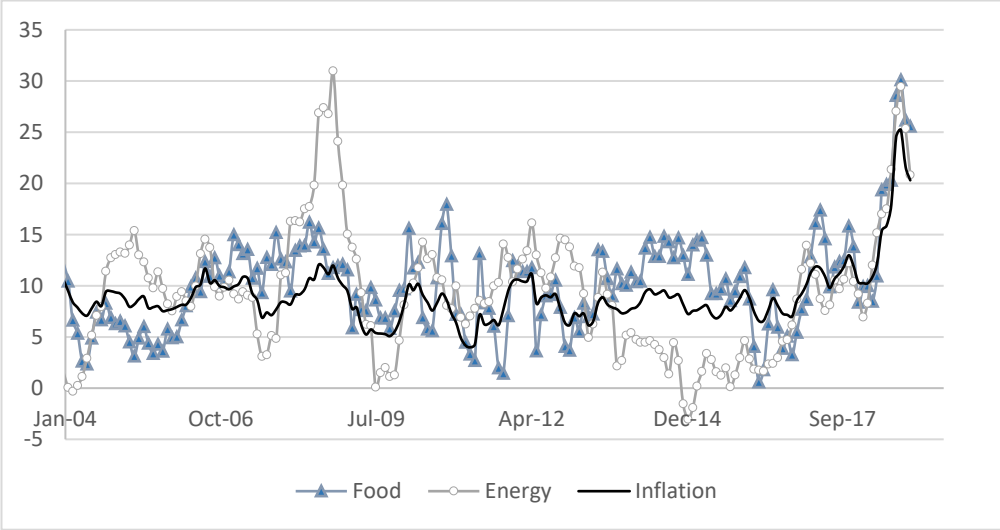
Figure 3.1 Annual Inflation Rates in Turkey (January 2004-December 2018)

To make a proper analysis, we first need to examine the general trend in Turkey's inflation. Figure 3.1 shows the general trend in inflation in Turkey from January 2004 to December 2018. Between 2003 and 2005, there was a significant decrease in the rate of inflation. After 2005, inflation started to rise and fall, Turkey has volatile but 1-digit rates of inflation on average. The average annual inflation rate equals 8.99 percent, and the standard deviation of annual inflation is 2.94 percent. Over the 16 years, the lowest inflation rate was seen in March 2011 (3.99 percent), while the highest inflation rate was seen in October 2018 (25.24 percent). Especially after May 2018, inflation has accelerated considerably. Before the hiking in the rate of inflation in 2018, the highest inflation rate was 12.98. Hence, we can say that inflation becomes a critical problem in the economy for the recent years.



Source: TURKSTAT

Figure 3.2. Consumer Price Indices: Energy, Food, and CPI



Source: TURKSTAT

Figure 3.3 Annual Inflation Rates: Energy, Food and General Inflation

Food inflation and energy inflation have an important role in the inflation rate in Turkey. As mentioned in Chapter 2, these two groups have a determining role in inflation rates in developing countries. When we look at food and energy inflation, we observe that they are highly volatile in Turkey. However, energy inflation is more volatile than food inflation since energy inflation mostly depends on the changes in the world and changes in exchange rates. Weather conditions are influential on Turkey's food inflation; this could be the reason for the volatility of food inflation.

According to Figure 3.3, both food and energy inflation affect the overall inflation rates, but these they go hand in hand in recent months.

Table 3.1 Annual Inflation Rates for the 12 Main Expenditure Groups (1)

Year	01. Food and Non-Alcoholic Beverages	02. Alcoholic Beverages and Tobacco	03. Clothing and Footwear	04. Housing	05. Furnishing, Household Eq., Routine Maintenance	06. Health	07. Transport	08. Communication	09.Recreation and Culture	10. Education	11. Hotels, Cafes, Restaurants	12. Miscellaneous Goods and Services	General
2004	6.62	11.49	7.75	11.52	6.22	11.70	13.46	1.70	9.83	17.84	14.42	10.15	9.35
2005	4.92	27.9	-0.13	9.87	6.26	-0.4	11	1.71	6.63	7.22	15	6.27	7.72
2006	11.2	5.06	1.91	14	7.31	7.93	10.2	1.34	8.25	7.73	13.5	4.55	9.65
2007	12	17.2	4.08	11.5	4.17	0.85	5.26	-1.78	-1.26	5.96	10.9	3.64	8.39
2008	11.9	0.32	-1.54	22.9	10.4	2.01	2.37	5.74	6.98	7.32	13.4	7.53	10.1
2009	9.26	20.9	3.39	2.31	-2.68	2.44	7.89	3.35	8.92	5.47	7.31	3.81	6.53
2010	7.02	24.7	4.74	5.91	3.27	0.57	6.78	-3.22	-2.32	4.25	9.76	1.79	6.4
2011	12.2	18.5	7.98	8.2	11	0.34	12.2	2.48	6.49	6.47	8.2	9.18	10.5
2012	3.9	0.98	8.17	11.4	5.89	1.68	5.54	5.9	1.98	4.81	9.31	10.5	6.16
2013	9.67	10.5	4.87	4.84	5.95	4.85	9.77	1.2	5.18	10.1	9.86	4.96	7.4
2014	12.7	7.67	8.43	6.83	8.06	8.62	2.07	1.61	5.68	8.31	14	11	8.17
2015	10.9	5.68	8.99	6.71	11	7.16	6.4	3.56	11.6	6.39	13.2	7.26	8.81
2016	5.65	31.6	3.98	6.42	6.24	9.73	12.4	3.18	5.93	9.47	8.62	7.46	8.53
2017	13.8	2.86	11.48	9.62	12.7	11.9	18.2	1.41	8.38	10.5	11.5	12.6	11.9
2018	25.1	2.39	14.83	23.7	31.4	16.7	16	9.62	20.9	10.2	19.8	30.7	20.3
Av.	10.46	12.51	5.93	10.38	8.48	5.74	9.30	2.52	6.87	8.13	11.92	11.22	9.32
St. Dev.	5.10	10.29	4.33	6.06	7.36	5.24	4.71	3.07	5.44	3.33	3.29	6.11	3.43

Source: Turkstat, Author's calculations.

(1): Annual inflation rates represent year-end inflation. Accordingly, they show the changes from December(t-1) to December(t)

The annual inflation rates of the main expenditure groups also give clues about the changes in the economy. According to Table 3.1, “food and non-alcoholic beverages,” “alcoholic beverages and tobacco,” “housing,” “hotels, cafes, and restaurants,” “miscellaneous goods and services” have higher inflation rates than the general inflation rate on average over the period. The prices of "Food and Non-Alcoholic Beverages" are subject to supply shocks in the country, and the import of these expenditure groups increases during the period. In this context, exchange rate changes may also be effective on these higher rates of inflation. "Miscellaneous Goods and Services" is another expenditure group affected by exchange rate changes. Also, special consumption taxes have an impact on these higher inflation rates on these goods. In addition to miscellaneous goods and services, “alcoholic beverages and

tobacco" is an expenditure group where we frequently observe price increases due to special consumption tax. Besides, all expenditure groups except "Education," "Hotels, Cafes, Restaurants," "Communication" have highly volatile prices than the average year-end inflation rate. The volatility of the prices of different expenditure groups contributes to socio-economic groups' inflation at different rates.

On the other hand, there are some remarkable increases in specific expenditure groups. For instance, the inflation of transport has an increasing trend since 2014. Considering the increasing trend in transport weights, this price increase will become more effective in general inflation[25]. Another rising trend belongs to recreation and culture. Apart from all these, the annual inflation of food and non-alcoholic beverages keeps its volatility, and the inflation rate in 2018 is very high compared to other years. However, its impact on the general inflation may decrease, considering the decreasing weights on this expenditure group. In general, the annual inflation rates change throughout the time; however, the changes in the last two years signal that something changes in the dynamics of inflation in Turkey.

Table 3.2 The Weights of 12 Main Expenditure Groups in CPI in Turkey (2003-2018)

Year	01.Food and non-alcoholic beverages	02.Alcoholic beverages and tobacco (1)	03.Clothing and footwear	04.Housing	05.Furnishings, household equipment	06.Health	07.Transportation	08.Communication	09.Recreation and culture	10.Education	11.Hotels, cafes, and restaurants	12.Miscellaneous goods and services
2003(3)	31.42	4.97	7.5	16.87	6.81	2.58	11.35	5.15	2.51	1.62	4.97	4.24
2004(3)	31.42	4.97	7.5	16.87	6.81	2.58	11.35	5.15	2.51	1.62	4.97	4.24
2005(3)	31.42	4.97	7.5	16.87	6.81	2.58	11.35	5.15	2.51	1.62	4.97	4.24
2006	31.1	0.44	7.81	17.27	7.71	2.54	12.59	5.33	2.47	1.79	5.99	4.96
2007	30.95	0.41	7.61	17.29	7.65	2.7	13.65	5	2.33	1.63	5.76	5.02

[25] In 2014, the highest group allocates 20.4% of its budget on transportation, while the lowest income group allocates 9.2% of its budget on transportation. This difference in weights almost stays the same until 2018. Accordingly, the increasing trend in transportation accelerates inflation for the highest income group more.

Table 3.2 (continued)

2008	31.36	0.34	7.67	16.88	7.57	2.16	14.54	4.82	2.25	1.67	5.7	5.02
2009	30.39	0.29	6.95	18.72	7.52	2.82	13.49	5.05	2.25	1.77	5.62	5.12
2010	27.6	5.31	7.3	16.83	6.78	2.55	13.9	4.94	2.83	2.48	5.51	3.97
2011	26.78	5.9	7.22	16.46	6.93	2.4	15.15	4.64	2.7	2.32	5.89	3.61
2012	26.22	5.21	6.87	16.44	7.45	2.29	16.73	4.6	2.98	2.18	5.63	3.4
2013	24.09	5.07	6.83	16.68	7.28	2.22	17.99	4.64	2.95	1.91	6.18	4.16
2014	24.45	5.29	7.17	16.41	7.52	2.44	15.54	4.7	3.36	2.26	6.58	4.28
2015	24.25	4.82	7.38	15.79	7.78	2.57	15.38	4.38	3.54	2.53	6.98	4.6
2016	23.68	4.98	7.43	15.93	8.02	2.66	14.31	4.42	3.81	2.56	7.47	4.73
2017	21.77	5.87	7.33	14.85	7.72	2.63	16.31	4.12	3.62	2.69	8.05	5.04
2018	23.03	5.14	7.21	14.85	7.66	2.64	17.47	3.91	3.39	2.67	7.27	4.76

Source: Turkstat, Author's calculations [(2)]

(1) Since the tobacco prices are available as of 2013, tobacco weights can be calculated since 2013. Accordingly, we need price data for price-updating in the calculation of weights. In this respect, from 2006 to 2009, the weights of alcoholic beverages and tobacco is low in our calculations.

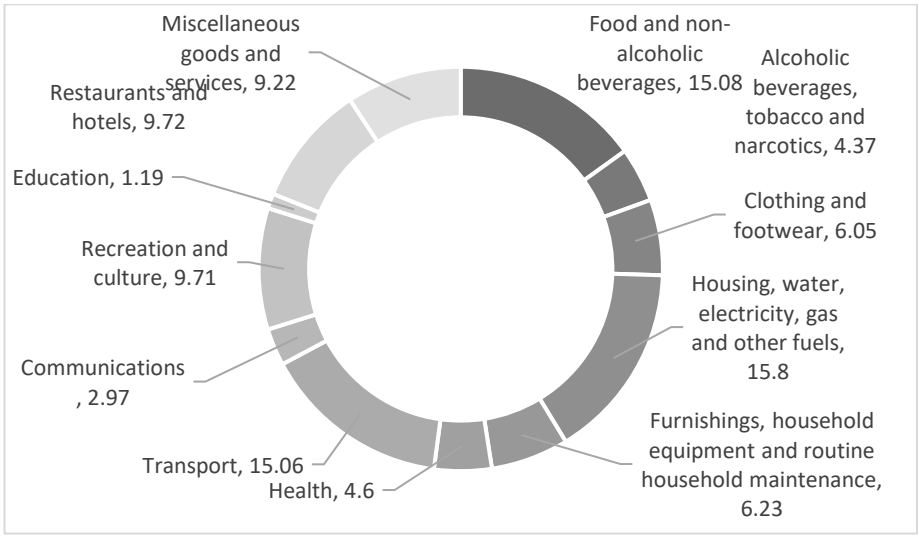
(2): The expenditure weights are calculated by the author from 2003 to 2009. The weights are retrieved from the TURKSTAT as of 2010.

(3): According to the Turkstat methodology, the reference period for weights comes from January (t-4) to December (t-2), which covers one-third of (t-4), one-third of (t-3), one-third of (t-2). Hence, there is a lack of expenditure data for 2003, 2004, 2005, and 2006. In this respect, we use the expenditure weights calculated based on 2003 HBS data for 2003, 2004, and 2005. For the weights in 2006, we also need expenditure data for 2002; therefore, we use only expenditure data in 2003 and 2004.

Besides that, we need to examine changes in the expenditure weights for the main expenditure groups to understand how inflation changes throughout time. According to Table 3.2, Turkey has the highest expenditure share on “food and non-alcoholic beverages.” However, this share has decreased until 2017. Although it slightly increased in 2018, the food expenditure weight decrease is remarkable for the Turkish economy. Therefore, the sensitivity of inflation to the food price changes has also decreased during the period. Also, “housing” and “transport” have higher expenditure shares in CPI. The expenditure share of transport has become higher than housing towards the end of the period.

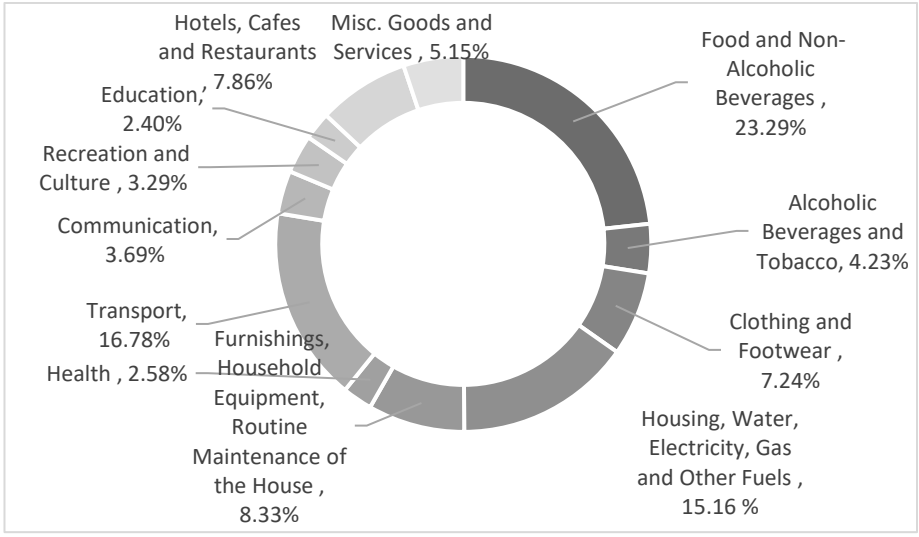
However, the lowest expenditure shares belong to education, health and recreation, and culture. The remarkable changes in the expenditure of “recreation and culture” and “hotels, cafes, and restaurants” show the transformation in a Turkish household's consumption pattern. These consumption pattern changes may indicate the social,

cultural, and economic transformation in the country. At the beginning of the period, the consumption bundle of a representative household in Turkey has more common ground with developing countries' consumption bundles. Throughout time, the consumption pattern in Turkey approaches to the consumption patterns in developed countries. Conversely, there are still important differences between consumption bundles between developed and developing countries.



Source: EUROSTAT

Figure 3.4 The Weights of 12 Main Expenditure Groups in HCIP in European Union (2019)

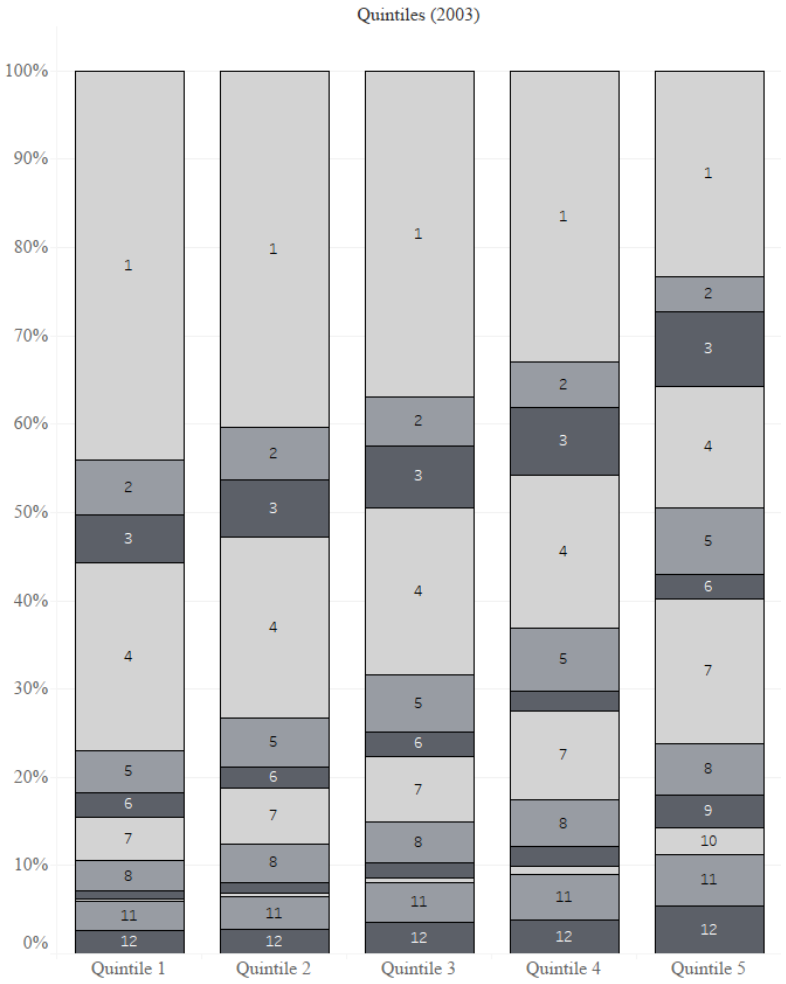


Source: TURKSTAT

Figure 3.5 The Weights of 12 Main Expenditure Groups in CPI in Turkey (2019)

The compositions of consumption bundles give messages about the differences in inflation movements across countries and income groups within a country. Inflation differences can be originated from the differences in the price movements or the differences in the consumption bundles; we can look at the weights of expenditure groups in price indexes to see differences in consumption bundles. As shown in Figure 3.4, housing, water, electricity, gas, and other fuels have the highest weight (15.8 percentage points) in the Harmonised Index of Consumer Prices for the European Union. “Food and non-alcoholic beverages,” “transport” also have higher weights (15.08 and 15.06 percent respectively). However, the highest weight belongs to “food and non-alcoholic beverages” in the Consumer Price Index of Turkey (23.29 percent). As discussed in Chapter 2, the dynamics and determinants of inflation differ across countries. For example, food prices have a greater importance in inflation in developing countries. One of the reasons behind this argument is the higher rates of expenditures on food. In developing countries, people allocate most of their budget for food expenditures. The figures above also imply this statement. In the European Union, households spend a smaller portion of their income on “food and non-alcoholic beverages” than spent in Turkey.

Another difference in these consumption bundles seems in the weights of recreation and culture expenditures. Households spend a higher portion of their income on cultural activities in the E.U. area than in Turkey. Also, a representative household spends 9.22 percent of their total expenditure on “miscellaneous goods and services” in the E.U., while it is 5.15 percent of total expenditure in Turkey. When the level of income increases, spending on these expenditure groups increases. In the next sections, when we examine the differences in income groups' consumption pattern within a country, we will see similar differences. Besides, the weight of transport expenditure is also higher in Turkey than in the E.U. Energy prices and the importance of exchange rate movements on these prices play an essential role in Turkey's inflation.



Source: Author's calculation, Household Budget Survey 2003 (TURKSTAT)

(1): We calculate the expenditure weights depending on the Household Budget Survey in 2003.

(2): The numbers refer to the main expenditure groups: 1.Food and non-alcoholic beverages, 2. Alcoholic beverages and tobacco, 3. Clothing and footwear, 4. Housing, 5. Furnishings, household equipment, 6. Health, 7. Transportation, 8. Communication, 9. Recreation and culture, 10. Education, 11. Hotels, cafes, and restaurants, 12. Miscellaneous goods and services

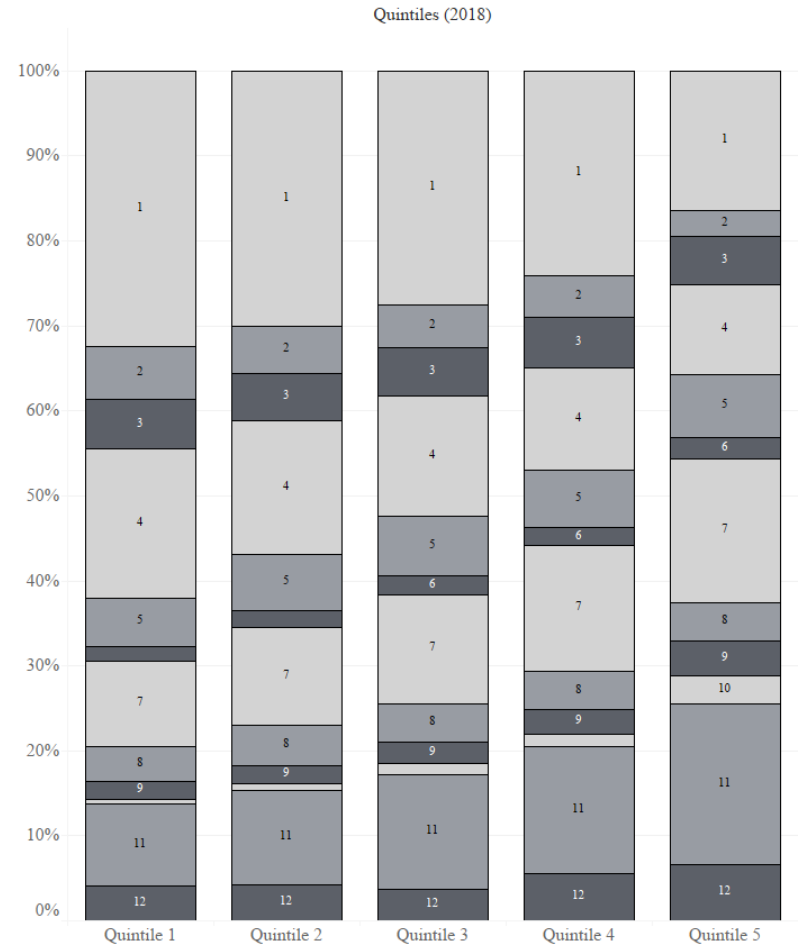
Figure 3.6 The Weights of 12 Main Expenditure Groups by Income Quintiles in Turkey (2003) (1), (2)

Besides the differences in the expenditure patterns across countries, we expect differences in the expenditure paths across income groups within a country. To support this idea, we can look at the expenditure patterns of different income groups in Turkey. Depending on the Household Budget Survey (2003) data, we sorted the household's annual disposable income and divided them into quintiles[26]. Quintile 1 refers to the

[26] The household size is considered when we calculate the disposable incomes. For the household size, we use the OECD's description.

lowest income group, and Quintile 5 refers to the highest income group. Then, we calculate the weights of the twelve main expenditure groups for each quintile in 2003. According to Figure 3.6, we can easily see that the expenditure patterns of different income quintiles differ from each other. Lower-income groups tend to spend on “food and non-alcoholic beverages,” “housing.” Therefore, 65.33 percent (44.04 and 21.29 percent, respectively) of their total expenditure is in these two categories. Otherwise, the portion of these two expenditure categories falls to 37.09 percent of the total expenditure in quintile 5. Accordingly, lower-income groups' expenses are mostly concentrated in specific and few categories, while this type of concentration is not seen in higher-income groups' expenditures. These two categories cover mostly necessary goods; accordingly, the lower-income groups will be more sensitive to the price changes in these categories.

Furthermore, the expenditures on "recreation and culture,” “education,” and “miscellaneous goods and services" are relatively higher in higher-income groups' consumption bundles. While the lowest income group allocates 0.93 percent of their total expenditures on “recreation and culture”, this proportion rises to 3.69 percent for the highest income group. We can see the same trend in “education” and “miscellaneous goods and services”; these proportions change from 0.2 and 2.59 percent to 3.10 and 5.47 percent of total expenditures. Hence, the differences in consumption patterns across income groups are evident according to the Household Budget Survey in 2003.

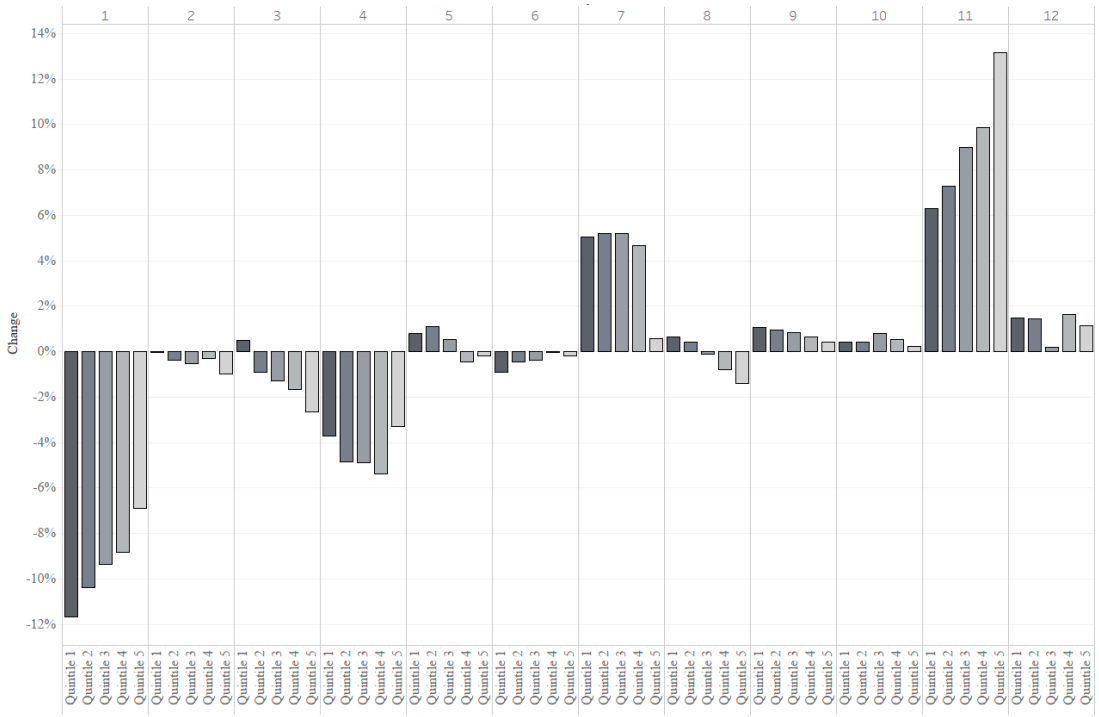


Source: Author's calculation, Household Budget Survey 2018 (TURKSTAT)

Figure 3.7 The Weights of 12 Main Expenditure Groups by Income Quintiles in Turkey (2018)

Alternatively, the composition of consumption baskets for income groups has changed from 2003 to 2018. As discussed in Chapter 2, the dynamics of inflation can change even in a country throughout time. Accordingly, the consumption patterns of income groups can change in time. Figure 3.7 shows the expenditure weights across income groups in 2018. For the lowest income groups, the important change is the decline in the weight of "food and non-alcoholic beverages"; they allocate 32.36 percent of their total expenditure for this category. The second important decline in the weight belongs to "housing", the new weight is 17.58 percent. Thus, there is a 15.39 percentage point decrease in the expenditure of these two categories. The weight of "food and non-alcoholic beverages" also decreases in the highest income groups; it was 16.39 percent in 2018. This decrease is smaller in comparison with the reduction in the lowest income groups.

Therefore, the weights of food expenditure of these income groups have converged to each other during the analysing period. And this convergence arises from the sharp decrease in the weights of food expenditure in the lowest income groups. In the end, the weight differences in food consumption between the two income groups get smaller. The expenditure share of "recreation and culture" increases from 0.93 percent to 2.03 percent for the lowest income group, while it increases by 0.41 percentage point for the highest income group. The weights of expenditure on "recreation and culture" have also converged to each other. Hence, these two main expenditure groups contributed to the differences in the consumption bundles in 2003. The convergence of these groups' weights may also reduce the differences in consumption bundles across income groups. Besides, the expenditure shares of "miscellaneous goods and services" increases in both income groups consumption basket. In the end, we see that the composition of the consumption baskets has changed over time.



Source: Author's calculation, Household Budget Survey 2003 & 2018 (TURKSTAT)

Figure 3.8 The Changes in Weights of 12 Main Expenditure Groups by Income Quintiles in Turkey (2003-2018)

According to Figure 3.8, we can easily see the decrease in the weights of "food and non-alcoholic beverages". The highest decline belongs to the lowest income group. Although the highest share of spending on "food and non-alcoholic beverages" still

belongs to the lowest income group, this downward trend reduces weight differences between income groups. Another remarkable decreasing trend belongs to the expenditure on "housing". The difference in housing weights between the lowest and the highest income groups does not change too much. Therefore, we cannot mention about convergence for the case of housing expenditure.

Another important change is the increases in expenditure shares on "hotels, restaurants, and cafes". Although the greatest change in shares belongs to the highest income group, the change in the lowest income group's spending on this group is remarkable. Some of the expenditures "food and non-alcoholic beverages" are transferred into the expenditures on "hotels, restaurants, and cafes". Besides, the weight of "transportation" has increased considerably for all income quintiles, except for the highest income quintile.

3.4 Data and Methodology

3.4.1 Data

Consumer Price Index measures the changes in prices of goods and services purchased by consumers in each period. In Turkey, CPI is a common way to see the changes in the prices of goods and services. TURKSTAT publishes the CPI and the inflation rates in Turkey monthly. 2003 is the base year for the current CPI. TURKSTAT uses the Laspeyres-Chain index to construct CPI. In the Laspeyres index, there is a consumer basket in the base year, and the index gives information about the changes in prices of these goods. The goods and services in the consumption basket change in time; thus, TURKSTAT needs to update goods and services and expenditure weights accordingly. However, the updating weights is not enough to show the changes in the index. Thus, in the Laspeyres-Chain Index, the previous year's index needs to combine with the new year's index. This method's advantage is to protect the index from scale effect originated from the huge deviations in the sub-indexes. (Atuk and Sevinç, 2012)

Consumer Price Index covers all the final monetary consumption expenditures on goods and services in the domestic markets[27]. For this purpose, TURKSTAT compiles

[27] All information about Consumer Price Index is available on TURKSTAT's website. The detailed information is in the metadata document.

553,064 prices from 28,019 outlets in a month. Four thousand two hundred seventy-four tenants are also included in the scope of the index. Because of seasonality, we can observe the changes in numbers of outlets and prices. In the calculating index, the whole population is covered without any grouping regarding income levels, etc. The prices collected are retail prices; they include taxes and excludes any deposits and instalments. In the end, TURKSTAT publishes CPI item basket and average prices; it consists of 418 items and their prices. In this study, we use this detailed price data which is at the 7-digit COICOP level.

Classification of Individual Consumption by Purpose (COICOP) is used to determine the weights of items and calculate the CPI. Thanks to this classification method, we can classify all goods and services into specific groups and classes according to their usage areas. The overall CPI has divisions that refer to the main expenditure groups, such as food and non-alcoholic beverages. These are called as 2-digit COICOP level. Then these divisions are divided into groups, such as food. These are called 3-digit COICOP level. When we examine groups in detail, we can get classes, such as bread and cereals. Classes have 4-digit COICOP level code. Then, there are sub-classes called as 5-digit COICOP level. The expenditures are classified by using 5-digit COICOP level codes in the Household Budget Survey. Every COICOP codes have weights in the Consumer Price Index. Depending on these weights, the changes in prices determine the inflation rate in the economy. The sources of weights are "Household Budget Surveys," "Foreign Visitor Survey," "Institutional Population Individual Consumption Survey," and administrative records. TURKSTAT uses the 7-digit COICOP level item prices to calculate CPI. To match HBS data with the price data, we need to aggregate these prices up to the 5-digit COICOP level.

TURKSTAT collects expenditure data by conducting a Household Budget Survey (HBS). We obtained HBS from 2003 to 2018 from the TURKSTAT database. There are three main variables in these surveys: variables of socio-economic status of the households, variables of consumption expenditures, variables of household composition, employment, and income status. This survey aims to provide information about the consumption patterns of different households. It shows the diversity of consumption and spending according to the socio-economic characteristics of households. These are used in national accounting, determination of poverty line and

determination of minimum wages, etc. Besides, TURKSTAT examines the changes in the consumption patterns of households.

In this study, Household Budget Survey is used to calculate expenditure weights. First, we have to match the data from CPI and the HBS. CPI has the classification of a 7-digit COICOP level, while the HBS has the 5-digit COICOP level classification. We aggregate the goods with 7-digit codes to goods with 5-digit codes with the help of Stata. Also, there is a difference between the codes used in CPI data and HBS data. The codes in the HBS is the same as European standards, but the item codes in CPI for Turkey have some differences. We have to match these codes. For example, in HBS, bread, macaroni, and other grain products have codes of "01112", "01113", and "01115," respectively, while they have codes of "01113", "01115", and "01112" in CPI data respectively. From 2003 to 2014, we can make the same adjustments to eliminate these differences, but the items and their codes of the Household Budget Survey changed in 2015. Therefore, new adjustments to match these two data are needed. Besides, some items should be excluded from the HBS because they do not have any prices in the CPI data, such as imputed rent. These types of items should be excluded; otherwise, they cause a misinterpretation about the CPI. After that, we have two consistent data sets; then, we calculate the weights for these goods and services (5-digit COICOP level).

3.4.3 Methodology

TURKSTAT updates Consumer Price Index baskets and the weights at the end of the year, and it uses the Laspeyres-Chain Index method to calculate inflation. According to this methodology, the goods and services which have importance on CPI, the expenditure weights refer to their importance in the consumption bundle. Also, the weights need to be updated. The index is calculated by multiplying weights with a change in prices. This index is chained by multiplying with the chain index numbers of December of the previous year.

Mathematically,

$$I = w * \frac{P_i}{P_0} \qquad (1)$$

$$I_t = w' * \left(\frac{P_{it}}{P_{December(t-1)}}\right) * I_{December(t-1)} \quad (2)$$

where I indicates index, P_i indicates the current price, w indicates weight, P_0 indicates base year price, w' indicates new weight, and t indicates time.

TURKSTAT uses household budget surveys, institutional population individual consumption surveys, foreign visitors' surveys, and administrative data to calculate the expenditure weights. In this study, we use the Household Budget Survey as a source of expenditure weights since we investigate the impacts of inflation on domestic households. For this purpose, we use Household Budget Surveys from 2003 to 2016. According to TURKSTAT, current weights are derived from two to four years earlier HBSs. To be more precise, expenditure data come from two (t-2), three (t-3), four (t-4) years earlier [28]. When we calculate the expenditure weights, we excluded the imputed rentals for housing, narcotics, etc. since TURKSTAT does not consider these. Also, we excluded the household's production from their expenditures to make a proper analysis of the price changes. In addition to all, we excluded the second-hand cars since European Statistics (Eurostat) suggest a method for calculating price index. TURKSTAT states that there are no important differences in the methodology of Eurostat. Since Eurostat's Harmonised Indices of Consumer Prices (HICP) manual has detailed information about the second-hand cars, we took it as a handbook for this study.

To calculate expenditure weights, we need weight reference periods and price reference period. According to the TURKSTAT methodology mentioned above, expenditure data comes from two, three, and four years earlier. However, we need to imply price-updating. Weights are calculated depending on the formula below:

$$E_{i,t} = \frac{\sum_{j=1}^{n} E_{i,j,t} * pw_{i,j,t}}{\sum_{j=1}^{n} pw_{i,j,t}} \quad (3)$$

[28] According to Eurostat, the expenditure data comes from two (t-2) years earlier, and prices are updated depending on one year earlier annual inflation rates. In Turkey, we calculate expenditure weights regarding expenditure data on two, three, and four years earlier.

$$AE_{i,t} = [E_{i,t-2}(1+\pi_{i,t-1}) + E_{i,t-3}(1+\pi_{i,t-2})(1+\pi_{i,t-1}) + \quad (4)$$

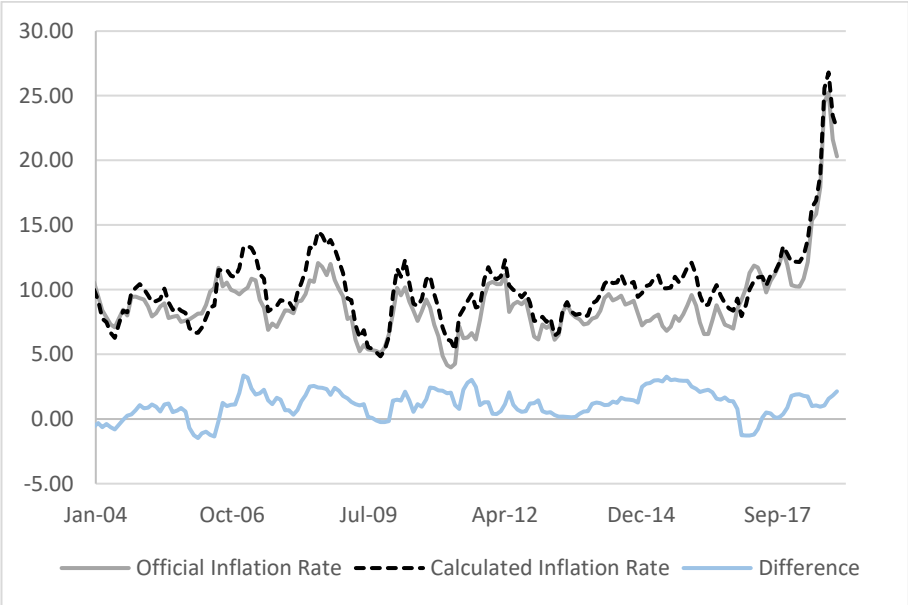
$$E_{i,t-4}(1+\pi_{i,t-3})(1+\pi_{i,t-2})(1+\pi_{i,t-1})]/3$$

$$AE_t = \sum_{i=1}^{m} AE_{i,t} \quad (5)$$

$$w_{i,t} = \frac{AE_{i,t}}{AE_t} \quad (6)$$

"i" represents goods and services (i=1,…,m). $E_{i,t}$ is the total expenditure on good i at time t. "j" represents the household I.D. (j=1,…,n). $E_{i,j,t}$ is the total expenditure of household j on good i at time t. pw is the population weight. $AE_{i,t}$ is the total inflated expenditure on good i for the time t. AE_t is the total inflated expenditure in the economy for the time t. $w_{i,t}$ is the expenditure weight of good I at time t. $\pi_{i,t}$ is the year-end inflation rate for good i at time t.

After calculating weights, we obtain the Consumer Price Index by multiplying those weights with the price changes and chaining December of the previous year's index. In the end, we aggregate 5-digit COICOP level indexes to the Consumer Price Index, and then we get inflation rates to compare with the official inflation rates.



Source: TURKSTAT, Author's calculations

Figure 3.9 Inflation Rate Comparison: Calculated Inflation vs. Official Inflation Rate (January 2004 - December 2018)

According to Figure 3.9, the calculated inflation is generally higher than the official inflation rate. The difference between official and calculated inflation rate is 1.13 on average. Since we try to examine the changes in the cost of living for domestic households, we use only the Household Budget Survey as a source of expenditure weights. The source of weights may be one reason for these differences.

However, TURKSTAT makes quality adjustments since the quality of goods and services changes in line with technological development. For example, in the early 2000s, tube television is the most common television for Turkey's households. The tube television gave place to LCD tv and plasma tv. In this case, TURKSTAT needs to make a quality adjustment for electronic devices like that. Also, they are making some quantity adjustments. For instance, they started to compile prices per kilo for pudding while compiling prices per pack. Since they do not explain publicly how quality adjustments are made for which goods or at which time, we made some adjustments depending on our assumptions explained below. Accordingly, the calculated inflation rate differs from the official inflation rate.

TURKSTAT publishes prices of goods and services for all years, and these prices are not subject to any adjustments in published price data. It makes adjustments on these prices when establishing a price index for some goods and services based on the quality changes. To capture these quality adjustments, we need to examine price changes in goods since we use detailed price data instead of aggregated price indexes. Extreme increases and decreases are one of the signs of quality adjustment. However, all extreme changes cannot be considered as a quality adjustment. To be consistent, the volatility of the prices of those goods are also considered. If it is not volatile in normal times, then peaked or tanked, these goods' indexes may have been quality-adjusted. All analyses up to now is a statistical analysis. However, this analysis is not enough to decide quality adjustments were made or not. Hence, we also checked all goods that may have quality adjustments to make proper assumptions. The goods are adjusted for quality changes are almost similar in all countries. The main reference for us is Eurostat. Then, we decide which goods are adjusted for quality changes; we establish indexes for those goods like they are new goods in the economy. After combining the weights and the indexes, we obtain inflation rates shown in Figure 4.9.

Since most of the studies about inflation differentials in Turkey use the price indexes published by TURKSTAT, they do not need these adjustments. These price indexes are aggregated indexes, and they are already adjusted. Hence, we use more detailed price data and establish our indexes for goods and services, as Akçelik (2016) did. We use the methodology mentioned above, and we make our assumptions since we do not have detailed information and data on quality adjustments made in Turkey[29]. The HICP Methodological Manual is our reference for these adjustments since TURKSTAT states there are no important differences with Eurostat's methodology.

There are two different types of methodology on quality adjustments as explicit and implicit methods. The value of a change in package size and the quality change value are necessary for explicit methods. Due to the lack of data, we cannot use these methods. On the other hand, we need all observed prices to implement explicit methods, and our data gives average prices for goods and services. Since the index calculations without quality adjustments deviate too much from the official inflation rates, we must find a way to make these adjustments. In this respect, we made our assumptions for specific goods and built a new price index for these goods. Therefore, this study differs from previous studies from this aspect.

3.5 Empirical Results

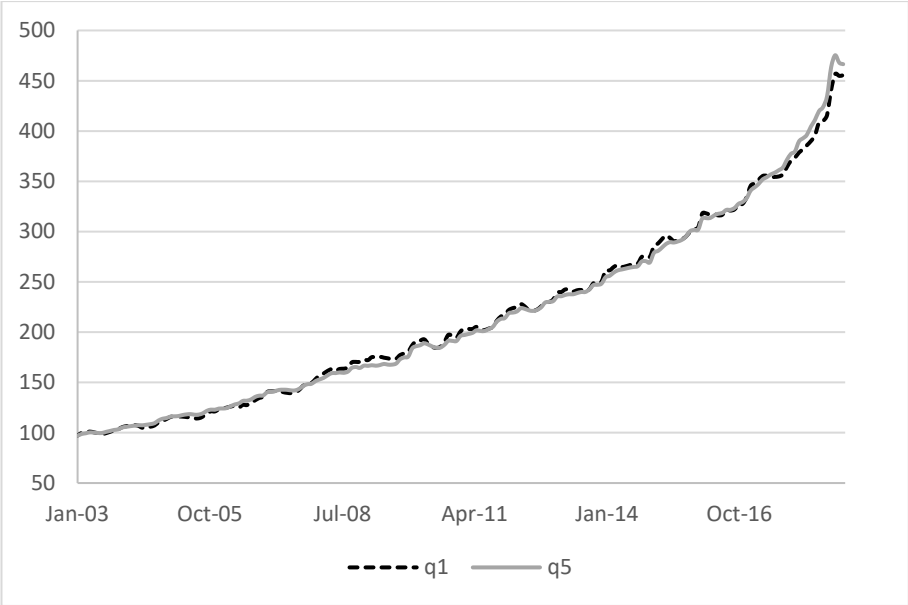
3.5.1 Inflation by Income Groups

Many studies on inflation differentials in Turkey use the aggregated data. For instance, they work on the 3- or 4-digit COICOP level data. Gursel and Kavuncu (2019), as a most recent study, calculate inflation differences between the poorest and the richest group in the economy via using the weight and indexes for twelve main expenditure groups. It means they work on 2-digit COICOP level indexes and weights. TURKSTAT data allows us to study on 5-digit COICOP level. Also, our analysing period is longer than other studies in Turkey.

[29] In some countries, the information about quality adjustments are published by the statistical offices. Statistics Canada publishes “The Canadian Consumer Price Index Reference Paper” in 2015. And, we can see which prices of goods are quality adjusted and which quality adjustment method used in Appendix. Besides, Office for National Statistics in the U.K published about the hedonic quality adjustment. They use the method of hedonic quality adjustments for the goods that have quality changes in a year. Also, they clearly explain the years for these adjustments are made in this paper.

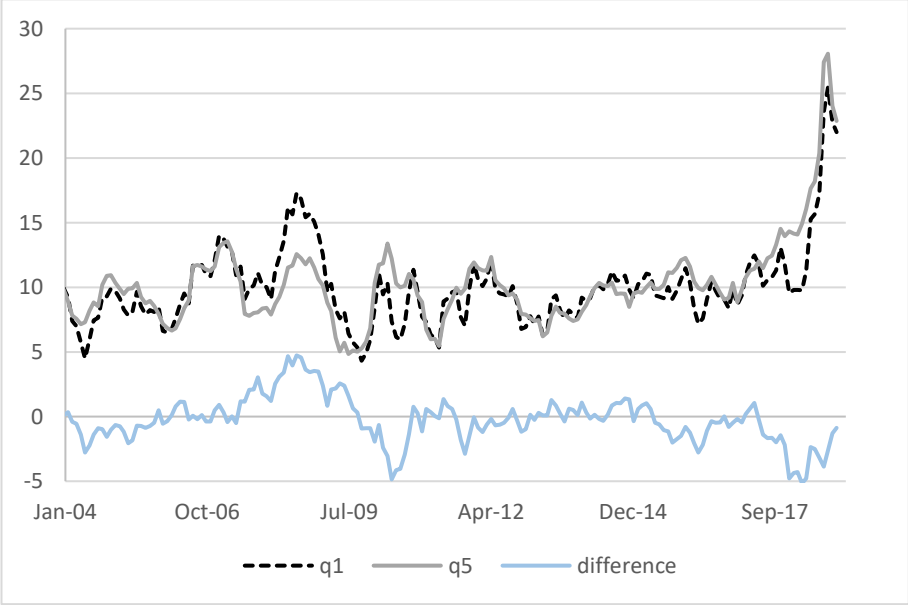
In the Household Budget Survey, there is information about the annual disposable income of households. However, we cannot use this information to form income groups since each household has different members who belong to different age groups. For example, a single adult household and one household with two children can have similar incomes. If we consider that their consumption patterns are like each other, we may obtain misleading results. Accordingly, analysing income groups cannot give the proper result by treating each household as equal. The studies on developed countries, per capita income is commonly used in these types of studies. However, dividing annual disposable income by the number of household members is not the solution since members also have different weights. Thus, we calculate the equivalised annual disposable income by using the modified Organisation for Economic Co-operation and Development (OECD) scale. According to this scale, each household member has different weights; the first adult has 1.0, the second adult has 0.5, and a child under 14 has 0.3. Dividing annual disposable income by the total weights of these members gives us the equivalised annual disposable income. After that, we sort these incomes in ascending order and obtain 5,10 and 20 equal groups: quintiles, deciles, ventiles, respectively.

We calculate the quintile-specific, decile-specific, and ventile-specific expenditure weights. Since the TURKSTAT method suggests that taking three years average, we use the same income groups method. Accordingly, the weights in year t we calculated include information on year t-2, t-3, t-4. We calculate expenditure weights by using the population weights and price data. Then, we combine them with the price indexes for the 5-digit COICOP level, and we obtain the different CPI indexes for those groups. First, we examine the inflation across quintiles, which refers to the five equal income groups. Figure 3.10 and Figure 3.11 shows the CPI indexes and inflation rates for those groups.



Source: TURKSTAT, Author's calculations

Figure 3.10 Consumer Price Index of 1st and 5th Quintiles (January 2003 - December 2018)



Source: TURKSTAT, Author's calculations

Figure 3.11 Inflation Rate Comparison: 1st and 5th Quintiles (January 2004-December 2018)

CPI indexes of 1st and 5th quintiles seem to move together from early 2004 to mid-2007. With the global financial crisis and the peak in the world's food prices, CPI for

quintile 1 became higher than quintile 5. After the crisis, CPI for quintile 1 is generally higher than quintile 5 up until 2017. After 2017, the scenario became reversed, and the richest quintile faces higher CPI. However, the mean of the difference is equal to 0.38, which means that the poorest group has a higher CPI index than the richest group have on the average.

On the other hand, Figure 3.11 shows that CPI changes have different results than the differences in CPI for different income groups. While the mean of CPI differences for quintile1 and quintile 5 is 0.38 percentage points, the mean inflation difference is equal to -0.25 percentage points. When we analyse the inflation differences, the difference is small at the detriment of the richest groups at the beginning of the period. After the mid-2007, the difference is getting larger at the detriment of the poorest group. The highest difference at the expense of the lowest income group is seen in July 2008 with 4.73. After the global financial crisis, they started to decrease. Accordingly, the difference between these income groups got smaller and even became negative in some periods. There is no such period that one group continuously face higher inflation rates than other groups for a while. However, June 2017 was the turning point, and the highest income group started to face higher inflation rates continuously. The highest difference at the expense of the highest income groups equals to -5.16 percentage point in April 2018. In recent years, Turkey started to have a problem with the exchange rate. The depreciation of the Turkish Liras most probably affects the consumption of the richest group in the country. Since they tend to consume imported goods, miscellaneous goods, etc., the TL's value changes are an important determinant of those goods' prices. Also, the exchange rate problem hit the macroeconomic variables. To decrease its effects, the government started to impose taxes more, such as special consumption taxes. The impact of these taxes is higher on the highest income group; accordingly, their cost of living is more sensitive to these changes than the lowest income group's cost of living. These policy preferences also affect the direction of inflation exposure.

The mean difference between quintile 1 and quintile 5 equals -0.25 percentage points (which is called μ), and the standard deviation is 1.80; the number of observations is 180. In the overall, the highest income quintile is worse off more than the lowest income quintile. To understand whether this difference statistically significant or not,

we apply a t-test for the inflation difference. The null hypothesis is that there is no significant difference between the inflation of those groups.

$$H_o: \mu = 0$$

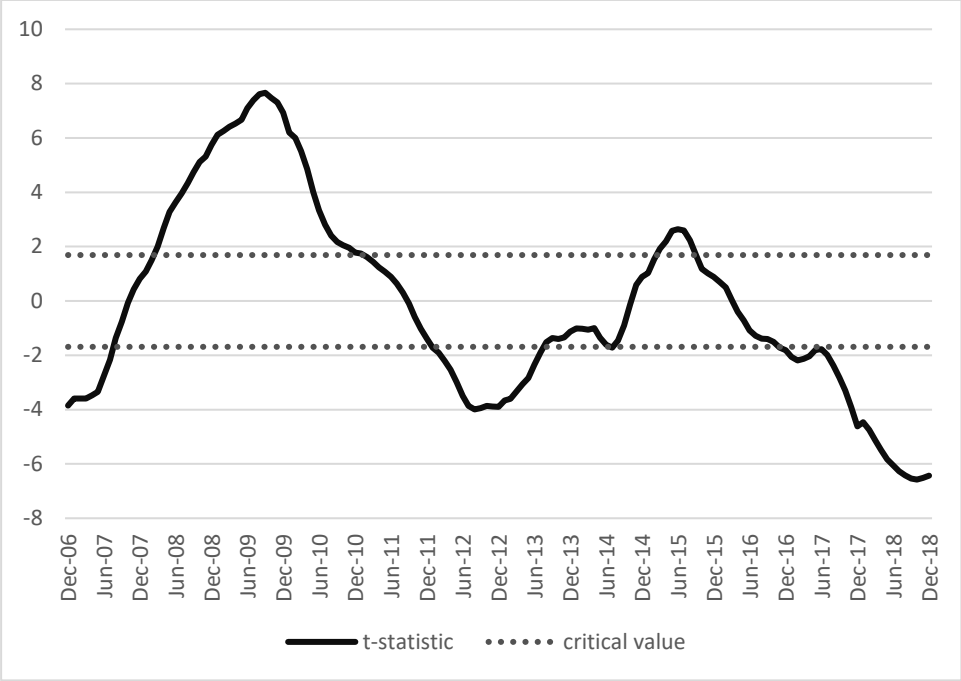
$$H_1: \mu \neq 0$$

According to the information about the sample, $t = -1.87$, and $t_{-0.025,178} = -1.97$ $t_{0.025,178} = 1.97$. Thus, we do not reject the null hypothesis; there are no statistically significant differences between those groups. Overall, we do not see huge differences. If we divide the whole periods into sub-periods, the significance of inflation differentials may change. Since there are periods that one group has continuously higher inflation rates. At the beginning and the end of the period, mostly the quintile 5 are affected by inflation more. On the other hand, inflation exposure is higher for quintile 1 between June 2007 and August 2009. Therefore, the direction of inflation differentials changes throughout time, and there are statistically significant differences for specific periods.

According to our results, there are no significant inflation differentials between these groups, but how they cope with inflation is quite different from each other. For instance, lower-income groups cannot escape from the effect of inflation on their cost of living. Most of their expenditures are necessities, and they cannot give up consumption on these goods, the change in the cost of living is more evident. However, the higher income groups have some space to change their consumption patterns since they have more likely to elastic demand for goods and services. They can also buy cheaper goods to tolerate inflation since they buy more expensive goods in the market, switch their outlets, etc. Accordingly, their sensitivity against inflation changes depending on their ability to switch their consumption bundles and outlet. Also, an increase in the cost of living pushes lower-income groups to consumption by borrowing. Thus, the effect of inflation may more be devastating for those groups in the long run.

The differences come from not only the different components of consumption but also the prices paid by households. Our study uses the average prices; therefore, we do not know which households buy a good at what price. The prices paid by different income

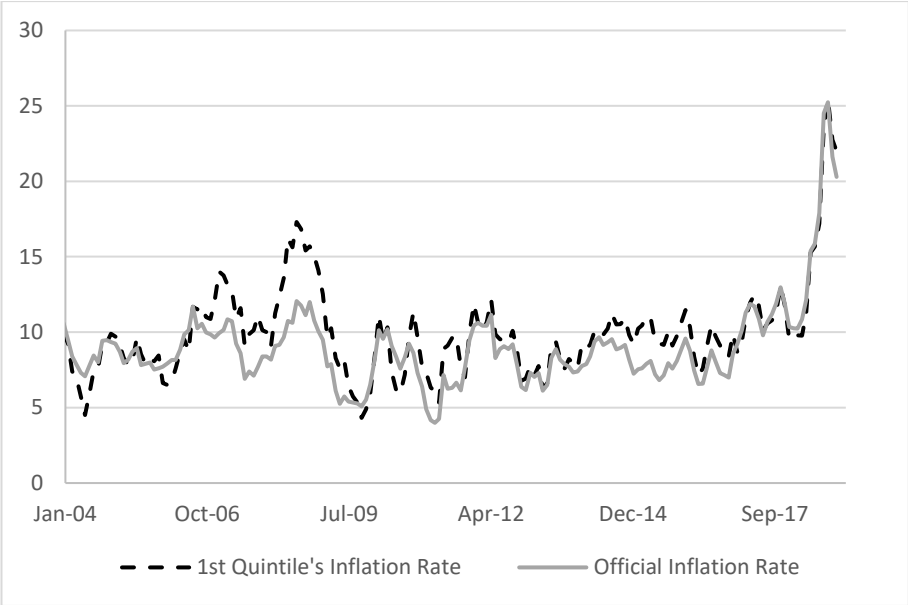
groups may also be different, and their changes too. To capture the differences across different groups, we also need this information related to prices paid. However, there is a lack of data in Turkey. For this reason, our study has some deficiencies from this point.



Source: TURKSTAT, Author's calculations

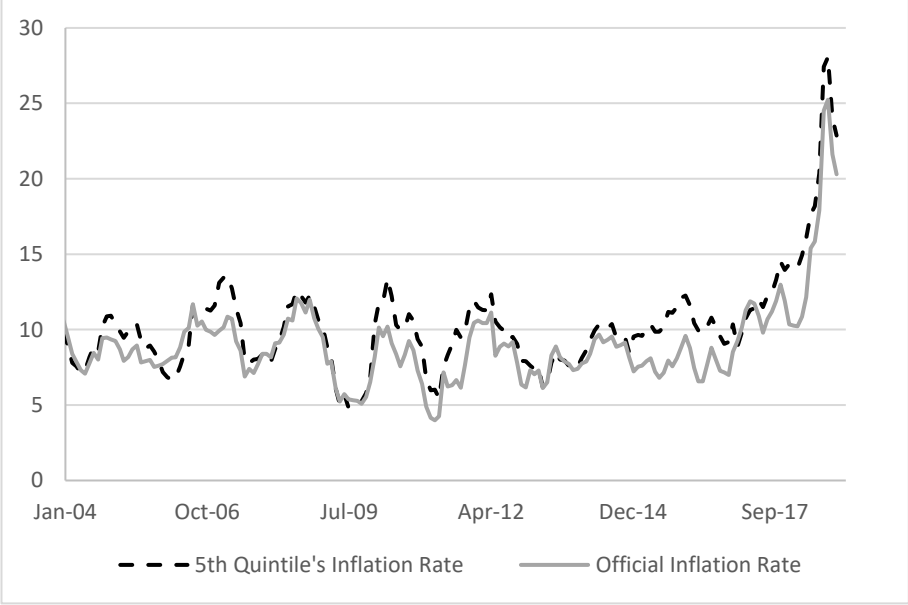
Figure 3.12 Statistical Significance of Annual Inflation Differential between 1st and 5th Quintiles

Besides analysing the whole period, we also investigate the inflation differentials in 36-month periods. Since these differentials vary periodically, we make the significance tests with the 36-month moving averages to figure out these periodical differences. Figure 3.12 plots the t-values and the critical values for 36 months of moving averages. The lowest income group's inflation exposure is statistically higher than those of the highest income groups from March 2008 to February 2011, and from April 2015 to October 2015. On the other hand, the highest income group has significantly higher inflation from January 2012 to July 2013 and since November 2016. Both the direction and the significance of inflation differentials changes across time. While the impact of the global financial crisis on inflation is higher on the lowest income groups, the exchange rate shock for the last years affects the highest income groups more.



Source: TURKSTAT, Author's calculations

Figure 3.13 Annual Inflation Rate of 1st Quintile vs. the Official Inflation Rate

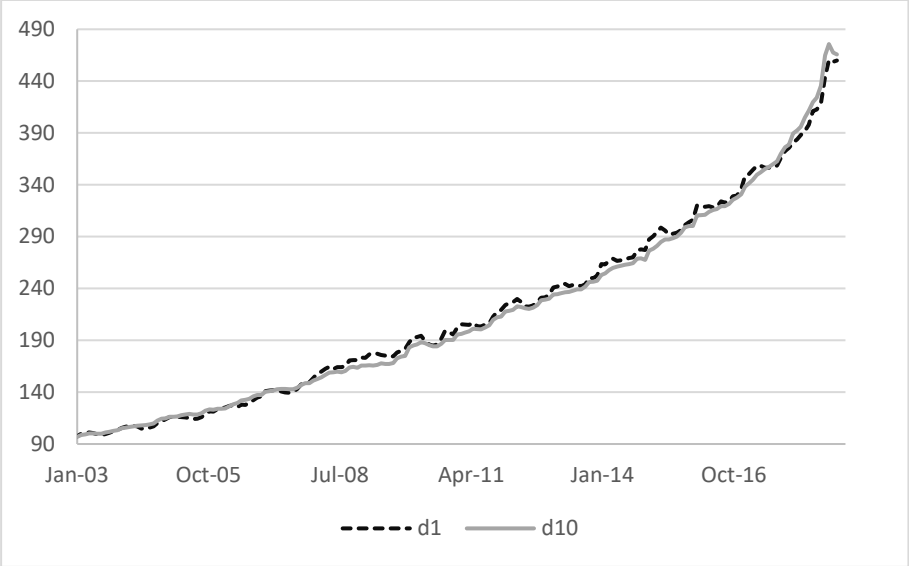


Source: TURKSTAT, Author's calculations

Figure 3.14 Annual Inflation Rate of 5th Quintile vs. the Official Inflation Rate

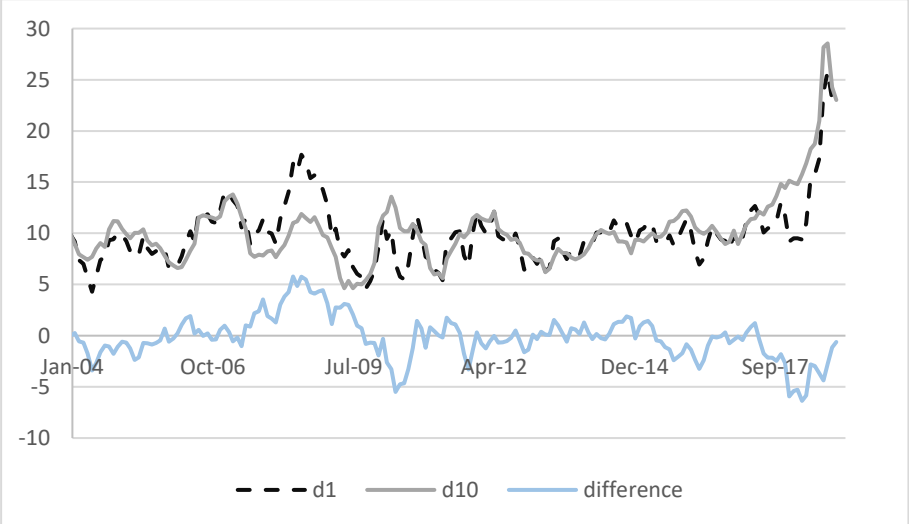
Another important debate about inflation is whether official inflation rates reflect the cost of living for different household types. In this respect, we compare the official inflation rates and the inflation rates for different quintiles. According to Figure 3.13 and Figure 3.14, both the 1st and 5th quintile's inflation rates are generally higher than

the official inflation rate. While the highest quintile faces 1.22 percentage point higher inflation rates regarding the official rates, the lowest quintile faces 0.97 percentage point higher inflation rates on average. However, the inflation for the lowest quintile deviates from the official inflation rates more.



Source: TURKSTAT, Author's calculations

Figure 3.15 Consumer Price Index of Each Decile (January 2003 - December 2018)

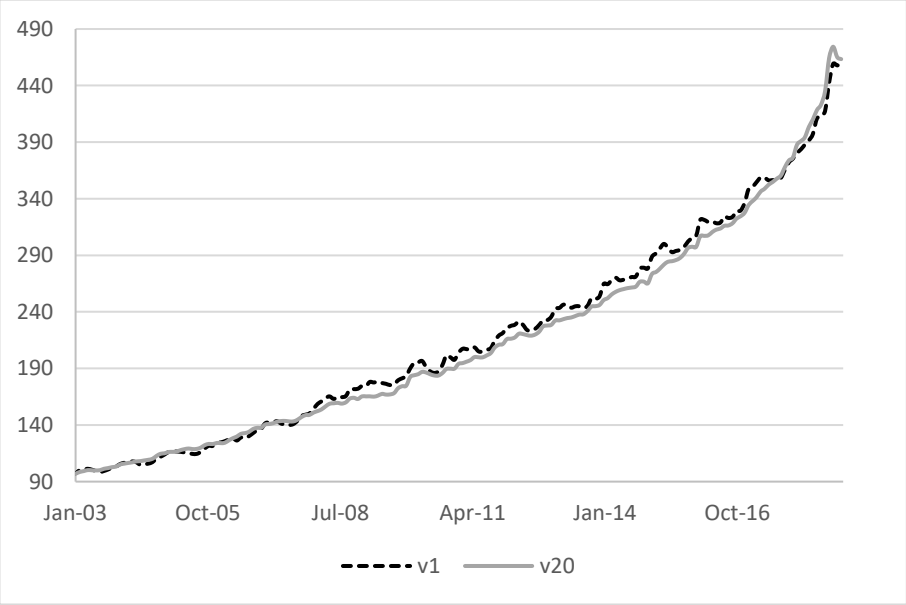


Source: TURKSTAT, Author's calculations

Figure 3.16 Inflation Rate Comparison: 1st and 10th Deciles (January 2004-December 2018)

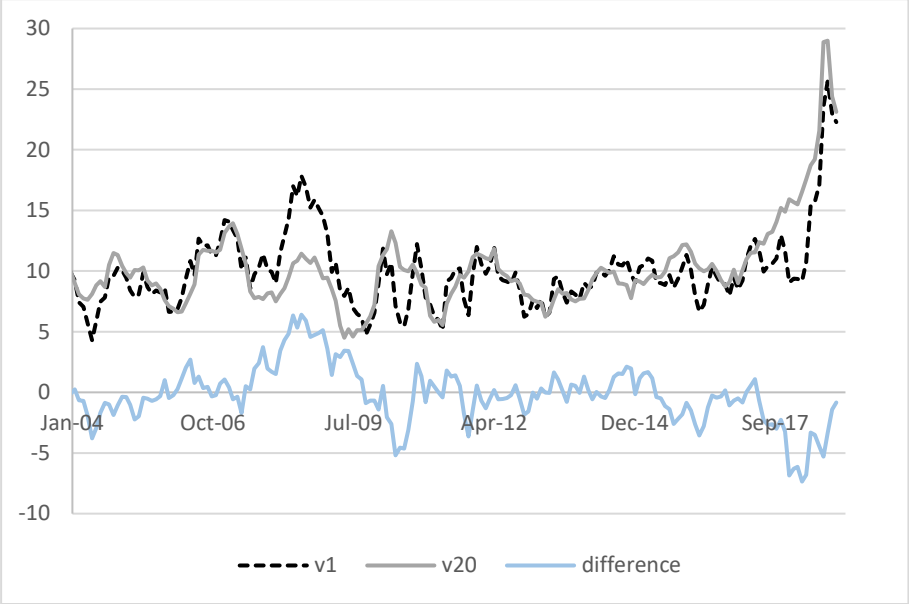
To pursue whether there is a relationship between the income gap and inflation differentials, we also calculate the decile- and ventile-specific inflation rates. Decile-specific CPI indexes and inflation rates for the first and the tenth deciles are represented in Figure 3.15 and Figure 3.16. The CPI differences change across decile 1 and decile 10 from the beginning of December 2007. After that, the CPI for decile 1 is continuously higher than the CPI for decile 10 until July 2017. The difference in CPI for those groups is 2.26 on the average. For the ventiles, the difference in CPI across ventile 1 and ventile 20 is 4.13. Thus, when the difference between incomes rises, the difference in CPIs rises as well.

Conversely, the mean of the decile-specific inflation difference equals -0.21, and the standard deviation is 2.17. The decile-specific inflation differential is smaller regarding quintile-specific inflation differentials. We know that the higher income groups have already faced higher inflation rates during the period, but the important thing is the change in inflation differentials in recent years. The increase in the inflation rates for higher-income groups is mostly seen in the middle of 2017. The inflation differences in recent years we have observed are high enough to dominate the entire period's results.



Source: TURKSTAT, Author's calculations

Figure 3.17 Consumer Price Index: 1st and 20th Ventiles (January 2003-December 2018)



Source: TURKSTAT, Author's calculations

Figure 3.18 Inflation Rate Comparison: 1st and 20th Ventiles (January 2004 - December 2018)

Figure 3.17 and Figure 3.18 plot the CPI and the inflation rates for the first and twentieth ventiles. The general trend is like the trend for income deciles that we mentioned above. The mean and the standard deviation of the inflation differentials are -0.19 and 2.40, respectively. As the income gap rises, the inflation differentials fall.

Table 3.3 Inflation by Different Income Groups

	Quintile 1	Quintile 5	Decile 1	Decile 10	Ventile 1	Ventile 20
Mean	9.97	10.22	10.02	10.23	10.01	10.21
Standard Deviation	3.18	3.37	3.25	3.49	3.26	3.61
Coefficient of Variation	31.93	32.97	32.40	34.15	32.51	35.33

Source: Author's calculations

Table 3.3 shows inflation by different income groups. It is easily seen that higher income groups face more inflation on average, in all income group decompositions. To see the volatility in these group-specific inflation rates, we also calculated the

standard deviations and the coefficient of variation[30]. According to Table 3.3, the volatility of inflation increases as the income gap rises. However, the increases in the volatility of inflation for the higher income group is relatively larger.

3.5.2 Contributions to Inflation Differentials

Another objective of this study is to present the contributor to the inflation differentials. There are positive and negative contributions in Table 3.4. The positive ones explain relatively higher inflation for the lowest income groups, while the negative ones explain relatively higher inflation for the highest income groups. We examine the inflation rates for quintile 1 and quintile 5. Mathematically, the contribution of main expenditure groups between period t-1 and period t attributable for income group i can be calculated as:

$$contribution_m^i = w_m^i * \frac{I_{12,t}^m - I_{12,t-1}^m}{I_{12,t-1}^m} \quad (7)$$

Table 3.4 Contributions of the Main Expenditure Groups to Inflation Differentials: 1st Quintile vs. 5th Quintile

Year	01. Food and Non-Alcholic Beverages	02. Alcholic Beverages and Tobacco	03. Clothing and Footwear	04. Housing	05. Furnishing, Household Eq., Routine Maintenance of the House	06. Health	07. Transport	08. Communication	09.Recreation and Culture	10. Education	11. Hotels, Cafes, Restaurants	12. Miscellaneous Goods and Services	General
2004	2.81	-0.11	-0.16	0.10	-0.39	-0.11	-1.42	-0.06	-0.31	-0.52	-0.38	-0.49	-1.04
2005	1.15	-0.10	-0.03	0.72	-0.38	-0.04	-0.86	-0.12	-0.07	-0.23	-0.34	-0.23	-0.53
2006	2.98	-0.04	-0.13	0.54	-0.19	0.01	-1.50	-0.11	-0.31	-0.24	-0.40	-0.15	0.46
2007	3.16	-0.04	-0.07	0.80	-0.08	-0.02	-1.35	0.01	-0.06	-0.23	-0.33	-0.19	1.6
2008	3.67	-0.01	-0.02	0.37	-0.07	0.33	0.15	-0.12	-0.22	-0.24	-0.37	0.00	3.47

[30] The coefficient of variation is statistical measure of dispersion around the mean. it is useful measure to compare different data set.

Table 3.4 (continued)

2009	0.54	-0.01	-0.04	1.02	-0.06	-0.01	-1.09	-0.18	-0.16	-0.20	-0.23	-0.48	-0.9
2010	0.89	-0.07	-0.10	0.55	-0.13	-0.01	-0.94	-0.18	-0.12	-0.19	-0.26	-0.60	-1.16
2011	2.73	-0.07	-0.12	0.42	-0.05	0.05	-1.23	0.04	-0.06	-0.33	-0.35	-1.09	-0.06
2012	0.43	-0.06	-0.13	0.43	-0.06	0.01	-0.80	-0.07	0.13	-0.21	-0.34	-0.29	-0.96
2013	1.80	-0.12	-0.07	0.39	-0.13	0.06	-1.02	-0.13	-0.11	-0.25	-0.29	-0.02	0.11
2014	1.89	0.18	-0.12	0.12	-0.23	-0.13	0.79	-0.38	-0.13	-0.33	-0.34	0.03	1.35
2015	1.59	0.24	-0.11	0.45	-0.56	-0.08	-1.04	-0.64	-0.49	-0.21	-0.43	-0.22	-1.5
2016	0.78	0.89	-0.13	0.87	-0.27	-0.11	-1.50	-0.22	-0.12	-0.05	-0.33	-0.25	-0.44
2017	2.25	0.08	-0.11	0.85	-0.26	-0.05	-2.88	-0.16	-0.91	-0.33	-0.47	-0.18	-2.17
2018	4.26	-0.14	-0.16	1.40	-0.02	-0.08	-2.75	-0.20	-0.86	-0.37	-1.48	-0.48	-0.88
Av.	2.06	0.04	-0.10	0.60	-0.19	-0.01	-1.16	-0.17	-0.25	-0.26	-0.42	-0.31	-0.17

Source: Author's own calculations, TURKSTAT

Table 3.4 shows the contributions of the main expenditure groups to inflation differentials. The main contributors to the inflation differentials at the expense of the lowest income group are "food and non-alcoholic beverages," and "housing." These contributors prove our hypothesis that lower-income groups are mostly spending on necessities. Accordingly, they are more sensitive to the changes in the prices of those goods. On the other hand, "transportation," "hotels, restaurants, and cafes," "miscellaneous goods and services" accelerate the inflation for the highest income group more and increase the inflation differentials at the detriment of the highest income group. The contribution of transportation is the highest one; it has an important role in inflation differentials at the expense of the richest groups. For the last years, the contributions of transportation increase in absolute terms. The effect of other contributors to the higher income group inflation also increases in recent years. The effect of recreation and culture expenditures has become important for the last years.

"Alcoholic beverages and tobacco" is generally classified as one of the main contributors to the inflation differentials at the expense of the lowest income groups. In our study, the contribution of this expenditure group seems small. Since the prices of cigarettes are available from 2013, since we used more detailed data, there is no information about its prices before 2013. We have a tobacco index in the price indexes published by TURKSTAT at the more aggregated level. However, the tobacco index

consists not only of cigarettes but also other types of tobacco. Thus, we cannot use this index for the sake of our analysis, and we have indexes for cigarettes after 2013. Accordingly, we can see the contribution of changes in their prices after that year. Due to the lack of data, we cannot see the contributory effect of tobacco prices on inflation differences.

3.6 Conclusion

Structural differences among economies generates different inflation dynamics. Accordingly, developed and developing countries have different stories about inflation. Furthermore, inflation across income groups may vary especially in developing countries due to high income inequality and volatile prices. According to our empirical findings, the lower income groups have higher inflation rates for the first half of the period of 2004-2018. In contrast, the higher income groups have higher inflation exposures for the second half of the period. The changes in inflation differences after the mid-2017 changes overall inflation differences during the whole period since these differences are very high. Over the period under investigation, higher-income groups have a higher inflation rate by 0.25% to lower-income groups in Turkey. We cannot state that one group is always affected by inflation more than other groups. The dynamics behind inflation differentials change in time. These dynamics guide inflation differentials to a specific group.

Many studies on developing countries report that lower-income groups experience higher inflation. Instead, when we exclude the last two years from analysis, we find similar results. In our case, the last years of the analysis period are an important turning point. From 2004 to September 2017, the lowest income quintiles witness higher inflation rates on average. After that period, inflation differentials change the direction, and inflation starts to increase for the higher income groups. The main reason behind this change is the pressure on the exchange rate in Turkey. As a developing country, the exchange rate pass-through is higher in Turkey.

As we expected, food and non-alcoholic beverages and housing play a crucial role in the positive inflation differentials between the lowest and the highest income groups. On the other hand, transportation, hotels, restaurants, cafés, and miscellaneous goods

and services have an increasing role in the negative inflation differentials among these groups.

Our analysis has some limitations. Since we used the price data published by TURKSTAT at the 7-digit COICOP level, our data need to be adjusted according to the quality changes. Therefore, we need the information on quality adjustments made by the statistical institute. However, there is no detailed information about quality adjustments. In this respect, we made some adjustments for quality changes in the price data. In addition to that, the price data covers the average prices. Accordingly, we cannot know the prices paid by households. In this study, we examined the inflation differences originating from the consumption bundles. Since we do not have detailed data about the prices paid by households, we cannot capture the inflation differences originating from these prices.

CHAPTER 4

DETERMINANTS OF INFLATION FOR SPECIFIC GROUPS IN TURKEY

4.1 Introduction

The literature on inflation differentials generally does not intend to explore the determinants of inflation differentials. Many studies mainly focus on the inflation differences across different household types and contributors to the inflation differentials[31]. However, the literature on inflation differentials seems incomplete without investigating the determinants of group-specific inflation. Related studies on Turkish households have already been very few; they do not elaborate on this question, except Akçelik (2016). Akçelik (2016) analyses the determinants of inflation differentials by using the monthly VAR model. The results are statistically significant for the richest quintiles, and the main determinants of this group's inflation are the exchange rate and import prices as expected. However, the model cannot give statistically significant results for the poorest quintiles.

To expand Akçelik's study and provide a more comprehensive analysis for income groups, we establish a new VAR model by slightly changing the previous model variables. Since this subject is not examined properly, we build a simple VAR model for the lowest and the highest income households and the representative household, separately.

For each household group, the lag length is set at four, and the model is estimated over the period 2003:2–2018:12 (191 months). First, variance decompositions are used to

[31] Ryan and Milne (1994) investigate the determinants of inflation in Kenya. Also, they analyse the determinants of inflation for the lower, middle, and higher income groups. they do not intend to examine the inflation differentials but results of the study shows that the variables determine the inflation differs. For instance, exchange rate changes are more important for higher income group inflation, while gas-oil price changes have higher effect on lower income group inflation.

assess how much of the variations in group-specific price indices over this period are explained by the variables. Second, impulse responses of group-specific inflation rates are estimated over an eight-month horizon. Variance decompositions of the VAR model for the lowest income group inflation indicate that the nominal effective exchange rate changes, CBRT policy rate, and world energy inflation explain 16.58%, 7.82 %, 3.21% of the variations in the lowest income group inflation, respectively. And variance decompositions of the VAR model for the highest income group inflation indicate that the nominal effective exchange rate changes, CBRT policy rate, and world energy inflation account for 28%, 8.34 %, 5.52% of the fluctuations in the highest income group inflation, respectively. Also, the exchange rate changes, CBRT policy rate, and world energy inflation explain 24.9%, 9.15%, 4.29% of the variations in the overall inflation rate.

According to the impulse responses, the lowest income group inflation is sensitive to nominal effective exchange rates. Moreover, the highest income group inflation is sensitive to changes in the nominal effective exchange rates and world energy inflation. However, the magnitude of the responses to the exchange rate of these groups differs from each other. The highest income group inflation is more sensitive to the exchange rate changes since the highest income group's consumption bundles consist of more imported goods. The overall inflation's and the highest group inflation's responses to the exchange rate shock are closer to each other.

The outline of this chapter is as follows: the next section explains the data and the methodology. The third section gives the results of the analysis. The last chapter concludes.

4.2 Data and Methodology

4.2.1 Data

TURKSTAT collects the detailed expenditure data in every year, which is called as Household Budget Survey data. The detailed information about this data is mentioned in Chapter 3. The average price data is another data source for consumer price inflation of specific income groups. By using these data, we calculate the general inflation and consumer price inflation(monthly) for the lowest and the highest income group. We

use the Arima X-12 method to eliminate seasonal fluctuations. The consumer price inflation for a specific group is the main variable in the analysis.

The OECD publishes the monthly industrial production index. It covers the production output changes of different sectors such as the manufacturing industry, electricity, gas, steam and air conditioning supply, and mining sector. The OECD uses 2015 as a reference period. We use this data to calculate the output gap for Turkey. Since the information on Gross Domestic Product is published quarterly, we use the monthly industrial production index as a proxy. With the Hodrick-Prescott filter, we get the trend and actual variables, and then we can easily calculate the output gap by using actual and potential output.

OECD publishes the world food and energy price indexes with the base year of 2016. We use the monthly change in these indexes, and these changes are seasonally adjusted. The food price index covers cereals, oils, sugar, vegetables, kinds of seafood, and other food prices. The energy price index consists of crude oil, natural gas, and coal prices.

The nominal effective exchange rates (NEER) are retrieved from the Fed database. We use the monthly changes of NEER ($/TL). Policy rates used by the CBRT is not one specific types of interest rates. The CBRT policy rate data are retrieved from both the Bank of International Settlement (BIS) database and the CBRT database. CBRT uses the overnight borrowing rate as a policy rate from 20 February 2002 to 19 May 2010. We use the BIS database for this period. Then, CBRT uses a one-week official repo rate as a policy rate since 20 May 2010, and we use the CBRT database after May 2010. However, after the end of 2010, CBRT actively uses one-week official repo rates, interest rate corridor, liquidity, required reserve ratios, and reserve option mechanism policies to concern inflation and current account deficit (Cömert and Türel, 2016). Accordingly, the one-week repo does not reflect the market average fund rate by itself. CBRT benefits from the overnight interest rates and the late liquidity window within the interest rate corridor. Therefore, the market interest rates were left to fluctuate within the interest rate corridor. In this respect, we use the market average fund rate after April 2011. CBRT. This data can be retrieved from the CBRT website.

4.2.2 Methodology

Following the works of McCarthy (2000), Benlialper and Cömert (2016), we will use Vector Autoregressive Model (VAR) to explore the determinants of the lowest and the highest income group inflation and the overall inflation in Turkey as well. VAR model is more useful for this study since it is used to capture an endogenous system of equations with multiple variables. It allows as to analyse each variable with its past lags and past lags of other variables. Therefore, the VAR model investigates the multiple interdependencies among them. The VAR model has two essential tools to analyse the dynamics of inflation: variance decomposition and impulse response functions. Variance decomposition used to explain how much variation in a variable comes from the variation in other variables. Impulse response functions allow us to explore an endogenous variable's response to the one standard deviation shock in another endogenous variable.

The VAR model has six variables: the consumer price inflation for a specific group, output gap, policy rate of CBRT, the nominal effective exchange rate, world food price inflation, and world energy price inflation. The model has both domestic and international variables. This study shows three separate inflation analyses for different households: the lowest income group, the highest income group, and a representative household. We say that the process $\{y_t\ ; t\ \in\ Z\}$ follows a vector autoregressive model of order p, denoted $VAR(p)$ if

$$X_t\ =\ A_0\ +\ A_1X_{t-1}\ +A_2X_{t-2}\ \ldots\ +\ A_pX_{t-p}\ +\ u_t \qquad t\ \in\ Z \qquad (8)$$

$$X_t = \begin{bmatrix} \pi_t^e \\ \pi_t^f \\ \Delta e_t \\ i_p \\ \tilde{y}_t \\ \pi_t^i \end{bmatrix}$$

$\pi_t^e, \pi_t^f, \Delta e_t, i, \tilde{y_t}, \pi_t^i$ are the world energy price inflation, world food price inflation, change in exchange rates ($/TL), policy rate, output gap for Turkey, Consumer price inflation for group i.

The purpose of this chapter is to examine the impact of variables in the model on the consumer price inflation for specific groups and the relationship between group-specific inflation and the other variables. To generate a shock, we use Cholesky decomposition of the variance-covariance matrix of the VAR residuals. Mathematically, it can be written as follows:

$$\begin{bmatrix} u_t^{\pi^e} \\ u_t^{\pi^f} \\ u_t^{\Delta e} \\ u_t^{i} \\ u_t^{\tilde{y}} \\ u_t^{\pi^i} \end{bmatrix} = \begin{bmatrix} A_{11} & 0 & 0 & 0 & 0 & 0 \\ A_{21} & A_{22} & 0 & 0 & 0 & 0 \\ A_{31} & A_{32} & A_{33} & 0 & 0 & 0 \\ A_{41} & A_{42} & A_{43} & A_{44} & 0 & 0 \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} & 0 \\ A_{61} & A_{62} & A_{63} & A_{64} & A_{65} & A_{66} \end{bmatrix} \begin{bmatrix} \epsilon_t^{\pi^e} \\ \epsilon_t^{\pi^f} \\ \epsilon_t^{\Delta e} \\ \epsilon_t^{i} \\ \epsilon_t^{\tilde{y}} \\ \epsilon_t^{\pi^i} \end{bmatrix} \quad (9)$$

where $\epsilon_t^{\pi^e}$ denotes world energy inflation shock, $\epsilon_t^{\pi^f}$ denotes world food inflation shock, $\epsilon_t^{\Delta e}$ denotes exchange rate shock, ϵ_t^{i} policy rate shock, $\epsilon_t^{\tilde{y}}$ output gap shock, and $\epsilon_t^{\pi^i}$ denotes group-specific consumer price inflation shock.

According to the Augmented Dickey-Fuller test, all the model variables are stationarity, except for the policy rate. To provide a stationarity condition, I take the first difference of the policy rate; then, it provides the stationary condition. After that, we need to decide the order for VAR estimation, since ordering is an important issue in VAR models. We want to see the interrelations between the variables, so we need to eliminate exogenous shock as far as possible. The most exogenous variable is world energy price inflation since Turkey is a small and open country and has no effect on the energy market. According to the economic intuition and the Granger Causality, Cholesky ordering of variables is world food price inflation, exchange rate changes, policy rate, output gap, and the consumer price inflation for group i.

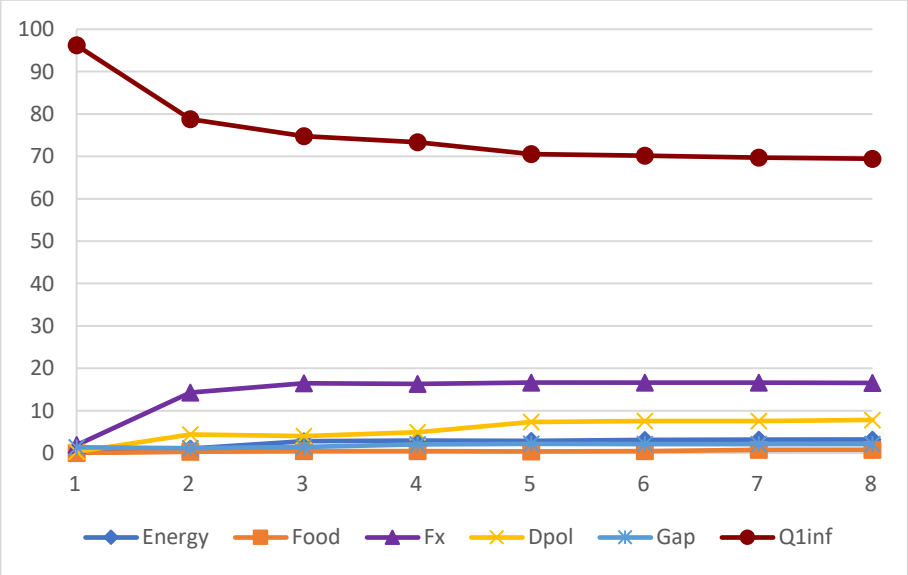
After the Akaike Information Criteria check and diagnostic test, the lag length is four for the lowest and highest income groups. There is no serial correlation between residuals in our models, which is tested by the autocorrelation LM test.[32] Our model

[32] The results of autocorrelation LM test can be found in Appendix A.2

is stable according to the results of the inverse AR roots test.[33] According to the Granger-Causality test, the model as a whole can explain the consumer price inflation for the three household groups.[34]

4.3 Empirical Results

As mentioned earlier, the determinants of inflation have evolved into external factors in developing countries. The responsiveness of inflation to the nominal effective exchange rate shocks is generally high in Turkey in the period of depreciation. In this respect, our baseline model has both domestic and external variables. Our primary aim is to find the determinants of the group-specific inflation rates in Turkey. Therefore, we estimate two different VAR for the lowest and the highest income group inflation separately[35]. I construct VAR with four lags, according to Akaike Information Criteria and the diagnostic tests. The model is stationary and free of autocorrelation. Figure 4.1 depicts the variance decomposition of the three household groups.

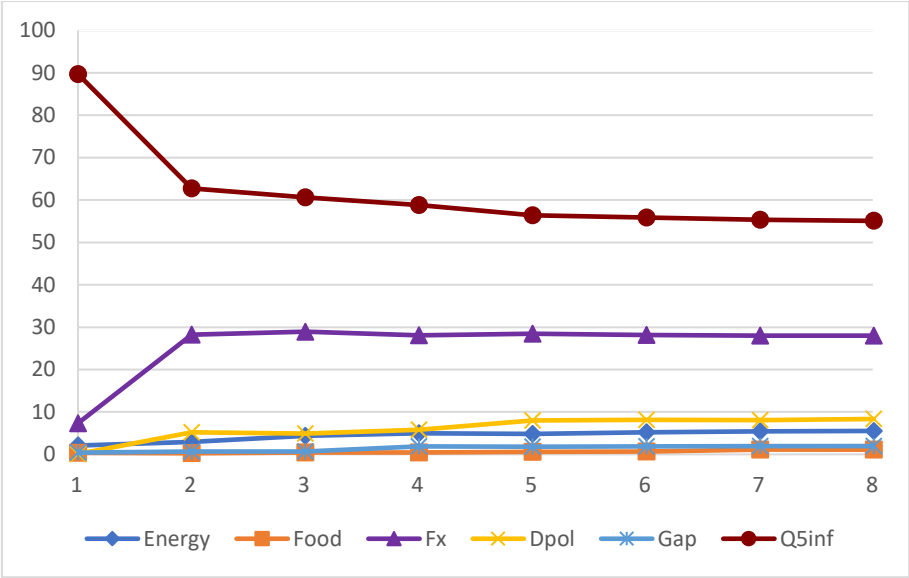


(a) The lowest income group inflation

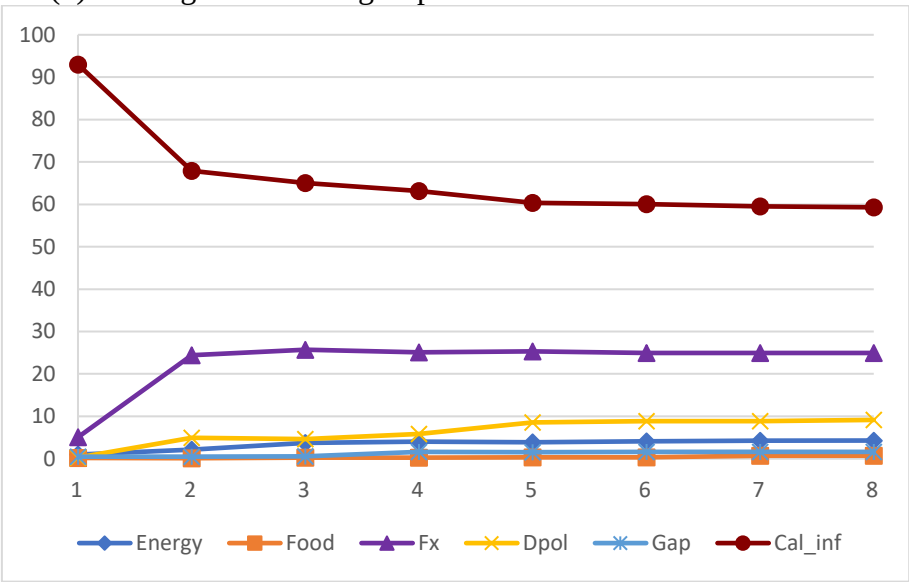
[33] The table for stability test can be found in Appendix A.2

[34] The results can be found in Appendix A.2

[35] VAR estimation results can be seen in Appendix A.1



(b) The highest income group inflation



(c) The overall inflation

Figure 4.1 Variance Decompositions of Group-Specific Inflation Rates

Many studies show that the past realizations of inflation affect Turkey's current inflation rates. (Arslaner et al., 2014; Benlialper and Cömert, 2016). Figure 4.1 (c) shows that the past variations of overall inflation account for 59.30% of itself, and our study also supports these studies. The lowest income group inflation explains 69.44% itself, whereas the highest income group inflation explains 55.07% itself. These realizations affect inflation by both affecting the inflation expectations and wage indexations. The lower-income groups more likely to have adaptive inflation expectations; accordingly, the importance of past realizations in the lowest income

group inflation is higher than the highest income group inflation. We can expect that the lowest income group inflation explains itself more since most of the lowest income group is the wage earner and the past realizations of inflation are used to determine the nominal wages.

Another important factor for inflation rates in Turkey is the nominal effective exchange rates. The exchange rate changes explain 16.58%, 28%, 24.91% of the variations in the lowest income group inflation, the highest group inflation, and the overall inflation, respectively. When compared to the lowest income group inflation and the overall inflation, it is seen that the highest income group inflation is explained more by the exchange rate changes. Accordingly, the exchange rate changes have a larger effect on this group, and the exchange rate shocks may expand the inflation differences between the two income groups in Turkey. As discussed in Chapter 2, Turkey has a higher exchange rate pass-through in inflation for the depreciation periods. Since Turkey witness depreciation for a while, these changes contribute to the inflation differences within the economy. Also, it may affect the direction of the inflation differentials.

Policy rate changes will account for 7.82% of the fluctuations in inflation for the lowest income group. In comparison, they explain 8.34% of the fluctuations in inflation for the highest income group inflation. Also, 9.15% of fluctuations in the overall inflation is explained by the policy rate changes. On the other hand, world energy inflation explains more the variations in the highest income group inflation.[36] As a higher portion of energy usage is imported from abroad, world energy inflation is important for Turkey's inflation. However, the highest income group has a relatively higher expenditure on energy than the lowest income group and a representative household. The variations in the world energy inflation are more important for the inflation for this group[37].

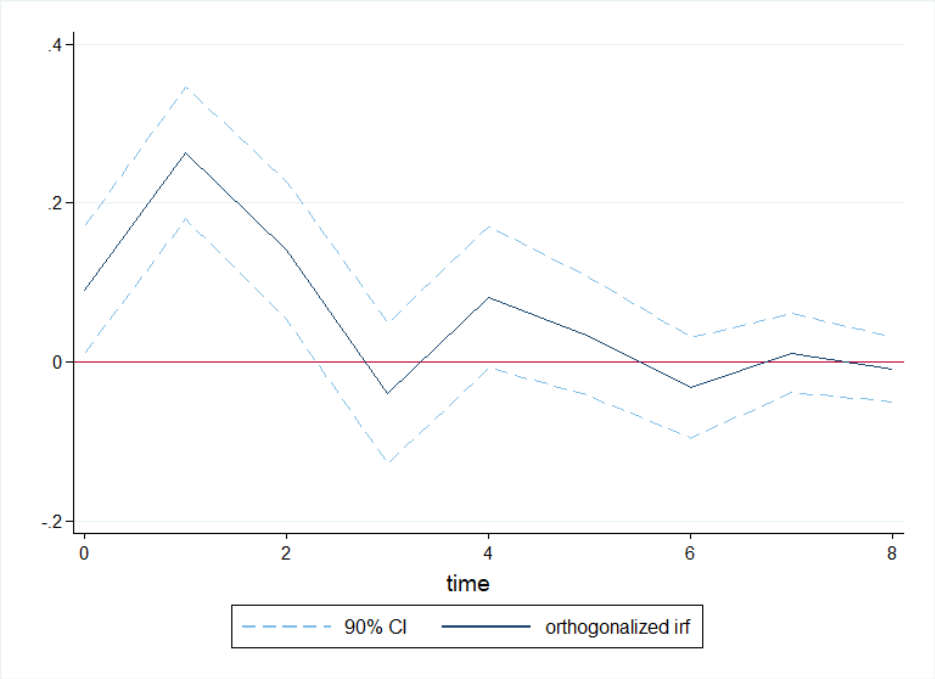
[36] World energy inflation explains 3.21%, 5.52%, 4.29% of the variations in the the lowest income group inflation, the highest group inflation and the overall inflation, respectively.

[37] The differences in the energy consumption mostly come from the usage of petrol, and the pricing of petrol is dependent on the changes in the world petrol prices. Accordingly, the higher income group inflation is more sensitive to the changes in the world energy inflation.

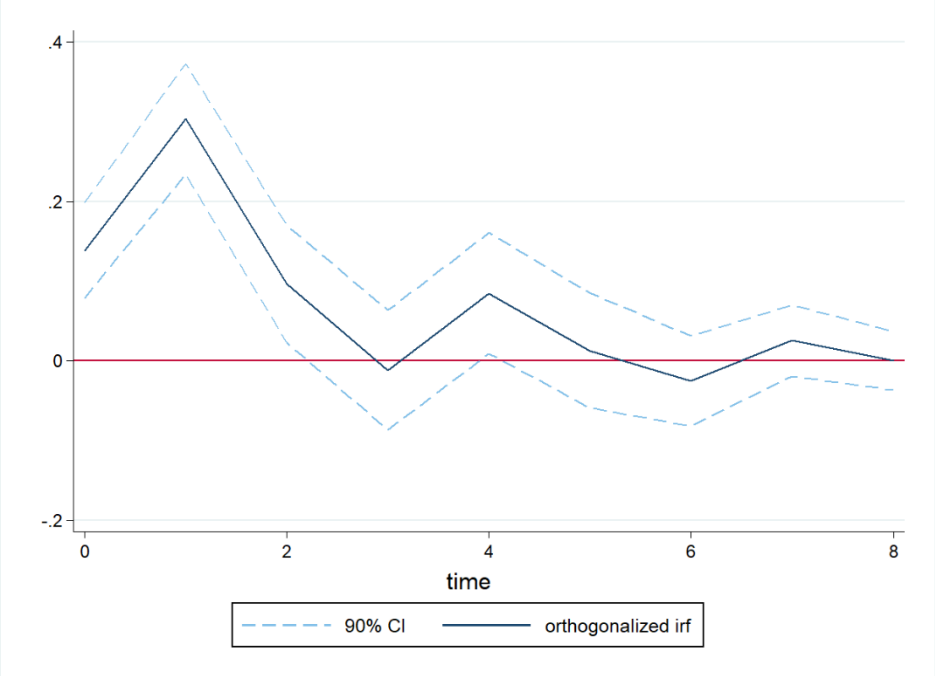
On the other hand, the lowest variance decompositions belong to the output gap and world food inflation for all inflation types. The variance decomposition of the output gap is low as expected.[38] The impact of world food inflation is insignificant; the share of food imports in Turkey's total imports is relatively low. Accordingly, the world food price changes cannot explain the variation in inflation.

The determinants of general inflation and group-specific inflations do not collide with each other. The dynamics of inflation in Turkey affect the dynamics of group-specific inflation. All inflation rates are affected by macroeconomic changes, but these effects' magnitudes are important for our analysis. The differences in the magnitudes allow us to see the differences across income groups. For instance, the most significant explanatory variable is the past realizations of inflation for both income groups. But the inflation persistence is higher for the lowest income groups. The exchange rate is an important variable for these groups; the exchange rates' changes explain the highest income group inflation more since the highest income group's consumption bundle has more imported goods. Accordingly, the analysis at the income group level allows us the dynamic changes within the country. To understand the determinants of inflation, we need to examine impulse responses of inflation to the shocks that come from other variables in the VAR model.

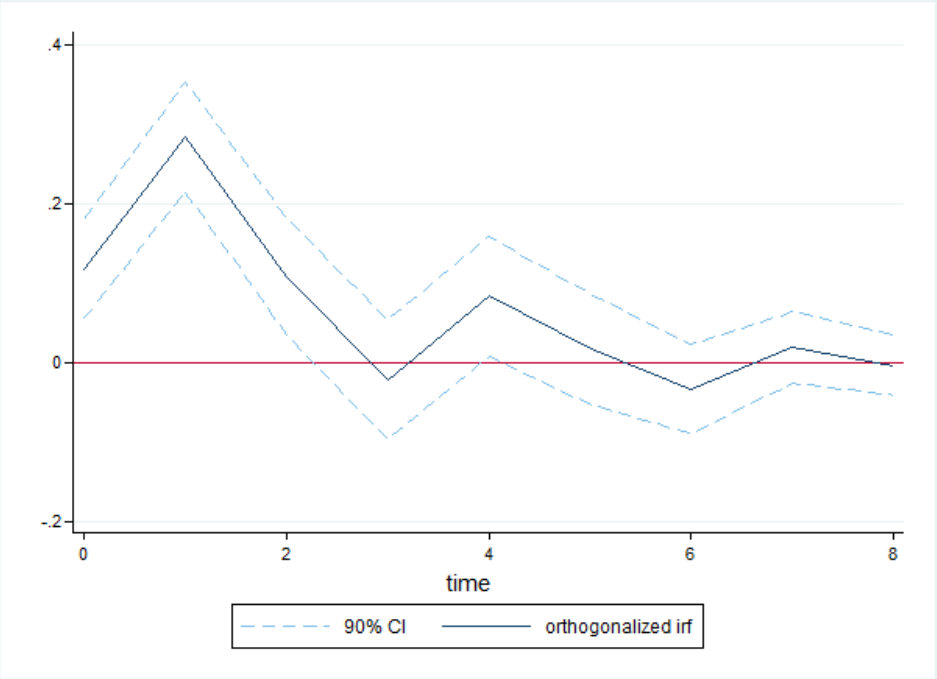
[38] Benlialper and Cömert (2016) also finds that the contribution of output gap is quite low.



(a) The lowest income group inflation



(b) The highest income group inflation



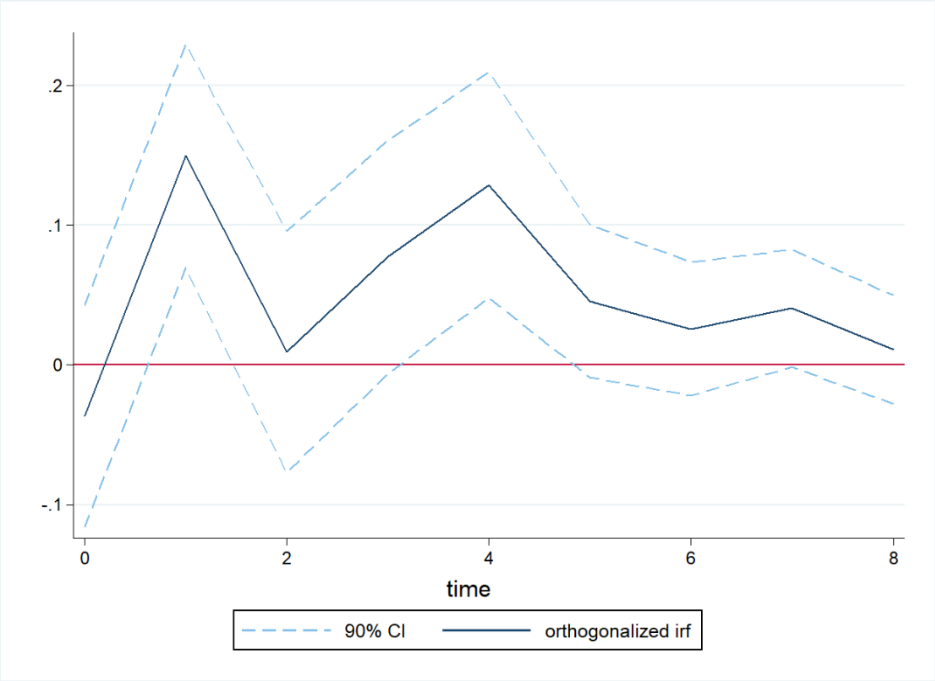
(c) The overall inflation

Figure 4.2 Impulse Response of the Lowest (1st Quintile) Income Group Inflation to Cholesky One S.D to Change in Exchange Rate

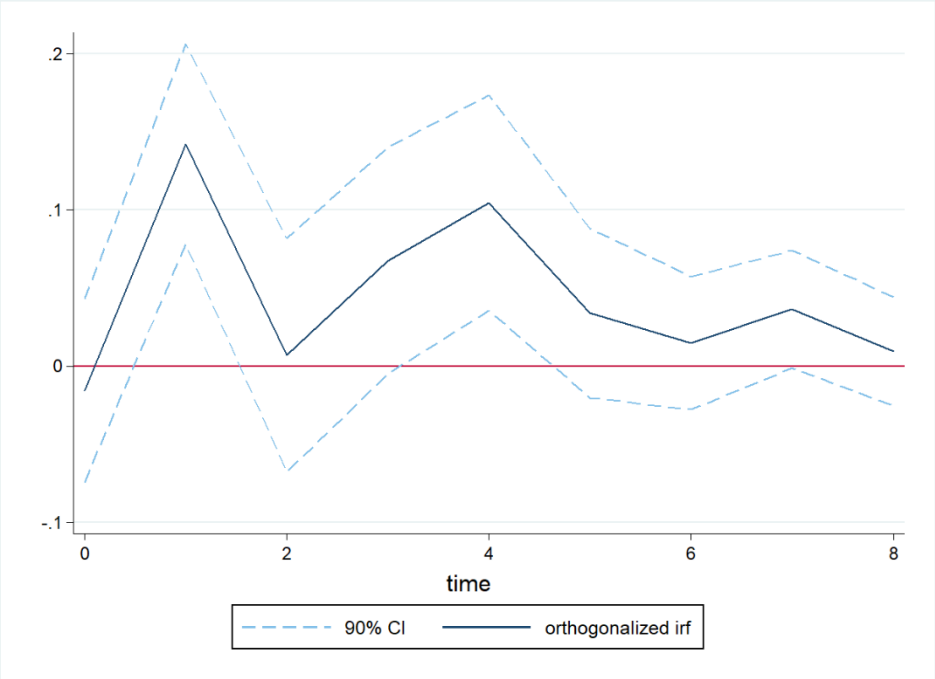
The exchange rate shock was transmitted to the lowest income group inflation. According to Figure 4.2 (a), its impact response is 9%, rising to 26% in the first step, then declining to 14% in the second step. The peak of the impact is seen in the first step. After the peak, its impact declines, and finally, it tends to die out. The shock has a larger impact on the lowest income group in the short run, which seems significant. To this end, the lowest income group inflation responses to the shocks in the exchange rates; this response is highly significant.

One standard deviation shock to the nominal effective exchange rate initially increases the inflation for the highest income group. According to Figure 4.2 (b), inflation's impact response is 13%, then it increases to 30% in the first step. After that, it declines, and then it tapers off to zero. When the overall inflation is considered, the impact response is 12%, then it increases to 28%, and it tends to zero. But the responses of both the highest income group inflation and overall inflation to the exchange rate shock are highly significant. Hence, the changes in exchange rates determine inflation, both overall and at the household level in Turkey. However, its impact on higher-income groups is higher compared to the impact on the lower-income group inflation.

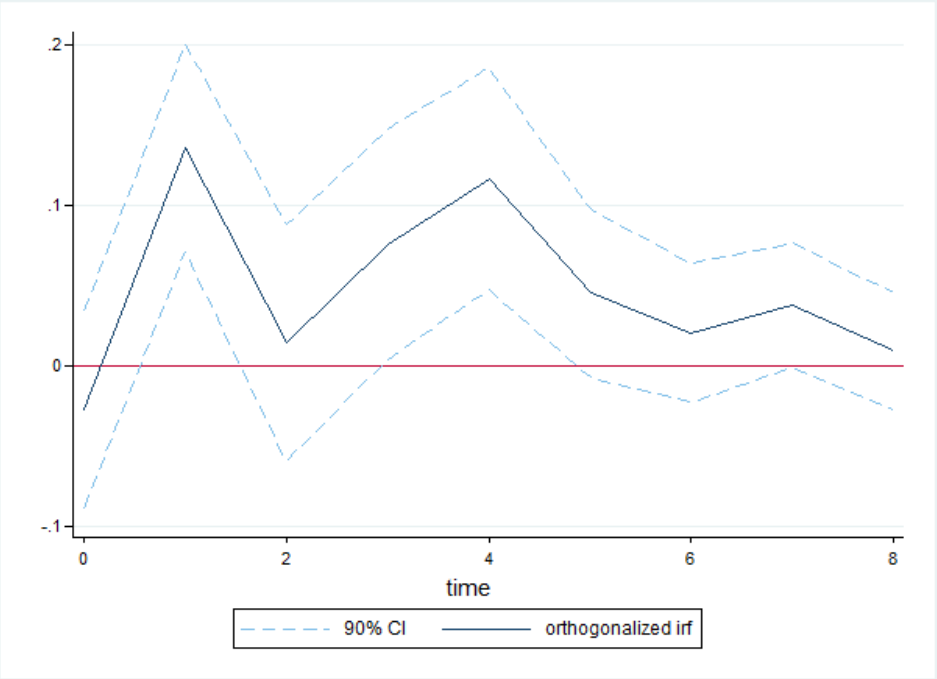
Therefore, the exchange rate shocks affect both income groups and the overall inflation. Still, the exchange rate shock becomes the determinant of the inflation differences across these groups since the magnitudes of impact are different.



(a) The lowest income group inflation



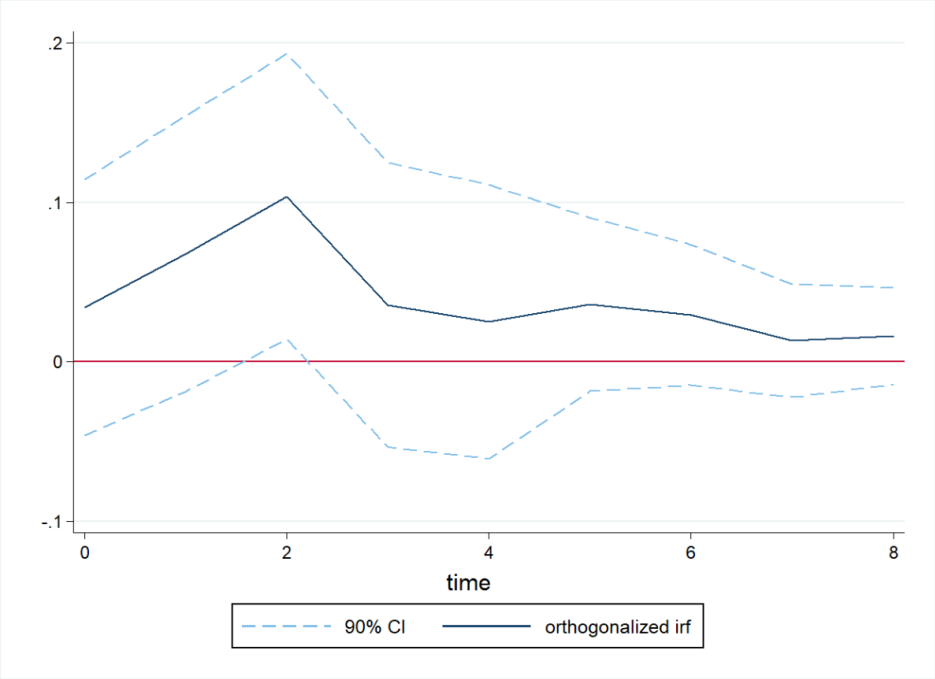
(b) The highest income group inflation



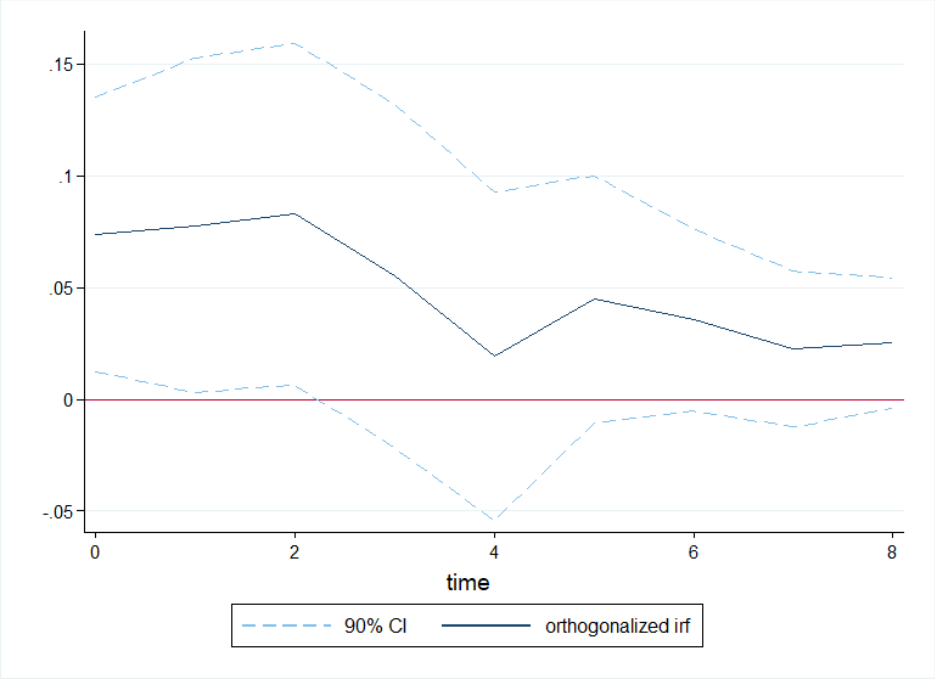
(c) The overall inflation

Figure 4.3 Impulse Response of Inflation Rates to Cholesky One S.D to Policy Rate

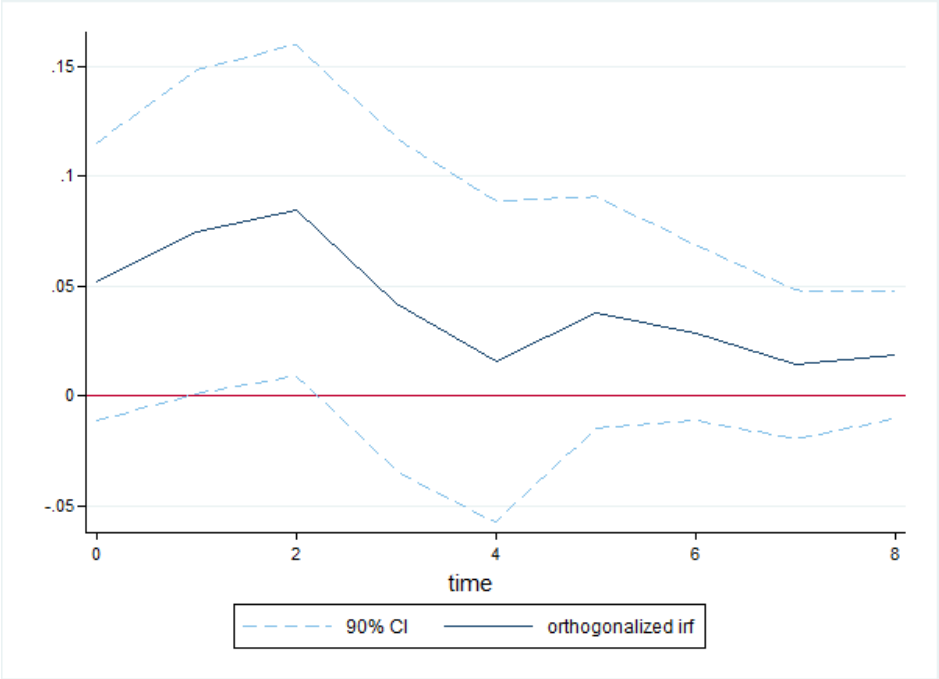
Figure 4.3 (a) shows the lowest income group inflation's impulse response to the policy rate. It increases the lowest income group inflation by 14% in the first step. The peak effect of shock is seen in the first step. Then, the impact of shock decreases and becomes insignificant. Although the impact of policy rate shock shows itself in the first period, it disappears in time and closes to zero. Overall, the effect of the policy rate on the lowest income group inflation is insignificant. The impulse response of the highest income group inflation to the policy rate can be shown in Figure 4.3 (b). A shock to policy rate to the highest income group inflation shows a cyclical pattern. Its impact response is -1% and insignificant, then it increases to 15% in the first step. But the impact of a shock disappears and becomes zero in time. And the shock on policy rate negatively affects the overall inflation rate at the impact period; then, it increases the overall inflation rate. After that, the impact of policy rate shock tapers off, and the response is insignificant. Overall, the impulse response of the highest group inflation to the policy rate is insignificant. Therefore, the policy rate does not determine inflation in Turkey. The policy rate's effectiveness in controlling inflation is low since inflation for all groups mostly driven by external factors in Turkey.



(a) The lowest income group inflation



(b) The highest income group inflation



(c) The overall inflation rates

Figure 4.4 Impulse Response of Inflation Rates to Cholesky One S.D to World Energy Inflation

The lowest income group inflation's impulse response to world energy inflation is depicted in Figure 4.4 (a). A shock to world energy inflation increases the inflation for the lowest income groups until period 2. Its impact response is 3%, then it increases by 6% and 10% in the first and second periods, respectively. After that, it sharply decreases and is gradually tending zero. The response of the lowest inflation group is insignificant. Figure 4.4 (b) depicts the highest income group inflation's impulse response to world energy inflation. It is clearly seen that a shock to world energy inflation gradually increases the highest income group inflation. Its impact response is 7%, then it increases to 8% in the second step. After the third step, it sharply decreases and tends to zero. The impact of the shock is significant until it reaches the peak. Overall, world price inflation has a positive effect on the highest income groups inflation. Although its impact is less than the impact of exchange rates, world energy prices also have a crucial role in the highest income group inflation. The highest income group allocates its budget more on energy consumption than the lowest income group. The energy prices mostly depend on world energy prices and the dollar value since we import a higher portion of the country's energy usage. Therefore, the fluctuations in the world energy prices affect the highest income group more. The

impact of world energy inflation increases the overall inflation at the beginning of the period; it decreases after the second step. Overall, the response of the overall inflation rate to the world energy inflation shock is insignificant. Compared to the three inflation rates' responses, we can see that the world energy inflation mostly determines the highest income group inflation. Accordingly, it differs from the lowest income group inflation and the overall inflation when there are fluctuations in the world energy inflation.

Overall, the VAR results show us that overall inflation rates, the lowest income group of inflation, and the highest income group inflation are affected by similar variables since changes in macroeconomic variables affect all households in the country. Turkey's overall inflation rate is mostly by driven exchange rate fluctuations; accordingly, the group-specific inflation rates are also determined by these fluctuations. However, the impact of exchange rate changes on group-specific inflation rates differs from each other. In this respect, higher-income group inflation is more sensitive to the fluctuations in exchange rates. Besides, world energy inflation has a crucial role in the highest income group inflation, although its impacts are insignificant for the lowest income group and the overall inflation. In this regard, the relatively higher expenditure shares of energy in the highest income group's consumption bundle explain why this group is more sensitive to world energy inflation changes.

4.4 Conclusion

In this chapter, we analysed the determinants of inflation for a representative household, the lowest and the highest income group separately. According to the variance decomposition analysis, the lowest income group inflation is demonstrating persistency and is explained by the nominal effective exchange rate and the policy rate. However, the impulse response function analysis indicates that the lowest income group inflation response to the exchange rate is significant. The variance decompositions result for the highest income group indicate that the highest income group inflation is explained by the changes in nominal effective exchange rate, and the world energy inflation. The impulse response functions show that the exchange rate changes, and world energy inflation changes have a significant impact on the highest income group inflation.

According to VAR results for Turkey's overall inflation, the exchange rate changes have very significant impact in the inflation rate in Turkey, as expected. The importance of exchange rate changes in inflation in Turkey can be explained with several factors. Firstly, Turkey is an import-dependent country in its production process. The import of intermediate goods is relatively higher. Accordingly, any change in these goods' prices transmits into the produced goods through the prices of intermediate goods. Second, Turkey also imports many luxury and other final goods. Therefore, any shock in the exchange rates affects the households that consume imported final goods. In this respect, Turkish economy is very vulnerable to the changes in exchange rates. At the income group level, the impacts of exchange rate changes are significant for both income groups. However, the highest income group is more sensitive to changes in exchange rates. As expected, the exchange rate has an important role in the inflation of this group. The exchange rate changes in the last years in Turkey can explain the changes in the direction of the inflation differentials. The exchange rate shocks in the economy affect the highest income groups more since they consume more imported and miscellaneous goods. In this sense, after 2017, differences between the lowest and the highest income group inflation become larger.

The world energy prices affect energy prices in Turkey as well. However, the impact of the changes in world energy prices is more apparent in the highest income group inflation. Since the highest income group allocates relatively higher portion of their income on energy consumption compared to the lowest income group and also a representative household in Turkey. The energy consumption differences mostly come from fuel expenditures. Both the changes in the exchange rates and the changes in world energy inflation affect the direction of inflation differentials in Turkey.

CHAPTER 5

CONCLUSION

This thesis investigates inflation differentials across income groups in Turkey for the period of 2004-2018. Our findings show that lower income groups have higher inflation exposures for the first half of the period, especially in the period of global financial crisis. In contrast, the higher income groups face higher inflation rates for the second half of the period, especially after 2014. The inflation differentials across the lowest and the highest income quintiles are statistically insignificant, although higher-income groups have higher inflation exposures on average. The dynamics of the inflation differentials have changed over the period under investigation. At the beginning of the analysing period, the differences in consumption patterns across income groups were more apparent compared to the end of the period. In developing countries, food expenditure is one of the main determinants of differences across consumption bundles. Combined with the volatility of food prices and the higher weights of food expenditure becomes the engine of inflation differentials in developing countries. However, there is a convergence in the food consumption between the lowest and the highest income groups. In this respect, food inflation started to lose its importance on the inflation differentials at the expense of lower income groups, but it is still important for the inflation differentials. On the other hand, the convergence in consumption patterns is not limited to food expenditures. The expenditure on hotels, cafes, and restaurants, transport expenditures have also converged across income groups. Since the differences in the consumption bundles are the source of inflation differentials, these convergences reduce the magnitude of these differentials.

Besides the changes in the consumption patterns of income groups, macroeconomic dynamics have also changed in throughout time in Turkey. After 2016, Turkey started

to experience remarkable exchange rate depreciations. As expected, the depreciations of Turkish Liras put upward pressure on prices in Turkey. Therefore, this pressure increases households' cost of living by causing higher inflation rates. However, higher-income groups are more affected by these increases in the inflation rates, since their consumption bundles consist of more goods whose prices are sensitive to the changes in the exchange rates. Also, changes in the exchange rate is putting pressure on the overall Turkish economy. Therefore, the government tries to reduce this pressure by imposing special consumption taxes, tariffs. Accordingly, these taxes also reduce the purchasing power of households. However, special consumption taxes may affect the highest income groups more since most of these taxes are imposed on miscellaneous goods and services. Hence, changes in both micro and macro-level alter the direction of inflation differentials towards the end of the period. This study allows us to examine these changes during the period under investigation.

In this study, we find that the changes in prices of food and non-alcoholic beverages, housing are the main reason for the inflation acceleration of the lowest income group. In contrast, the main reasons behind the inflation acceleration of highest income group are transport, hotels, restaurants, cafes, and miscellaneous goods and services. Besides the contributors to the inflation differentials, we also analyse the determinants of the group-specific inflation to understand the dynamics behind the inflation differentials. By using the VAR model, we investigate the determinants of group-specific inflation. According to our results, the higher income groups are more sensitive to the changes in the exchange rates. This result explains the changes in the direction of inflation differentials for the last years of the period under investigation. Also, world energy inflation has a significant impact on the highest income group inflation. Since energy consumption mostly depends on imports, the world energy prices may have a significant impact on prices in Turkey. However, this impact is more apparent for the highest income group since energy expenditures have higher weights on in their consumption bundle.

Even if higher income groups face higher inflation on average from 2004 to 2018, they have ability to tolerate inflation more than lower income groups. As discussed in Argente and Lee (2020), higher income groups can lessen the impact of inflation by switching outlet or buying cheaper goods etc. However, lower income groups cannot

tolerate inflation by switching outlets or buying cheaper goods since they have already bought the cheapest goods and chosen the outlet with the cheapest prices. In this respect, there are various aspects to analyse the impact of inflation on income groups. When we look at the contributors to group-specific inflation rates, lower-income group inflation is mostly increased by increasing prices in necessity goods. Accordingly, they cannot tolerate inflation by giving up consumption of these goods since they are necessities. In contrast, the contributors to the highest income group's inflation are generally classified as luxury goods and services; therefore, higher-income groups can change their consumption patterns to lessen the impact of inflation on themselves.

Unfortunately, our analysis captures only the inflation differentials that are originated from the consumption bundles and the volatility of prices. We use the average price data at the 7-digit COICOP level since it is the most detailed data published by TURKSTAT. Accordingly, this study assumes that all households pay the same price. As we all know, different income groups shop from different stores and pay different prices for similar products. Since we do not have detailed data about prices paid by each household, we cannot analyse the inflation differentials that originate from the prices paid by different income groups.

The price data have other limitations too. The data give us average prices that are observed in specific months. However, when the qualities of goods and services change, the relevant prices are not adjusted in the data. When we want to construct price indexes for these goods, we see extreme changes in the prices of the goods subject to quality adjustments. Besides, there is no detailed information about quality adjustments made by TURKSTAT. To figure out which quality adjustments were made, we investigate all extreme price changes in the data. After that, we make our assumptions on the quality adjustments and construct the price indexes depending on these assumptions. Hence, our calculated inflation rate differs from the official inflation rates.

Another important limitation of this study is the lack of data regarding tobacco prices before 2013. Although the data about tobacco expenditure is available for the entire period, we cannot see the impact of tobacco prices on inflation differentials across income groups. The studies using the aggregate indexes in Turkey find a relationship

between tobacco prices and inflation differentials across income groups since the aggregated index for tobacco is available. However, the tobacco index covers not only cigarettes but also tobacco; therefore, we cannot use this index as a proxy.

In the end, the dynamics and directions of inflation differentials can change throughout time. The inflation differentials may cancel out each other in the long run. However, it is important to understand the short-run effects of inflation differentials to come up with proper policies to address income group level problems in the economy. In this respect, inflation at the household level could give an important signal to policymakers. With the knowledge of the group-specific inflation rates, they can conduct better policies.

We can conduct a more comprehensive analysis of inflation differential with more detailed price data for further study. Accordingly, the dynamics of these differentials can be understood more clearly. Besides, TURKSTAT's income group specification does not allow to make social class analysis regarding inflation differentials. For this purpose, we may change the income level classification and conduct a study about inflation differentials across social classes.

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APPENDICES

A. ESTIMATION RESULTS AND DIAGNOSTIC TESTS OF VAR MODELS

Appendix A.1 Vector Autoregression Results

Table A.1.1 Vector Autoregression Estimates for the Lowest Income Group Inflation

Vector Autoregression						
Sample	2003m7 - 2018m12			**Number of obs**		186
Log likelihood	-2111.694			**AIC**		24.31929
FPE	1483.033			**HQIC**		25.37348
Det(Sigma_ml)	292.6924			**SBIC**		26.9207
Standard errors in () & P-values in []						
	Energy	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
Energy - L1	.1528156 (.0756196) [0.043]	.0158298 (.0342429) [0.644]	.0380606 (.0478144) [0.426]	.0152636 (.0111716) [0.172]	.014711 (.0143659) [0.306]	.0098481 (.0095296) [0.301]
Energy - L2	.0268841 (.0763325) [0.725]	.0419511 (.0345657) [0.225]	-.0441288 (.0482651) [0.361]	.0064645 (.0112769) [0.566]	.0025437 (.0145013) [0.861]	.0146831 (.0096194) [0.127]
Energy - L3	.0088792 (.0748003) [0.906]	.0245124 (.0338719) [0.469]	.0009977 (.0472963) [0.983]	.00542 (.0110506) [0.624]	.0126676 (.0142102) [0.373]	.0006435 (.0094263) [0.946]
Energy - L4	.0729666 (.0716836) [0.309]	.0567532 (.0324606) [0.080]	-.0014833 (.0453257) [0.974]	.002809 (.0253568) [0.912]	-.0046022 (.0136181) [0.735]	.0061875 (.0090336) [0.493]
Food - L1	.5216091 (.1716379) [0.002]	.313803 (.077723) [0.000]	-.122327 (.1085269) [0.260]	.002809 (.0253568) [0.912]	-.0354489 (.032607) [0.277]	.0607706 (.0216298) [0.005]
Food - L2	.2835633 (.1830512) [0.121]	-.0559672 (.0828913) [0.500]	.0074906 (.1157435) [0.948]	.01643 (.027043) [0.543]	.0327834 (.0347752) [0.346]	-.0126043 (.0230681) [0.585]
Food - L3	-.0142111 (.1851003) [0.939]	-.0910615 (.0838192) [0.277]	-.151866 (.1170392) [0.194]	.0365902 (.0273457) [0.181]	.0228728 (.0351645) [0.515]	-.0004151 (.0233264) [0.986]
Food - L4	-.0183719 (.1839032) [0.920]	-.043422 (.0832771) [0.602]	.2111486 (.1162822) [0.069]	-.005923 (.0271688) [0.827]	-.0018252 (.0349371) [0.958]	.0148556 (.0231755) [0.522]
Fx - L1	-.0063946 (.135346) [0.962]	-.0694209 (.0612889) [0.257]	.4385565 (.0855794) [0.000]	.0669056 (.0199952) [0.001]	.052497 (.0257124) [0.041]	.0612685 (.0170563) [0.000]
Fx - L2	.0526091 (.1413641) [0.710]	.0597887 (.0640141) [0.350]	-.2590827 (.0893847) [0.004]	-.0076871 (.0208843) [0.713]	-.0217227 (.0268557) [0.419]	.0149551 (.0178147) [0.401]
Fx - L3	.0087439 (.1403286) [0.950]	-.0137072 (.0635451) [0.829]	.1175066 (.0887299) [0.185]	.0275749 (.0207314) [0.183]	.0145457 (.026659) [0.585]	-.0123284 (.0176842) [0.486]

Table A.1.1 (continued)

Fx - L4	-.1828392 (.1331606) [0.170]	-.0752857 (.0602993) [0.212]	-.0926662 (.0841976) [0.271]	-.0237519 (.0196724) [0.227]	-.0553512 (.0252972) [0.029]	.0177007 (.0167809) [0.292]
Dpol - L1	.2238307 (.5518389) [0.685]	.0893315 (.2498898) [0.721]	-.4811072 (.3489284) [0.168]	.1549638 (.0815256) [0.057]	-.1054524 (.1048358) [0.314]	.2170261 (.0695428) [0.002]
Dpol - L2	.2575383 (.5678877) [0.650]	-.2336863 (.2571572) [0.363]	.2932428 (.3590761) [0.414]	.2629404 (.0838965) [0.002]	.202019 (.1078847) [0.061]	-.0194252 (.0715653) [0.786]
Dpol - L3	-.5084934 (.5307039) [0.338]	-.1919551 (.2403192) [0.424]	.4824686 (.3355647) [0.150]	.128921 (.0784032) [0.100]	.2132833 (.1008207) [0.034]	.0986463 (.0668793) [0.140]
Dpol - L4	.1712837 (.5269877) [0.745]	.5929027 (.2386364) [0.013]	.129965 (.3332149) [0.697]	.0603009 (.0778542) [0.439]	-.1955538 (.1001147) [0.051]	.1125555 (.066411) [0.090]
Gap - L1	.1092656 (.3813265) [0.774]	.0434089 (.1726765) [0.802]	.0486459 (.2411132) [0.840]	.0088762 (.056335) [0.875]	-.2417601 (.0724427) [0.001]	-.0133061 (.0480548) [0.782]
Gap - L2	-.0688165 (.3734278) [0.854]	-.310986 (.1690997) [0.066]	-.1993054 (.2361188) [0.399]	-.0983305 (.0551681) [0.075]	-.2540357 (.0709421) [0.000]	-.077474 (.0470594) [0.100]
Gap - L3	-.5609262 (.3778278) [0.138]	-.0906997 (.1710921) [0.596]	-.2136897 (.238901) [0.371]	-.04095 (.0558181) [0.463]	-.2967816 (.071778) [0.000]	-.0364504 (.0476139) [0.444]
Gap - L4	-.1305216 (.3813215) [0.732]	-.3129395 (.1726742) [0.070]	-.1398683 (.24111) [0.562]	.0057705 (.0563343) [0.918]	-.1795434 (.0724417) [0.013]	.0297123 (.0480542) [0.536]
Q1inf - L1	-.0307589 (.5844007) [0.958]	-.1653248 (.2646348) [0.532]	-.6144935 (.3695172) [0.096]	-.0072621 (.0863361) [0.933]	-.064285 (.1110218) [0.563]	.0277284 (.0736462) [0.707]
Q1inf - L2	-.7549635 (.5707746) [0.186]	-.4560616 (.2584644) [0.078]	.2440011 (.3609014) [0.499]	.1361269 (.084323) [0.106]	-.1146458 (.1084331) [0.290]	-.1412714 (.0719291) [0.050]
Q1inf - L3	.3080691 (.5824827) [0.597]	.1266912 (.2637663) [0.631]	-.0157064 (.3683045) [0.966]	-.0737335 (.0860527) [0.392]	.0373595 (.1106574) [0.736]	-.0297243 (.0734045) [0.686]
Q1inf - L4	-1.764627 (.5878281) [0.003]	-.4489105 (.2661868) [0.092]	-.2559483 (.3716844) [0.491]	-.1936407 (.0868424) [0.026]	.1289354 (.1116729) [0.248]	-.1191396 (.0740781) [0.108]
_cons	2.05779 (1.022602) [0.044]	1.02503 (.4630661) [0.027]	1.208235 (.6465927) [0.062]	.0215196 (.1510735) [0.887]	.0136236 (.1942693) [0.944]	.9668287 (.1288684) [0.000]
Parms	25	25	25	25	25	25
RMSE	5.68016	2.57215	3.59157	.839155	1.07909	.715814
R-sq	0.2758	0.2326	0.2243	0.3603	0.2409	0.3327
Chi2	70.847	56.38285	53.777	104.7424	59.0166	92.75559
P>chi2	0.0000	0.0002	0.0005	0.0000	0.0001	0.0000

Table A.1.2 Vector Autoregression Estimates for the Highest Income Group Inflation

Vector Autoregression			
Sample	2003m7-2018-m12	**Number of obs**	186
Log likelihood	-2059.181	**AIC**	23.75464
FPE	843.1924	**HQIC**	24.80883
Det(Sigma_ml)	166.413	**SBIC**	26.35605

Table A.1.2 (continued)

Standard errors in () & P-values in []

	Energy	Food	Fx	Dpol	Gap	Q5inf
Energy - L1	.1324182 (.0775673) [0.088]	.0114384 (.0337871) [0.735]	.0413672 (.0483077) [0.392]	.0169837 (.0114296) [0.137]	.0163498 (.0144672) [0.258]	.0097341 (.0074008) [0.188]
Energy - L2	.0311648 (.0783228) [0.691]	.0493212 (.0341162) [0.148]	-.0397376 (.0487782) [0.415]	.0072008 (.011541) [0.533]	.0043431 (.0146081) [0.766]	.0086502 (.0074729) [0.247]
Energy - L3	.0062736 (.0767949) [0.935]	.0201615 (.0334506) [0.547]	.0006452 (.0478266) [0.989]	.0059836 (.0113158) [0.597]	.0120425 (.0143232) [0.400]	.0017623 (.0073271) [0.810]
Energy - L4	.0828747 (.07321) [0.258]	.0646893 (.0318891) [0.043]	.0024177 (.045594) [0.958]	-.0008375 (.0107876) [0.938]	-.0051903 (.0136545) [0.704]	-.0005008 (.0069851) [0.943]
Food - L1	.527561 (.1762555) [0.003]	.3324789 (.0767741) [0.000]	-.1408692 (.1097691) [0.199]	.00269 (.0259715) [0.918]	-.0349744 (.0328737) [0.287]	.0439736 (.0168168) [0.009]
Food - L2	.2454877 (.1874058) [0.190]	-.0998173 (.0816309) [0.221]	.020504 (.1167133) [0.861]	.0296351 (.0276145) [0.283]	.0312308 (.0349534) [0.372]	-.0192569 (.0178806) [0.281]
Food - L3	-.0104919 (.188789) [0.956]	-.0756968 (.0822334) [0.357]	-.1342169 (.1175747) [0.254]	.0381526 (.0278183) [0.170]	.0266953 (.0352114) [0.448]	.004415 (.0180126) [0.806]
Food - L4	-.0451159 (.1874683) [0.810]	-.0711522 (.0816582) [0.384]	.2182929 (.1167523) [0.062]	-.0089462 (.0276237) [0.746]	-.0002551 (.0349651) [0.994]	.0108028 (.0178866) [0.546]
Fx - L1	-.0457343 (.1393797) [0.743]	-.0746666 (.0607116) [0.219]	.4269219 (.0868035) [0.000]	.0674415 (.0205378) [0.001]	.0563227 (.025996) [0.030]	.0619222 (.0132984) [0.000]
Fx - L2	.0141783 (.1476168) [0.923]	.0622399 (.0642995) [0.333]	-.2409111 (.0919334) [0.009]	.0057299 (.0217515) [0.792]	-.0159152 (.0275323) [0.563]	-.0172671 (.0140843) [0.220]
Fx - L3	.0587162 (.1459946) [0.688]	-.0147284 (.0635929) [0.817]	.1504003 (.0909231) [0.098]	.0348647 (.0215125) [0.105]	.0153452 (.0272297) [0.573]	.0023717 (.0139295) [0.865]
Fx - L4	-.1806933 (.137811) [0.190]	-.0803158 (.0600283) [0.181]	-.0891032 (.0858265) [0.299]	-.0280575 (.0203066) [0.167]	-.0594991 (.0257034) [0.021]	.0062539 (.0131487) [0.634]
Dpol - L1	.37392 (.5553054) [0.501]	.052932 (.2418821) [0.827]	-.4083952 (.3458353) [0.238]	.1837304 (.0818249) [0.025]	-.134663 (103571) [0.194]	.2110436 (.0529824) [0.000]
Dpol - L2	-.0384267 (.5804984) [0.947]	-.2461773 (.2528558) [0.330]	.1759343 (.3615251) [0.627]	.2503862 (.0855371) [0.003]	.216644 (.1082698) [0.045]	-.0539055 (.0553861) [0.330]
Dpol - L3	-.6581244 (.5565983) [0.237]	-.0970682 (.2424452) [0.689]	.5190374 (.3466405) [0.134]	.1098078 (.0820154) [0.181]	.2589572 (.1038122) [0.013]	.0764161 (.0531058) [0.150]
Dpol - L4	.1601642 (.5632856) [0.776]	.5461995 (.2453581) [0.026]	.0888354 (.3508052) [0.800]	.0344066 (.0830008) [0.678]	-.2174121 (.1050594) [0.039]	.0300881 (.0537438) [0.576]
Gap - L1	.1074951 (.3859246) [0.781]	.0658651 (.1681025) [0.695]	.0534247 (.2403477) [0.824]	-.0007697 (.0568664) [0.989]	-.2390218 (.0719795) [0.001]	.0490326 (.0368216) [0.183]

Table A.1.2 (continued)

Gap - L2	-.0384267 (.5804984) [0.896]	-.3223056 (.1647267) [0.050]	-.1627788 (.235521) [0.489]	-.0948288 (.0557245) [0.089]	-.2479283 (.070534) [0.000]	-.0067733 (.0360821) [0.851]
Gap - L3	-.5628901 (.3797187) [0.138]	-.039532 (.1653993) [0.811]	-.1971226 (.2364827) [0.405]	-.0510972 (.055952) [0.361]	-.2823613 (.070822) [0.000]	-.0136624 (.0362294) [0.706]
Gap - L4	-.0476471 (.3841966) [0.901]	-.2953467 (.1673498) [0.078]	-.1168211 (.2392715) [0.625]	.0039518 (.0566118) [0.944]	-.1723773 (.0716572) [0.016]	.0358401 (.0366567) [0.328]
Q5inf - L1	.6306023 (.8044484) [0.433]	.1460577 (.3504048) [0.677]	-.6658291 (.5009976) [0.184]	-.1817881 (.1185364) [0.125]	-.0510535 (.1500392) [0.734]	.2244156 (.0767535) [0.003]
Q5inf - L2	-.8525366 (.8226683) [0.300]	-.8789575 (.358341) [0.014]	-.1282198 (.5123446) [0.802]	.1083856 (.1212211) [0.371]	-.246392 (.1534374) [0.108]	-.1356044 (.0784918) [0.084]
Q5inf - L3	.2383603 (.8371012) [0.776]	.6215614 (.3646278) [0.088]	-.2825481 (.5213332) [0.588]	-.048673 (.1233478) [0.693]	.0846519 (.1561293) [0.588]	.0951676 (.0798689) [0.233]
Q5inf - L4	-1.418142 (.8792363) [0.107]	-1.063164 (.3829811) [0.006]	.6262958 (.5475743) [0.253]	.1092914 (.1295565) [0.399]	.1614326 (.163988) [0.325]	-.0766576 (.0838891) [0.361]
_cons	1.408171 (1.159818) [0.225]	1.235809 (.5051981) [0.014]	1.032381 (.7223163) [0.153]	-.0969932 (.1709006) [0.570]	.0421334 (.2163199) [0.846]	.7018908 (.1106598) [0.000]
Parms	25	25	25	25	25	25
RMSE	5.77452	2.51529	3.59628	.850883	1.07702	.550955
R-sq	0.2516	0.2662	0.2222	0.3423	0.2438	0.4432
Chi2	62.52091	67.46567	53.1493	96.78254	59.96077	148.0437
P>chi2	0.0000	0.0000	0.0006	0.0000	0.0001	0.0000

Table A.1.3 Vector Autoregression Estimates for the Overall Inflation

Vector Autoregression						
Sample	2003m7 - 2018m12			**Number of obs**		186
Log likelihood	-2066.503			**AIC**		23.83336
FPE	912.2542			**HQIC**		24.88755
Det(Sigma_ml)	180.0431			**SBIC**		26.43477
Standard errors in () & P-values in []						
	Energy	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
Energy - L1	.1383395 (.0764301) [0.070]	.013259 (.0337613) [0.695]	.0390893 (.0480879) [0.416]	.0151798 (.0113804) [0.182]	.0156297 (.0143851) [0.277]	.0111244 (.0075373) [0.140]
Energy - L2	.0319947 (.0773207) [0.679]	.0467679 (.0341547) [0.171]	-.0410181 (.0486483) [0.399]	.0068582 (.011513) [0.551]	.0035691 (.0145527) [0.806]	.0092188 (.0076252) [0.227]
Energy - L3	.0093595 (.0756564) [0.902]	.0231484 (.0334195) [0.489]	.0007368 (.0476011) [0.988]	.0054551 (.0112652) [0.628]	.0127153 (.0142395) [0.372]	.0010937 (.007461) [0.883]
Energy - L4	.0796737 (.072298) [0.270]	.059944 (.031936) [0.061]	.0020429 (.0454881) [0.964]	-.0004891 (.0107651) [0.964]	-.0048652 (.0136074) [0.721]	.0008568 (.0071298) [0.904]

Table A.1.3 (continued)

Food - L1	.5244244 (.173769) [0.003]	.3223501 (.0767586) [0.000]	-.1312202 (.1093311) [0.230]	.0036961 (.0258741) [0.886]	-.0361689 (.0327055) [0.269]	.0459432 (.0171367) [0.007]
Food - L2	.2591262 (.1849639) [0.161]	-.0784197 (.0817037) [0.337]	.0142156 (.1163747) [0.903]	.021487 (.027541) [0.435]	.0320016 (.0348125) [0.358]	-.0168153 (.0182407) [0.357]
Food - L3	-.0153557 (.186867) [0.935]	-.0844643 (.0825444) [0.306]	-.1446026 (.117572) [0.219]	.0371573 (.0278243) [0.182]	.0259104 (.0351707) [0.461]	-.0013644 (.0184283) [0.941]
Food - L4	-.03115 (.1854819) [0.867]	-.0584354 (.0819326) [0.476]	.2118864 (.1167006) [0.069]	-.0096003 (.0276181) [0.728]	-.001461 (.03491) [0.967]	.0148566 (.0182918) [0.417]
Fx - L1	-.0252392 (.137605) [0.854]	-.0712271 (.060784) [0.241]	.4334215 (.0865777) [0.000]	.0655708 (.0204893) [0.001]	.05321 (.025899) [0.040]	.0613934 (.0135703) [0.000]
Fx - L2	.0368279 (.1454087) [0.800]	.0692862 (.0642311) [0.281]	-.2497766 (.0914876) [0.006]	-.0022422 (.0216512) [0.918]	-.0181654 (.0273677) [0.507]	-.0078909 (.0143398) [0.582]
Fx - L3	.0351029 (.1438699) [0.807]	-.0192401 (.0635514) [0.762]	.1324746 (.0905194) [0.143]	.031082 (.0214221) [0.147]	.0164491 (.0270781) [0.544]	-.0046299 (.0141881) [0.744]
Fx - L4	-.1732984 (.1355947) [0.201]	-.0778647 (.059896) [0.194]	-.0875436 (.0853128) [0.305]	-.0245469 (.0201899) [0.224]	-.0581072 (.0255206) [0.023]	.0106846 (.013372) [0.424]
Dpol - L1	.3097935 (.5515865) [0.574]	.0555664 (.2436512) [0.820]	-.4139256 (.3470445) [0.233]	.1757019 (.0821308) [0.032]	-.1174818 (.1038154) [0.258]	.2015114 (.0543961) [0.000]
Dpol - L2	.1472393 (.5740674) [0.798]	-.2156604 (.2535816) [0.395]	.2344445 (.3611889) [0.516]	.2505163 (.0854781) [0.003]	.2051308 (.1080466) [0.058]	-.0336264 (.0566131) [0.553]
Dpol - L3	-.5848098 (.5427027) [0.281]	-.1186896 (.239727) [0.621]	.4683665 (.341455) [0.170]	.1119605 (.080808) [0.166]	.2399761 (.1021434) [0.019]	.0811851 (.05352) [0.129]
Dpol - L4	.2485847 (.5462235) [0.649]	.5912521 (.2412822) [0.014]	.124781 (.3436702) [0.717]	.0525133 (.0813322) [0.518]	-.2067793 (.102806) [0.044]	.0624672 (.0538672) [0.246]
Gap - L1	.1002485 (.3826932) [0.793]	.0600417 (.1690463) [0.722]	.054491 (.240781) [0.821]	.0036281 (.0569827) [0.949]	-.2384219 (.0720276) [0.001]	.0291739 (.0377402) [0.440]
Gap - L2	-.061264 (.3744046) [0.870]	-.3180513 (.165385) [0.054]	-.1749085 (.2355661) [0.458]	-.1019132 (.0557485) [0.068]	-.2488625 (.0704676) [0.000]	-.0336941 (.0369228) [0.361]
Gap - L3	-.5538467 (.3772189) [0.142]	-.0550356 (.1666281) [0.741]	-.2137225 (.2373368) [0.368]	-.0492069 (.0561676) [0.381]	-.2892035 (.0709973) [0.000]	-.0159122 (.0372004) [0.669]
Gap - L4	-.0782672 (.3814206) [0.837]	-.3039723 (.1684841) [0.071]	-.1336591 (.2399803) [0.578]	.0047342 (.0567932) [0.934]	-.1785812 (.0717881) [0.013]	.0356432 (.0376147) [0.343]

Table A.1.3 (continued)

Cal_inf - L1	. 2144796 (.7620318) [0.778]	-.0660715 (.3366107) [0.844]	-.7503393 (.4794514) [0.118]	-.0872054 (.1134659) [0.442]	-.0532488 (.1434238) [0.710]	.1628201 (.0751496) [0.030]
Cal_inf - L2	-.8600932 (.76129) [0.259]	-.7358236 (.3362831) [0.029]	.1433008 (.4789847) [0.765]	.1462439 (.1133554) [0.197]	-.2118681 (.1432842) [0.139]	-.1166806 (.0750765) [0.120]
Cal_inf - L3	.1992373 (.7750571) [0.797]	.4384306 (.3423644) [0.200]	-.1792508 (.4876466) [0.713]	-.055627 (.1154053) [0.630]	.064784 (.1458753) [0.657]	.050732 (.0764342) [0.507]
Cal_inf - L4	-1.946206 (.8013021) [0.015]	-.9397707 (.3539575) [0.008]	.2001143 (.5041593) [0.691]	-.0872213 (.1193132) [0.465]	.1683017 (.1508149) [0.264]	-.1127418 (.0790224) [0.154]
_cons	2.210178 (1.155259) [0.056]	1.335374 (.5103101) [0.009]	1.152788 (.7268601) [0.113]	-.0294193 (.1720171) [0.864]	.0281671 (.217434) [0.897]	.796116 (.1139287) [0.000]
Parms	25	25	25	25	25	25
RMSE	5.72409	2.52849	3.60145	.852312	1.07734	.564495
R-sq	0.2646	0.2585	0.2200	0.3400	0.2433	0.4171
Chi2	66.91983	64.8262	52.46294	95.82694	59.81169	133.1026
P>chi2	0.0000	0.0000	0.0007	0.0000	0.0001	0.0000

Appendix A.2 Diagnostic Tests of VAR Model for the Lowest and Highest Income Groups

Table A.2.1 Lag Length Selection Criteria for the Lowest Income Group

Selection Order Criteria

Sample: 2003m7 - 2018m12 No. of obs = 186

Lag	**LL**	**LR**	**Df**	**P**	**FPE**	**AIC**	**HQIC**	**SBIC**
0	-2285.19				2016.56	24.6364	24.6786	24.7405
1	-2198.72	172.93	36	0.000	1172.32*	24.0938*	24.389*	24.822
2	-2168.2	61.039	36	0.006	1244.93	24.1527	24.7009	25.505
3	-2146.88	42.65	36	0.207	1461.98	24.3105	25.1117	26.2876
4	-2111.69	70.37*	36	0.001	1483.03	24.3193	25.3735	26.9207

Endogenous: energy food fx dpol gap q1inf

Exogenous: _cons

Table A.2.2 Autocorrelation LM tests for VAR of the Lowest Income Group

Autocorrelation Lagrange-Multiplier Test			
Lag	**Chi2**	**df**	**Prob > chi2**
1	47.3043	36	0.09842
2	55.6846	36	0.01918
3	44.0844	36	0.16681
4	33.1972	36	0.60261
H_0: ***no autocorrelation at lag order***			

Table A.2.3. Stability Test for VAR of the Lowest Income Group

Eigenvalue stability condition		
Eigenvalue		**Modulus**
.7367487 +	.1696291i	.756024
.7367487 -	.1696291i	.756024
.3746877 +	.6559751i	.755443
.3746877 -	.6559751i	.755443
.4220976 +	.6053041i	.737943
.4220976 -	.6053041i	.737943
-.3043073 +	.6682324i	.73426
-.3043073 -	.6682324i	.73426
-.671777 +	.1966856i	.699978
-.671777 -	.1966856i	.699978
-.5427779 +	.3971644i	.672568
-.5427779 -	.3971644i	.672568
-.1154744 +	.6579535i	.66801
-.1154744 -	.6579535i	.66801
.4992489 +	.3800985i	.627475
.4992489 -	.3800985i	.627475
.5830951		.583095
.2244445 +	.4795564i	.529481
.2244445 -	.4795564i	.529481
-.0372556 +	.5043072i	.505681
-.0372556 -	.5043072i	.505681
-.4043375		.404338
-.2519602 +	.2832086i	.379066
-.2519602 -	.2832086i	.379066
All the eigenvalues lie inside the unit circle. *VAR satisfies stability condition.*		

Table A.2.4 Granger Causality Test Results for VAR of Lowest Income Group

Granger Causality Wald Test				
Equation	**Excluded**	**Chi2**	**df**	**Prob>chi2**
Energy	food	14.858	4	0.005
Energy	fx	2.3751	4	0.667
Energy	dpol	1.1729	4	0.883
Energy	gap	2.6978	4	0.610
Energy	Q1inf	10.596	4	0.032
Energy	ALL	42.306	20	0.003
Food	energy	6.1167	4	0.191
Food	fx	4.0294	4	0.402
Food	dpol	6.7356	4	0.151
Food	gap	6.4757	4	0.166
Food	Q1inf	6.4226	4	0.170
Food	ALL	27.399	20	0.124
Fx	energy	1.3256	4	0.857
Fx	food	6.1411	4	0.189
Fx	dpol	4.4238	4	0.352
Fx	gap	1.7706	4	0.778
Fx	Q1inf	3.5828	4	0.465
Fx	ALL	17.623	20	0.612
Dpol	energy	2.6937	4	0.610
Dpol	food	2.6822	4	0.612
Dpol	fx	12.758	4	0.013
Dpol	gap	3.9884	4	0.408
Dpol	Q1inf	8.5585	4	0.073
Dpol	ALL	32.883	20	0.035
Gap	energy	1.984	4	0.739
Gap	food	2.5371	4	0.638
Gap	fx	8.7988	4	0.066
Gap	dpol	10.631	4	0.031
Gap	Q1inf	3.1572	4	0.532
Gap	ALL	29.587	20	0.077
Q1inf	energy	4.3609	4	0.359
Q1inf	food	8.0471	4	0.090
Q1inf	fx	17.443	4	0.002
Q1inf	dpol	24.384	4	0.000
Q1inf	gap	4.1649	4	0.384
Q1inf	ALL	79.829	20	0.000

Table A.2.5 Lag Length Selection Criteria for the Highest Income Group

Selection Order Criteria								
Sample: 2003m7 - 2018m12							**No. of obs :** 186	
Lag	**LL**	**LR**	**Df**	**P**	**FPE**	**AIC**	**HQIC**	**SBIC**
0	-2245.14				1311.03	24.2058	24.248	24.3099
1	-2145.75	198.78	36	0.000	663.277*	23.5242*	23.8194*	24.2526*
2	-2111.72	68.068	36	0.001	678.231	23.5454	24.0936	24.8981
3	-2088.48	46.472	36	0.113	780.282	23.6826	24.4838	25.6597
4	-2059.18	58.606*	36	0.010	843.192	23.7546	24.8088	26.356
Endogenous: energy food fx dpol gap q5inf								
Exogenous: _cons								

Table A.2.6 Autocorrelation LM tests for VAR of the Highest Income Group

Lagrange-multiplier test			
Lag	**Chi2**	**df**	**Prob > chi2**
1	48.4938	36	0.07978
2	59.3853	36	0.00839
3	50.7786	36	0.05216
4	42.8524	36	0.20077
H_0: ***no autocorrelation at lag order***			

Table A.2.7. Stability Test for VAR of the Highest Income Group

Eigenvalue stability condition		
Eigenvalue		**Modulus**
.3906505 +	.6805863i	.784733
.3906505 -	.6805863i	.784733
.7664224 +	.1333394i	.777935
.7664224 -	.1333394i	.777935
-.3972456 +	.6113955i	.729115
-.3972456 -	.6113955i	.729115
-.671546 +	.2049572i	.702126
-.671546 -	.2049572i	.702126
.4024596 +	.5724436i	.699761
.4024596 -	.5724436i	.699761
-.1288652 +	.6748432i	.687037
-.1288652 -	.6748432i	.687037
-.5177881 +	.3879782i	.647017
-.5177881 -	.3879782i	.647017
.4234186 +	.4595118i	.624848
.4234186 -	.4595118i	.624848
-.07872647 +	.6045245i	.609629
-.07872647 -	.6045245i	.609629
.4474139 +	.2433383i	.509306

Table A.2.7 (continued)

.4474139 -	.2433383i	.509306
-.4352824		.435282
-.07796952 +	.4220229i	.429165
-.07796952 -	.4220229i	.429165
.3797774		.379777
All the eigenvalues lie inside the unit circle. *VAR satisfies stability condition.*		

Table A.2.8 Granger Causality Test Results for VAR of Highest Income Group

Granger causality Wald tests				
Equation	**Excluded**	**Chi2**	**df**	**Prob>chi2**
Energy	food	13.778	4	0.008
Energy	fx	2.0201	4	0.732
Energy	dpol	1.5829	4	0.812
Energy	gap	2.5953	4	0.628
Energy	q5inf	4.2227	4	0.377
Energy	ALL	34.905	20	0.021
Food	energy	7.2928	4	0.121
Food	fx	4.667	4	0.323
Food	dpol	5.3342	4	0.255
Food	gap	7.0239	4	0.135
Food	q5inf	15.221	4	0.004
Food	ALL	37.156	20	0.011
Fx	energy	1.279	4	0.865
Fx	food	6.2954	4	0.178
Fx	dpol	3.6851	4	0.450
Fx	gap	1.4225	4	0.840
Fx	q5inf	3.0865	4	0.543
Fx	ALL	17.09	20	0.647
Dpol	energy	3.1164	4	0.539
Dpol	food	4.0402	4	0.401
Dpol	fx	14.063	4	0.007
Dpol	gap	3.7357	4	0.443
Dpol	q5inf	3.2319	4	0.520
Dpol	ALL	26.89	20	0.138
Gap	energy	2.23	4	0.694
Gap	food	2.6487	4	0.618
Gap	fx	9.8483	4	0.043
Gap	dpol	13.304	4	0.010
Gap	q5inf	3.8862	4	0.422
Gap	ALL	30.418	20	0.063

Table A.2.8 (continued)

Q5inf	energy	3.5083	4	0.477
Q5inf	food	7.26	4	0.123
Q5inf	fx	23.242	4	0.000
Q5inf	dpol	25.502	4	0.000
Q5inf	gap	3.0537	4	0.549

Table A.2.9 Lag Length Selection Criteria for the Overall Inflation

Autocorrelation Lagrange-Multiplier Test			
Lag	**Chi2**	**df**	**Prob > chi2**
	48.6599	36	0.07742
1	57.9057	36	0.01175
2	48.6257	36	0.07790
3	39.1342	36	0.33095
4	48.6599	36	0.07742
H_0: ***no autocorrelation at lag order***			

Table A.2.10 Autocorrelation LM tests for VAR of the Overall Inflation

Autocorrelation Lagrange-Multiplier Test			
Lag	**Chi2**	**df**	**Prob > chi2**
	48.6599	36	0.07742
1	57.9057	36	0.01175
2	48.6257	36	0.07790
3	39.1342	36	0.33095
4	48.6599	36	0.07742
H_0: ***no autocorrelation at lag order***			

Table A.2.11. Stability Test for VAR of the Overall Inflation

Eigenvalue stability condition		
Eigenvalue		**Modulus**
.3849052 +	.6755966i	.777549
.3849052 -	.6755966i	.777549
.7526147 +	.1626082i	.769981
.7526147 -	.1626082i	.769981
-.3419546 +	.6380085i	.72387
-.3419546 -	.6380085i	.72387
.4083856 +	.5819358i	.710935
.4083856 -	.5819358i	.710935
-.6741603 +	.1959127i	.70205
-.6741603 -	.1959127i	.70205
-.1296378 +	.6761285i	.688444
-.1296378 -	.6761285i	.688444
-.5353405 +	.3900867i	.662387
-.5353405 -	.3900867i	.662387

Table A.2.11 (continued)

.4603779 +	.4209528i	.623818
.4603779 -	.4209528i	.623818
-.08575024 +	.5386019i	.545385
-.08575024 -	.5386019i	.545385
.5031073		.503107
.3399094 +	.3088379i	.459259
.3399094 -	.3088379i	.459259
-.4411874		.441187
-.1132038 +	.3979005i	.413691
-.1132038 -	.3979005i	.413691
All the eigenvalues lie inside the unit circle. *VAR satisfies stability condition.*		

Table A.2.12 Granger Causality Test Results for VAR of the Overall Inflation

Granger Causality Wald Test				
Equation	**Excluded**	**Chi2**	**df**	**Prob>chi2**
Energy	food	14.17	4	0.007
Energy	fx	1.9251	4	0.750
Energy	dpol	1.4198	4	0.841
Energy	gap	2.5484	4	0.636
Energy	Cal_inf	7.6178	4	0.107
Energy	ALL	38.815	20	0.007
Food	energy	6.7965	4	0.147
Food	fx	4.6302	4	0.327
Food	dpol	6.3289	4	0.176
Food	gap	6.9375	4	0.139
Food	Cal_inf	13.154	4	0.011
Food	ALL	34.832	20	0.021
Fx	energy	1.2478	4	0.870
Fx	food	6.103	4	0.192
Fx	dpol	3.6596	4	0.454
Fx	gap	1.6643	4	0.797
Fx	Cal_inf	2.5526	4	0.635
Fx	ALL	16.507	20	0.685
Dpol	energy	2.6003	4	0.627
Dpol	food	3.1274	4	0.537
Dpol	fx	12.288	4	0.015
Dpol	gap	4.2329	4	0.375
Dpol	Cal_inf	2.549	4	0.636
Dpol	ALL	26.168	20	0.160
Gap	energy	2.1736	4	0.704
Gap	food	2.7109	4	0.607
Gap	fx	9.2009	4	0.056
Gap	dpol	12.058	4	0.017

Table A.2.12 (continued)

Gap	Cal_inf	3.8009	4	0.434
Gap	ALL	30.287	20	0.065
Cal_inf	energy	4.1418	4	0.387
Cal_inf	food	7.719	4	0.102
Cal_inf	fx	22.657	4	0.000
Cal_inf	dpol	26.328	4	0.000
Cal_inf	gap	3.0767	4	0.545
	ALL	95.887	20	0.000

B. VARIANCE DECOMPOSITIONS OF VAR MODELS

Table B.1.1 Variance Decomposition of VAR for the Lowest Income Group

Variance Decompositions						
Standard errors in ()						
Variance Decompositions of Energy						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	1 (1.3e-17)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	.955303 (.028327)	.043402 (.028062)	.000139 (.001603)	.00075 (.003769)	.000393 (.002651)	.000013 (.000501)
3	.907887 (.042654)	.078528 (.040012)	.000612 (.003633	.00312 (.008206)	.000374 (.002552)	.009478 (.013124)
4	.880671 (.048543)	.08398 (.042613)	.004148 (.007996)	.007109 (.009614)	.014655 (.015023)	.009436 (.013346)
5	.820429 (.054761)	.081111 (.041863)	.034011 (.025553)	.006773 (.008975)	.01383 (.014348)	.043847 (.028101)
6	.795926 (.059415)	.078781 (.040894)	.059466 (.0354)	.008015 (.00925)	.013485 (.013977)	.044327 (.028492)
7	.785711 (.061369)	.077928 (.040533)	.069816 (.037963)	.008196 (.009484)	.014583 (.014668)	.043765 (.028023)
8	.782914 (.061912)	.077998 (.040469)	.069621 (.037885)	.009378 (.010685)	.016466 (.015251)	.043623 (.027887)
Variance Decompositions of Food						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.080478 (.038254)	.919522 (.038254)	0 (0)	0 (0)	0 (0)	0 (0)
2	.086286 (.041985)	.904547 (.043471)	.006214 (.010522)	.000675 (.003526)	.000475 (.002875)	.001802 (.005763)
3	.094688 (.045046)	.867699 (.050222)	.008735 (.014268)	.002282 (.005491)	.010751 (.01269)	.015845 (.018395)
4	.096332 (.045755)	.849261 (.052474)	.017465 (.021094)	.009662 (.013794)	.011763 (.014149)	.015517 (.018198)
5	.103752 (.046028)	.808141 (.056085)	.031257 (.028555)	.019612 (.015055)	.01574 (.016505)	.021497 (.020302)
6	.10324 (.046123)	.799702 (.058135)	.038258 (.031984)	.019487 (.014737)	.017858 (.017494)	.021455 (.020267)
7	.103071 (.04614)	.798298 (.058391)	.038262 (.031949)	.019454 (.014685)	.019036 (.018643)	.02188 (.020474)
8	.102746 (.046081)	.796345 (.058597)	.038911 (.032)	.020558 (.01452)	.019641 (.019018)	.0218 (.020403)

Table B. 1. 1 (continued)

Variance Decompositions of Fx						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.012721 (.016329)	.08221 (.038346)	.90507 (.040894)	0 (0)	0 (0)	0 (0)
2	.011017 (.014874)	.098115 (.044995)	.870658 (.048833)	.007362 (.011404)	.000688 (.003399)	.01216 (.014571)
3	.013716 (.016002)	.096319 (.044314)	.867248 (.04846)	.007709 (.012646)	.003111 (.006225)	.011897 (.014442)
4	.021693 (.021306)	.103672 (.044147)	.837495 (.051188)	.018825 (.018497)	.005048 (.00944)	.013267 (.015601)
5	.021585 (.021267)	.104172 (.043572)	.833467 (.051376)	.022118 (.020624)	.005308 (.00961)	.013351 (.015446)
6	.021536 (.021218)	.110143 (.044901)	.82628 (.052538)	.022007 (.020393)	.00597 (.010628)	.014064 (.015274)
7	.021459 (.021131)	.110272 (.044875)	.825124 (.052567)	.02235 (.020692)	.006517 (.011566)	.014277 (.015436)
8	.021352 (.021016)	.110083 (.044816)	.825038 (.052557)	.022246 (.020525)	.006571 (.011627)	.014711 (.015627)
Variance Decompositions of Dpol						
Step	Energy	Food	Fx	Dpol	Gap	Q1inf
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.0006 (.003589)	.052515 (.031832)	.161571 (.048142)	.785314 (.05336)	0 (0)	0 (0)
2	.00461 (.008797)	.056333 (.034113)	.238811 (.057286)	.700091 (.060214)	.000123 (.001449)	.000032 (.000764)
3	.011805 (.016241)	.051499 (.032542)	.25245 (.061806)	.666834 (.06465)	.012749 (.013926)	.004663 (.008809)
4	.01828 (.022591)	.051215 (.027524)	.271396 (.067405)	.639476 (.068692)	.013336 (.014566)	.006298 (.008607)
5	.019339 (.024525)	.048944 (.026583)	.262177 (.06843)	.629143 (.070015)	.01282 (.014348)	.027576 (.021234)
6	.020834 (.026863)	.04924 (.026253)	.259782 (.067269)	.625985 (.070372)	.013753 (.014441)	.030405 (.02336)
7	.021294 (.027898)	.048795 (.025953)	.256547 (.067159)	.627594 (.070616)	.013721 (.014276)	.03205 (.024266)
8	.022985 (.029386)	.048649 (.025667)	.254061 (.066947)	.624945 (.070936)	.013598 (.014132)	.035763 (.025788)
Variance Decompositions of Gap						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.005258 (.010577)	.008805 (.013603)	.027478 (.023474)	.001621 (.005772)	.956838 (.029152)	0 (0)
2	.007305 (.013128)	.015608 (.015654)	.032588 (.022315)	.004913 (.008798)	.937963 (.031375)	.001624 (.005603)
3	.00794 (.013461)	.018915 (.019341)	.033211 (.023637)	.019661 (.020425)	.912767 (.038911)	.007506 (.010634)
4	.011097 (.015267)	.021376 (.021029)	.033211 (.023637)	.034763 (.025096)	.89108 (.042204)	.010168 (.014213)
5	.010466 (.014381)	.026551 (.022718)	.055299 (.029834)	.044168 (.028398)	.842089 (.048201)	.021427 (.021831)
6	.010401 (.014023)	.028274 (.022272)	.05498 (.029283)	.043735 (.028012)	.841408 (.048429)	.021203 (.021569)
7	.01041 (.013642)	.029245 (.023467)	.057323 (.031346)	.043687 (.027875)	.832632 (.050855)	.026704 (.024189)
8	.010432 (.013569)	.029725 (.023977)	.05743 (.030503)	.043493 (.027672)	.826866 (.052381)	.032053 (.026733)

Table B. 1. 1 (continued)

Variance Decompositions of Q1inf						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q1inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.002634 (.007507)	.000013 (.000521)	.018832 (.019719)	.003034 (.007966)	.013598 (.01666)	.961889 (.027538)
2	.010676 (.014833)	.003438 (.008353)	.143157 (.046769)	.043796 (.026697)	.01155 (.013975)	.787383 (.051782)
3	.028035 (.023826)	.004512 (.008671)	.164558 (.048764)	.040306 (.024835)	.014838 (.014107)	.74775 (.054093)
4	.02952 (.024457)	.004463 (.008365)	.163298 (.048316)	.049266 (.026293)	.02022 (.016598)	.733232 (.054185)
5	.029179 (.023507)	.004265 (.007963)	.166465 (.046955)	.073198 (.031366)	.021831 (.017705)	.705063 (.053707)
6	.030836 (.023823)	.004459 (.008216)	.165969 (.046589)	.075541 (.032227)	.021606 (.017299)	.701588 (.053772)
7	.031935 (.023878)	.007632 (.008862)	.166223 (.046914)	.075971 (.032501)	.021518 (.01711)	.696721 (.054337)
8	.032094 (.023857)	.007917 (.009087)	.165864 (.046696)	.078249 (.033254)	.021452 (.017032)	.694423 (.054713)

Table B.1.2 Variance Decomposition of VAR for the Highest Income Group

Variance Decompositions						
Standard errors in ()						
Variance Decompositions of Energy						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	.954174 (.028468	.040514 (.026871)	.000186 (.001869)	.001929 (.006103)	.000227 (.002024)	.002969 (.007565)
3	.914953 (.040613)	.076437 (.039169)	.000278 (.002458)	.002811 (.007968)	.000229 (.002047)	.005292 (.008877)
4	.883535 (.047237)	.081302 (.041427)	.002793 (.006826)	.009186 (.011413)	.01657 (.015962)	.006614 (.010533)
5	.846343 (.051903)	.079796 (.04124)	.031597 (.024743)	.008712 (.010833)	.016379 (.015869)	.017173 (.018442)
6	.82165 (.05754)	.077805 (.040396)	.056801 (.035313)	.009284 (.011155)	.015885 (.015409)	.018576 (.02038)
7	.81265 (.05969)	.076963 (.039932)	.066078 (.037858)	.009479 (.011456)	.016004 (.015625)	.018826 (.020555)
8	.81032 (.060392)	.076994 (.03986)	.066513 (.038161)	.010178 (.012218)	.016877 (.015925)	.019118 (.020776)
Variance Decompositions of Food						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.082081 (.038566)	.917919 (.038566)	0 (0)	0 (0)	0 (0)	0 (0)
2	.087611 (.042469)	.904989 (.0436)	.005872 (.010214)	.000153 (.001682)	.000571 (.003136)	.000804 (.003857)
3	.094861 (.04511)	.861975 (.049924)	.008347 (.013965)	.001196 (.004288)	.012527 (.013698)	.021094 (.018879)
4	.096425 (.045675)	.842454 (.051652)	.017147 (.020758)	.00782 (.012789)	.014178 (.015637)	.021976 (.017345)

Table B. 1. 2 (continued)

5	.103658 (.045509)	.792661 (.055698)	.029808 (.027472)	.023841 (.017053)	.018209 (.017719)	.031824 (.020113)
6	.100648 (.044519)	.768704 (.060259)	.047793 (.033778)	.023327 (.016065)	.019014 (.018065)	.040514 (.02546)
7	.100342 (.044352)	.766761 (.060871)	.049981 (.034533)	.023306 (.015887)	.019199 (.01854)	.040411 (.025284)
8	.100021 (.044037)	.764445 (.061051)	.050508 (.034294)	.024454 (.01565)	.020349 (.019009)	.040224 (.025138)
Variance Decompositions of Fx						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.008571 (.01346)	.078542 (.037709)	.912887 (.039512)	0 (0)	0 (0)	0 (0)
2	.007622 (.012624)	.097421 (.044955)	.880571 (.047965)	.005994 (.010417)	.000419 (.002665)	.007972 (.01197)
3	.010865 (.014366)	.094394 (.043779)	.873322 (.048497)	.007065 (.01286)	.002547 (.005755)	.011808 (.017028)
4	.019712 (.020833)	.099834 (.043261)	.84736 (.050755)	.016037 (.017489)	.004689 (.009265)	.012367 (.017347)
5	.019564 (.020684)	.100428 (.042746)	.841813 (.050919)	.017399 (.018886)	.005107 (.009566)	.015689 (.02012)
6	.019721 (.020624)	.106154 (.043609)	.827814 (.05345)	.01711 (.018596)	.006495 (.011154)	.022706 (.024788)
7	.019762 (.020347)	.105527 (.043323)	.827781 (.052886)	.017225 (.018565)	.007165 (.01228)	.022541 (.024577)
8	.0198 (.020199)	.105698 (.043397)	.827579 (.053003)	.017258 (.018505)	.007196 (.012177)	.02247 (.024516)
Variance Decompositions of Dpol						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.000232 (.002235)	.046901 (.030266)	.162037 (.048331)	.790829 (.05304)	0 (0)	0 (0)
2	.005337 (.011017)	.050062 (.032403)	.225602 (.056947)	.70821 (.060267)	.000037 (.0008)	.010752 (.013973)
3	.014609 (.019944)	.045665 (.030225)	.24042 (.061545)	.677888 (.064625)	.01164 (.01347)	.009778 (.012713)
4	.020953 (.025984)	.047907 (.026086)	.262689 (.067197)	.644806 (.068644)	.013206 (.014974)	.01044 (.013961)
5	.02358 (.029272)	.047192 (.025738)	.262382 (.069333)	.643068 (.070762)	.013455 (.015753)	.010323 (.013503)
6	.027505 (.03298)	.048029 (.025751)	.259835 (.069529)	.639113 (.071739)	.015328 (.015884)	.010191 (.013343)
7	.030402 (.035669)	.047467 (.025466)	.259813 (.069993)	.637065 (.072404)	.015146 (.015657)	.010107 (.013285)
8	.034885 (.038449)	.047303 (.025095)	.257105 (.069908)	.634246 (.072898)	.015621 (.015648)	.010841 (.013592)
Variance Decompositions of Gap						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.006523 (.011767)	.01027 (.014661)	.022682 (.021403)	.003734 (.008749)	.956792 (.029166)	0 (0)
2	.009459 (.014981)	.015751 (.015623)	.029147 (.020997)	.009266 (.012011)	.935811 (.031787)	.000567 (.003329)
3	.009634 (.014743)	.018558 (.01883)	.029521 (.022226)	.028675 (.024431)	.900062 (.041259)	.013551 (.015412)
4	.013117 (.016601)	.021511 (.021023)	.027968 (.021256)	.047346 (.029583)	.876062 (.04468)	.013996 (.016157)
5	.012437 (.015831)	.027296 (.022854)	.051463 (.029033)	.05662 (.032477)	.831891 (.050222)	.020293 (.022814)

Table B. 1. 2 (continued)

6	.012335 (.015364)	.028521 (.022208)	.051659 (.028337)	.055787 (.032084)	.829849 (.051044)	.021849 (.023179)
7	.012556 (.01497)	.029858 (.023744)	.05477 (.031101)	.056166 (.032293)	.824807 (.052704)	.021843 (.023325)
8	.012757 (.014997)	.030628 (.024497)	.054873 (.030556)	.056061 (.032211)	.821974 (.05364)	.023707 (.0247)
Variance Decompositions of Q5inf						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Q5inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.020784 (.020702)	.003744 (.008846)	.073329 (.036348)	.00094 (.004267)	.004073 (.008848)	.897131 (.042196)
2	.029145 (.025261)	.002641 (.006616)	.282488 (.058399)	.051727 (.026717)	.006909 (.008551)	.627089 (.058649)
3	.044017 (.032048)	.00453 (.008908)	.289433 (.060305)	.04902 (.025843)	.006585 (.008425)	.606414 (.06042)
4	.049709 (.034627)	.004809 (.008547)	.280736 (.059228)	.058026 (.027857)	.018785 (.016412)	.587935 (.059796)
5	.048339 (.033758)	.005851 (.009914)	.284386 (.058928)	.079701 (.033599)	.017965 (.015624)	.563759 (.058659)
6	.052194 (.034764)	.006853 (.011196)	.281609 (.058665)	.081331 (.034805)	.019129 (.015269)	.558885 (.058886)
7	.054432 (.03531)	.011045 (.013088)	.280339 (.058401)	.081028 (.035063)	.019437 (.014978)	.55372 (.059264)
8	.055214 (.035599)	.011106 (.013166)	.280169 (.058174)	.083422 (035991)	.019339 (.014929)	.550749 (.059547)

Table B.1.3 Variance Decomposition of VAR for the Overall Inflation

Variance Decompositions						
Standard errors in ()						
Variance Decompositions of Energy						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	.955883 (.02796)	.041977 (.027446)	.000115 (.001468)	.00138 (.005164)	.000264 (.002179)	.000382 (.002713)
3	.914067 (.040978)	.076322 (.039185)	.000267 (.002422)	.003164 (.008457)	.000249 (.00205)	.005932 (.010024)
4	.883613 (.047744)	.081181 (.041441)	.003577 (.007719)	.00804 (.010532)	.015924 (.015733)	.007665 (.01236)
5	.830844 (.053776)	.078431 (.040727)	.033569 (.025588)	.007821 (.009896)	.015331 (.015288)	.034004 (.026222)
6	.800599 (.060062)	.075938 (.039639)	.063388 (.036635)	.00866 (.009953)	.014762 (.014758)	.036653 (.02825)
7	.790171 (.062251)	.075017 (.039173)	.074306 (.039451)	.008827 (.01013)	.015154 (.015111)	.036525 (.028074)
8	.787359 (.062923)	.075102 (.039091)	.074409 (.039605)	.010043 (.011237)	.016578 (.015553)	.036509 (.028069)
Variance Decompositions of Food						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.076705 (.0375)	.923295 (.0375)	0 (0)	0 (0)	0 (0)	0 (0)

Table B. 1. 3 (continued)

2	**.081489 (.041062)**	**.910619 (.042368)**	**.006888 (.011083)**	**.000227 (.002054)**	**.000599 (.003217)**	**.000178 (.001816)**
3	.089014 (.043792)	.867382 (.049608)	.009252 (.014631)	.001341 (.004439)	.012773 (.013804)	.020239 (.019915)
4	.090457 (.044384)	.848915 (.051609)	.018651 (.021577)	.007811 (.012745)	.014062 (.015459)	.020105 (.018834)
5	.096638 (.044126)	.79674 (.055918)	.032151 (.02855)	.023717 (.016759)	.017707 (.017368)	.033046 (.022796)
6	.094694 (.043521)	.779232 (.059543)	.046359 (.033874)	.023358 (.016006)	.0188 (.017911)	.037557 (.025536)
7	.09446 (.043375)	.777504 (.060041)	.047636 (.034289)	.023321 (.015882)	.019425 (.018729)	.037654 (.025416)
8	.094022 (.043147)	.774919 (.060273)	.048224 (.034115)	.024704 (.015607)	.020663 (.019234)	.037468 (.02528)
Variance Decompositions of Fx						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.009607 (.014235)	.081704 (.038309)	.90869 (.040267)	0 (0)	0 (0)	0 (0)
2	.008447 (.01319)	.099037 (.045171)	.875464 (.048411)	.005627 (.010082)	.000501 (.00291)	.010924 (.013915)
3	.011346 (.01463)	.096621 (.04426)	.871102 (.048355)	.006254 (.011857)	.002831 (.006033)	.011847 (.015918)
4	.019073 (.020269)	.103235 (.044006)	.845515 (.050501)	.015773 (.017197)	.004883 (.009392)	.011522 (.015468)
5	.018968 (.020186)	.103868 (.043481)	.841689 (.050581)	.017988 (.019112)	.005239 (.00964)	.012247 (.016224)
6	.019026 (.020145)	.109973 (.044609)	.830892 (.052534)	.017808 (.01886)	.006146 (.010872)	.016154 (.018446)
7	.018986 (.019947)	.10969 (.044425)	.830482 (.052232)	.017926 (.018935)	.00664 (.011795)	.016276 (.018364)
8	.018928 (.01981)	.1097 (.044437)	.830613 (.052189)	.017888 (.018808)	.006611 (.011736)	.01626 (.018358)
Variance Decompositions of Dpol						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	7.1e-06 (.00039)	.05232 (.031788)	.16237 (.048235)	.785303 (.053361)	0 (0)	0 (0)
2	.004431 (.009432)	.055501 (.033918)	.231925 (.057257)	.705378 (.060438)	.000064 (.001049)	.002701 (.007021)
3	.012686 (.01789)	.050819 (.03223)	.246052 (.061807)	.673856 (.064905)	.012563 (.013909)	.004023 (.007069)
4	.019018 (.024089)	.050982 (.027538)	.267738 (.067536)	.644098 (.069053)	.013682 (.015037)	.004481 (.007487)
5	.020758 (.026707)	.049695 (.027019)	.264215 (.069399)	.641646 (.071217)	.013646 (.015479)	.010042 (.014171)
6	.022937 (.029485)	.050155 (.02679)	.261312 (.06874)	.638441 (.071752)	.015657 (.015702)	.011498 (.016212)
7	.024029 (.031053)	.049694 (.026515)	.259214 (.068894)	.639204 (.072109)	.015473 (.015506)	.012386 (.017226)
8	.02631 (.032787)	.049486 (.026151)	.256441 (.068679)	.636467 (.072468)	.015577 (.015382)	.015719 (.019326)
Variance Decompositions of Gap						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.005949 (.011244)	.009496 (.014112)	.025026 (.022443)	.00267 (.007403)	.956859 (.029145)	0 (0)
2	.008641 (.014308)	.015805 (.015664)	.030429 (.02156)	.00684 (.010353)	.937612 (.031468)	.000672 (.003618)

Table B. 1. 3 (continued)

3	**.008974 (.014239)**	**.018777 (.019023)**	**.030824 (.022768)**	**.024476 (.022746)**	**.904418 (.040423)**	**.012532 (.01452)**
4	.012189 (.015977)	.021512 (.021011)	.029214 (.021639)	.041335 (.027627)	.882073 (.04359)	.013677 (.016047)
5	.011505 (.015132)	.027251 (.022844)	.052972 (.029313)	.051115 (.030793)	.834464 (.049643)	.022694 (.023426)
6	.011448 (.014669)	.028519 (.02229)	.05313 (.028625)	.050405 (.030397)	.832788 (.050342)	.023711 (.023518)
7	.011573 (.0143)	.029841 (.023765)	.05577 (.031016)	.05059 (.030437)	.826891 (.052184)	.025336 (.024403)
8	.011619 (.014249)	.030471 (.024387)	.055986 (.030212)	.050457 (.030269)	.821599 (.053696)	.02987 (.026654)
Variance Decompositions of Cal_inf						
Step	**Energy**	**Food**	**Fx**	**Dpol**	**Gap**	**Cal_inf**
0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1	.00976 (.014346)	.00159 (.005809)	.050662 (.031158)	.002816 (.007516)	.005046 (.010023)	.930125 (.036056)
2	.021354 (.021669)	.001143 (.004049)	.244435 (.056184)	.049365 (.02638)	.004896 (.007726)	.678808 (.057589)
3	.03722 (.029275)	.002924 (.006717)	.257116 (.058193)	.046677 (.02568)	.005706 (.007591)	.650357 (.059714)
4	.04021 (.030788)	.002856 (.006414)	.250592 (.0571)	.058793 (.028653)	.015835 (.015675)	.631714 (.059323)
5	.038698 (.029573)	.003101 (.006834)	.253106 (.056202)	.085879 (.035141)	.015446 (.014867)	.60377 (.058016)
6	.041265 (.030028)	.003272 (.007215)	.249659 (.055714)	.088908 (.036663)	.016 (.014212)	.600894 (.058089)
7	.042655 (.03012)	.007075 (.009504)	.249518 (.055783)	.088905 (.037072)	.016265 (.013946)	.595581 (.058485)
8	.0429 (.030108)	.007225 (.009791)	.249134 (.05548)	.091502 (.038004)	.016194 (.013891)	.593044 (.058735)

C. TURKISH SUMMARY / TÜRKÇE ÖZET

Enflasyon, çeşitli mal ve hizmetlerin genel fiyat düzeyindeki sürekli ve hissedilir artışı ifade eden bir kavramdır. Enflasyondaki değişim, bize, hanehalklarının yaşam maliyetindeki ve satın alma gücündeki değişimi gösterir. Hükümet ve politika yapıcıları, enflasyonu çeşitli politikaların yapımında referans olarak kullanmaktadır. Asgari ücretin belirlenmesi, sosyal yardımlar, transfer ödemeleri, emekli maaşlarının belirlenmesi gibi politikalarda resmi enflasyon önemli bir belirleyicidir. Bu tür politikalar genellikle gelir ve satın alma gücü dağılımını etkilediklerinden, ekonomideki fiyat değişimlerine göre düzenlenmesi gerekmektedir. Bu sebeple, politika yapıcıları Ulusal İstatistik Ofisleri tarafından yayınlanan resmi enflasyon oranını referans almaktadır. Bu enflasyon oranları temsili bir hanehalkının tüketim sepetindeki fiyat değişimini göstermekte, çeşitli gelir ve demografik gruplara göre ayrı bir enflasyon hesaplanmamaktadır.

Yukarıda bahsi geçen politikalar genellikle toplum içindeki belirli grupların gelir düzeyi ve onların satın alma gücü ile ilgilidir, fakat yayınlanan resmi enflasyon oranları bu grupların satın alma güçlerindeki değişimi ölçmek gibi bir amaca hizmet etmemektedir. Dolayısıyla, bu politikalar yapılırken resmi enflasyon yerine, gelir gruplarına ait enflasyonların kullanılması daha yararlı olabilir. Enflasyon hanehalklarının gelir düzeyine ve demografik özelliklerine göre değişiklik gösterebilmektedir. Örneğin, çocuklu bir hanehalkının tüketim sepeti ile iki yetişkinden oluşan hanehalkının tüketim sepetleri farklılık gösterebilir. Evli olup olmama, çocuk sahibi olma, eğitim seviyesi, yaş gibi faktörler hanehalklarının tüketim sepetlerinde farklılığa yol açabilmektedir. Aynı şekilde, gelir düzeyi de tüketim sepetlerinin oluşturulmasında önemli farklılıklara neden olmaktadır. Örneğin, gelir düzeyi yükseldikçe gıda, barınma gibi zorunlu harcamalara ayrılan pay azalmakta ve otomobil, kültür, eğlence, otel, kafe ve restoranlar gibi lüks mal ve hizmetlere ayrılan pay artmaktadır. Zorunlu mal ve hizmetlerdeki fiyat artışı, lüks mal ve hizmetlere kıyasla daha fazla olduğu zamanlarda düşük gelirli hanehalklarının karşılaştıkları

enflasyon daha yüksek olurken, tam tersi bir artışta ise yüksek gelirli hanehalkları daha fazla enflasyona maruz kalmaktadır. Farklı enflasyon oranlarından kaynaklanan bu farklılaşmalar devlet eliyle yapılan politikalar tarafından azaltılabilir.

Enflasyonun farklı hanehalkları arasında dağılımı ile ilgili çalışmalar gelişmiş ülkeler için sayıca daha fazladır. Gelişmiş ülkelere özgü çalışmalar iki yönden de gelişmiş ülkelere göre daha zengindir: demografik gruplara göre enflasyon ve gelir gruplarına göre enflasyon. Demografik gruplara göre enflasyon konusunda yapılan çalışmalarda ortak sonuç, enflasyonun çeşitli demografik gruplar arasında farklılaştığıdır. Fakat demografik özellikler çeşitlendirilebilir olduğu için, hangi grubun diğerlerine kıyasla daha fazla enflasyona maruz kaldığı çalışmalar arasında farklılık göstermektedir. Gelir gruplarına göre enflasyon konusundaki çalışmaları sonuçları bakımından ikiye ayırmak mümkündür: gelir grupları arasındaki enflasyon farkını istatistiki olarak anlamlı bulan ve bulmayan çalışmalar. Gelir grupları arasındaki enflasyon farklılaşmasının belirgin olduğunu iddia eden çalışmalar ise daha yüksek enflasyona maruz kalan gelir grubu konusunda ikiye ayrılmaktadır: Bazı çalışmalar düşük gelir grubunun daha fazla enflasyonla karşılaştığını gösterirken, diğerleri yüksek gelirli grupların daha yüksek enflasyona maruz kaldığını ortaya koymaktadır.

Gelişmekte olan ülkeler ile ilgili literatüre bakıldığında ise bu konudaki çalışmalar oldukça az olmasına rağmen gelir gruplarına göre enflasyon, demografik gruplara göre enflasyon konusuna kıyasla daha fazla çalışılmaktadır. Bunun ardındaki en önemli nedenlerden biri gelişmekte olan ülkelerde gelir eşitsizliğinin gelişmiş ülkelere kıyasla daha yüksek olması yatmaktadır. Gelir düzeyindeki farklar hanehalklarının tüketim sepetlerine de etki ettiği için, gelir gruplarının fiyat değişimlerinden farklı etkilenmesi beklenen bir sonuç haline gelmektedir. Özellikle gelişmekte olan ülkelerde gıda, kira, elektrik ve ısınma gibi zorunlu harcama kalemlerinin ağırlığının daha fazla oluşu ve bu harcama kalemlerine ait ağırlıkların gelir grupları arasındaki farklarının gelişmiş ülkelere göre daha yüksek olması sebebiyle, enflasyon gelir grupları arasında daha heterojen dağılmaktadır. İlgili yazın göstermektedir ki; gelişmekte olan ülkelerde düşük gelir grupları uzun vadede daha fazla enflasyona maruz kalmaktadır. Aynı zamanda gelir grupları arasındaki enflasyon farklılaşması istatistiki olarak da anlamlıdır.

Gelişmiş ve gelişmekte olan ülkelerdeki enflasyon dinamikleri birbirinden farklı olduğu için enflasyonun gelir grupları arasındaki dağılımında da farklı sonuçlar elde etmek olasıdır. Gelişmekte olan ülkelerde enflasyon genellikle arz yönlü faktörler tarafından belirlenirken, gelişmiş ülkelerde talep yönlü faktörler daha etkin rol oynamaktadır. Buna ek olarak, gelişmekte olan ülkelerde enflasyon, döviz kurundaki değişimlere karşı gelişmiş ülkelere kıyasla daha hassastır. Döviz kurundaki değişimler hem talep hem de arz yönlü etkilere sahiptir. Gelişmekte olan ülkeler genellikle hem tüketimde hem de üretimde ithalata bağımlıdır. İthal edilen tüketim mallarının fiyatları döviz kurundaki değişimlerden doğrudan etkilenip enflasyona talep yönlü bir baskı yapar. Döviz kurundaki değişimler ithal edilen ara malların fiyatlarına etki ederek, dolaylı olarak ülke içinde üretilen nihai malların da fiyatlarına sirayet eder, bu da enflasyon üzerinde arz yönlü bir baskıya neden olur. Özetle, gelişmiş ve gelişmekte olan ülkeler arasındaki enflasyon dinamikleri birbirinden farklı olabilmektedir. Bu farklılıklar gelir gruplarına özgü enflasyonlar arasındaki farklılaşmaya da etki ederek, literatürdeki farklı sonuçların bir nedeni olmuştur. Gelişmekte olan ülkelerde gözlemlenen görece oynak ve yüksek enflasyon, gelir eşitsizliği ile birlikte düşünüldüğünde, gelir grupları arasındaki enflasyon farklılaşmasını artırabilmektedir.

Türkiye görece yüksek enflasyon ve gelir eşitsizliği gibi gelişmekte olan ülkelere özgü özellikler taşımaktadır. Görece yüksek ve oynak enflasyon hem hanehalklarının alım gücünü düşürmekte hem de ekonomide çeşitli belirsizliklere yol açmaktadır. Bu fiyat oynaklığı belirli mal ve hizmet fiyatlarında gerçekleştiğinde, o fiyatlardaki değişime daha duyarlı olan hanehalklarının karşılaştığı enflasyon diğerlerine kıyasla farklılaşmaktadır. Bunun en önemli nedenlerinden biri ise Türkiye'deki gelir eşitsizliğidir. Gelir, tüketim sepetlerinin en önemli belirleyicilerinden biridir. Gelir düzeylerindeki farklılaşma tüketim sepetlerine de yansıyarak, fiyat değişimlerinin hanehalkları üzerindeki etkisini farklılaştırmaktadır. Türkiye üzerine yapılan çalışmalar göstermektedir ki; Türkiye'de farklı gelir grupları çoğunlukla farklı enflasyonlarla karşılaşmaktadır. Bu konuda Türkiye verisi ile yapılan çalışmanın az olması ile birlikte, bu çalışmalar kapsamlı bir analiz sunamamaktadır. Akçelik (2016) dışındaki çalışmalar, genellikle gelir grupları arasındaki enflasyon farklarını ve bu farklara katkı sağlayan ana harcama grupları üzerinde durmakta, gelip gruplarının enflasyonlarının belirleyicileri üzerinde kapsamlı bir analiz sunamamaktadır. Bu çalışma literatürdeki bu boşluğu doldurmak ve gelir gruplarına özgü enflasyonun

belirleyicileri hakkında teorik bir çerçeve sunabilmeyi amaçlamaktadır. Bu çalışmanın ana amacı 2004'ten 2018'e kadar olan zaman dilimde Türkiye'de gelir grupları arasında enflasyon farklarını ve gelir gruplarına özgü enflasyonların belirleyicilerini araştırmaktır. Aynı zamanda, aşağıdaki sorulara cevap bulmayı hedeflemektedir:

- Gelir grupları arasında enflasyon farklılaşması var mıdır? Eğer varsa, bu enflasyon farklarının boyutu nedir?
- Bu farklılaşmanın belirleyicileri nelerdir?
- Gelir grupları arasında enflasyon farklılaşması hangi koşullar altında gözlemlenir?
- Bir gelir grubu tüm zaman aralığı boyunca daha yüksek enflasyona maruz kalmakta mıdır? Veyahut bu enflasyon farkları zaman içerisinde değişmekte midir?

Bu çalışmada Türkiye'deki gelir grupları arasındaki enflasyon farklılıkları ve bu farklılıkların zaman içerisindeki değişimi analiz edilmiştir. Bunun için Türkiye İstatistik Kurumu tarafından yayınlanan Hanehalkı Bütçe Anketi'nden (HBA) ve Tüketici Fiyat Endeksi Madde Sepeti ve Ortalama Fiyatlar'dan yararlanılmıştır. Hanehalkı Bütçe Anketi 2003-2016 yıllarını kapsamaktadır. Ortalama fiyatlar ise 2003 yılının Ocak ayından 2018 yılının Aralık ayına kadar olan zamanı kapsamaktadır. Enflasyonun hesaplanma yöntemi Türkiye İstatistik Kurumu'nun kullandığı yöntem ile aynıdır. İlk olarak, 5 basamaklı COICOP (Amaca Yönelik Bireysel Tüketim Sınıflaması) mal ve hizmetlerin farklı gelir gruplarının tüketim sepetlerindeki ağırlıkları hesaplanmıştır. Bu hesaplama için, ilgili yıldan iki, üç ve dört yıl önceye ait harcama verisi kullanılmıştır. Daha sonra bu üç yıla ait harcama verilerinde fiyat ayarlaması yapılarak, harcama verilerinin ağırlıklı ortalaması alınmıştır. Fiyat verisindeki mal ve hizmetler 7 basamaklı COICOP koduna sahip oldukları için, Hanehalkı Bütçe Anketi ile uyumlu olması açısından 5 basamaklı COICOP mal ve hizmetlere göre toplulaştırılmıştır. Daha sonra bu iki veri birbiri ile eşleştirilmiştir. Buna ek olarak, izafi kira, şans oyunları gibi fiyat verisinde karşılığı bulunmayan harcamalar hesaplamalardan çıkarılmıştır. Türkiye İstatistik Kurumu Tüketici Fiyat Endeksini hesaplarken Laspeyres Zincirleme Endeksini kullanmaktadır, bu nedenle biz de ilgili kurumun internet sitesinde paylaşılan metaveriden yararlanarak Tüketici Fiyat Endeksini aynı yöntem ile oluşturulmuştur.

Başlangıç olarak Türkiye İstatistik Kurumu'nun hesapladığı Tüketici Fiyat Endeksi'ni (2003=100) hesaplanmıştır. Daha sonra aynı ayın bir önceki yıldaki endeksine göre değişimi, yani yıllık enflasyonu hesaplanmıştır. Resmi enflasyon oranları ile hesapladığımız enflasyon oranlarını karşılaştırıldığında, hesaplanan enflasyonun genellikle resmi enflasyon oranlarından yukarda seyrettiğini söylenebilir. Bunun ardındaki bir neden tüketim sepetindeki ürünlerin ağırlıkları olabilir. Türkiye İstatistik Kurumu bu ağırlıklar hesaplanmasında Hanehalkı Bütçe Anketi, Yabancı Misafir Anketi, İdari Kayıtlar gibi kaynakları bir arada kullanırken, bu çalışmada yalnızca Hanehalkı Bütçe Anketini referans alınmıştır. Buna ek olarak, Türkiye İstatistik Kurumu teknolojik gelişmelere paralel olarak tüketim sepetlerindeki mallarda kalite düzenlemesi yapmaktadır. Örneğin, 2000'li yılların başında televizyon fiyatları için tüplü televizyon fiyatları kullanılırken, teknolojik gelişme ile birlikte tüketim sepetindeki tüplü televizyon yerini plazma televizyonlara bırakmıştır. Dolayısıyla ilgili fiyat endeksi bu kalite düzenlemesine göre oluşturulmuştur. Fakat hangi yılda, hangi ürünlerde bu tür değişiklikler yapıldığı bilgisi Türkiye İstatistik Kurumu tarafından paylaşılmadığı için, bu konudaki ayarlamaları fiyat artışlarındaki sapmaları gözlemleyerek ve Avrupa İstatistik Ofisi tarafından yayınlanan Tüketici Fiyat Endeksi hesaplama kılavuzundaki kalite ayarlamalarını referans alarak yapılmıştır.

Gelir gruplarına göre enflasyon hesaplanmasında ise Türkiye İstatistik Kurumunun gelir sınıflandırmasına (%20'lik beş gelir grubu) ek olarak, %10'luk on gelir grubu ve %5'lik beş gelir grubu olmak üzere üç farklı gelir sınıflandırması yapılmıştır. Bu gelir sınıflandırması eşdeğer yıllık harcanabilir gelire göre yapılmış ve eşdeğer yıllık harcanabilir gelir hesaplanırken hanehalkındaki kişi sayısı da dikkate alınmıştır. Daha sonra bu üç ayrı kategorideki her bir gelir grubunun kendi Tüketici Fiyat Endeksi ve yıllık enflasyonları hesaplanmıştır. Tüm bu hesaplamaların ardından, üç ayrı kategorideki en yüksek ve en düşük gelir gruplarının yıllık enflasyonları karşılaştırılmıştır. İki gelir grubu arasındaki enflasyon farkı, en düşük gelir grubunun enflasyonundan en yüksek gelir grubunun enflasyonunu çıkararak bulunmuştur. Üç ayrı grupta da araştırmanın zaman aralığının ilk yarısında düşük gelir grupları daha fazla enflasyona maruz kalırken, ikinci yarısında yüksek gelir grupları daha yüksek enflasyona maruz kalmıştır. İncelenen dönem boyunca en yüksek yüzde yirmilik gelir grubunun enflasyonunun, en düşük yüzde yirmilik gelir grubunun enflasyonundan ortalama 0.25 yüzde puan yüksek olduğu gözlemlenmiştir. Yıllık enflasyon farkı, en

düşük yüzde onluk gelir grubu ile en yüksek yüzde onluk gelir grubu arasında ise -0.21 yüzde puandır. Bu fark, en yüksek yüzde onluk gelir grubunun 0.21 yüzde puan daha fazla enflasyona maruz kaldığını göstermektedir. Yüzde beşlik gelir gruplarındaki enflasyon farkına bakıldığında ise en yüksek yüzde beşlik gelir grubunun en düşük yüzde beşlik gelir grubuna kıyasla 0.19 yüzde puan daha yüksek enflasyona sahip olduğu görülmektedir.

Gelir grupları arasındaki enflasyon farkının istatistiki olarak anlamlı olup olmadığını test etmek için yüzde yirmilik gelir grupları arasındaki enflasyon farklarını kullanılmıştır. Enflasyon farkı ortalaması -0.25 yüzde puandır, gözlem sayısı ise 180dir. Sıfır hipotezi iki gelir grubu arasındaki enflasyon farkının eşit olduğunu savunur iken, alternatif hipotez iki gelir grubu arasındaki enflasyon farkının sıfırdan farklı olduğunu savunmaktadır. T-testi sonucunda, sıfır hipotezi reddedilemez. Dolayısıyla, iki gelir grubunun enflasyon oranları arasında uzun vadede istatistiki olarak anlamlı bir fark yoktur. Yukarıda da belirttiğimiz gibi, enflasyon dinamikleri zaman içinde değişiklik gösterebilmektedir, bu nedenle dönemsel olarak da incelenmesi gerekmektedir. Bu nedenle, 36 aylık kayan pencereler yöntemi kullanılarak gelir grupları arasındaki enflasyon farklarının anlamlılığını dönemsel olarak da incelenmiştir. Bunun sonucunda, Mart 2008 ile Aralık 2010 arasındaki dönemde en düşük yüzde yirmilik gelir grubunun daha fazla enflasyona maruz kaldığı ve bu farkın istatistiki olarak anlamlı bir fark olduğu söylenebilir. Bahsi geçen dönemde gıda fiyatlarında önemli artışlar yaşanmıştır. Düşük gelir gruplarının tüketim sepetlerinin büyük bir bölümünün gıdalardan oluştuğu düşünüldüğünde, bu fiyat artışlarının ilgili gelir grubunun enflasyonunda yukarı doğru bir baskı kurduğunu söylemek doğru olacaktır. Diğer bir yandan, Aralık 2016'dan itibaren en yüksek yüzde yirmilik gelir grubunun daha fazla enflasyona maruz kaldığını ve bu farkın da istatistiki olarak anlamlı olduğunu söylenebilir. Bahsi geçen dönemde Türkiye'nin döviz kurunda yaşanan artışlar sebebiyle ithal edilen malların fiyatlarında yukarı yönlü değişimler olmuştur. Yüksek gelirli grupların tüketim sepetlerinin düşük gelir gruplarına kıyasla daha fazla ithal mal içerdiği düşünüldüğünde, döviz kuru şoklarının yüksek gelir gruplarının enflasyonunu daha fazla arttırdığı söylenebilir. Buna ek olarak, son yıllarda döviz kurundaki değişimlerin de etkisiyle özel tüketim vergilerinde artışlar meydana gelmiştir, bu vergilerdeki artışlar genellikle yüksek gelir gruplarının tüketim sepetlerindeki mal ve hizmetler ile ilgilidir. Dolayısıyla, bu vergi

artışları yüksek gelir gruplarının Bahsi geçen zamanların dışında kalan yıllarda çoğunlukla iki gelir grubu arasındaki enflasyon farkının sıfırdan farklı olduğunu ve zaman içerisinde bu farkın yönünün değişiklik gösterdiğini, fakat bu farkların istatistiki olarak anlamlı olmadığını gözlemliyoruz.

En yüksek ve en düşük gelir grupları arasındaki enflasyon farkı incelendikten sonra, resmi enflasyon oranlarının gelir gruplarının enflasyonunu temsil edebilirliği incelenmiştir. İki gelir grubunun enflasyon oranlarını resmi enflasyon oranları ile karşılaştırıldığında, hesapladığımız enflasyon oranlarının çoğunlukla resmi enflasyonun üzerinde seyrettiğini gözlemledik. Bu karşılaştırmada göze çarpan şey şudur: Gelir gruplarının enflasyonunun resmi enflasyondan en fazla saptığı dönemler, diğer gelir grubundan daha yüksek enflasyona maruz kaldığı dönem ile aynıdır. Buna ek olarak, göreli olarak daha düşük enflasyonla karşılaşan gelir grubunun enflasyonu resmi enflasyon oranlarına daha yakın olduğu gözlemlenmektedir. Sonuç olarak, resmi enflasyon oranları bu sapmaları yansıtamamaktadır.

Bu çalışmada gelir grupları arasındaki enflasyon farklarına katkıda bulunan ana harcama kalemleri de analiz edilmiştir. Yapılan hesaplamalar sonucunda, enflasyon farkının düşük gelir gruplarının zararına açılmasına katkıda bulunan ana harcama kalemleri "gıda ve alkolsüz içecekler" ve "konut" olmuştur. Enflasyon farkının yüksek gelir gruplarının zararına açılmasında ise "ulaştırma", "lokanta ve oteller", "eğlence ve kültür", "çeşitli mal ve hizmetler" büyük ölçüde etkilidir. Bu ana harcama kalemlerini büyük ölçüde zorunlu harcamalar ve lüks harcamalar olarak ikiye ayrıldığını gözlemliyoruz. Beklendiği gibi zorunlu harcama kalemlerindeki fiyat artışları düşük gelir gruplarının enflasyonunu daha fazla artırırken, lüks tüketim mal ve hizmetlerindeki fiyat artışları ise yüksek gelir gruplarının enflasyonunu daha fazla artırmaktadır.

Ayrıca, bu çalışma Vektör Otoregresif Model kullanarak hem Türkiye'deki genel enflasyonun hem de en yüksek ve en düşük yüzde yirmilik gelir grubuna özgü enflasyonunun belirleyicilerini araştırmaktadır. Bu analiz ile gelir gruplarına göre enflasyon literatürüne önemli bir katkıda bulunmaktadır. Çünkü gelir gruplarına göre enflasyon literatürü çoğunluklar farklı gelir gruplarının enflasyonlarını hesaplamakta ve bu enflasyon farklarına katkıda bulunan mal ve hizmetleri araştırmaktadır.

Doğrudan bu gelir gruplarına özgü enflasyon oranının belirleyicilerinin araştırılması ve genel enflasyon oranlarının belirleyicileri ile karşılaştırılması literatürde yaygın değildir. Genel enflasyon ve gelir gruplarına özgü enflasyonları analiz etmek üzere üç farklı vektör otoregresif modeli kurulmuştur. Üç enflasyon da aynı ülke içindeki farklı hanehalklarının tüketim sepetlerindeki değişimi gösterdiği için aynı makroekonomik değişkenlerden etkilenmesi olasıdır. Modelde kullanılan değişkenler şu şekildedir: dünya enerji enflasyonu, dünya gıda enflasyonu, döviz kuru, Türkiye Cumhuriyeti Merkez Bankası politika faizi, Türkiye'deki çıktı açığı ve son olarak enflasyon oranları.

Vektör Otoregresif analizinden elde edilen sonuçları varyans ayrıştırma tahminleri ve etki-tepki fonksiyonları olarak ikiye ayırmak mümkündür. Varyans ayrıştırma tahminlerine göre, üç ayrı enflasyondaki varyasyonlar sırasıyla geçmiş enflasyon oranlarla, döviz kurundaki değişimlerle ve dünya enerji fiyatlarındaki varyasyonlarla açıklanmaktadır. Fakat bu değişkenlerin açıklayabilirliği, yani varyans ayrıştırma tahminleri büyüklük olarak birbiri arasında farklılık göstermektedir. Örneğin, düşük gelir grubuna özgü enflasyonun, diğer enflasyonlara kıyasla geçmişteki enflasyon oranları tarafından daha fazla açıklandığı gözlemlenmiştir. Öte yandan, döviz kurundaki değişimlerin ise yüksek gelir grubuna özgü enflasyonu açıklamada diğer enflasyonlara kıyasla daha fazla yüzdeye sahip olduğu tespit edilmiştir. Dünya enerji fiyatlarındaki değişimler ise yüksek gelir grubuna özgü enflasyondaki değişimleri açıklamada diğer enflasyonlara kıyasla daha yüksek varyans ayrıştırma tahminine sahiptir.

Etki-tepki analizine göre temsili hanehalkına ait bulgular, Türkiye'deki genel enflasyonun döviz kuru şoklarına karşı duyarlı olduğunu göstermiştir. Politika faizi şoku, dünya enerji enflasyonu şoku genel enflasyon üzerinde istatistiki olarak anlamlı bir tepkiye yol açmamaktadır. Düşük gelir grubuna özgü enflasyonun şoklara verdiği tepkileri incelediğimizde ise genel enflasyonda da gözlemlendiği gibi döviz kurundaki değişimlere karşı daha duyarlı olduğunu gözlemlenmektedir. Yüksek gelir grubuna özgü enflasyon ise hem döviz kuru şokuna hem de dünya enerji enflasyonu şokuna karşı daha duyarlıdır. Bu üç enflasyonu birlikte değerlendirildiğinde ortak duyarlılığın döviz kuru hareketlerinde olduğunu görülebilir, Türkiye birçok yönden dış etkilerden etkilenen bir ülke olduğu için bu sonuç kaçınılmazdır. Fakat etki-tepki fonksiyonları

ayrı ayrı incelediğimizde, yüksek gelir grubuna özgü enflasyonun düşük gelir grubuna özgü enflasyona kıyasla döviz kurundaki değişimlere daha duyarlı olduğunu gözlemlenebilmektedir. Yapılan analize göre, özellikle son iki yılda yüksek gelir grupları düşük gelir gruplarına kıyasla daha yüksek enflasyonla karşılaşmıştır. Hatta bu enflasyon farkı son iki yılda o kadar açılmıştır ki, sonuçlar uzun vadede yüksek gelir gruplarının daha fazla enflasyona maruz kaldığını ortaya koymuştur. Bu enflasyon farkındaki değişimin en önemli nedenlerinden biri son yıllarda Türkiye'deki döviz kuru değişimleridir. Türk lirası, özellikle dolar karşısında değer kaybederken, bunun etkileri yüksek gelir gruplarında daha yoğun görülmektedir. Buna ek olarak, bu gelir gruplarının dünya enerji fiyatlarındaki değişimlere karşı da duyarlı oluşu ve Türkiye'deki enerji fiyatlarının dünyadaki enerji fiyatlarına ve döviz kuruna göre belirleniyor oluşu da bu konuda önemli bir rol oynamaktadır. Yüksek gelir gruplarının bu fiyat değişimlerine karşı daha duyarlı oluşunun ardında ise bu grupların tüketim sepetlerinde bahsi geçen fiyat değişimlerinden doğrudan veya dolaylı olarak etkilenen mal ve hizmetlerin ağırlığının yüksek oluşu yatmaktadır.

Yüksek gelir grupları uzun vadede daha yüksek enflasyonla karşı karşıya kalsa bile, enflasyon karşısında düşük gelir grupları kadar çaresiz kalmazlar. Yüksek gelir grupları enflasyonun etkilerini daha fazla tolere edebilecek ve zaman zaman azaltabilecek yollara başvurabilirler. Bu yollar, alışveriş yapılan yerleri değiştirmek, daha ucuz mallar satın alarak, tüketim sepetlerinde fiyatları artan mal ve hizmetlerde çeşitli değişikliklere gitmek gibi örneklendirilebilir. Öte yandan, düşük gelir grupları halihazırda piyasadaki ucuz malları ve düşük fiyatlı ürün satan alışveriş noktalarını tercih ettikleri için artan fiyatlar karşısında bunları değiştirebilmek gibi imkanları yoktur. Buna ek olarak, yüksek gelir gruplarının enflasyonunu artıran harcama kalemleri genellikle lüks tüketim malları ve hizmetlerdir, dolayısıyla bu harcama kalemlerindeki talepler daha esnek olabilmektedir. Fakat düşük gelir gruplarının enflasyonun artıran harcama kalemler, gıda, kira, ısınma vb. gibi zorunlu harcama kalemlerinden oluştuğu için, bu grupların bahsi geçen harcama kalemlerine olan talepleri esnek olamamaktadır. Herhangi bir fiyat artışında tüketiminden vazgeçilebilecek mal ve hizmetler olmaması nedeniyle, bu mal ve hizmetlerin fiyatlarındaki artış direkt olarak düşük gelir gruplarının satın alma gücünü düşürecek ve enflasyonun etkisini azaltabilecek herhangi bir yol bulamayacaklardır. Bu yönden enflasyonun gelir grupları üzerindeki etkisini analiz etmenin farklı boyutları da vardır.

Bu çalışma, detaylı fiyat verisi eksikliği sebebiyle, yalnızca gelir gruplarının tüketim sepetlerindeki farklılıklardan kaynaklanan enflasyon farklılaşmasını incelemektedir. Oysaki, farklı gelir hanehalkları aynı veyahut benzer ürünlere birbirinden farklı fiyatlar verebilmektedir. Hanehalklarının mal ve hizmetleri aldıkları fiyatların ayrıca toplandığı bir veri seti olmaması nedeniyle, hanehalkları tarafından ödenen fiyat farklılıklarından kaynaklanabilecek enflasyon farklılaşması analizi bu çalışmada sunulamamaktadır. Buna ek olarak, bahsi geçen fiyat verisi kalite ayarlamalarına göre düzenlenmiş fiyatları değil, doğrudan değişen ürünün fiyatlarını içerdiği için, bazı yıllarda belirli ürünlerin fiyatlarında sapmalar meydana gelmektedir. Kalite ayarlamaları ile ilgili detaylı bilgi Türkiye İstatistik Kurumu tarafından paylaşılmamaktadır. Bu hususta, bu çalışmadaki kalite ayarlamaları, Türkiye İstatistik Kurumu'nun da arasında metodoloji olarak önemli farklar olmadığını beyan ettiği, Avrupa İstatistik Ofisi tarafından yayınlanan Tüketici Fiyat Endeksi Hesaplama Kılavuzu'na göre yapılmıştır. Bu bilgi eksikliği analizleri çeşitli yönlerden kısıtlamaktadır. Bu bilgilere ulaşılabildiği veyahut daha detaylı fiyat endekslerinin de paylaşılabildiği bir veri seti var olabilirse bu kısıtlamalar ortadan kalkabilecektir.

Son olarak, bu çalışmanın en önemli bulgularından biri gelir grupları arasındaki enflasyon farklılaşmasının zaman içinde değişebilir olduğudur. Ülke içindeki gerek makro-ekonomik gerek hanehalkı düzeyindeki dinamik değişimleri bu zaman içerisindeki değişimin nedenidir. Uzun vadede bu enflasyon farkları birbirini dengelese de kısa vadede gözlemlediğimiz enflasyon farkları sorun teşkil etmektedir. Çünkü işçi ve işveren arasındaki ücretlerin belirlenmesinde, vergiler ve transfer ödemeleri ile ilgili kararlarda enflasyon oranları referans olarak kullanılmaktadır. Dolayısıyla, kısa vadede gözlemlenen farklılaşmanın bu politikalara yansımaması daha fazla enflasyonla karşılaşan gelir grubunun refah durumunu daha kötüye götürebilir. Bu sebeple, gelir gruplarına özgü enflasyonları ilgili politikalarda referans olarak kullanılması daha yararlı olacaktır.

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