

Getting Real?

The Uneven Burden of Inflation across Households in Turkey

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Abstract

Inflation is typically measured using aggregate price indices that are based on bundles of goods and services sold or consumed by the “median” agent. In the case of households, in particular, budget shares vary substantially across income and demographic groups. Assessing how inflation behaves at the household level requires understanding how heterogeneous changes in consumer prices affect household choices and well-being differently. In recent years, price increases have been particularly high in Turkey, with double-digit inflation starting in 2017 and intensifying in 2018 and 2020 due to exchange rate volatility, macroeconomic instability, and the economic disruption brought about by Covid-19. This paper calculates income-decile price indices to examine the inflation experience across income groups and discusses their implications for household welfare.

Households in the first decile allocate nearly 70 percent of their budget to food and housing, twice as much as the corresponding share for the typical household in the upper decile. Inflation measures that consider these heterogeneities in expenditures show a higher burden for the poor in recent inflation episodes driven by rapid increases in food prices (2013, 2015 and 2019). In 2015, for instance, 342,000 additional people would have been deemed poor (an increase of 4.2 percent) had the poverty calculations taken into account the actual inflation experience of poor and vulnerable households. A methodological extension of the World Bank’s upper-middle-income poverty line (\$5.50 2011 purchasing power parity) that takes into consideration the inflation experience of the bottom deciles yields higher poverty rates for Turkey every year between 2011 and 2020.

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1. Introduction

Policy makers have plenty macroeconomic reasons to care about high inflation. But there are also important microeconomic (firm- and household-level) considerations to control the inflation rate, including the potential differential effects of price changes on purchasing power and household well-being across different populations. Inflation is typically measured and tracked using aggregate price indices such as the Producer Price Index (PPI) or Consumer Price Index (CPI), often the standard practiced employed in most price measurement programs across the world. While informative, these indices are based on aggregate bundles of goods and services sold or consumed by the “median” firm or household. In the specific case of households, in particular, the allocation of their budgets across different types of goods and services varies substantially across income and demographic groups in ways that do not necessarily match the preferences and budget possibilities of the median household. Therefore, assessing how inflation behaves at the household level requires understanding how heterogeneous changes in consumer prices affect household choices and well-being differently.

An empirical regularity in Emerging Markets and Developing Economies (EMDEs) is that households from the bottom of the distribution tend to allocate a higher budget share to food and housing expenditures. If the prices of these items increase faster than core inflation (which excludes price changes in the food and energy sectors), low-income households will face higher effective inflation rates. Beyond variation in consumption bundles, poor households can also bear a higher burden if the prices that they pay for the different goods and services are above the average for reasons such as buying smaller but pricier quantities, dealing with stronger information asymmetries, inability to smooth the seasonality of agricultural production and weaker bargaining power (Kaplan and Schulhofer-Wohl 2017 and Orhun and Palazzolo 2018).¹ Heterogeneity in the effects of inflation can also arise due to variation in opportunities to substitute expenditures with affordable options that ensure the same level of utility,² access to financial instruments that insulate the nominal value of assets from inflation or in the indexing of pensions, wage negotiations, tax brackets or public transfers.

¹ Analyzing over 500 million transactions between 2004 and 2013, Kaplan and Schulhofer-Wohl (2017) find that lower-income households experienced higher inflation and nearly two-thirds of the variation comes from differences in prices paid for identical goods.

² For instance, it is not rare to see low-income households opting for fewer proteins in their diets to guarantee a minimum calorie intake when food is scarcer or more expensive.

In this paper, we construct income-decile specific price indices that capture heterogeneity in consumption bundles to investigate the inflation experience of different income groups in Turkey and shed light on the role of varying inflation rates on poverty and inequality. In recent years, price increases have been particularly high in Turkey, with double-digit inflation starting in 2017 and intensifying in 2018, 2020 and 2021 due to exchange rate volatility, macroeconomic instability and the economic disruption brought about by the Covid-19 pandemic. In fact, some of the price hikes experienced in recent years have been remarkably high for goods and services that make up a larger share of the budget of low-income and vulnerable households. Due to limitations in data availability, we can only estimate differences in inflation across income groups, matching consumption expenditures by deciles with their corresponding annual average inflation rates, thereby not accounting for substitution effects, changes in budget shares across expenditure categories or potential differences in prices across deciles.

For the period 2011-2020, the results indicate that expenditures on basic needs carry a larger weight in the overall budget of lower-income households compared to better-off households. Households from the bottom decile allocate nearly 70% of their budget to food and housing, twice as big as the corresponding share for the typical household in the upper decile – and also higher than for the median household (54%). Consequently, inflation measures that consider these heterogeneities in expenditures show a higher burden for the poor in some of the recent inflation episodes (2013, 2015 and 2019). When compared to households in the 10th decile, the annual inflation rate experienced by poor households was higher in six of the 10 years covered in the analysis. While the annual differences in inflation across income groups are modest (between 1 and 2 percentage points) due to fast increases in prices across most consumption items, inflation is skewed towards poor households when food price inflation is an important driver of overall inflation. The total inflation in the 10-year period was 10.39% for the bottom decile and 10.16% for the top decile, an annual average difference of 0.23 percentage points that is statistically significant at the 5% level.

The effects of decile-specific inflation measures on the calculation of poverty are not trivial. Extending the methodology of the upper-middle-income poverty line (\$5.50 per capita per day expressed in 2011 Purchasing Power Parity (PPP)) using the higher inflation rate borne by the first

decile –as opposed to the overall CPI– captures, for instance, 342,000 and 209,000 extra poor in 2015 and 2019, respectively. This corresponds to an increase in poverty in the order of 2.5%-4.2%, roughly speaking between one-fourth and one-third of the average annual reduction in poverty achieved in a typical year of robust and broad-based economic growth in Turkey. In fact, we find that an extension of the “standard” poverty methodology that better reflects the inflation experience of low-income households yields higher poverty rates in every single year analyzed for the period 2011-2020. The results also show that the fast inflation episodes observed after 2017 largely wiped out the real income gains achieved by the bottom of the distribution as a result of pro-poor growth in the period 2011-2016.

While not much for Turkey, existing research on household-level heterogeneity in inflation is growing. Despite the significant variation in the results available in the literature, many studies have documented that high inflation often impacts lower-income households disproportionately more. This is particularly evident in food price inflation episodes such as the global food price shocks in 2007-08 and 2010-11 due to the varying structure of consumption. On average, households from the bottom quintile in EMDEs spend around half of their budget on food while the corresponding share drops to 20% for the top quintile, although this gap widens for lower income countries (Ha, Kose and Ohnsorge 2019). In fact, Martin and Ivanic (2016) show that increases in food prices tend to result in net increases in poverty in the short run even after the positive income effects among net food sellers are taken into account. The existing evidence is not conclusive but findings from some studies using long price data series suggest that the gaps in inflation can persist over time (Levell and Oldfield 2011; Kaplan and Schulhofer-Wohl 2017; Weichenrieder and Gurer 2018).

This paper proceeds as follows. Section 2 presents a succinct overview of the literature on heterogeneous effective inflation rates across population groups. Section 3 gives background on Turkey’s inflation context in recent years. Section 4 describes the data and methodology employed to construct income decile-specific inflation rates. Section 5 characterizes the distribution of inflation and discusses the implications for real income, poverty and inequality over the period of analysis. Finally, Section 6 concludes.

2. Existing Literature

The literature on effective inflation rates across income and demographic groups is growing. This includes a wealth of studies that focus on the heterogeneity of inflation and its consequences on poverty and inequality for a wide range of countries, including developed countries to middle- and low-income countries (for instance, Hobijn and Lagakos 2005 or Kaplan and Schulhofer-Wohl 2017 for the United States, Gürer Weichenrieder 2020 for the European Union, Oosthuizen 2013 for South Africa, or Arndt et al. 2015 for Mozambique, among many others). Two empirical regularities emerge from most of these studies. First of all, the dispersion in inflation rates across the distribution, demographic groups (determined by age, household size, gender of the household head, etc.) and geographic regions is not trivial, with cumulative differences amounting to large disparities over the medium and long term. For instance, in the period 2001-2015, the consumption bundles of the lowest deciles in 25 countries in the EU became 11.2 percentage points more expensive than the corresponding bundles of the richest deciles.

A second pattern in the evidence is the unequal burden often borne by lower-income households (including in Turkey, Akçelik 2016³), which is more evident in inflation episodes driven by large acceleration of food prices. Notable examples of such uneven burden are illustrated by the welfare effects of the food crisis in 2007-08 and 2010-2011. Food net sellers tend to benefit from higher food prices, but a great deal of evidence shows that such positive impacts are often counteracted in the short term by the wider negative effects on net food buyers, even in net food exporter countries. The 2010 surge in food prices, for example, resulted in a net increase of 44 million in the number of people living in extreme poverty worldwide –68 million fell below the poverty line whereas 24 million climbed out of poverty (Ivanic, Martin and Zaman 2012). However, as seen in Vietnam in the 2007-08 food price crisis, fast accelerating food prices can be welfare enhancing when the poor's share in the production of the inflationary food items is high (Vu and Glewwe 2011). In the medium- to long-term, things can look different as markets (factor returns and output) adjust to changes in prices.

³ Between 2004 and 2015, the inflation rate of the bottom quintile was 0.65 percentage point higher than the inflation rate of the top quintile, while the inflation rate experienced by the bottom decile was 0.78 percentage point higher than that of the top decile.

The available evidence also examines the different circumstances and mechanisms through which lower-income households may be more prone to bear the brunt of inflation. First and foremost, the bottom part of the distribution is typically found to allocate a higher share of their expenditures to food. In Turkey, for instance, the 1st decile spends 7 of 10 Turkish lira of their incomes on food and housing, about twice as much as the richer decile. In addition to differences in consumption bundles, poor households may have more limited means to cope with rising prices, such as lower ability to substitute across goods (Argente and Lee 2015). Similarly, budget, information and bargaining constraints mean that lower-income households may end up paying higher prices per unit (Kaplan and Schulhofer-Wohl 2017; Orhun and Palazzolo 2018). They are less able to make bulk purchases and often, due to marked seasonality in agricultural production and credit market imperfections, farmers sell their produce at low prices at the height of the harvest season and buy food at much higher prices in the lean season (Burke, Bergquist and Miguel 2019). Higher exposure to the effects of inflation also stem from the fact that poor and vulnerable households are less likely to earn indexed wages –due chiefly to high levels of informality, hold a higher share of their income and wealth in cash and fewer savings –due to lower financial inclusion,⁴ or receive public transfers whose values are not always tied to the evolution of inflation rates, as is the case in some of the social assistance programs in Turkey (Kahn 1997; Mulligan and Sala-i-Martin 2000; Erosa and Ventura 2002; Burdick and Fisher 2007, Cysne, Maldonado, and Monteiro 2005; Areosa and Areosa 2016).

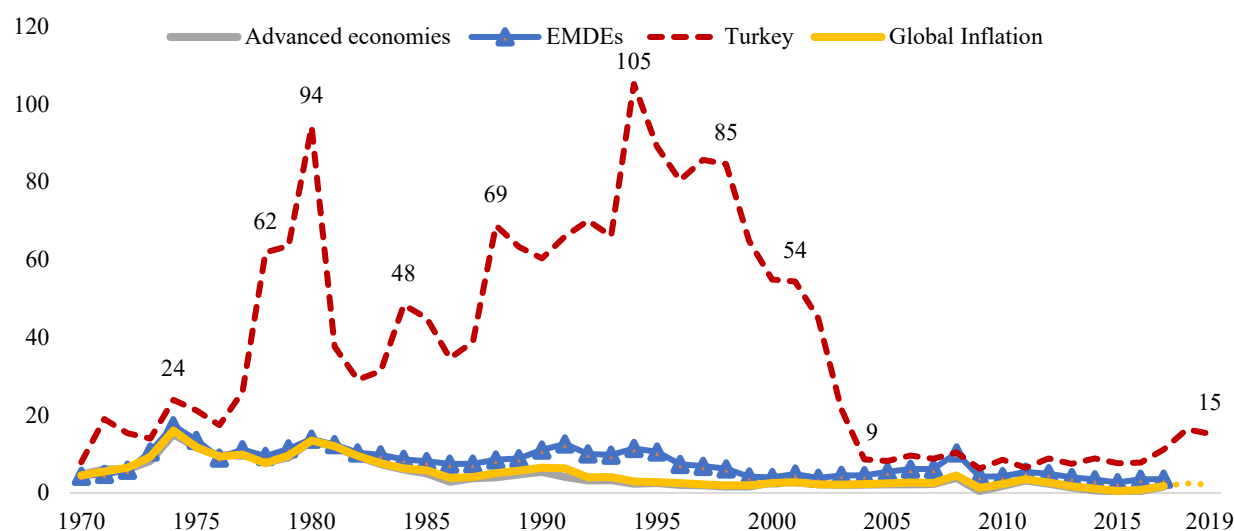
3. Inflation in Turkey

Turkey has long experience dealing with fast and enduring periods of inflation. As shown in Figure 1, episodes of high inflation were frequent between the 1970s and the middle of the 2000s, significantly more than across other EMDEs. Local economic and political turmoil along with an challenging external context, including a major global oil shock and volatile financial markets, created the conditions for high inflation in the 1970s. Price pressures continued in the 1980s largely due to monetized fiscal imbalances. The 1990s marked another decade of high inflation. Average annual changes in the CPI exceeded 50%, reaching an all-time high of 105% during the 1994 crisis.

⁴ Findex data from 2017 shows that 56% of the bottom 40 had a bank account compared to 77% for the rest of the population. Global Findex 2017.

A set of structural reforms introduced in the early-middle 2000s managed to curb inflation. Turkey implemented stronger monetary and fiscal policy frameworks, adopted a flexible exchange regime, advanced reforms for the banking sector, deepened trade and financial integration and consolidated the independence of the Central Bank circumscribing its mission to establishing and maintaining price stability (World Bank 2014). The prospects of the EU accession process, as well as accompanying IMF and World Bank programs, helped to anchor these economic reforms while Turkey regained the confidence of international markets. By 2004, the inflation rate had fallen to single digits for the first time in 34 years.

Figure 1. Inflation in Turkey, Advanced Economies, EMDEs, and Global Inflation (annual %, 1970-2019)⁵



Notes: Regional-Global aggregations are median inflation rates. Global, Advanced Economy and EMDE inflation rates between 1970 and 2017 are from Ha, Kose, Ohnsorge (2019). Inflation rates for Turkey and global inflation after 2017 are from World Bank Open Data which uses the International Monetary Fund, International Financial Statistics and data files.

Source: Ha, Kose, Ohnsorge (2019) and IMF Data

Except for a mild uptick to 10.4% in the midst of the Global Financial Crisis in 2008, inflation remained stable until 2017, when it began to pick up. Inflation accelerated in the following year compounded by a substantial weakening of the Turkish lira and macro instability associated to the 2018-19 economic crises. At the peak of the exchange rate crisis (August-September 2018), the Turkish lira had lost over 70% of its value against the U.S. dollar relative the level of the exchange rate in January 2018 (World Bank 2019). While inflation subsided in the second half of 2019, the

⁵ Regional-Global aggregations are median inflation rates. The Global, Advanced Economy and EMDE inflation rates between 1970 and 2017 are from Ha, Kose, Ohnsorge (2019). The inflation rates for Turkey and global inflation after 2017 are from World Bank Open Data which uses the International Monetary Fund, International Financial Statistics and data files.

trend was quickly reversed by the massive shock brought about by Covid-19 and the policy response (credit incentives) to mitigate the effects of the pandemic. All in all, the inflation rate has remained in double-digit territory since 2017.

4. Data and Methodology

Data

The analysis relies on two main sources of data to construct the expenditure-decile adjusted inflation rates. The first source is the Turkish Household Budget Survey (HBS), a nationally representative household survey administered by the Turkish Statistical Institute (TUIK) on a yearly basis. The second source is the Survey on Income and Living Conditions (SILC), also collected annually, which is used specifically to examine the evolution of real income and real minimum wages using the inflation experience of each decile.⁶

The HBS collects detailed information on household living conditions, expenditures and incomes. While the exact sample size varies from year to year, since 2009 TUIK has been surveying around 1,300 households monthly for a total of around 15,600 per year for each of the surveys. Households are asked to report their monthly expenditures corresponding to the month preceding the survey date. The expenditure data is grouped into 12 main categories according the Classification of Individual Consumption According to Purpose (COICOP)⁷ as follows: 1) food and non-alcoholic beverages, 2) alcoholic beverages and tobacco, 3) clothing and footwear, 4) housing, water, electricity, gas and other fuels, 5) furnishings, household equipment and routine maintenance of the dwelling, 6) health, 7) transport, 8) communications, 9) recreation and culture, 10) education, 11) hotels, cafes and restaurants and 12) miscellaneous goods and services. Further disaggregation is also available under each COICOP category. For example, transport includes subcategories such as new motor cars, bicycles, diesel, domestic and international flights, driving lessons, among others. In total, there are 303 expenditure items in the HBS 2019 data, the latest of the survey waves available at the time of undertaking this analysis.

⁶ For this part of the analysis, income deciles are created in the SILC data. They are only slightly different from the consumption deciles generated using the HBS data due to a strong correlation between income data in the SILC and consumption data in the HBS.

⁷ COICOP is a reference classification published by the United Nations Statistics Division.

We use the HBS data for the period 2011-2019 to construct and value the consumption basket of each household in the sample. Households are sorted into deciles 1 (lowest) to 10 (highest) according to their per capita consumption.⁸ Unfortunately, the survey is only representative at the national level, making it impossible to examine differences in inflation experience across regions or between urban and rural areas. Moreover, the HBS was not carried out in 2020 due to the disruptions created by the Covid-19 pandemic. The implications for not having the 2020 survey when analyzing the inflation incidence in 2020 are discussed in the following section.

The SILC is a nationally and regionally representative survey similar to the HBS, but it is more focused on capturing detailed information on income sources while collecting less detailed data on household expenditures. TUIK has been conducting the Turkish SILC survey since 2006, which is analogous to the EU-SILC administered by Eurostat since 2004 to monitor income, social inclusion and living conditions in all EU countries plus Iceland, Norway and Switzerland. The sample size of the survey in Turkey has been expanding over time, increasing from 17,562 households in (65,472 individuals) in 2012 to 24,068 households (81,178 individuals) in 2018. Starting in 2014, the SILC survey became geographically representative at the NUTS2 level, corresponding to 26 sub-regions.⁹

The income data in SILC is more suitable for our analysis compared to the data available in HBS. Rather than asking respondent households to report their income for the 12-month period preceding the survey, SILC collects income data for the same reference period (survey year) for all households in the sample. Consequently, it is possible in the SILC data to infer individuals earning the minimum wage in the same year. Additionally, the SILC survey includes questions on household non-labor income, such as public and private transfers and income from properties and other assets. Detailed data on employment also allows breaking employment type across employees, employers and self-employed as well as labor intensity (part and full time workers). This study uses SILC data for the period 2011-2018.¹⁰

⁸ The World Bank uses the consumption data available in the HBS to calculate and monitor the evolution of monetary-based poverty rates in Turkey.

⁹ NUTS stands for Nomenclature of Territorial Units for Statistics, a system of geographic divisions developed by Eurostat for statistical purposes (<https://ec.europa.eu/eurostat/web/nuts/background>).

¹⁰ The reference period for the income data collected in the SILC survey is the year preceding the field work.

Finally, we use price data collected by TUIK, in particular the monthly CPI, which includes price information broken down by the 12 main COICOP expenditure groups. The periods of reference available in the data include monthly and annual changes as well as changes relative to December of the preceding year and the 12-month moving average of the change in CPI. In order to capture the inflation episodes that are relevant to each household, all the inflation calculations estimated in this paper are based on 12-month moving averages. This is not possible otherwise for households interviewed in the early months of the year of survey field work using the December-to-December price changes rates reported by TUIK.

Methodology

The CPI data described in the previous section is used to construct annual inflation figures for each household deriving weighted averages based on budget shares from the consumption baskets in the HBS. Equation 1 formalizes the calculation of household-specific inflation rates as follows:

$$\pi_{ht} = \sum_{g=1}^{g=12} \frac{e_{ght}}{E_{ht}} \times \pi_{gt} \quad (1)$$

where π represents inflation, h denotes households, t is the survey year, e corresponds to budget shares for each of the 12 COICOP good and services categories, E denotes to total household expenditures and g indexes the 12 good and services groups. Annual price changes for each of the 12 groups of goods and services is published by TUIK. Work by Atuk and Sevinc (2012) presents in detail how subgroup inflation and overall annual inflation are calculated. Once household-specific inflation rates are constructed, each household is placed into income deciles according to its relative position in the per capita expenditure distribution. Average inflation rates for each decile are calculated as described in Equation 2 using population sample weights in the HBS:

$$\pi_{D_nt} = \sum \frac{\pi_{htn}}{N_n} \quad (2)$$

where D denotes deciles, n indexes deciles from 1 to 10 and N is the total number of households in each decile. We compute standard errors for decile-specific inflation rates regressing household inflation figures on binary variables that indicate the decile corresponding to each household as follows:

$$y_t = \beta_0 + \sum_d \beta_d \text{decile}_{dt} + \varepsilon \quad (3)$$

where y is the household specific 12-month moving average inflation, t indicates the survey year, $decile$ denotes the categorical decile indicators, d indexes each decile (the first decile is set as the reference term) and ε is the error term. Standard errors for each β are used to measure the statistical precision of decile-specific inflation rates.

Our inflation calculations are adjusted to match the official TUIK numbers which include additional sources of information beyond HBS. TUIK uses HBS, Tourism and the Constitutional Population Expenditure surveys to compute the weights of the CPI basket. TUIK also draws from administrative data to refine the consumption weights for energy services such as electricity, natural gas and water. These adjustments create minor differences with respect to the weights derived exclusively from HBS. To ensure consistency between the two methodologies, the final CPI values were adjusted using the ratio of the HICE-based CPI rates to TUIK's official CPI rates. More specifically, the official TUIK national CPI in a given year was divided by the calculated overall national CPI. The resulting coefficient was used to scale up the national and decile specific CPI values that we estimate using the HBS data.

Finally, household-specific inflation rates for 2020 were computed using TUIK's price data for 2020 together with budget shares drawn from the HBS-2019. The HBS survey for 2020 was not carried out due to the restrictions imposed to contain the spread of Covid-19. However, a comparison of budget shares for the 12 COICOP goods and services groups across deciles in the 2018 and 2019 HBS surveys show that the composition of consumption bundles remained fairly stable between the two years. Out of the 12 groups, 10 changed from one year to the other by less than 1 percentage point and the other two varied by around 3 percentage points. Unfortunately, the analysis of real incomes and the effects of decile-specific inflation rates on poverty could not be carried out due to the lack of HBS data in 2020.

Total household disposable income is readily available in the SILC survey. In order to convert nominal income into real values, decile-specific inflation rates from the HBS were used for each of the income groups. Labor income, in turn, is defined as income earned from employment related activities including employee wages and business owner earnings. The units of analysis for the examination of labor income are individuals who work full-time and do not engage in other part-

time activities.¹¹ Therefore, total income earnings for the reference year are divided by the months worked full-time.¹² Earnings distributions and deciles are defined for each of the groups of workers (full time, employers, regular employees and casual employees). Similar to the inflation adjustments applied to household disposable income, nominal earnings are converted into real values using decile-specific inflation rates computed using HBS data.

The sample for the analysis of real minimum wages is restricted to employees who work full time. For each year, earnings in cash are compared to the value of the official minimum wage to identify workers who are paid the minimum wage. However, this approach comes with a caveat. The identification of minimum wage earners is measured with error due to the self-reporting nature of the income data in SILC, in particular the rounding of earnings and months of work in addition to the likely reluctance of some individuals to report their full income to avoid losing social benefits that are tied to the value of the minimum wage. In fact, the empirical distribution of earnings amongst formal workers shows bunching right below the minimum wage threshold. In contrast, the distribution of earnings for informal workers does not display any discontinuities around the same threshold.

5. Results

5.1 The incidence of inflation

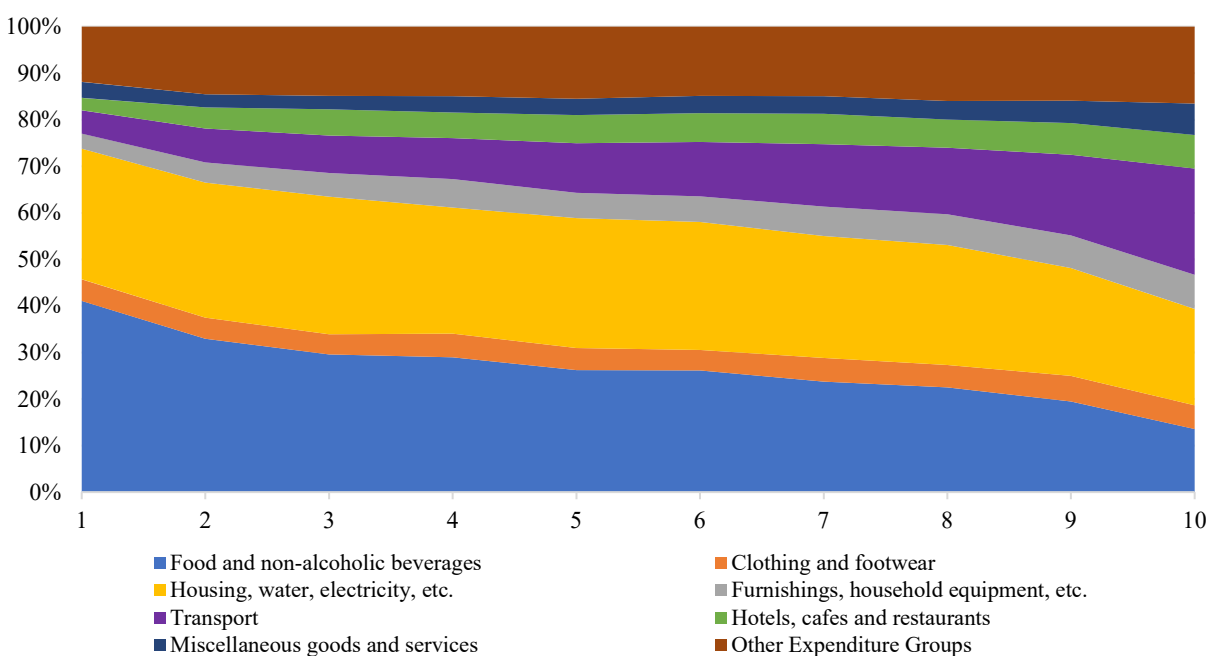
As expected, there is significant variation in the composition of the consumption baskets of Turkish households across the income distribution. Expenditure data for 2019 classified by the 12 COICOP groups presented in Figure 2 shows that food, non-alcoholic beverages and housing make up a larger share of overall consumption for the bottom of the distribution compared to the upper deciles. While food and non-alcoholic beverages account for 41.1% of the total expenditures for households from the bottom of the distribution, this share is a third (13.1%) for the top decile –and also smaller for the median household (26.2%). Similarly, poor families allocate 28% of the expenditures to housing whereas a typical household from the richest decile spends 21%. Although the gap is smaller, a comparison of the budget shares between the Bottom 40 and the Top 60 reveal

¹¹ Since there might be individuals within the same household who are in and out of employment or the work force, doing the analysis at the individual level rather than across households provides a more accurate picture of workers' wages.

¹² Lack of data on the number of hours worked for part-time workers makes it impossible to calculate monthly or hourly wages for these workers.

differences in the same direction. Shares of other consumption items such as transportation, furnishing and household equipment or expenditures on hotels, cafes and restaurants display the opposite trend, increasing for families along the income distribution. Overall, more that 70% of all expenditures of households from the first decile go to cover basic necessities, namely food, housing, education and health. This share drops to 41% for the typical household in the top income decile and is 54% for the median household.

Figure 2: Consumption patterns vary greatly across income groups (2019)



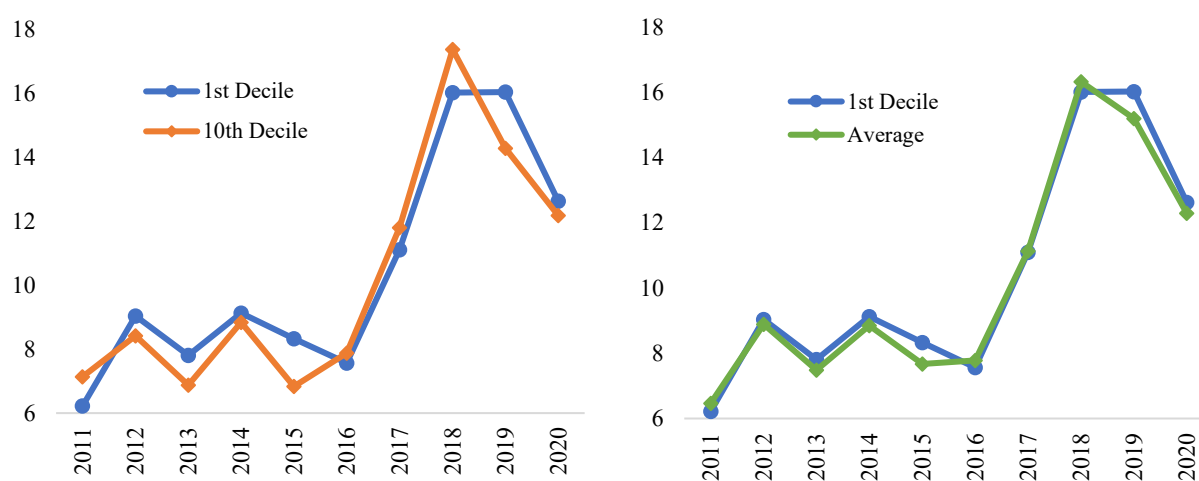
Source: World Bank calculations using data from TUIK

The large differences in the structure of expenditures make some households more exposed to high inflation episodes depending on the productivity shocks underlying the spike in prices. Assuming everything else constant, high food or housing inflation, for instance, is felt relatively more by poor and vulnerable households than the rest of the population, leading to regressive effects. In fact, prices of the CPI basket's subcomponents tracked by TUIK often follow different trajectories due to a host of external and domestic factors (for instance, international price shocks, exchange rate volatility, disruptions to international and domestic supply chains and taxes, among others) that affect different goods and services unevenly.

Figure 3 shows the level and evolution of the inflation experience for the first decile between 2011 and 2020 compared to the top decile (panel A) and the average inflation taking into account

the structure of the expenditures for each decile (panel B). In general, the differences between the three series are not large, but inflation is slightly higher for the bottom income decile. When compared to households in the 10th decile, the annual inflation rate experienced by poor households was higher in six out of the 10 years covered in the analysis. The years with the largest gaps are 2013, 2015 and 2019, whereas the opposite was true during the first phase of the 2018-19 crisis in 2018 when fast accelerating prices in transportation had a bigger burden on better-off households. The cumulative inflation in the 10-year period was 10.39% for the bottom decile and 10.16% for the top decile, a difference of 0.23 percentage points that is statistically significant at the 5% level. Contrasting the inflation rates of the bottom decile with respect to the average inflation rates or comparing the Bottom 40 vis-à-vis the Top 60 yield similar conclusions (Figure A.1 in the Annex).

Figure 3: Inflation for the 1st Decile, 10th Decile and the overall population (2011-2020)
 Inflation for 1st vs 10th Deciles (2011-2020) (Panel A)
 Inflation for 1st Decile vs Overall (2011-2020) (Panel B)

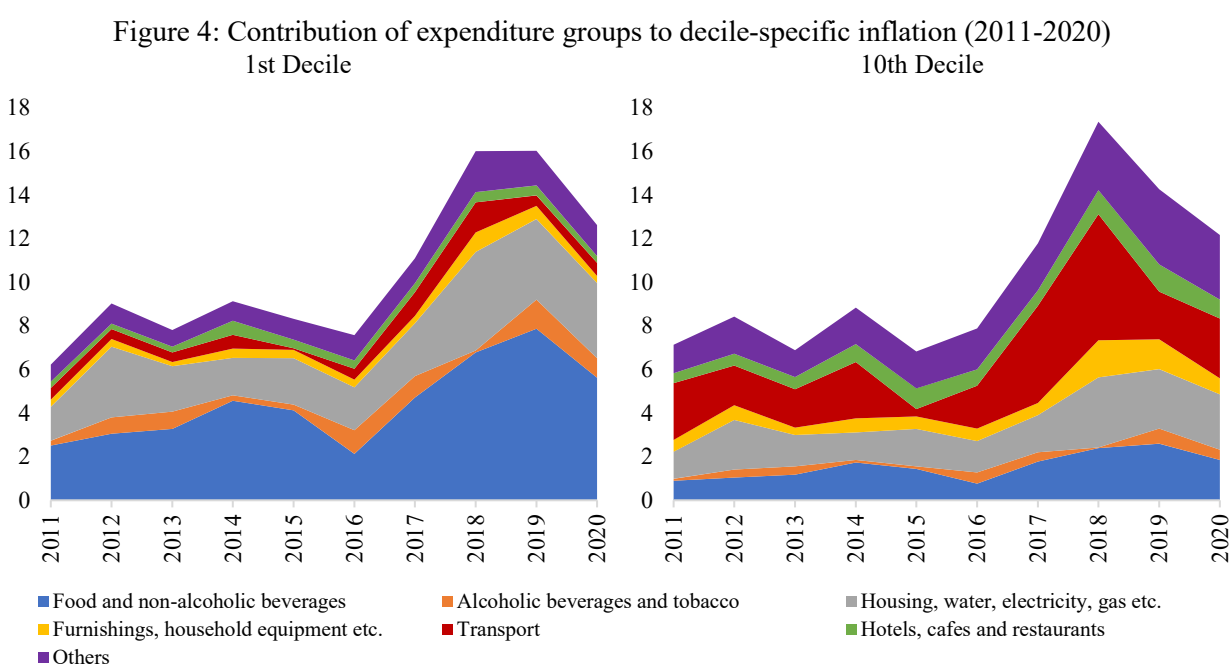


Source: World Bank calculations using data from TUIK

We also looked at the contribution of different expenditure categories to examine the sources of variation in the incidence of inflation across the population. Figure 4 shows a breakdown of the overall inflation experience of the 1st and 10th decile across the seven main groups of expenditures plus a category that combines the remaining items consumed (labeled as “others”). Considering the large weight of food in the total consumption of poor households, it does not come as a surprise to observe that inflation episodes with a heavy burden on this group of the population –such as those that took place in 2013, 2015 and 2019– are chiefly driven by substantial increases

in food and non-alcoholic beverages prices. The largest inflation gap between the bottom and top deciles occurred in 2015, where overall inflation averaged 7.7% but food inflation reached 10.9%. Prices for transportation good and services, increased only by 1.5%.

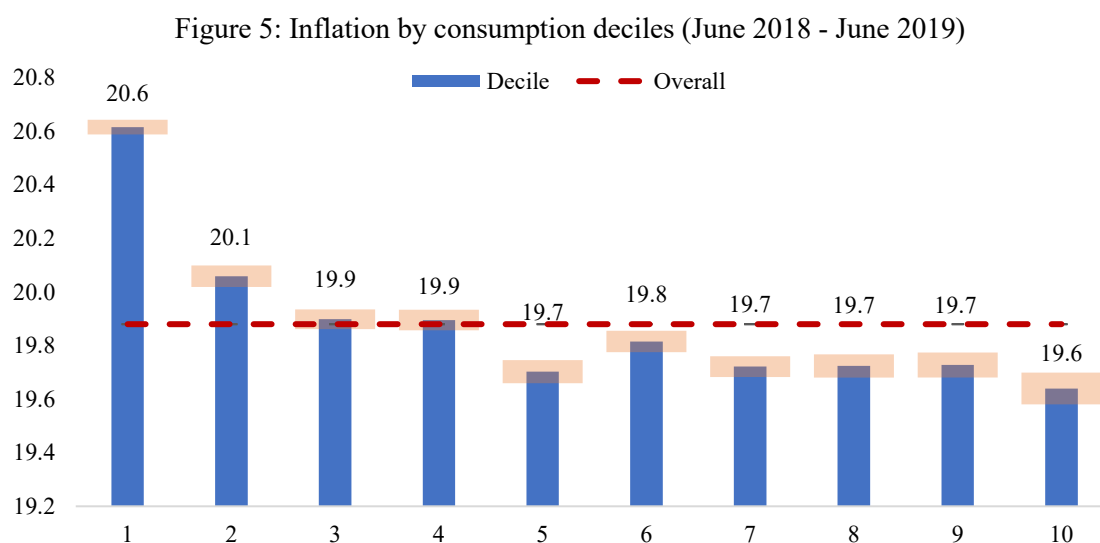
Table A.1 in the annex shows the contribution of each of the expenditure category to the overall inflation experienced by each of the income deciles for the three latest years with monthly price data available. In 2019, for instance, nearly 75% of the overall inflation borne by the first decile is explained exclusive by price pressures on food and housing expenditures. In contrast, the corresponding figure for the upper decile is 37%.



The incidence of inflation in the 2018 crisis shows the opposite pattern. Households from upper parts of the distribution experienced relatively higher inflation (17.4% for the top decile compared to 16% in the 1st decile) largely due to faster price increases in transportation (22%) than in food and non-alcoholic beverages (18%). In the period 2011-2020, increases in food prices explain 43% of the total inflation borne by poor families, a ratio that drops to 15% for the wealthiest households. In contrast, inflation of transportation expenditures comprise over a quarter (26%) of the total inflation recorded for the consumption bundles purchased by better-off households –as opposed to 6% for the 1st decile. These differences are also evident when the comparison is made between households from the Bottom 40 and those from the Top 60 (Figure A.2 in the Annex). Finally,

housing costs is another group of expenditures that are important to monitor when tracking the impacts of inflation on household welfare. In this case, however, they feature prominently in the expenditures of most households along the distribution, with budget shares ranging from 26% to 19% for the 1st and 10th deciles, respectively.

A further look into the year following the exchange rate crisis that started in the middle of 2018 and led to the highest inflation rate in the last decade offers additional insights about the inflation experience of the poor. As it can be seen in Figure 5, the overall 12-month moving average inflation for this period was 19.9%, with a slightly higher inflation for the 1st decile (20.6%) and somewhat lower for the top decile (19.6%). The fact that inflation was equally high for both income groups in the 2018-19 crisis is explained by the fast price acceleration of both food and non-alcoholic beverages (26.4%) and transportation goods and services (19.2%). The overall inflation subsided in 2020, decreasing to 12.3%, but it was again moderately higher for the bottom decile (12.6%) than for the top decile (12.2%) on account once again of faster food inflation.



Note: 12-month moving average for the period June/2018-June/2019. 95% confidence intervals shown in orange.
Source: World Bank calculations using data from TUIK.

5.2 Implications on the estimation of poverty and inequality

Starting in 2016, TUIK stopped reporting absolute poverty and instead began to measure it in a relative sense, namely the share of people with incomes below 50% of the national median income. For that reason, Turkey does not use an absolute poverty line to monitor the evolution of

poverty. In contrast, the World Bank tracks the evolution of poverty following an absolute poverty measurement approach. Two main elements are part of this exercise: the welfare indicator and the poverty line. Household welfare is measured using consumption per capita obtained annually from the HBS surveys, whereas the poverty threshold of reference for Turkey is the upper-middle-income poverty line of \$5.50 per capita per day expressed in 2011 PPP. The standard practice to convert this line into real Turkish lira values is to update it with the annual inflation rate derived from the overall national CPI. However, as evidenced above, the overall CPI likely underestimates the inflation experience of lower-income households, above all in cases where inflation is driven by fast growth of food prices. Indeed, this was the case in the rapid price hikes that occurred in 2013, 2015 and 2019.

In order to check the sensitivity of the “standard” poverty calculations to price adjustments to the poverty line that take into account the actual prices changes borne by the poor and vulnerable, we recalculated the real Turkish lira value of the \$5.50 (2011 PPP) poverty threshold in 2019 using the CPI for the 1st decile as opposed to the overall CPI. The result shows that 209,000 additional individuals would have fallen under the poverty line relative to the poverty incidence computed based on the “standard” price adjustment (8,229,895 people were in poverty with the standard approach). The magnitude of this increase in the poverty rate is 2.5% or 0.3 percentage points (rising from 10.2% to 10.5%). Similarly, calculations using decile-specific inflation for 2015 translate into 342,000 extra poor, namely an increase of 4.2% or 0.4 additional percentage points (reaching 11.1%, up from 10.7%).

These differences are not trivial. On average, the measurement gap is equivalent to between one-fourth and one-third of the average annual reduction in poverty achieved in a typical year of robust and broad-based economic growth in Turkey. In fact, we find that extending the “standard” poverty methodology using a measure that more closely reflect the inflation burden on low-income households yields a higher poverty rate in every single year analyzed for the period 2011-2020. Along the same lines, the values of the Gini coefficient, a standard measure of inequality, are slightly (0.6%) but consistently higher when estimated using the inflation experience of each decile (Figure 6). Other inequality measures often used in the literature, such as percentile ratios (90th/10th or 80th/20th) yield results that point in the same direction.

We also estimate the sensitivity of poverty to the incremental price increase experienced by the 1st decile relative to the overall inflation as measured by the CPI for the period 2011-2019. The results are summarized in Table 1. The values are high, ranging from 1.41 in 2012 to 3.28 in 2015, underscoring the high vulnerability of households to the negative effects of fast price increases on purchasing power, particularly for families right above the poverty line when inflation is pushed by price hikes of food, non-alcoholic beverages, housing, education and health. The average value of this sensitiveness check for the period analyzed is 1.98. In other words, the poverty rate increases nearly twice as fast as the price increases above the CPI that are experienced by the bottom decile and are not offset by income (labor and non-labor) growth.

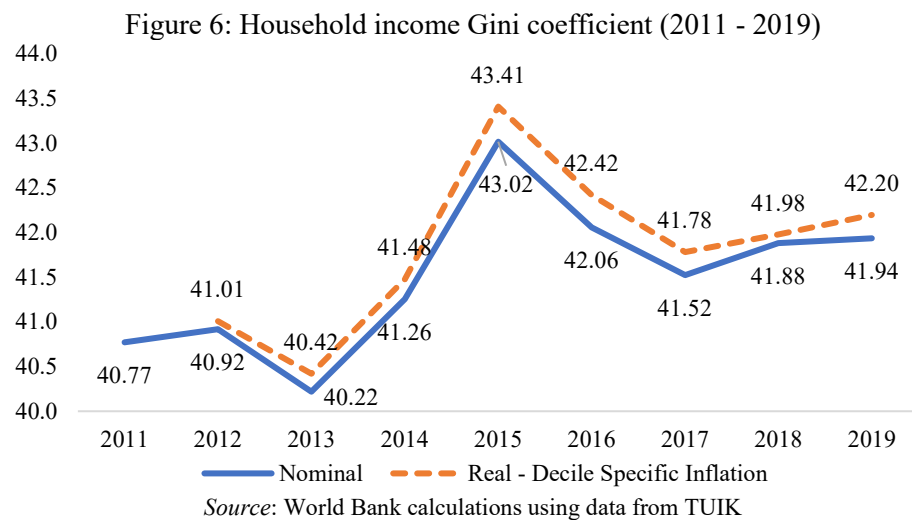


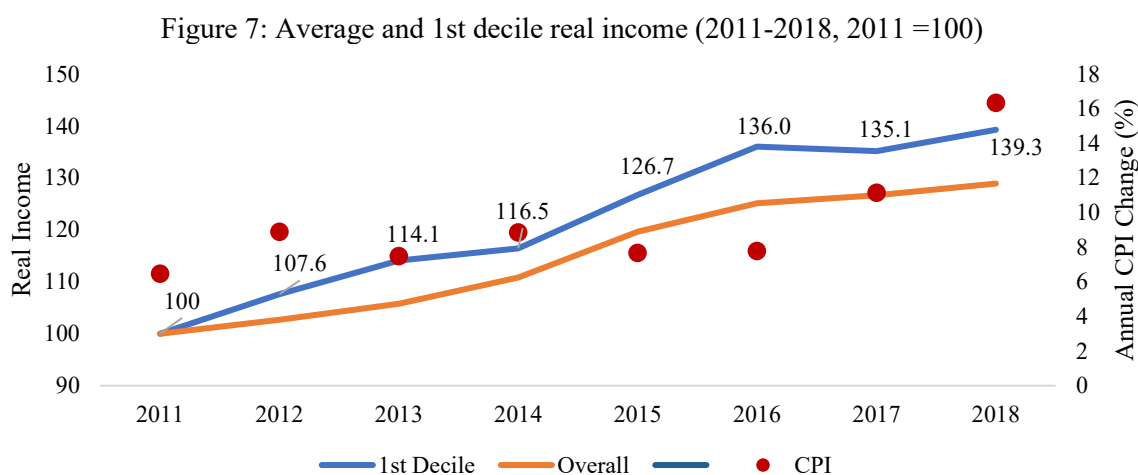
Table 1: Poverty rate and sensitivity of poverty to using the price index for the 1st decile

	\$5.50 Poverty Line (2011 PPP) and Official CPI	Poverty Rate with \$5.50 Line	Poverty Line - 1st-decile CPI	Poverty Rate - 1st-decile price index	Sensitivity of the poverty rate	Population	Additional Individuals in poverty with 1st- decile CPI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2011	189.8	13.0	189.8	13.0	-		
2012	206.7	12.0	206.9	12.0	1.407	73,603,548	14,721
2013	222.2	10.8	223.1	10.8	1.791	74,456,551	58,076
2014	241.9	9.9	243.5	10.1	2.537	75,693,281	122,623
2015	260.4	10.7	263.7	11.1	3.282	76,368,972	342,133
2016	280.7	9.4	283.7	9.6	1.940	77,109,456	150,363
2017	311.9	8.6	315.2	8.7	1.491	78,862,192	106,464
2018	362.9	8.5	365.7	8.6	1.770	79,761,944	91,726
2019	418	10.2	424.3	10.5	1.689	80,708,979	209,036

Note: Sensitivity of poverty to the incremental price increase experienced by the 1st decile relative to the overall inflation as measured by the CPI calculated as the ratio between the percentage change in poverty [(4)-(2)] and the percentage change in the poverty line [(3)-(1)]. Source: World Bank calculations using data from TUIK.

5.3 Real incomes

The SILC survey collects detailed household data on disposable income. Figure 7 and Figure 8 display the evolution of real incomes between 2011 and 2018 for the 1st and 10th deciles as well as the average income and the overall CPI.¹³ All the numbers are converted into real values using decile-specific inflation rates and normalized to 100 using baseline values as a reference. The graphs confirm the inclusiveness of economic growth in Turkey during the 2010s. The incomes of households from the bottom of the distribution expanded faster than the incomes of the wealthiest households and also faster than the average income. However, the pace of real income growth slowed down as Turkey entered a new period of high inflation in 2017. Between 2011 and 2016, the annualized real growth rate of 1st decile income was 6.3%. Between 2016 and 2018, the corresponding figure dropped to 1.2%. Nominal income figures hide the slowdown since nominal-based growth was similar across the two period (15.2% for the years 2011-2016 and 14.9% for the period 2016-2018). In other words, incomes have been increasing at a similar rate, but this has not translated into stronger purchasing power for the 1st decile after 2016.



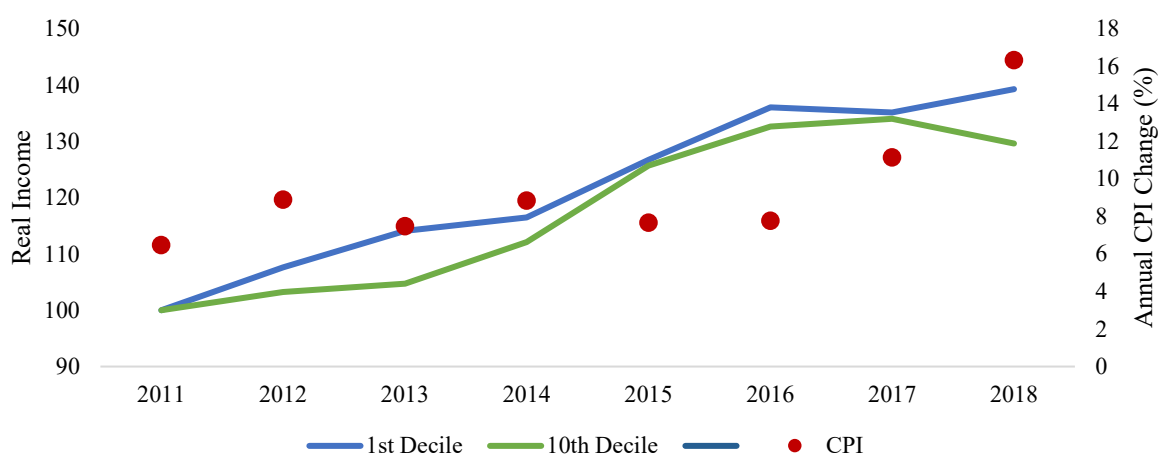
Source: World Bank calculations using data from TUIK and the SILC

Given the importance of labor income for the bottom half of the distribution –represents 60% of total income in 2019, we look at cash earnings among full-time only workers. Decile specific inflation adjustments are again used to account for distributional differences in changes of cost of living across income groups. Figure 9 displays changes in the real labor income of the

¹³ As mentioned in the methodology section, the deciles used in the income analysis are constructed using income information from the SILC which are different from the expenditure based deciles used in the previous sections. However, the distributional inflation rates are still calculated using the HBS.

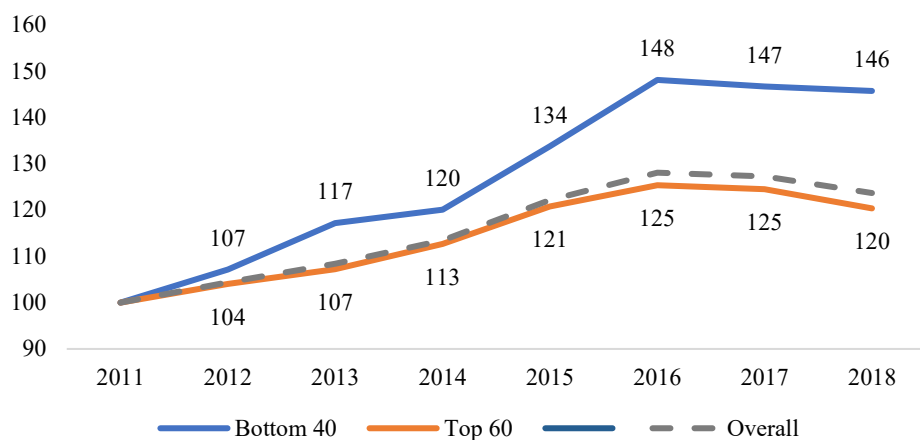
Bottom 40, the Top 60 and the overall population between 2011 and 2018.¹⁴ The trend mirrors the evolution of the total income, with strong annual real growth in the first half of the decade for the Bottom 40 (8.2%) and the Top 60 (4.6%). This strong growth came to a halt between 2016 and 2018, a period that marked the exchange rate volatility crisis and the rapid increase in inflation. Real incomes posted negative growth rates, on average -0.8% for the Bottom 40 and -2% for the rest of the population. The labor income results show that the drop in overall income growth for the bottom of the distribution was driven by stagnant employment related to real income levels after 2016.

Figure 8: Real incomes of 1st and 10th decile (2011-2018, 2011 =100)



Source: World Bank calculations using data from TUIK

Figure 9: Real labor income of the Bottom 40 and Top 60 (2011-2018, 2011 =100)



Source: World Bank calculations using data from TUIK

¹⁴ The decision to use the Bottom 40 and Top 60 as opposed to the 1st and 10th deciles has to do with a relatively large number of workers from the bottom decile with zero earnings. Since the population of interest for this part (full-time workers) is not the full population, the Bottom 40 and Top 60 do not match exactly the groups defined using total per capita consumption or total per capita income.

The historical trends indicate that the fraction of workers remunerated at the minimum wage level is significant. Between 2011 and 2020, for example, the share of formal employees earning the minimum wage fluctuated between 35-44 percent.¹⁵ The overwhelming majority of them belong to the bottom half of the distribution. Table 2 presents nominal values of the minimum wage and three different calculations to express them in real terms: 1) overall CPI, 2) 1st decile inflation rate and 3) Bottom 40 inflation rate. The three definitions yield similar values, although the level of the minimum wage is 2% lower under the second definition on account of the higher inflation borne by households from the lowest decile. In the years with price stability (2011-2016), the nominal increase in the minimum wage outpaced price inflation. Until 2015, the average annual nominal wage increase was around 10%, namely a real increase of 2%-3%. In 2016, the government enacted a major policy change to boost nominal minimum wage levels by 37%, resulting in a real wage increase of 27%. Yet, from 2017 onwards, fast and accelerating inflation (CPI and Bottom 40) outpaced nominal minimum wage growth.

Table 2: Nominal and real minimum wage value using based on difference price adjustments

	Minimum Wage (Nominal)	Real Minimum Wage (Overall Inflation)	Real Minimum Wage (1st Decile Inflation)	Real Minimum Wage (Bottom 40 Inflation)
2011	630	630	630	630
2012	701	644	643	643
2013	773	660	658	658
2014	846	664	660	661
2015	949	692	683	686
2016	1301	880	870	873
2017	1404	854	846	848
2018	1603	838	832	835
2019	2021	918	904	910
2020	2325	940	923	931

Source: World Bank calculations using data from TUIK and Ministry of Family, Labour and Social Services¹⁶

6. Conclusions

This paper documents the differences in spending across households and the distributional impacts of heterogeneity in inflation rates at the household level. This is often an aspect overlooked

¹⁵ Data from Social Security Institution. The share of formal workers with minimum wage among all formal workers was 44.0 in 2011; 41.6 in 2012; 38.3 in 2013; 38.1 in 2014; 38.6 in 2015; 40.9 in 2016; 35.0 in 2017; 36.2 in 2018; 36.8 in 2019 and 42.0 in 2020.

¹⁶ Numbers from the Ministry of Family and Social Services and author calculations using HBS.

in the economic analysis of inflation, which tends to be centered around the macroeconomic causes and consequences of fast price increases. Likewise, the varying incidence of inflation is frequently not captured in household welfare analysis that is carried out using “headline” rates of inflation to proxy for the changes in prices faced by the poor.

We estimate decile inflation rates for Turkey –a country battling high inflation in recent years– for the period 2011-2020 using consumer expenditure survey data and item-group specific price data from the official Turkish Statistical Institute. The results show that inflation is typically higher for vulnerable populations, especially when inflation is propelled by fast increases in food prices and housing costs, the most prevalent items in the consumption basket of a typical poor household. Differences in cumulative inflation between 2001 and 2020 show that the consumption bundle of the poorest decile has become 5 percentage points more expensive than the richest decile’s basket, on average a yearly gap of 0.23 percentage point. However, this estimate is most likely a lower bound of the real gap owing to the fact that lower-income households tend to pay higher prices within the same categories of goods –for instance, due to liquidity constraints that prevent them from buying larger quantities and taking advantage of bulk discounts, an issue that we do not investigate in this paper but that is documented in the literature (for instance, Kaplan and Schulhofer-Wohl 2017; Orhun and Palazzolo 2018).

Measuring the inflation realizations of vulnerable groups provides valuable information for policy for a number of reasons. First of all, monetary policy is often guided by macro models built around the welfare maximization of a representative household that is assumed to face average inflation. Therefore, the optimal monetary policy resulting from solving such optimization problem may result in larger welfare losses for households that have to deal with higher inflation. Moreover, also from a macro perspective, heterogeneity in inflation experience may anchor higher inflation expectations across some groups of the population, undermining policy efforts to curb the overall inflation rate (Johannsen 2014).

There are also important policy insights on the micro side. Since low-income households tend to spend a large share of their incomes on food, inflation episodes driven by substantial changes in food prices make these households more vulnerable. Understanding the factors contributing to fast price increases well in advance, for instance through early warning systems

that flag supply or demand shocks that may translate into drastic changes in food prices, can help design and implement ex-ante adaptive mitigation responses to protect the well-being of vulnerable households, particularly net food buyers. Social safety nets, a natural policy option to alleviate the unequal effects of inflation and other shocks, are also susceptible to inflation heterogeneity. In many countries, benefit levels are indexed to overall consumer prices. This means that the value of public transfers falls in real terms at times when the benefits are needed the most to offset the uneven impact of inflation on the poor. A similar logic applies to the incidence of indexing pensions or minimum wages to core inflation measures.

Finally, our results show that heterogeneity in realized inflation has implications for the measurement of poverty and income inequality and the formulation of policies to address them. Broadly speaking, poverty and inequality in real incomes are expected to increase when inflation for the bottom deciles is higher than the overall CPI or the inflation experience of individuals from the upper parts of the distribution. The evidence for Turkey in the year following the exchange rate crisis that started in the middle of 2018 and pushed the inflation rate to the highest level in the last decade illustrates this point. Using the inflation realization of the 1st decile (20.6%) to more accurately account for the changes in prices –as opposed to the CPI (19.9%)– results in 209,000 extra individuals living below the poverty line in 2019. In fact, not adjusting the World Bank’s upper-middle-income -poverty line (\$5.50 2011 PPP) to take into consideration the inflation experience of the bottom deciles underestimates the incidence of poverty in Turkey in every single year between 2011 and 2020. As evidenced in this paper, accurate estimation of the actual purchasing capacity of households matters not only for the identification of the poor, but also for the effective and efficient design of poverty alleviation policies.

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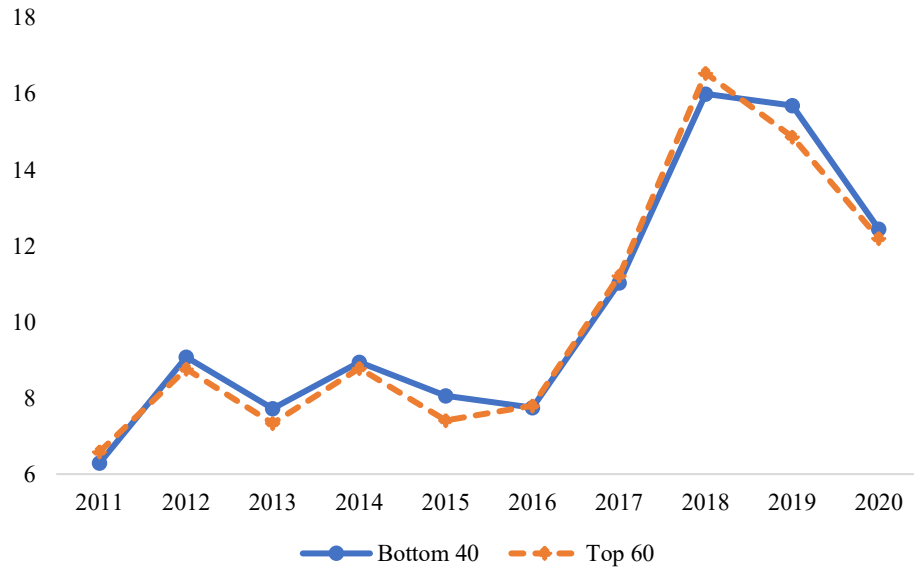
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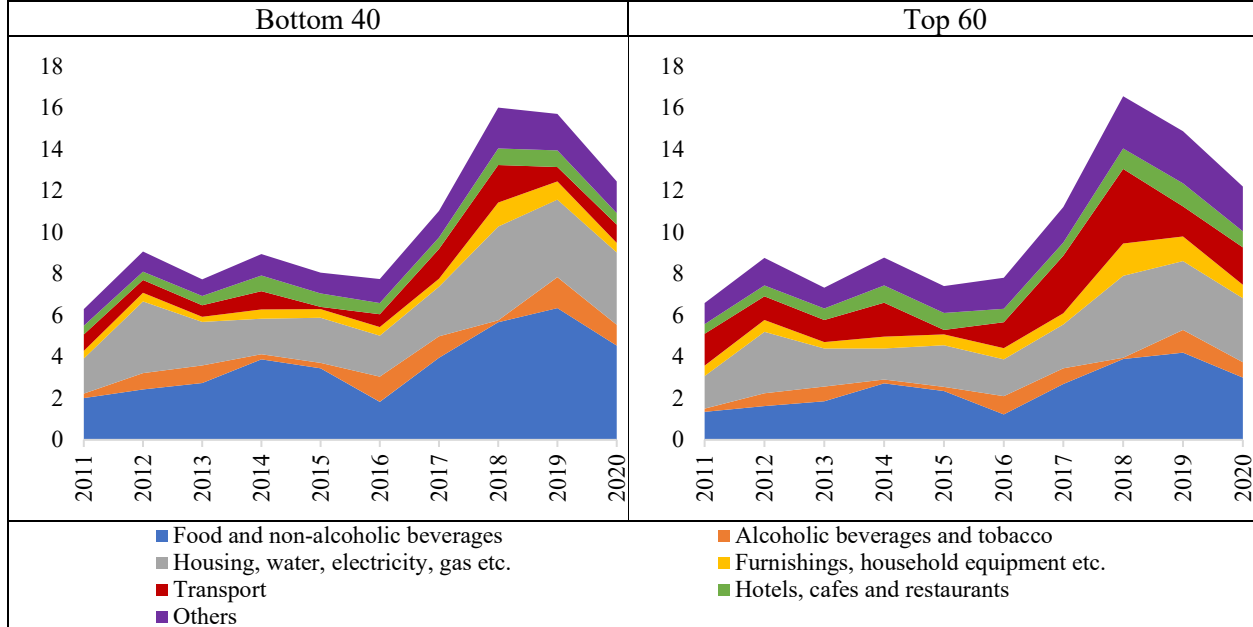
Annex

Figure A.1: Inflation for the Bottom 40 and Top 60 (2011-2020)



Source: World Bank calculations using data from TUIK

Figure A.2: Contribution to inflation by expenditure group for the Bottom 40 and Top 60 (2011-2020)



Source: World Bank calculations using data from TUIK

Table A.1: Contribution to inflation by expenditure group for Consumption Deciles (2018-2020)

Decile	Food and non-alcoholic beverages	Alcoholic beverages and tobacco	Housing, water, electricity, gas etc.	Furnishings, household equipment etc.	Transport	Hotels, cafes and restaurants	Others
2018							
1	6.78	0.09	4.52	0.89	1.39	0.47	1.88
2	5.69	0.09	4.72	1.16	1.66	0.81	1.86
3	5.23	0.09	4.53	1.22	1.97	0.91	2.05
4	4.98	0.08	4.31	1.33	2.23	0.99	2.09
5	4.62	0.08	4.26	1.41	2.63	0.94	2.21
6	4.51	0.08	4.22	1.46	2.70	0.98	2.28
7	4.24	0.07	4.25	1.51	2.93	0.94	2.37
8	4.01	0.07	3.95	1.58	3.52	0.97	2.40
9	3.61	0.05	3.71	1.67	4.03	0.99	2.68
10	2.39	0.04	3.21	1.70	5.79	1.11	3.13
2019							
Overall	4.61	0.07	4.17	1.39	2.88	0.91	2.30
1	7.87	1.33	3.69	0.61	0.48	0.46	1.59
2	6.31	1.64	3.81	0.81	0.70	0.78	1.66
3	5.66	1.50	3.89	0.94	0.77	0.98	1.80
4	5.55	1.48	3.56	1.13	0.85	0.95	1.99
5	5.02	1.40	3.67	1.01	1.02	1.04	2.04
6	5.01	1.18	3.62	1.02	1.12	1.06	2.15
7	4.54	1.26	3.44	1.18	1.29	1.12	2.20
8	4.31	1.07	3.39	1.23	1.38	1.05	2.46
9	3.73	0.97	3.05	1.30	1.67	1.16	2.79
10	2.59	0.70	2.73	1.36	2.19	1.24	3.46
2020							
Overall	5.06	1.25	3.49	1.06	1.15	0.98	2.22
1	5.62	0.90	3.44	0.33	0.60	0.32	1.42
2	4.50	1.11	3.55	0.43	0.88	0.54	1.43
3	4.04	1.01	3.62	0.50	0.97	0.68	1.54
4	3.96	1.00	3.32	0.61	1.06	0.66	1.73
5	3.58	0.95	3.42	0.54	1.28	0.72	1.75
6	3.58	0.80	3.37	0.55	1.40	0.74	1.85
7	3.24	0.85	3.21	0.63	1.61	0.78	1.90
8	3.08	0.72	3.16	0.66	1.72	0.73	2.10
9	2.66	0.66	2.84	0.70	2.09	0.81	2.39
10	1.85	0.47	2.54	0.73	2.74	0.86	2.97
Overall	3.61	0.85	3.24	0.57	1.43	0.68	1.91

Source: World Bank calculations using data from TUIK

Table A.2. HBS-based inflation vs Official TUIK's inflation rate (12-month moving average)

	Authors' Calculations (HBS)	TUIK
2011	6.44	6.47
2012	9.28	8.89
2013	7.58	7.49
2014	8.58	8.85
2015	7.86	7.67
2016	7.61	7.78
2017	10.97	11.14
2018	16.22	16.33
2019	15.51	15.2
2020	12.46	12.3

Source: World Bank calculations using data from TUIK

Table A.3. Adjusted inflation (12-month moving average, scaled by the ratio of TUIK and HBS inflation)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Decile 1	6.22	9.03	7.81	9.13	8.33	7.57	11.10	16.02	16.03	12.63
Decile 2	6.29	9.12	7.75	9.00	8.10	7.77	11.01	15.98	15.71	12.44
Decile 3	6.31	9.11	7.70	8.85	7.99	7.83	11.00	15.98	15.54	12.37
Decile 4	6.35	9.04	7.64	8.81	7.81	7.83	10.99	16.03	15.51	12.33
Decile 5	6.36	9.00	7.59	8.75	7.79	7.78	10.89	16.14	15.19	12.24
Decile 6	6.40	8.90	7.58	8.74	7.65	7.79	11.10	16.23	15.16	12.28
Decile 7	6.45	8.87	7.41	8.84	7.60	7.79	10.98	16.30	15.03	12.22
Decile 8	6.52	8.78	7.33	8.82	7.37	7.78	11.13	16.50	14.87	12.16
Decile 9	6.65	8.62	7.21	8.72	7.22	7.78	11.39	16.76	14.67	12.14
Decile 10	7.14	8.42	6.88	8.84	6.83	7.88	11.79	17.36	14.27	12.17
Bottom40	6.29	9.08	7.72	8.95	8.06	7.75	11.03	16.00	15.70	12.44
Top60	6.59	8.77	7.33	8.79	7.41	7.80	11.21	16.55	14.87	12.20
Overall	6.47	8.89	7.49	8.85	7.67	7.78	11.14	16.33	15.20	12.30

Source: World Bank calculations using data from TUIK

Figure A.3. Real income of the 1st decile and average real income (HBS, expenditure deciles, 2011-19)

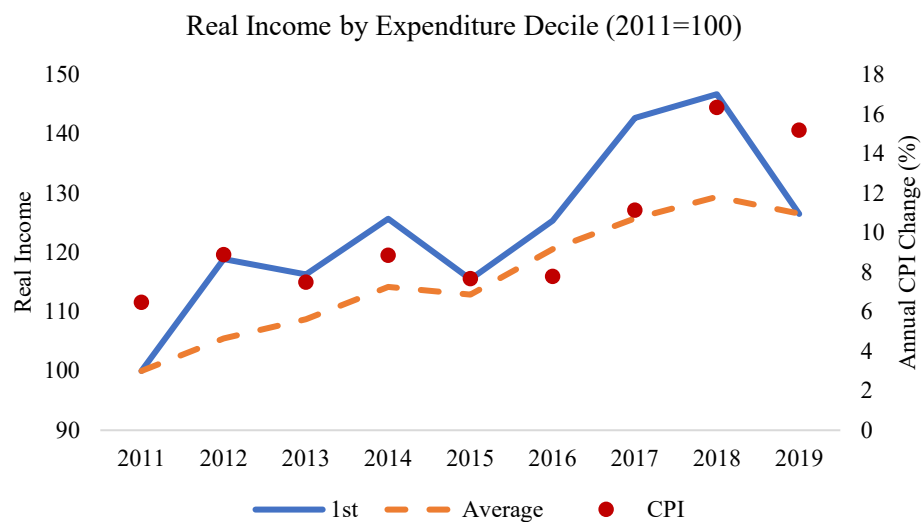


Figure A.4. Real income of the 1st and 10th deciles (HBS, expenditure deciles, 2011-19)

