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DISCUSSION PAPER SERIES

IZA DP No. 16619

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# ABSTRACT

## Modelling the Distributional Effects of the Cost-of-Living Crisis in Turkey and the South Caucasus: A Microsimulation Analysis

This study addresses the different distributional and welfare implications of price volatility amid the ongoing cost-of-living crisis, focusing on both Turkey and the South Caucasus region, which have different welfare regimes and patterns of price changes. This paper explores the impact of inflation and uses compensating variations and equivalized incomes to measure shifts in welfare in a cross-country comparative context. The effects of inflation are closely related to specific price increases for various goods and the distribution of household budgets. In particular, lower-income countries and individuals allocate a higher share of their budgets to essential goods such as food, heating oil, and electricity. Consequently, the pronounced price escalation in these essential goods has led to a stronger inflationary effect in the less affluent countries. Consistent with media narrative, we find that the distributional consequences of these price changes are more pronounced than originally thought. Nevertheless, there are notable differences across countries in the level of inflation, its composition, and the relative increase within the income spectrum. It is worth noting that comparable levels of inflation regressivity are due to different interactions between the magnitude of price inflation and its disproportionate impact on the income distribution. Our analysis quantifies the offsetting fluctuations associated with inflation and reveals a significant behavioural component, largely due to the fact that those exposed to significant price fluctuations predominantly purchase necessities. An important aspect to consider in the potential impact on households is the savings rate. Households with lower savings are disproportionately affected by these shifts in spending behaviour.

**JEL Classification:** E21, D12, D31, I30
**Keywords:** inflation, distributional effect, welfare effect

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**Modelling the Distributional Effects of the Cost-of-Living Crisis in Turkey and the South Caucasus: A Microsimulation Analysis**

## 1. Introduction

The pandemic and the war in Ukraine have led to a sharp increase in prices throughout the world. Given the nature of the price increases has seen a concentration in price growth of necessities such as energy and food there are particular concerns about the distributional impact of these price changes.

More specifically, in surveys on the macroeconomic outlook, 93 percent of respondents in the European Union and more than 80 percent of people in various countries in Central Asia cited the cost-of-living as a major concern (World Bank, 2023). Of all countries in Europe and neighbouring countries, Turkey has experienced the largest increase in prices. This paper explores the net differential impact of price changes on the income distribution and welfare in Turkey. In order to gauge the scale of the impact, we undertake a comparative analysis with neighbouring countries in the South Caucasus.

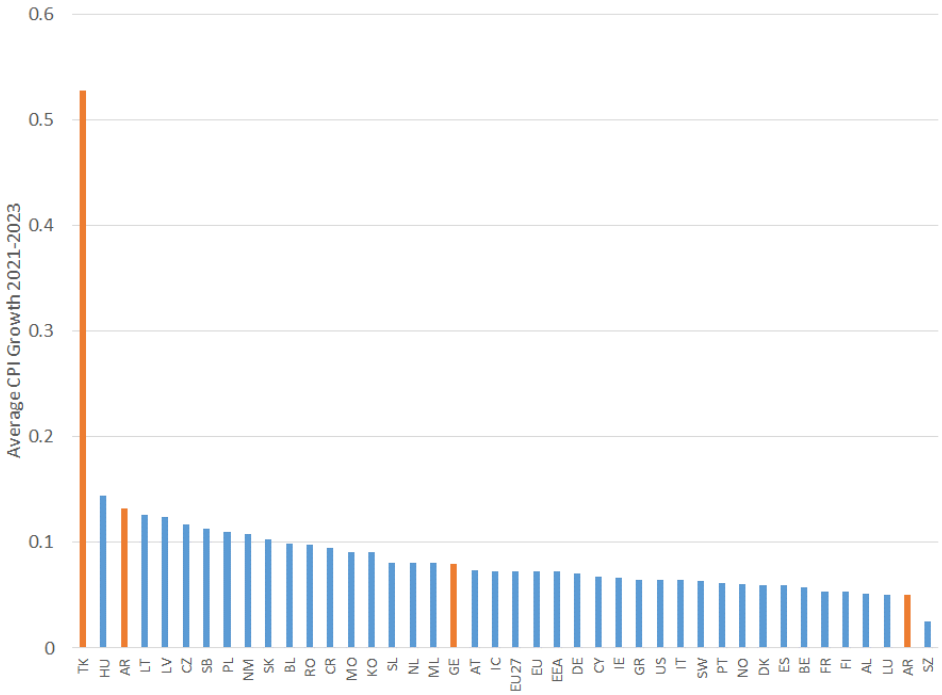
Official measures of the cost-of-living have evolved since the early 20th century (Konus, 1939; Arrow, 1958; Prais, 1959; Pollak, 1980; Deaton, 1998), while the use of the consumer price index to measure the cost-of-living has been criticised for its inability to account for the heterogeneous needs of economic agents (Allen, 1958; Boskin and Hurd, 1986; Amble and Stewart, 1994; Crawford and Smith, 2002; Hobjin and Lagakos, 2005). Studies focusing on group-specific price indexes have analysed the unequal effects of inflation along the distribution of household incomes (Brittain, 1960; Tipping, 1970; Fry and Pashardes, 1985; Crawford and Smith, 2002; Doorley, 2022). However, this approach has been criticised for failing to account for substitution behaviour (Aizorbe and Jackman, 1993; Murphy and Garvey, 2004; Loughrey and O'Donoghue, 2012). Sologon et al. (2022) evaluated the distributional and welfare impact of the current cost-of-living across European countries and incorporated consumption behavioural responses to price changes. The behavioural responses were relatively minor, underscoring that households have limited flexibility in adjusting their consumption, particularly when the most significant price changes affect essential goods.

Studies on the impact of the cost-of-living crisis have focused on developed countries, while there is relatively little literature for developing countries[2]. Timmins (2005) estimated spatial differences in the cost-of-living conditions and household location decisions in Brazil, and Bittencourt (2007) also found a negative effect of inflation on income distribution in Brazil. Zhang (2011) analysed the distributional impact of energy price reform in Turkey and estimated a standard demand model separately for different income groups. Ivanic et al. (2012) estimated the first-order effects of the 2006-2008 food price crisis for a large number of developing countries using microsimulation techniques. Rodriguez and Atamanov (2021) explored the first-order impact of the cost-of-living changes due to the Covid-19 epidemic on household wealth and poverty in the Islamic Republic of Iran. Canavire-Bacarreza et al. (2023) assessed the distributional effects of fuel price increases on poverty and income inequality in Paraguay.

[2] The categorization of countries is based on the World Bank's classification by per capita income. Hereinafter, the countries with high income are referred as developed countries, while the countries with upper- and lower-middle income are referred as developing countries.

In light of Turkey's exceptional surge in price growth and its strategic geopolitical position, this paper aims to examine the distributional consequences of inflation within the country. Turkey, which has repeatedly faced high inflation rates and cost-of-living crises, in the past, the average annual inflation rate in 2022 was over 50%, which can be described as a cost-of-living crisis. This is in stark contrast to the European Union's average of 7.3%. Neighbouring countries Armenia, Georgia, and Azerbaijan have experienced average annual inflation rates of 13.2%, 7.9%, and 5%, respectively, as illustrated in Figure 1.

**Figure 1. Annualised price inflation in Turkey, the South Caucasus and European Union neighbours**




Source: Eurostat, Armenia, Azerbaijan and Georgia Statistical Offices

Since the mid-1990s, Turkey has consistently recorded the highest annualized inflation rate among EU countries and neighboring countries in each five-year period, with the exception of Iceland, which marginally surpassed Turkey during the 2005-2009 financial crisis. While Turkey experienced relatively moderate price growth, averaging around 10% between 2005 and 2020, the late 1990s saw even higher inflation rates than those currently observed. The early 2000s witnessed an annualized rate exceeding 30%. Turkey's inflation has remained elevated since the oil crisis of the 1970s, consistently outpacing the average rates. In a literature review, Kibritcioglu (2002) attributed much of this persistent inflation to factors such as public sector deficits, fueled by infrastructure and military spending, which crowd out domestic capital. Additional drivers include political instability and ingrained expectations of high inflation within the economy. Contrastingly, the countries of the South Caucasus—namely Armenia, Georgia, and Azerbaijan—have demonstrated more effective control over inflation since gaining independence from the Soviet Union, as noted by Aliyev and Gasimov (2014).

**Table 1. Average annualised consumer prices index (1996-2023)**

| | 1996-1999 | 2000-2004 | 2005-2009 | 2010-2014 | 2015-2020 | 2021-2023 |
|---|---|---|---|---|---|---|
| Turkey | 0.737 | 0.308 | 0.083 | 0.073 | 0.124 | 0.528 |
| Armenia | 0.056 | 0.031 | 0.039 | 0.038 | 0.007 | 0.056 |
| Azerbaijan | | | 0.118 | 0.037 | 0.062 | 0.058 |
| Georgia | | | 0.017 | 0.018 | 0.015 | 0.053 |
| EU | 0.016 | 0.021 | 0.023 | 0.019 | 0.013 | 0.073 |
| Turkey Rank | 1 | 1 | 2 | 1 | 1 | 1 |

Source: Eurostat, IMF

The study focuses on four developing countries, namely Turkey, Armenia, Azerbaijan, and Georgia. We envisage a threefold contribution.

First, rather than focusing on the change in the standard of living of an average individual, we include in our estimates price-related welfare losses (gains) along the entire distribution of household income. Muellbauer (1974) evaluated the distributional consequences of inflation, taking into account substitution behaviour, by estimating a linear expenditure system of demand equations and the implicit indices of the true cost of living for different levels of expenditure in Britain. Following this line of research, Creedy and van de Ven (1997), Loughrey and O'Donoghue (2012) and Sologon et al. (2022) have assessed the distributional effects of inflation in Australia and a selection of EU countries. This approach allows us to assess the impact of price changes on household income distribution while taking into account the ability of households to offset some of their welfare losses through substitution behaviour.

Secondly, the rate of inflation for the years 2020-2022 in Turkey and the South Caucasus varies across different categories of goods and services. Additionally, consumption patterns diverge among income groups within these countries. As of October 2022, Turkey experienced an annual inflation rate of 85.51%, marking the highest level in a quarter-century. This inflationary trajectory in Turkey can be described as an inverted U-shape, influenced by a strong base effect as well as global fluctuations in food and energy prices. In contrast, by the end of 2022, Armenia recorded an inflation rate of 8.64%, Azerbaijan had 13.85%, and Georgia had 11.90%. This research enriches existing literature by examining the distributional consequences of rising living costs due to inflation across countries with varying consumption habits and welfare systems. Our study builds upon the seminal work of Sologon et al. (2022), which focused on European countries, by extending the analysis to developing countries where empirical evidence is comparatively limited.

Third, following the methodological extension in Sologon et al. (2022) based on the taxation literature, we assess not only the distributional consequences of inflation for different types of individuals along the distribution, but also the progressive or regressive effects of inflation overall and quantify which commodity items cause these effects in each country. Hagemann (1982) found that the cost-of-living for households increases when the CPI does not fully reflect inflation if wages and tax brackets are not adjusted accordingly, and no social protection to cushion households.

The paper has the following outline. Section 2 describes the methodology and addresses the data used on price changes for various consumption patterns. Section 3 assesses the distributional and welfare consequences of inflation, followed by concluding remarks in Section 4.

## 2. Methodology and Data

The purpose of this paper is to model the impact of price inflation and to simulate the impact on the distribution of households within the countries of interest in this paper in Turkey and the South Caucasus. In particular given the impact of price changes on consumption patterns, we wish to explore some behaviour adjusted inequality measures.

In developing this analysis, we use the distributional-microsimulation framework developed by Sologon et al. (2022) to evaluate the distributional and welfare impact of inflation and extended in the PRICES framework to incorporate environmental taxes (O'Donoghue et al., 2023). This modelling framework simulates price and consumption-based policies including indirect taxes, price inflation (consumer price and producer price) and environmental taxation. In this paper, we utilise a subset of the analytical capacity looking at consumer price inflation.

***Welfare effects***

The framework incorporates a Linear Expenditure System (LES) demand system building upon the methodology described in (Creedy, 2000) to model the behavioural response to price changes and to provide behavioural elasticity adjusted distributional measures.

The expenditure function, $E(p, U)$ specifies the minimum expenditure required to achieve a given utility level, $U$, in the context of a given price vector, represented as $p = (p_1, \dots, p_n)$. The Linear Expenditure System (LES) is characterized by additive utility functions:

$$U = \sum_{i=1}^{n} (x_i - \gamma_i)^{\phi_i} \tag{1}$$

where $x_i$ denotes the consumption of each good, $\gamma_i$ represents the subsistence or committed consumption level for each good, and $\phi_i$ represents the marginal budget shares. We begin the process of utility maximization under the budget constraint $y = \sum p_i x_i$. This optimization leads to the linear expenditure functions for each good (or group of goods), denoted by $i$:

$$p_i x_i = p_i \gamma_i + \phi_i \left( y_h - \sum\nolimits_j p_j \gamma_j \right) \tag{2}$$

From this we derive budget elasticities, $e_i$ which provide us with $\phi_i$, an essential component of the utility function:

$$e_i = \frac{\phi_i y}{p_i x_i} => \phi_i = e_i \, w_i \tag{3}$$

where $w_i$ stands for the budget share assigned to commodity group $i$, $0 \leq \phi_i < 1, \sum_i \phi_i = 1$.

Differentiating and adjusting we produce own-price elasticities, $e_{ii}$ , which provide us with the required values for $\gamma_i$, a crucial element of the utility function:

$$e_{ii} = \frac{\gamma_i (1 - \phi_i)}{x_i} - 1 => \gamma_i = \frac{(e_{ii} + 1) x_i}{(1 - \phi_i)} \tag{4}$$

To determine the values of $\phi_i$ and $\gamma_i$, we first need to estimate the budget elasticities, $e_i$, and the own-price elasticities, $e_{ii}$, which we will discuss in more detail in the following sections.

In the first stage, we calculate budget elasticities, $e_i$, which provide information on how the distribution of budget shares across expenditure groups, $w_i$, varies with income. These budget elasticities are estimated based on the methodology described in Creedy (1998). We estimate the parameters of the linear expenditure system (LES) for each commodity group $i$ using Engel functions:

$$w_i^h = \alpha_i + \beta_i ln y^h + \varphi_i (ln y^h)^2 + \delta_i \mathrm{X^h} \tag{5}$$

where $w_i^h$ represents the budget share allocated to commodity group $i$ within household $h$, relative to the total consumption of household $y^h$. The variable $X$ includes a set of individual and household characteristics of household $h$. In our analysis, we consider a total of 19 different commodity groups $i$, ranging from $i = 1, \dots, 19$. To estimate the parameters of the Engel functions shown in Equation (5), we use a pooled ordinary least squares (OLS) approach at the household level.

Using the parameters, we estimated for each commodity group (where $i$ ranges from 1 to 19) in Equation (5) and the corresponding budget shares for each commodity group, we calculate the budget elasticities, $e_i$. The formula for deriving these budget elasticities is as follows:

$$e_i = 1 + \frac{dw_i}{dy}\frac{lny}{w_i} = 1 + \frac{\beta_i + 2\varphi_i lny}{w_i} \qquad \text{if } \varphi_i \neq 0 \tag{6}$$

We evaluate the budget elasticities, $e_i$, at population sub-group average incomes $\overline{lny}^{pg}$ and budget shares $\overline{w_i}^{pg}$:

$$e_i^{pg} = 1 + \frac{\beta_i + 2\varphi_i \overline{\ln y}^{pg}}{\overline{w_i}^{pg}} \quad \text{if } \varphi_i \neq 0 \tag{7}$$

$$e_i^{pg} = 1 + \frac{\beta_i}{\overline{w_i}^{pg}} \quad \text{if } \varphi_i = 0 \tag{8}$$

Once we have calculated the budget elasticities, $e_i$, we can proceed to calculate $\phi_i$ according to Equation (3), using the population group-specific $\overline{w_i}$. This calculation yields a matrix of estimates for a set of 10x19 values:

$$\phi_i^{pg} = e_i^{pg} * \overline{w_i}^{pg} \tag{9}$$

To calculate $\gamma_i$ according to Equation (4), we need not only $\phi_i$ but also the own-price elasticities of demand, $e_{ii}$. To estimate these price elasticities, we use an approximation method described in Creedy (2001). These price elasticities can be derived using a method based on a result of Frisch (1959) for direct additive utility functions. This method requires the use of the elasticity of marginal utility of spending with respect to total spending, often referred to as the Frisch parameter, $\xi$. Both own-price and cross-price elasticities are expressed as follows:

$$e_{ij} = -e_i w_j \left(1 + \frac{e_i}{\xi}\right) + \frac{e_i \delta_{ij}}{\xi} \tag{10}$$

where $\delta_{ij} = 1$ if $i = j$, and 0 otherwise. Own-price elasticities are expected to have negative values, since price increases usually lead to a decrease in demand for the good in question. The

closer $e_{ij}$ is to -1, the more pronounced is the elasticity of demand in response to price increases. To derive estimates for the Frisch parameter, $\xi$, we use the method described in Creedy and Dixon (1998) and Lluch et al. (1977).

**Table 2. Budget and price elasticities**

| Expenditure Category | AR | | GE | | TR | |
|---|---|---|---|---|---|---|
| | Budget | Price | Budget | Price | Budget | Price |
| Food and Non-alcoholic beverages | 0.699 | -0.799 | 0.987 | -0.701 | 0.626 | -0.455 |
| Alcoholic Beverages | 0.848 | -0.873 | 1.800 | -1.007 | 0.517 | -0.309 |
| Tobacco | 0.451 | -0.468 | 0.455 | -0.319 | 0.098 | -0.060 |
| Clothing and Footwear | 0.954 | -0.983 | 0.627 | -0.362 | 0.876 | -0.530 |
| Home fuels | 1.573 | -1.569 | 0.660 | -0.375 | 1.521 | -0.912 |
| Electricity | 1.008 | -1.037 | 0.677 | -0.396 | 0.880 | -0.531 |
| Rents | 0.274 | -0.289 | 1.238 | -0.698 | 0.250 | -0.162 |
| Household services | 1.580 | -1.585 | 1.056 | -0.598 | 1.611 | -0.963 |
| Health | 1.182 | -1.212 | 0.904 | -0.546 | 1.015 | -0.616 |
| Private transport | 1.514 | -1.522 | 1.766 | -0.989 | 1.367 | -0.828 |
| Public Transport | 0.913 | -0.942 | 0.659 | -0.386 | 0.748 | -0.455 |
| Information & Communication | 0.969 | -0.998 | 1.081 | -0.611 | 0.881 | -0.535 |
| Recreation and culture | 1.369 | -1.350 | 0.952 | -0.547 | 1.270 | -0.790 |
| Education | 1.126 | -1.156 | 0.785 | -0.446 | 0.962 | -0.585 |
| Restaurants and hotels | 0.873 | -0.903 | 0.798 | -0.457 | 0.776 | -0.484 |
| Other goods and services | 1.159 | -1.167 | 1.277 | -0.719 | 1.055 | -0.677 |
| Childcare costs[3] | . | . | . | . | . | . |
| Motor fuels | 1.008 | -1.037 | 1.195 | -0.674 | 0.599 | -0.363 |
| Durables | 0.858 | -0.886 | 1.287 | -0.724 | 1.208 | -0.763 |

Table 2 presents the estimated data on budget shares and price elasticities of demand[4]. As expected, price elasticities of demand generally exhibit negative values, indicating an inverse relationship between price and quantity demanded. This observation virtually rules out the possibility of Giffen behaviour as suggested by Jensen and Miller (2008).

In each country, the elasticity of the budget elasticity for food and non-alcoholic beverages is less than one, suggesting that the budget share for food decreases as total spending changes. Similar patterns emerge for other major items such as electricity and fuel in Armenia and Turkey, where the elasticities of the budget shares remain below one. In contrast, the budget share elasticity exceeds one for certain commodity groups, including recreation and culture and restaurants and hotels, except in Georgia. For fuels, Armenia and Georgia have similar budget share elasticities, while the value in Turkey falls well below one.

The results for the alcohol category suggest an inelastic price elasticity of demand, which is consistent with previous literature (Fogarty, 2006). It is worth noting that a low budget share elasticity does not necessarily mean that the commodity group is a necessity for most of the population, a consideration that is relevant to our results regarding spending on alcohol and tobacco. The budget share elasticities for clothing and footwear are either close to one or above, except in the case of Georgia. This result may be due to households temporarily deferring these expenditures during periods of low income, as suggested by Browning and Crossley (2009).

[3] Although it is of great importance for single families and families with children, there is no data on childcare costs.

[4] We derived specific budget elasticities for ten different population subgroups categorized by household type, as described in the Data section. Although not reported here, this results in a matrix of 10x19 budget elasticities.

***Compensating variation***

A money metric of the change in welfare can be evaluated based on the concept of *compensating variation* (CV), which is the monetary compensation that households should receive after price increases given the initial total expenditure in order to maintain their utility (to be equally well off) as before the price change. Please refer to Sologon et al. (2022) for the mathematical derivation of CV. We will report CV relative to initial expenditure levels.

***Welfare decomposition***

To assess the overall impact of price changes on the welfare of the entire population, we use the social welfare function associated with the Atkinson index, which is based on the equally distributed equivalent income ($Y_{ede}$) before (0) and after price (1) adjustments.

$$W(e) = y_{ede}(e) = \overline{y_e} * \big(1 - A(e)\big) \tag{11}$$

This is used to evaluate the change in welfare due to the increase in prices, relative to the initial situation pre-price changes.

$$\Delta W = \ (y_{ede_1} - y_{ede_0})/y_{ede_0} \tag{12}$$

Following Sologon et al. (2022), the welfare change can be decomposed into the contribution of the efficiency and equity components of welfare and their interactions by expanding and manipulating the difference in (12)[5]:

$$\begin{aligned} \Delta W &= [\overline{y_e}_1\big(1 - A_1(e)\big) - \overline{y_e}_0\big(1 - A_0(e)\big)]/\overline{y_e}_0\big(1 - A_0(e)\big) \\ \Delta W &= (\overline{y_e}_1 - \overline{y_e}_0)/\overline{y_e}_0 + \big(A_1(e) - A_0(e)\big)/A_0(e) \\ &+(\overline{y_e}_1 - \overline{y_e}_0)/\overline{y_e}_0\big(A_1(e) - A_0(e)\big)/A_0(e) \\ \Delta\%W &= \Delta\%\overline{y_e} + \Delta\%A(e) + (\Delta\%\overline{y_e} * \Delta\%A(e)) \end{aligned} \tag{13}$$

***Distributional metrics***

We assess the variations in household consumption baskets across the different countries, focusing on the budget allocations for key commodity items. This enables us to determine the individual commodities that are most influential in driving inflation in each country. To understand the distributional consequences of inflation, we examine both the structure of household spending and the inflationary trends across income levels within each nation. This allows us to evaluate whether the impact of inflation is progressive or regressive and to pinpoint the specific commodities that contribute to these distributional effects.

In order to quantify the progressive/regressive effects we follow Sologon et al. (2022), who adapted the measures typically used in the taxation literature to an inflationary context. The distributive effect of inflation can be calculated using the Reynolds-Smolensky index (Lambert, 2001):

$$RS = CI_{X+C} - CI_X \tag{14}$$

[5] For a review of the literature investigating the decomposition of distributional outcomes using microsimulation techniques, please refer to Sologon et al. (2023).

where $CI_X$ is the concentration index for pre-price change total expenditure (X) (households ranked by disposable income) and $CI_{X+C}$ is the concentration index for post-price change total expenditure (X+C). Following Sologon et al. (2022), Pfahler (1990) and Decoster et al. (2002), RS can be decomposed into an inflation rate and a disproportionality component:

$$RS = \frac{r}{1+r} * K \tag{15}$$

where r is the average inflation rate and K is the Kakwani index. K reflects the disproportionality between the structure of initial expenditure and the increase in expenditure due to inflation:

$$K = CI_C - CI_X \tag{16}$$

$CI_C$ captures the income-related inequality in the changes in total expenditure (C) due to price changes and $CI_X$ measures the income-related inequality in total initial expenditure. A negative RS indicate a regressive impact of inflation (affecting more the bottom).

K or the progression of inflation along the income distribution can be further decomposed into the contribution of each commodity group:

$$K = \frac{r_1}{r} * K_{C_1} + \frac{r_2}{r} * K_2 + \cdots + \frac{r_i}{r} * K_{C_i} \tag{17}$$

where $r_i$ refers to the average inflation rate and $K_{C_i}$ is calculated as:

$$K_{C_i} = CI_{C_i} - CI_X \tag{18}$$

where $CI_{C_i}$ captures the income-related inequality in the changes in expenditure of commodity item $i$ $(C_i)$ due to price changes in item $i$.

***Data***

Our analysis is based on the most recent and reliable data from each country's household budget survey. Specifically, we use data from the 2020 Household Budget Survey (AR-HBS) for Armenia, the 2021 Household Budget Survey (GE-HBS) for Georgia, and the 2019 Household Budget Survey (TR-HBS) for Turkey. Microdata for Azerbaijan is not available for research purposes[6]. However, there is detailed distributional data available for budget shares, but detailed by decile of consumption rather than decile of income that we use in this paper. For comparative purposes we include a number of tables in the Appendix for the four countries.

These surveys have a similar structure and provide comprehensive insights into various aspects of household finances, including a detailed breakdown of expenditures, household composition, demographic and socio-economic characteristics of household members, and disposable income. Based on the detailed information on household expenditures provided by these surveys, we calculate changes in the cost of living for individual households by accounting for price variation across expenditure categories. We then adjust the composition of households' baskets to account for recent price changes. It is important to note that our unit of analysis in these datasets is the household. We do not examine income within the household, and acknowledge that income distribution within households can vary substantially.

The sample size varies across countries, with Georgia having the largest dataset with 13,621 households, followed by Turkey with 11,521 households and Armenia with 5,184 households.

[6] It should be noted that the data used are from before the Nagorno-Karabakh conflict between Armenia and Azerbaijan and the migration of people from Nagorno-Karabakh.

It should be noted that the level of disaggregation available in the Turkish data is much greater than that available in either of the publicly available Armenian and Georgian datasets. This limits comparative analysis at a deeper level than the adjusted COICOP classification we use.

To update the cost of living for each household, we rely on Harmonized Consumer Price Index (HCPI) data obtained from Eurostat for Turkey and from the national statistical offices for Armenia and Georgia. Eurostat provides monthly HCPI data for each EU member state plus some others including Turkey, carefully broken down to the 4-digit COICOP (Classification of Individual Consumption by Purpose) level. CPI information however is only available at an aggregated COICOP level for Armenia and Georgia from their national statistical offices.

Given this limitation, we take a practical approach by applying the 4-digit COICOP categories to items that exhibit the largest price fluctuations. Using HCPI data, we calculate price changes between December 2020 and December 2022 for each expenditure item in each country. The resulting consumer price index growth rates (CPI) for each item and country are documented in Table 1. Ultimately, our adjusted COICOP analysis includes a total of 19 expenditure groups, but seven of them are the same as the original COICOP. The 19 expenditure groups are presented in detail in Table 5.

To allow for heterogeneity in welfare effects, we construct 10 household types based on demographic characteristics and disposable income. We construct five household types based on demographic characteristics; 1) singles, 2) singles with children, 3) couples, 4) couples with children, 5) other households. Each household type is further split by disposable income levels: above and below the median equivalised household disposable income. Other households can include extended relatives living within the household[7].

**Table 3. Price changes from December 2020 to December 2022 (in %) (COICOP)**

| COICOP Heading | Expenditure item | HCPI Price change (in %) | | |
|---|---|---|---|---|
| | | AR | GE | TR |
| | All-items HICP | 16.94 | 23.1 | 123.5 |
| CP01 | Food and non-alcoholic beverages | 24.17 | 32.6 | 155.7 |
| CP02 | Alcoholic beverages and tobacco | 18.88 | 15.1 | 98.2 |
| CP03 | Clothing and footwear | 20.42 | 2.0 | 51.2 |
| CP04 | Housing, water, electricity, gas and other fuels | 10.21 | 60.3 | 131.3 |
| CP05 | Furnishings, household equipment and routine maintenance of the house | 21.25 | 23.2 | 143.9 |
| CP06 | Health | 6.15 | 2.4 | 100.8 |
| CP07 | Transport | 12.06 | 19.6 | 137.3 |
| CP08 | Communication | 1.51 | -1.0 | 44.2 |
| CP09 | Recreation and culture | 22.78 | 7.9 | 88.1 |
| CP10 | Education | 6.17 | 11.8 | 61.0 |
| CP11 | Restaurants and hotels | 14.72 | 28.5 | 137.3 |
| CP12 | Miscellaneous goods and services | 16.78 | 17.6 | 107.9 |

### *Budget Shares*

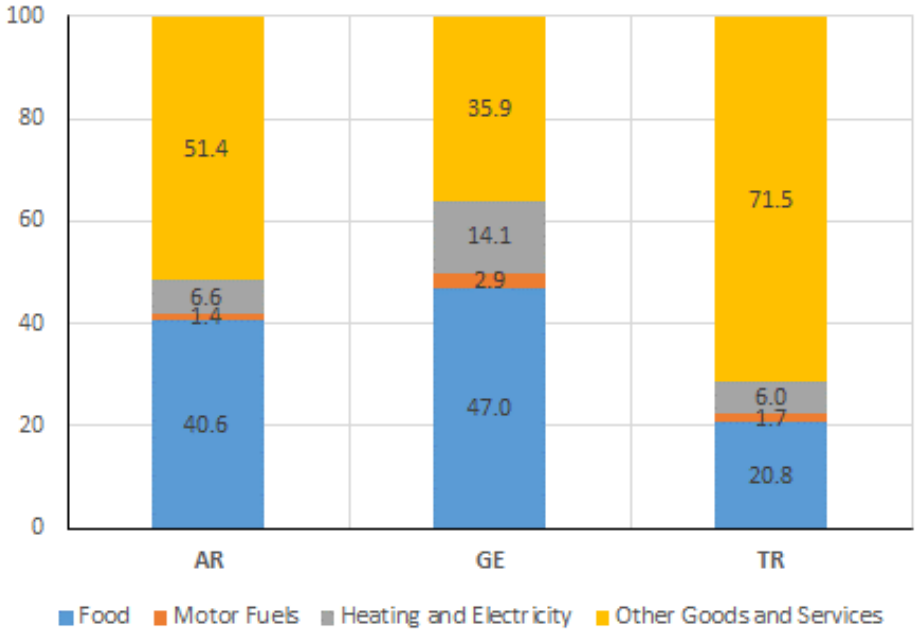
The composition of goods and services within the typical consumption patterns of countries with different spending levels affects the variation in inflation rates over time. This is primarily due to the correlation between spending levels and the allocation of resources across categories.

[7] We recognise that households in these countries differ in characteristics such as religion, consumption patterns, and family structures, and that the data set is heterogeneous. It is beyond the scope of this study to uncover all heterogeneities.

In particular, the study of the relationship between expenditure categories and essential goods, with special emphasis on goods such as food, electricity, lighting, and heating, is crucial. This phenomenon is described by Engle's law, which states that as a nation becomes wealthier, the share of total spending on essential goods tends to decrease. This empirical regularity has been repeatedly observed in economic data, as shown by the seminal work of Houthakker (1957).

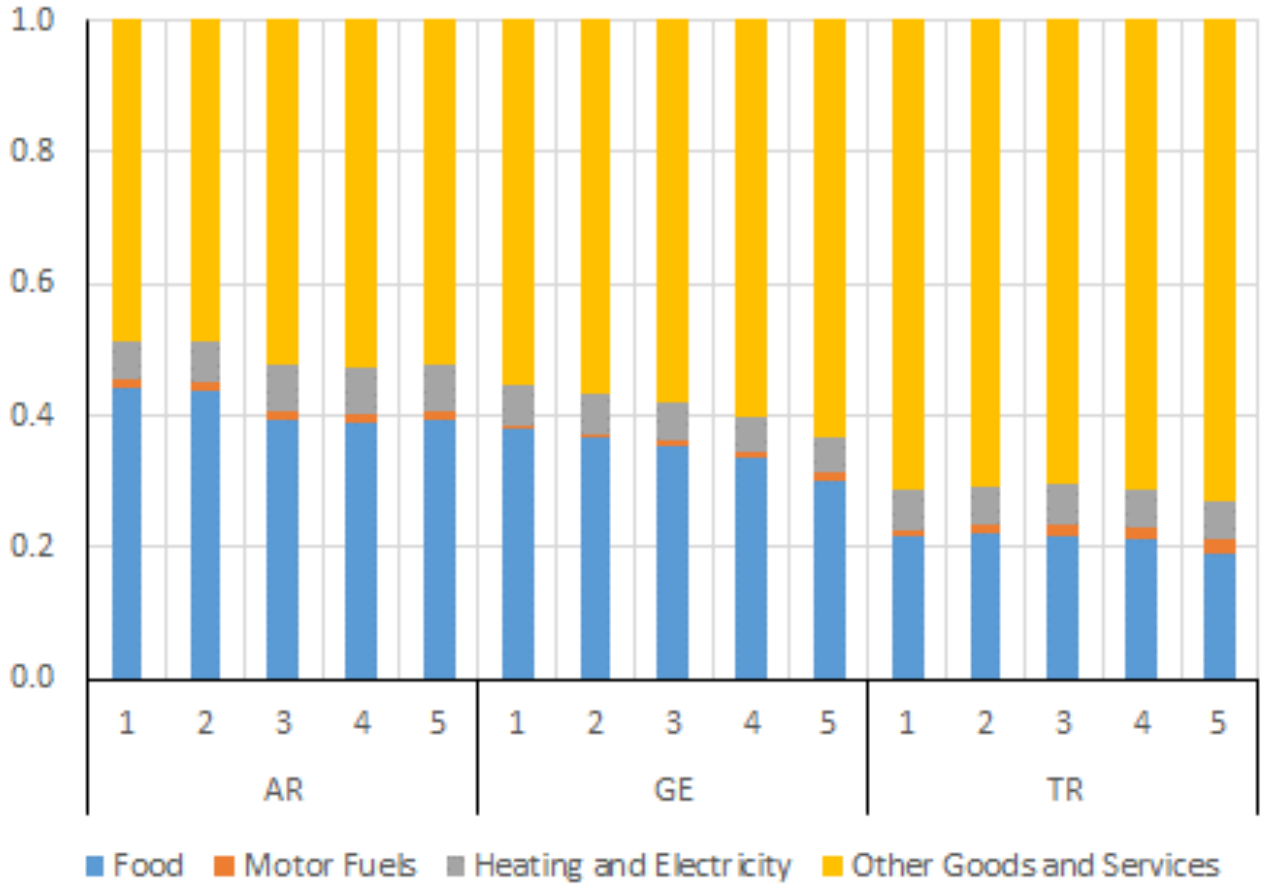
Figure 2 illustrates the distribution of budget allocations for diverse commodity sub-components within the typical households of both Turkey and the South Caucasus in the survey years. It is notable that the relative importance of items such as food, heating, electricity, and motor fuels in terms of the average budget shares varies significantly across these countries. Specifically, Armenia and Georgia exhibit lower budget allocations in comparison to Turkey. Notably, even in Turkey, an upper-middle-income country, there is a discernible trend towards lower budget allocations for essential necessities within the overall expenditure.

**Figure 2. Aggregate budget shares**




The distribution of average household shares for food shows a considerable range, from 20.8 percent in Turkey to 47% in Georgia with Armenia a slightly lower 40.6%. This discrepancy appears to be closely related to income differences among these countries. Turkey has nearly twice the GDP per capita of Armenia and Georgia. Reflecting the necessity nature of food, poorer households and countries will have a higher food budget shares.

**Figure 3. Budget shares of expenditure components across equivalised disposable income quintiles**



Meanwhile, motor fuel expenditures vary across countries, with Georgia recording a relatively high average share of 2.9 percent, compared with 1.4 percent in Armenia and 1.7 percent in Turkey. This is not surprising, because according to the official statistics of the countries, the number of motor vehicles per 1000 people in 2022 is 378 for Georgia, 254 for Turkey and 177 for Armenia. The average household share of expenditures on heating and electricity also shows interesting patterns, with Georgia recording the highest share at 14.1 percent and Turkey and Armenia significantly lower at respectively 6.0 and 6.6 percent. This divergence can be attributed in part to different climatic conditions, income levels, and demographic factors, all of which contribute to the observed differences. In summary, Figure 2 shows that average-income households in Armenia and Georgia are significantly more vulnerable to the effects of rising prices for essentials such as food, heating, and electricity than their counterparts in Turkey. This increased vulnerability is a consequence of the substantial share of their budgets that they spend on these essentials and reflects the interdependent relationship between income, spending, and the cost of living.

Figure 3 describes the spending patterns in the quintiles of the income distribution in each country. These compositions show notable differences, particularly among low-income households, which spend a larger share of their budgets on essential categories such as food and energy. As income rises, these budget shares gradually decline. Consequently, price fluctuations in these essentials have a greater impact on low-income households than on higher-income households.

Figure 3 is primarily concerned with the dynamics of allocations to specific commodity groups within each country. However, it is important to recognise that there are significant differences in these budget shares across countries. For food, the budget share, within country, is lower for the top quintile than for bottom quintiles, reflecting the budget elasticity of less than 1. In Armenia, the budget share for the bottom two quintiles is significantly higher than the bottom three deciles, while in Turkey the bottom four quintiles have a similar budget share for food which is higher than the top quintile. Georgia, on the other hand has a gradually decline in budget share over the distribution, but has the highest decline over the distribution. Lining up the countries side by side, we note a steady decline in the food budget share, consistent with Engle's law and the differences in GDP per capita.

It is worth noting that motor fuel allocations tend to increase with rising income, a trend that is particularly pronounced in Georgia and Turkey. This means that rising fuel prices have a greater impact on higher-income households, highlighting the complexity of the dynamics of income distribution in these countries. For household heating and electricity costs, the share is higher for poor households in Turkey and Georgia, but in Armenia the opposite holds, albeit with the third quintile having the highest budget share. The bottom two quintiles in Armenia seem to be relatively poorer, prioritising food relative to other commodity groups. As a result, heat and electricity does not feature like a necessity in wealthier countries. However, for quintiles 3 to 5, the pattern of a declining budget share with income applies.

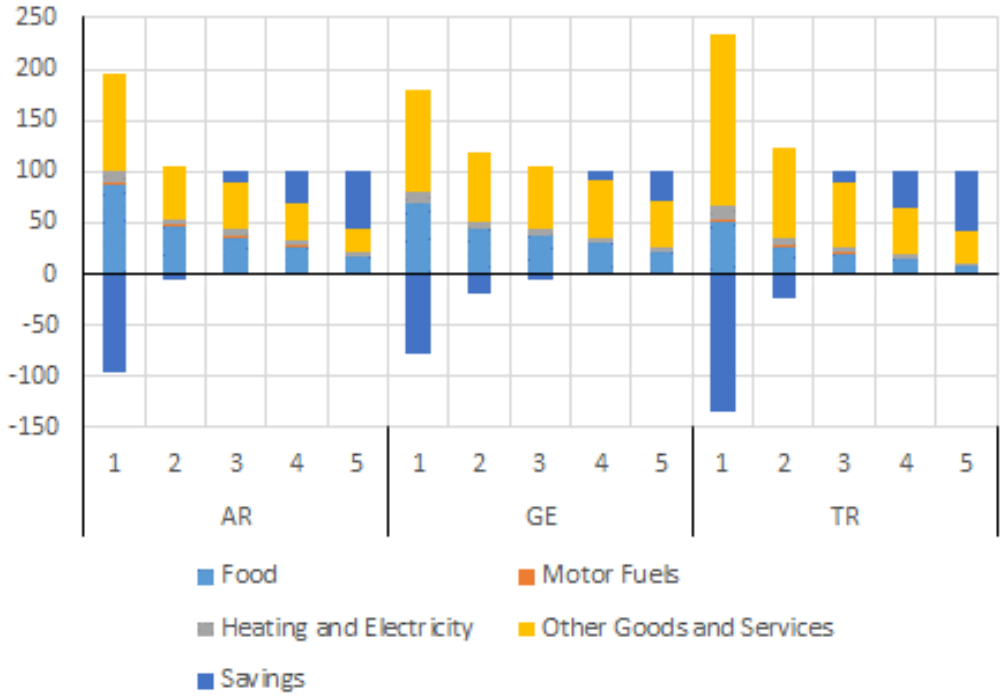
The budget share for other commodities is a residual sector with the budget share rising with income, particularly the case in Georgia and with the share rising from Armenia to Georgia to Turkey accounting for the different economic situation. In the Appendix, we note that neighbours Armenia and Azerbaijan, when ranked by deciles of expenditure, have the most similar budget share pattern, but with Azerbaijan having the lowest budget elasticity and declining food share over the distribution.

While the distribution of budget shares is important, a critical missing component is the gap between income and expenditure in the savings rate. While we cannot examine the capacity of households to absorb price increases from accumulated wealth, the pattern of savings across the distribution can serve as a proxy measure of this resilience to price shocks.

Figure 4 provides a visual representation of the relative contributions of the savings rate as well as primary expenditure subcomponents as a share of total income, broken down by quintiles of household equivalized disposable income. It is noteworthy that not only do low-income households spend a larger share of their income on food and energy, but that their savings rate is negative and are thus constrained in their ability to save. In all three countries, we find that savings rates are negative for the lowest quintile of the income distribution and gradually increase as we move up the income ladder. This observed trend is well in line with the results of previous research on the relationship between saving behaviour and income distribution (Browning and Lusardi, 1996). While negative savings rates at the bottom of the distribution are typical, the scale of the dissaving rate is likely to incorporate some unaccounted sources of purchasing power such as personal transfers, undeclared income or own produced consumption. It is unlikely that these households, given their high share of necessities in their consumption basket can access borrowings and are also less likely to have large accumulated savings.

Our observations show that wealthier households tend to allocate a larger share of their income to saving than their lower-income counterparts. This strategic financial decision gives them the flexibility to maintain their spending habits by drawing on their accumulated savings when needed. In contrast, low- and middle-income households might choose to lower their savings rate to protect their basic wealth and social status (Wisman, 2013). When we compare this across the three countries, we find that Turkey has the biggest differential savings rate, with the most negative at the bottom and the most positive at the top, followed by Armenia at similar levels and Georgia with a lower differential. These differences in saving behaviour are a valuable clue that we can use to investigate further the differentiated financial landscapes of these countries. Combined with the high food and energy shares, the savings rates story underscores the fact that significant fluctuations in food and energy prices can disproportionately affect these households, assuming their incomes remain constant. While at the top of the income distribution, it highlights the vulnerability of low-income households to energy price volatility in the broader context of our analysis of inflation.

**Figure 4. Budget and savings shares in household income across equivalised disposable income quintiles**




## 3. Results

We focus next on the distributional impacts of consumer price inflation. Table 4 details the average consumer price inflation between December 2020 and December 2022, focusing on the average household, considering the household expenditure allocation and the variations in commodity prices. It is important to note that Turkey experienced the highest overall inflation among the countries studied during this period. In contrast, Georgia recorded the lowest inflation rates. However, Azerbaijan exhibited even lower inflation, as detailed in the Appendix.

The primary drivers of inflation differ substantially among countries, influenced by both good-specific inflation factors and their relative budget allocations. Armenia has the highest proportion of inflation attributable to food price increases, at 55%. This reflects both its highest food budget share, as shown in Figure 3, and its highest food CPI-to-overall CPI ratio, even though its food price inflation is lower than that of other countries. Georgia, which also has a relatively high food budget share, follows with the next highest proportion at 47%. Turkey, being more affluent, has the smallest contribution from food to its overall inflation, at 25%.

In Turkey, a considerable portion of inflation is attributable to other goods and services, a category that also holds a relatively high share in the other countries. In this case, the impact on overall inflation is driven more by the high budget allocation to this category rather than by commodity-specific inflation rates. The contribution of both motor and domestic fuel inflation has been more pronounced in Turkey and Georgia. This is due to both countries having lower budget shares allocated to these items, coupled with a lower impact from commodity-specific

inflation rates. In contrast, Armenia has experienced political factors affecting fuel prices in recent years, which has had a different kind of influence on its inflation landscape[8].

**Table 4. Estimated inflation by main sub-components**

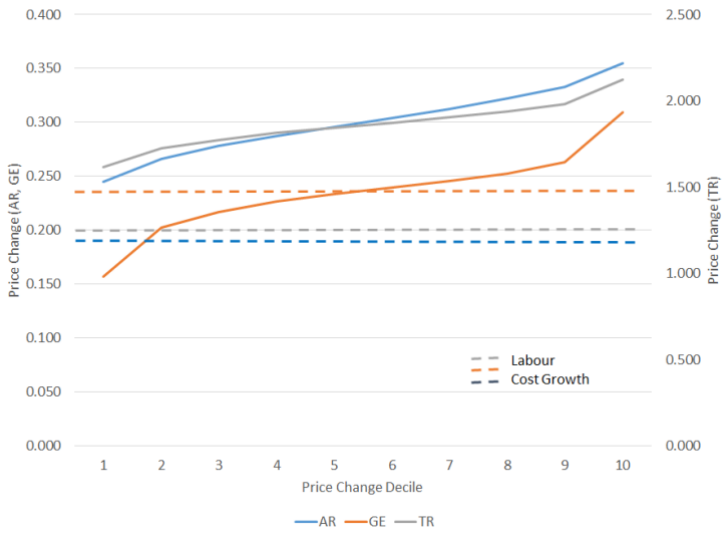
| | AR | GE | TR | AR | GE | TR |
|---|---|---|---|---|---|---|
| | Price Inflation | | | Share of Total Price inflation | | |
| Food | 16.3 | 10.9 | 46.0 | 0.558 | 0.470 | 0.246 |
| Motor Fuels | 0.2 | 0.7 | 4.2 | 0.006 | 0.029 | 0.022 |
| Heating and Electricity | 0.8 | 3.3 | 15.5 | 0.028 | 0.141 | 0.083 |
| Other Goods and Services | 11.9 | 8.4 | 121.6 | 0.408 | 0.359 | 0.649 |

Rising prices for other goods and services are observed in all three countries. These expenditures increase inflation by 17.8 percent in the case of Georgia and by 28.3 percent in the case of Armenia.

***Distributional impact of inflation***

Figure 5 describes the distributional consequences of inflation, comparing December 2022 compared with December 2020, decomposed by price change decile. Thus, the top 10% are those with the highest 10% of price changes and the bottom 10% have the lowest price change. The level of the lines reflects the overall inflation rate. Although the average rate is lower in Georgia, the ratio between the top and the bottom of the distribution is the highest, with the highest variation in price. The Turkish average price growth is the highest (requiring a second axis), but the difference between those most affected and those least affected is the flattest. In each country, there is slight gradual change between the second decile and the ninth decile, with large changes between the first and second and between the ninth and tenth deciles. This may support targeted inflation mitigation measures on the relatively small proportion who are affected the most.

**Figure 5. Average Price Change by Price Change Decile**




The dotted lines represent the growth rate of labour costs during this period. For Georgia, the dotted line passes through the middle of the distribution, indicating that approximately 50% of the population have price growth above the increase in labour costs, while the remaining sees

[8] https://iwpr.net/global-voices/armenia-lowers-energy-prices

50% decrease. In the absence of the distribution of labour cost growth across the distribution and without taking other incomes into account, it is not possible assess the distributional effect in terms of welfare.

In Armenia and Turkey, the growth in labour costs was lower than even the lowest decile of price growth rates. Consequently, the post-tax growth in labour income is likely to be less than the rate of inflation, leading to a decrease in purchasing power across various income levels. In contrast, Azerbaijan appears to resemble Georgia more closely, with the average growth rate in labour costs closely aligning with the average increase in prices (as detailed in the Appendix). One possible explanation for this insulation against price inflation in Azerbaijan could be its status as a fossil fuel-exporting nation. Companies in the petroleum and natural gas sectors may have been able to increase wages in line with sales, thereby mitigating the impact of inflation on incomes.

In Figure 6, we report the impact of inflation by quintiles of household disposable income, decomposed by the 4 commodity components, which sum to total inflation. When ranked in this way, we find relatively little difference across the income distribution. Thus, the factors that influence the differential price inflation experience depends more on other factors, such as household composition and individual consumption patterns.

This categorization is consistent with the primary subcomponents of goods and provides a holistic perspective on the distributional impact of inflation. The distributional impact of inflation varies across countries. In Armenia, the impact is relatively modest, whereas in Georgia it is progressive, and in Turkey, it is notably strong. In Armenia, the impact of food inflation is relatively uniform across income groups, but in Georgia it is more pronounced, indicating that a larger percentage of inflation for high-income households is caused by food than for low-income households.

**Figure 6. Distributional impact of inflation across equivalised disposable income quintiles**

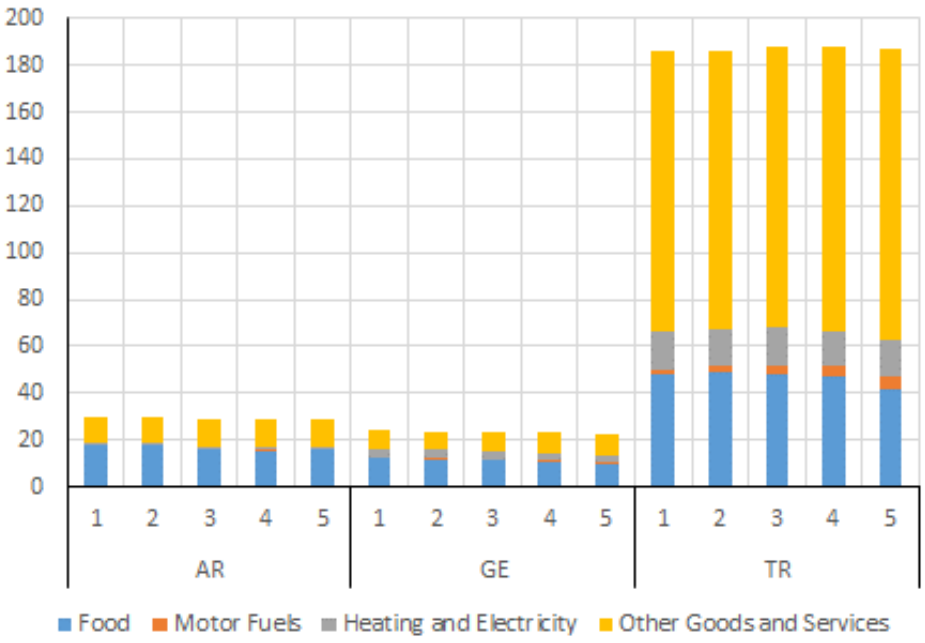


**Table 5. Distributional impact of value of price changes relative to (before behavioural response)**

| Denominator | Disposable income | | | | | Expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Quintile** | **Food** | **Motor Fuels** | **Heating and Electricity** | **Other Goods and Services** | **Total** | **Food** | **Motor Fuels** | **Heating and Electricity** | **Other Goods and Services** | **Total** |
| **Armenia** | | | | | | | | | | |
| 1 | 105.4 | 0.8 | 2.9 | 51.5 | 160.5 | 17.8 | 0.2 | 0.7 | 11.1 | 29.8 |
| 2 | 18.5 | 0.2 | 0.7 | 11.3 | 30.7 | 17.6 | 0.2 | 0.7 | 11.1 | 29.6 |
| 3 | 14.1 | 0.2 | 0.8 | 10.6 | 25.6 | 15.7 | 0.2 | 0.9 | 12.2 | 29.0 |
| 4 | 10.8 | 0.1 | 0.6 | 8.2 | 19.7 | 15.6 | 0.2 | 0.9 | 12.3 | 28.9 |
| 5 | 7.8 | 0.1 | 0.4 | 6.0 | 14.3 | 15.8 | 0.2 | 0.9 | 12.2 | 29.0 |
| **Georgia** | | | | | | | | | | |
| 1 | 31.0 | 1.2 | 10.1 | 21.0 | 63.3 | 12.4 | 0.4 | 3.5 | 7.7 | 24.0 |
| 2 | 14.3 | 0.4 | 4.4 | 9.2 | 28.3 | 11.9 | 0.4 | 3.5 | 7.8 | 23.6 |
| 3 | 12.1 | 0.5 | 3.8 | 8.3 | 24.7 | 11.4 | 0.6 | 3.4 | 8.0 | 23.4 |
| 4 | 9.9 | 0.6 | 3.1 | 7.6 | 21.3 | 10.9 | 0.7 | 3.1 | 8.4 | 23.1 |
| 5 | 7.5 | 0.7 | 2.4 | 6.6 | 17.2 | 9.7 | 1.0 | 3.1 | 9.0 | 22.9 |
| **Turkey** | | | | | | | | | | |
| 1 | 293.7 | 17.2 | 109.5 | 690.5 | 1110.8 | 47.9 | 2.3 | 16.3 | 119.9 | 186.4 |
| 2 | 62.5 | 4.4 | 21.7 | 157.7 | 246.4 | 48.6 | 3.2 | 15.5 | 118.6 | 185.9 |
| 3 | 44.4 | 3.8 | 15.7 | 113.5 | 177.4 | 48.2 | 3.8 | 16.2 | 120.0 | 188.3 |
| 4 | 31.2 | 3.2 | 10.2 | 83.5 | 128.0 | 47.0 | 4.4 | 14.8 | 121.8 | 188.0 |
| 5 | 19.3 | 2.6 | 7.2 | 57.4 | 86.5 | 41.7 | 5.6 | 15.1 | 124.8 | 187.2 |

While the distributional effects of inflation appear relatively uniform when assessed in terms of the nominal change in expenditure relative to previous spending levels, the picture changes dramatically when these effects are evaluated in relation to disposable income (Table 5). Higher rates of dissaving among the lower income deciles and increased savings among the top deciles imply that the nominal change in expenditure is more pronounced when households are dissaving and less so when they are saving. While expenditure may serve as a more accurate benchmark in a welfare analysis, the data presented in this table highlights the varying degrees of financial strain experienced by different income groups, especially when accounting for their savings behaviour. It is important to note that this table does not factor in behavioural changes. Therefore, it serves as an indicator of the potential pressure on household behaviour and welfare, rather than a comprehensive measure of overall changes in welfare.

***Distributional metrics***

To quantify the results presented in Figure 6 and Table 5 and to gain deeper insight into the distributional consequences of inflation across countries, we compute a number of distributional metrics in Table 6. These metrics are drawn from the tax literature, following the methodological adaptation in Sologon et al. (2022) (see also Lambert (2001)). The Reynolds-Smolensky index ($RS$) shown in column 4 confirms that inflation in Turkey had a slightly progressive effect when expressed in terms of expenditure, i.e., it disproportionately affected the higher income groups. In the other countries, however, it had a slightly regressive effect, with Georgia having the most pronounced regressive impact. These results are consistent with the patterns observed in Figure 6, where the quintile bars illustrate the distribution of the impact of inflation on the economy as a whole.

**Table 6. Decomposition on distributional impact into base and rate effects**

| | CI pre-change ($X$) | $CI_{C_i}$ | $CI_{X+C_i}$ | $RS_{C_i}$ | $K_{C_i}$ | Avg. r. |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| AR | | | | | | |
| Total Expenditure | **0.139** | **0.133** | **0.138** | **-0.001** | **-0.005** | **0.292** |
| Food | | 0.112 | 0.135 | -0.004 | -0.026 | 0.163 |
| Motor Fuels | | 0.159 | 0.138 | 0.000 | 0.020 | 0.002 |
| Heating and Electricity | | 0.180 | 0.139 | 0.000 | 0.041 | 0.008 |
| Other Goods and Services | | 0.158 | 0.140 | 0.002 | 0.020 | 0.119 |
| GE | | | | | | |
| Total Expenditure | **0.197** | **0.188** | **0.196** | **-0.002** | **-0.009** | **0.233** |
| Food | | 0.150 | 0.193 | -0.005 | -0.047 | 0.109 |
| Motor Fuels | | 0.380 | 0.198 | 0.001 | 0.183 | 0.007 |
| Heating and Electricity | | 0.169 | 0.196 | -0.001 | -0.028 | 0.033 |
| Other Goods and Services | | 0.230 | 0.200 | 0.003 | 0.033 | 0.084 |
| TR | | | | | | |
| Total Expenditure | **0.170** | **0.171** | **0.171** | **0.001** | **0.001** | **1.873** |
| Food | | 0.142 | 0.161 | -0.009 | -0.028 | 0.460 |
| Motor Fuels | | 0.314 | 0.176 | 0.006 | 0.144 | 0.042 |
| Heating and Electricity | | 0.155 | 0.168 | -0.002 | -0.015 | 0.155 |
| Other Goods and Services | | 0.180 | 0.175 | 0.005 | 0.009 | 1.216 |

Note: X = initial expenditure; $CI_{C_i}$ = concentration index of the cost increase in item i, $C_i$; $CI_{X+C_i}$= CI of the increase in total expenditure due to the cost increase in item i, $C_i$; $RS_{C_i}, K_{C_i}$= Reynolds-Smolensky and Kakwani of $C_i$; r = average inflation rate; RS = (3)-(1); K =(2)-(1).

**Figure 7. Direct redistributive effect of each commodity group (RS)**

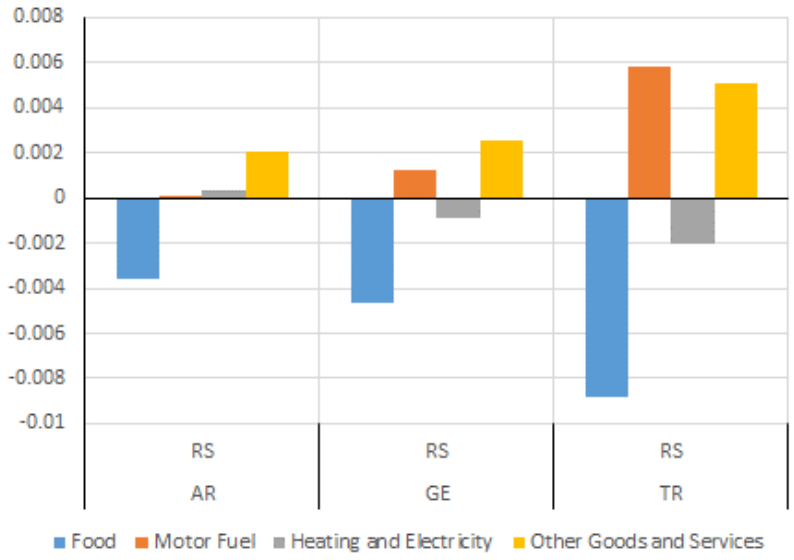



Figure 7 shows the direct redistributive effects ($RS$) of inflation within each commodity group (based on Table 6 column 4). This allows us to see which component drove the overall regressive/progressive impact. Following the methodological innovation for inflation developed by Sologon et al. (2022) based on methods used in taxation (see Pfahler (1990) and Decoster et al. (2002)), the redistributive effect can be decomposed into the contribution of each component by decomposing K or the progression of inflation along the income distribution. Based on Equation (16), K can be decomposed into the contribution of the five commodity groups. Table 7 summarizes the main results of our decomposition by expressing the contribution of each commodity component as a percentage of the progressivity/regressivity of inflation. The average inflation rate is obtained from the inflation rates for food (1), fuel (2), heating and electricity (3), and other goods and services (4). Figure 7 and Table 7 provide both a visual decomposition and a relative quantification of the contribution of each component.

In Turkey, the progressive effect was driven primarily by motor fuel inflation at 338.44% and other goods and services inflation at 612.42%, whereas essential goods (food, heating, and electricity) exerted a regressive counterbalancing effect. In Georgia, the regressive effect was predominantly driven by essential goods (food, heating and electricity) with a combined contribution of approximately 303.26%. In Armenia, the regressive impact was primarily driven by food inflation at 284.43%.

In a cross-country comparison, it is observed that food inflation exhibits a more regressive trend in Turkey than in Georgia and Armenia. Similarly, inflation associated with heating and electricity is more regressive in Turkey as compared to Georgia. On the contrary, motor fuel inflation is notably progressive, with Turkey leading, followed by Georgia. Inflation pertaining to other goods and services is progressive across all the mentioned countries, with a more pronounced progression in Turkey.

**Table 7. Percentage contributions of the commodity groups to the progressivity / regressivity of inflation**

| Component | Formula | Relative contribution of each component in K (%) | | |
|---|---|---|---|---|
| | | AR: Regressive | GE: Regressive | TR: Progressive |
| Food | $\frac{r_1}{r} * K_{C_1}$ | 284.43 | 256.92 | -720.76 |
| Motor fuels | $\frac{r_2}{r} * K_2$ | -2.68 | -64.24 | 338.44 |
| Heating & Electricity | $\frac{r_3}{r} * K_{C_3}$ | -22.01 | 46.34 | -130.11 |
| Other goods and services | $\frac{r_4}{r} * K_{C_4}$ | -159.73 | -139.02 | 612.42 |
| Total | $K$ | 100 | 100 | 100 |

***Welfare losses of inflation***

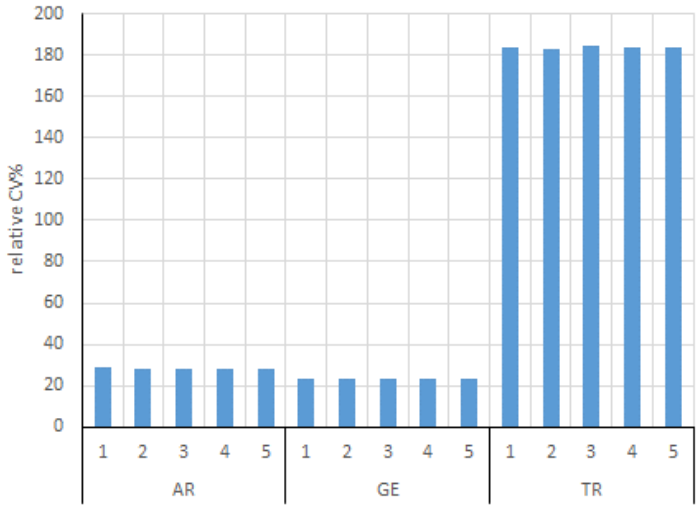
Next, we evaluate the impact of price increases on the cost of living and examine how price changes contribute to the overall welfare of society.

***Compensating variation***

The compensating variation quantifies the change in general welfare that results from the change in the cost of living due to price increases when we account for behavioural changes. It essentially represents the monetary compensation that households need to maintain their initial level of welfare (utility) in the face of price increases.

To gain insight into how this compensating change affects households with different financial resources, we plot it relative to initial total expenditures in Figure 8. Using this plot, we can approximate the percentage change in the cost of living for households with different resources. The trend in welfare losses across the income distribution mirrors the distributional pattern of inflation observed in Figure 6. Countries with greater wealth exhibit lower welfare losses. In general, losses are more pronounced for lower-income households than for higher-income households in all countries.

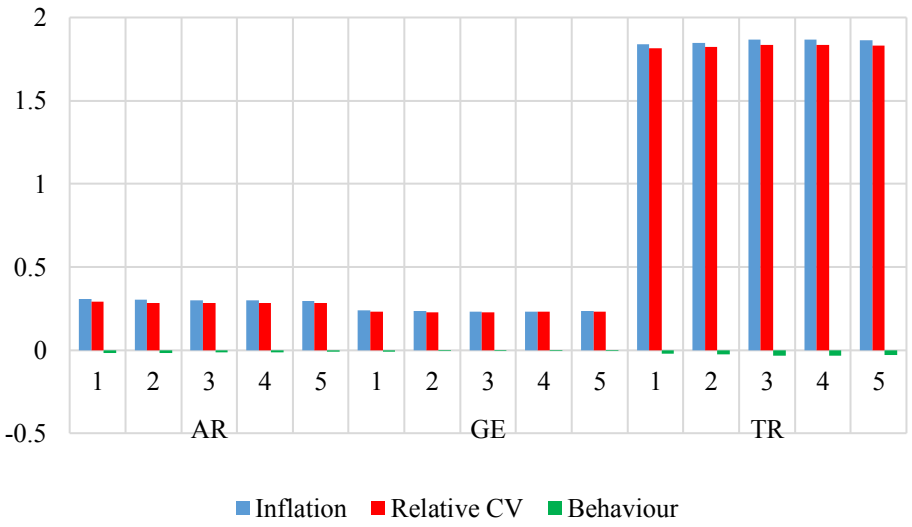
**Figure 8. Relative changes in welfare measured by the compensating variation by equivalised disposable income quintile**



The relative compensating change (CV) in Figure 9 illustrates the relative increase in income that households would need in order to maintain their utility in the new price landscape. The discrepancy between these two figures represents the adjustments that households make in their consumption patterns due to shifts in the relative prices of various commodity groups in order to maintain their utility in the face of rising prices. In simpler terms, this means the difference between the amount that the price increase would cost households financially if there were no behavioural adjustments and the amount that it would cost if one takes into account that households can change their consumption behaviour to mitigate the effects of the price increase.

In general, the behavioural response factor is found to exert a very limited influence on welfare in all countries. This result is not surprising given that the strongest price fluctuations are observed in important categories such as energy and food, which offer households limited flexibility in adjusting their consumption behaviour. This finding is consistent with the behavioural responses estimated by Sologon et al. (2022) for selected European countries.

**Figure 9. Welfare losses decomposition into price and behavioural adjustment**




To assess the overall impact of price changes on the welfare of the entire population, we use the social welfare function associated with the Atkinson index, which is based on the distribution of equivalized incomes before and after price adjustments, as shown in Table 7.

**Table 8. Welfare Changes as measured by $Y_{ede}(2)$**

| | Atkinson Index(2) | | | Mean $Y_e$ | | | $Y_{ede}(2)$ | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre -change | Post -change | Relative change | Pre -change | Post -change | Relative change | Pre -change | Post -change | Relative change |
| AR | 0.303 | 0.305 | 0.91% | 91625 | 71217 | -22.27% | 63895 | 49467 | -22.58% |
| GE | 0.388 | 0.392 | 0.92% | 596 | 484 | -18.87% | 365 | 294 | -19.34% |
| TR | 0.313 | 0.302 | -3.35% | 7676 | 2740 | -64.31% | 5274 | 1911 | -63.76% |

The analysis of the Atkinson index shows that the increase in consumer prices contributes to an increase in inequality in Armenia, while conversely it reduces inequality in Georgia and Turkey. These results are in close agreement with previous observations derived from the *RS* index. The largest welfare losses, as measured by equivalized income distributed equally, are observed in Turkey (63.8%), followed by Armenia (22.6%) and Georgia (5.9%).

In Figure 10, if we break down the welfare losses into their efficiency and equity components using the data in Table 7, we see that the main reason for the welfare decline is a reduction in efficiency, which translates into a decline in average equivalized income. In particular, the small changes in consumption inequality suggest that the price increase has affected all households and to similar relative degrees.

**Figure 10. Decomposition of the welfare changes**


## 4. Discussion and Conclusions

This paper examines the distributional dynamics of price fluctuations for the period from December 2020 to December 2022, coinciding with the onset of the cost-of-living crisis in both Turkey and the South Caucasus. This analysis makes a contribution to the study of consumption inequality in times of economic turmoil. During this period, the average inflation rate in these countries rose to levels not seen since the 1980s, and the price increase was equivalent to a decade's worth of price growth. The driving forces behind this price escalation were primarily country-specific shocks and increased fuel costs, partly due to the Ukraine conflict. It is worth noting that most goods and services, especially food, also saw significant price increases. Inflation developments were also influenced by several macroeconomic factors, including the supply chain disruption after Covid-19 and the increasing pressure on housing prices that has built up since the 2008-2009 financial crisis. The extent of price increases varied widely across countries, reflecting differences in consumption patterns, the impact of mitigation measures, and differences in the origin of imports.

Our work combines a careful analysis of the distributional effects of inflation with the measurement of welfare changes that incorporate behavioural changes in a cross-country comparative setting. Our paper complements the comparative evidence on the cost-of-living crisis found in Europe by providing evidence for developing countries, providing valuable insights. Our study effectively decomposes the impact of inflation between December 2020 and 2022 and examines how it affects the full income spectrum in Turkey and South Caucasus. These countries span a range of welfare regimes and exhibit different patterns of average price fluctuations, making them a notable focus for our analysis.

To improve our understanding of the cost-of-living crisis in these countries, we follow the latest advancements in the field developed by Sologon et al. (2022) in the context of European countries and we extended the approach in the context of developing countries. First, we go beyond conventional methods in assessing the distributional impact of inflation by applying a technique normally used to assess the progressivity or regressivity of tax and benefit systems. Building upon Pfhaler (1990), we examine the interplay between the inflation rates of various commodity groups and the structure of expenditures. This novel approach allows us to identify the overall level of progressivity or regressivity of inflation in each country and to examine the underlying determinants in more detail. Second, building upon Creedy (2000) we assess the impact of price fluctuations on welfare by considering also behavioural responses. Our methodology involves estimating a demand system to model households' spending behaviour on different groups of goods in each country. This includes estimating income and price elasticities using a common methodology so that we can make a comprehensive comparative assessment of consumer welfare in these countries. We do not explore gender gaps in in spending behaviour due to a lack of disaggregated data, but acknowledge that women often bear the brunt of economic crisis. This is because women are more likely to be in insecure or informal work, and are often unable to increase their working hours due to their caring roles and commitments (Giebel and Heath, 2023; Lokshin et al., 2023).

The impact of inflation depends on a number of factors, including the extent to which the prices of certain goods rise and their share in household spending. The availability of social protection in each country may be important to analyse, as it may have acted as a buffer against the economic shock of unemployment, or other shocks due to illness. Certain single households may for example have access to a state pension (contributory). Social protection can also boost demand in periods of recession. In Armenia and Georgia, essential goods such as food, fuel, and electricity take up a larger share of household budgets. Combined with stronger price increases in these essential categories, these dynamics have led to higher inflation rates in less affluent countries, with significant differences observed across countries. It is worth noting, however, that Turkey is a special case. It has the highest inflation rate in the world, a distinction that can be attributed to idiosyncratic factors such as strongly negative real interest rates and expansionary fiscal policies. These unique circumstances set Turkey apart from the usual inflation trends in other countries. In Turkey, asset prices and exchange rate channels are very effective, therefore negative interest rate shock distorts income and wealth distribution by inflating asset prices and triggers inflation by causing upward exchange rate developments (Can et al., 2020).

Consistent with the media narrative, the distributional impacts are substantial. There are significant differences across countries in the level and composition of inflation rates. In Armenia and Georgia, the distributional impact of inflation is most regressive and hits the poor hardest, while in Turkey it is progressive.

The main finding from our analysis is that the distributional effects of inflation show different patterns across countries and that a universal explanation is not possible. Could this be because of government run social protection programmes? Similar levels of inflation-related regressivity may be due to different interactions between the magnitude of inflation and its uneven effects along the income spectrum. Future research should examine more closely the policy determinants underlying these inequalities. For example, examining cushioning policies such as fuel price caps, subsidies for services such as public transportation, social programs, technological advances in electricity generation, and trade policy decisions related to fossil fuel procurement can provide valuable insights into the nuances of these distributional effects.

Using a linear expenditure system, this study has quantified the compensating variations that result from these price fluctuations, which serves as a benchmark for measuring changes in wealth. The distributional consequences of price changes reflect pure price changes, with the behavioural component playing a relatively minor role, mainly because the most important goods are among those that experience the largest price fluctuations. Moreover, when we break down the shift in aggregate welfare using the concept of equally distributed equivalized income, we find that the change in aggregate welfare is driven mainly by the direct effects of price changes rather than by changes in inequality. This observation underscores the relatively uniform impact of these price changes on different segments of society. Gender related differences were not available for this study.

While the distributional impact of price fluctuations may not be particularly pronounced, a crucial factor that significantly affects their potential impact on households is the savings rate. Wealthier households tend to have higher savings rates, while those at the lower end of the income spectrum often have low or even negative savings rates. Consequently, wealthier households are able to maintain their spending levels by drawing on their savings or lowering their savings rates when faced with price changes. Economically disadvantaged households, on the other hand, have only a limited buffer against these price changes and are more likely to be forced to reduce their spending or resort to moneylenders or other non-formal sources of financing. It is worth noting that households in some countries managed to accumulate savings during the Covid-19 crisis, a trend that is particularly evident among high-income households (Dossche et al. 2021; Lydon and McIndoe-Calder, 2021). However, these accumulated savings may have eroded among certain groups, particularly those with lower incomes. As a result, these households have a disproportionate impact on their current spending. It is important to recognize that while lower savings may result in immediate spending cuts for poorer households, it may also mean lower future spending for wealthier households.

Central banks take action to counter prevailing inflation by raising interest rates. It is likely that these policy responses will have different effects on budgets. The resulting decline in spending and investment is likely to have the greatest impact on the middle-income segment, mainly because this is where a large share of jobs is located in the service and construction sectors. At the same time, the rise in mortgage rates will lead to higher housing costs, which will have a greater impact on the middle-income segment, where savings rates tend to be lower. In contrast, individuals at the higher end of the income spectrum who benefit from higher investment income are likely to see gains. Conversely, individuals with fixed incomes who have a limited ability to absorb extraordinary price jumps, especially those at the lower end of the income distribution, will benefit from a more stable price environment.

Reflecting on recent crises, as highlighted in O'Donoghue et al. (2022), we recognize that a solidarity-based policy response during the Covid-19 crisis played a crucial role in safeguarding living standards and strengthening confidence in institutions in many countries. This was facilitated by the introduction of lower interest rates by central banks, including the Central Bank of the Republic of Turkey. In contrast, the austerity-focused approach taken during the financial crisis had a negative impact, particularly on the most economically vulnerable, leading to diminishing confidence in government. With rising interest rates and increasing debt burdens, the pressures we are experiencing in the current cost-of-living crisis are beginning to resemble those of the financial crisis. It is therefore imperative to prioritize the preservation of living standards for the most disadvantaged and hard-pressed middle classes of society. As has been shown during the financial crisis, these groups tend to curtail their spending when faced with financial difficulties, which can affect public confidence.

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## Appendix

**Table 9. Composition of change in price by decile of consumption**

| | AR | AR | AR | AR | AZ | AZ | AZ | AZ | GE | GE | GE | GE | TR | TR | TR | TR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Food | H&E | Transport | Other | Food | H&E | Transport | Other | Food | H&E | Transport | Other | Food | H&E | Transport | Other |
| 1 | 0.208 | 0.070 | 0.007 | 0.715 | 0.827 | 0.063 | 0.013 | 0.097 | 0.425 | 0.131 | 0.054 | 3.213 | 0.205 | 0.033 | 0.017 | 0.745 |
| 2 | 0.403 | 0.034 | 0.009 | 0.554 | 0.797 | 0.072 | 0.014 | 0.117 | 0.469 | 0.106 | 0.058 | 3.747 | 0.229 | 0.043 | 0.020 | 0.707 |
| 3 | 0.483 | 0.029 | 0.008 | 0.480 | 0.781 | 0.077 | 0.016 | 0.127 | 0.485 | 0.101 | 0.065 | 3.786 | 0.252 | 0.046 | 0.023 | 0.680 |
| 4 | 0.539 | 0.025 | 0.007 | 0.429 | 0.763 | 0.085 | 0.016 | 0.136 | 0.497 | 0.098 | 0.066 | 3.805 | 0.258 | 0.055 | 0.022 | 0.664 |
| 5 | 0.590 | 0.022 | 0.006 | 0.382 | 0.750 | 0.090 | 0.017 | 0.142 | 0.510 | 0.101 | 0.066 | 3.517 | 0.276 | 0.056 | 0.024 | 0.643 |
| 6 | 0.632 | 0.019 | 0.006 | 0.342 | 0.734 | 0.094 | 0.018 | 0.153 | 0.504 | 0.102 | 0.067 | 3.540 | 0.282 | 0.062 | 0.023 | 0.632 |
| 7 | 0.676 | 0.016 | 0.005 | 0.303 | 0.719 | 0.101 | 0.020 | 0.160 | 0.509 | 0.101 | 0.066 | 3.525 | 0.270 | 0.065 | 0.026 | 0.640 |
| 8 | 0.716 | 0.015 | 0.004 | 0.265 | 0.701 | 0.108 | 0.021 | 0.169 | 0.489 | 0.129 | 0.064 | 2.718 | 0.277 | 0.070 | 0.026 | 0.627 |
| 9 | 0.766 | 0.012 | 0.004 | 0.218 | 0.669 | 0.126 | 0.022 | 0.183 | 0.452 | 0.182 | 0.061 | 1.866 | 0.271 | 0.079 | 0.027 | 0.623 |
| 10 | 0.851 | 0.008 | 0.002 | 0.138 | 0.594 | 0.158 | 0.028 | 0.219 | 0.338 | 0.356 | 0.047 | 0.816 | 0.182 | 0.206 | 0.018 | 0.594 |

Note: H&E - Heating and Electricity

**Table 10. Average change in price by decile of consumption**

| | AR | AZ | GE | TR |
|---|---|---|---|---|
| 1 | 0.318 | 0.222 | 0.230 | 1.618 |
| 2 | 0.308 | 0.210 | 0.235 | 1.724 |
| 3 | 0.307 | 0.203 | 0.235 | 1.774 |
| 4 | 0.302 | 0.195 | 0.236 | 1.815 |
| 5 | 0.300 | 0.189 | 0.237 | 1.845 |
| 6 | 0.299 | 0.183 | 0.241 | 1.873 |
| 7 | 0.297 | 0.177 | 0.236 | 1.903 |
| 8 | 0.296 | 0.170 | 0.235 | 1.936 |
| 9 | 0.294 | 0.162 | 0.234 | 1.979 |
| 10 | 0.283 | 0.144 | 0.226 | 2.124 |
| Total | 0.301 | 0.186 | 0.235 | 1.873 |
| Labour Cost Growth | 0.240 | 0.187 | 0.210 | 1.240 |