Policy Research Working Paper 10377

Who Suffers the Most from the Cost-of-Living Crisis?

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WORLD BANK GROUP
Europe and Central Asia Region &
Poverty and Equity Global Practice
April 2023

Policy Research Working Paper 10377

Abstract

This paper constructs cost-of-living indexes for different groups of households to quantify the differences in the distribution of the burden of high inflation among the populations of countries in Europe and Central Asia. The analysis demonstrates that the cost-of-living crisis of 2022–23 has had a heterogeneous impact on European populations. Poor households appear to suffer the most from rising food and energy prices. Poverty and inequality rates and the profiles of the poor based on household-specific inflation rates systematically differ from those based on the standard consumer price index approach. Accounting for the variability of inflation rates across household types might help policy makers design policies that better protect vulnerable households and promote economic growth.

This paper is a product of the Office of the Chief Economist, Europe and Central Asia Region and the Poverty and Equity Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at mlokshin@worldbank.org, zsajaia@worldbank.org, and itorre@worldbank.org.

Who Suffers the Most from the Cost-of-Living Crisis?

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Keywords: Inflation, Cost of living, Poverty, Inequality, Europe and Central Asia

JEL: E31, D31, I32

[1] The authors are with the World Bank. This paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent. We thank Martin Ravallion, Dean Jolliffe, and participants of the seminar in the World Bank for their comments and suggestions. We are grateful to Aylén Rodriguez Ferrari for providing excellent assistance in preparation of this paper.

1 Introduction

After a long period of historically low inflation, the post-pandemic recovery and the war in Ukraine resulted in a sharp rise in consumer prices in early 2022, particularly in food and energy (World Bank, 2022a). In Europe, the annual median inflation reached 12 percent in October 2022, a level not recorded since the 1990s. The increase in the expense to purchase goods and services necessary to maintain standards of living, that is, the cost of living, is now the most pressing concern for 93% of Europeans (European Parliament 2022).

The reasons for concern are clear. High inflation has a negative impact on real incomes. Rising food prices and energy bills, increasing mortgages and rents, and higher service prices are eroding the standards of living of a large part of the European population. Households previously considered well-protected might become vulnerable to various income shocks that could push them into poverty. During the first half of 2022, real wages declined by 2.4 percent in the European Union, 3.3 percent in Eastern Europe, and wage growth slowed in Central and Western Asia (Belser et al. 2022). About 60% of European workers now have lower real incomes than they did before the pandemic (UN 2022).

These estimates of the impact of inflation on real incomes are based on each country's official consumer price index (CPI), which typically measures the change in prices of a fixed consumption basket of goods and services. The actual consumption basket of each household may differ from the CPI basket. When price variations are small, this difference may not matter. But when price variations are high or uneven – that is, when prices of some goods or services increase more than the prices of others – changes in the price of the CPI basket may be very different from changes in the price of households' actual consumption baskets. Under these circumstances, the CPI may be a poor indicator for measuring a household's COL.

In contexts of high or uneven inflation, the changes in the cost-of-living across households might be heterogeneous: increases in the price of a given household's consumption basket may be different from that of the CPI, and they may be different from the price changes of other households' consumption baskets. The burden of inflation may be unequally spread across households. These differences have clear policy implications, as many public programs targeted at vulnerable populations use CPI-based inflation adjustments, which may not represent the actual changes in the cost-of-living of targeted populations (Schultze and Mackie 2002).

In this paper, we construct cost-of-living indexes for different groups of households in order to quantify differences in the inflation burden across the populations of countries in Europe and Central Asia (ECA). We use microdata on household expenditures to construct consumption baskets for each household and use detailed price data to track the evolution of the price of such baskets. We generate detailed inflation estimates for 19 emerging market and developing economy (EMDE) countries in ECA and provide a limited set of estimates for 25 countries in the European Union (EU) and the European Economic Area (EEA).

Our results show that the high inflation of 2022 had a heterogeneous impact on European populations. The burden of inflation was spread unevenly across households, with poor households appearing to have suffered the most from rising food and energy prices. Households in the bottom decile of the consumption distribution faced inflation, that is, for the average country in EMDE ECA, 2.3 percentage points higher than the inflation faced by households in the top decile, with the difference reaching 5 percentage points in some countries. We also show that poverty and inequality rates and the profiles of the poor derived from household-specific inflation rates differ from those based on the standard CPI approach. In all countries in our sample, the poverty headcount rate, the poverty gap, and the Gini index of inequality are higher when using COL household-specific indexes than when using the CPI.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents the methodology for constructing household-specific COL indexes, and section 4 describes the data used for our analysis. Section 5 presents a descriptive analysis of the differences in inflation rates across goods and services and in consumption patterns across households. Section 6 presents the main findings. Section 7 discusses the implications of our approach for the analysis of poverty and inequality. Section 8 draws policy implications.

2 Literature review

Official measurements of the cost of living started in the late 19th century. In 1914, the US and UK governments constructed an index to adjust wages during the period of high inflation driven by World War I. After World War II, the COL index was renamed the Consumer Price Index (CPI) in the US and the Index of Retail Prices (IRP) in the UK (USBLS 1966; Courtney 2014). The long-standing debate among researchers about the limitations of these indexes in informing economic

policies resulted in efforts to find better instruments to measure the "true" cost of living. Interest in this topic has risen during periods of high inflation (Mehrhoff and Breuer 2010; Chai et al. 2015), with research on the issue picking up in this decade (DimensionsAI n.d).

Konüs (1939) was the first to develop the formal theory of the COL index. He and many researchers after him argue that the CPI, as a fixed expenditure-weighted index, fails to account for changes in the composition of consumption in response to changes in relative prices (Hagemann 1982) and the quality and variety of the purchased goods and services (Ulmer 1946). Lebow and Rudd (2003) show that ignoring the substitution effect in the US overstates changes in the actual COL by about 0.9 percentage points a year. To address these critiques, researchers constructed price indices specific to particular groups of households.

Arrow (1958) addressed variations in consumption patterns across income groups and suggested deriving separate cost-of-living indexes for each income level or subsets of consumption categories, such as food. Baez et al. (2021) observed that low-income households in Türkiye devote more than 70 percent of their budget to cover necessities compared to 54 percent spent by median-income households and 45 percent by households in the top decile. Low-income households have little room to substitute the products they consume with more affordable options or access to financial services and wage negotiations in the face of a COL increase. A surge in food prices thus disproportionally affects low-income people.

Gürer and Weichenrieder (2020) document "pro-rich inflation" in 25 EU countries in 2001–15, showing that households in the lowest income decile faced higher inflation than did households in the top decile. The prices of necessities that comprise a large share of expenditure by lower-income households rose more than average prices. Food prices, for example, rose by 47.5 percent, while the prices of goods and services consumed by wealthier households (such as recreation and cultural activities and vehicles) increased at a rate below the average. Kints and Breunig (2021) find similar results for Australia. Erosa and Ventura (2002) argue that wealthy households allocate a larger share of their assets to interest-bearing instruments and, thus, are better protected from inflation than poor households. In contrast, the impact of inflation in Germany was almost the same for households at all levels of income (Mehrhoff and Breuer 2010).

Pollack (1980) extended the theory of the cost-of-living indexes to social groups. He argues that the purpose of the CPI indexation is to prevent the erosion of the purchasing power of social

security or pension beneficiaries. If the CPI does not reflect the true COL, some population groups are at risk of falling into poverty (Colavecchio et al. 2011). Fritzer and Glatzer (2009) demonstrated that the interaction of household composition and income level defines the impact of inflation. In Austria, families with two or more adults or a single person with low to medium income and single parents with high income experienced an inflation 0.2 percentage points above the headline inflation rate. Brachinger (2008) finds that in the period of high inflation in 2007 in Germany, the inflation rates faced by families with more than three children were significantly higher than the official CPI inflation. Michael (1979), using US data from 1967 and 1974, finds that the relationship between household characteristics and true COL is not stable over time. In some periods, households with specific characteristics may face higher inflation than the average, but in other periods, these same households may face lower inflation.

Amble and Stuart (1994) argue that relatively higher inflation for the elderly is due to price increases for medical care that represent a larger proportion of older households' budgets. Oldfield et al. (2018) document that pensioners in the UK spend a larger share of their budget on food and fuel and less on housing than non-pensioners and thus are more affected by food and fuel price inflation. Kalwij et al. (2018) report higher inflation faced by households of pensioners than average households in the Netherlands. Hobijn and Lagakos (2005) find similar results for the US during 1987-2001. They show that inflation exceeds the official CPI inflation for the elderly, low-income households, and households with children over 18 years old. In Ireland, inflation impacts more rural than urban households, followed by lower-income families and pensioners, because of differences in spending on heating and transportation (Lydon 2022). At the same time, the aggregate cost of living in cities larger than 100,000 inhabitants is higher than in rural areas of Spain (Lasarte-Navamuel et al. 2017).

Hagemann (1982) reports geographical differences in the rates of inflation in the US. He also shows that households with the head 45 to 64 years of age and those headed by retiaries face different inflation rates compared to CPI inflation. Antón et al. (2016) analyze data from 31 European countries, and Cullinan et al. (2011) data from Ireland to study the implications of high inflation on the well-being of people with disabilities. Both studies conclude that people with disabilities are more vulnerable to high inflation than the general population.

A divergence in the cost-of-living across households has consequences for the measurement of income inequality. Muellbauer (1974) examines the different impacts on UK households of price changes between 1964 and 1970 and finds that the COL of low-income households grew faster than the CPI captured. Ignoring this kind of error overstates the reduction in inequality from 1964 to 1970 by 13-15 percent.

3 Methodology

Consumption patterns vary across households at different income levels for various reasons. Engel's law postulates that the share of the household budget spent on food declines with income (Chai and Moneta 2010). Shares of the household budget spent on housing are also typically higher for poor households than for rich ones. Wealthier households tend to spend proportionally more on transportation, education, insurance, and pensions than poorer households and allocate their assets differently (Erosa and Ventura 2010). These differences in consumption patterns and heterogeneous changes in consumer prices lead to different levels of inflation faced by different households. Increases in the COL varying by household income could have significant implications for poverty and inequality, potentially affecting a range of government policies (Gürer and Weichenrieder 2020).

The standard CPI measures the costs of the basket of goods and services purchased by the "typical" household. But because the consumption basket purchased by a household is likely to differ from the CPI basket, the inflation rate it faces will likely differ from the CPI inflation rate. Such differences can be especially large in periods of high inflation.

A large body of economic research analyzes other factors affecting differences in the rates of inflation measured by the CPI and the COL approaches. Among the most important drivers are substitution bias, incomplete quality adjustment, and the treatment of housing expenses. The overall conclusion of these studies is that CPI inflation is likely to overstate COL inflation (Jacobs, et al. 2014).

Formally, the CPI inflation is calculated based on the Lowe index[2]:

[2] The Lowe index is a fixed-basket type index in which the quantity vector (or expenditure shares) corresponds to a reference period that may be different from the price periods compared. Although most countries claim that they use a Laspeyres (or "Laspeyres-type") index for their national CPI (UN 2009), the claim is not strictly accurate. In the

$$L_0^t = \sum_{j=1}^{m} s_j^0 \frac{p_j^t}{p_j^0} \quad (1)$$

where L_0^t is the overall index; p_j^0 and p_j^t are the prices for the consumption component *j* (*m* is the number of consumption components) in the reference period *0* and period *t*; and, s_j^0 is the share of consumption component *j* for the reference basket evaluated at the prices in period *0*:

$$s_j^0 = \frac{p_j^0 q_j^b}{\sum_{j=1}^{m} p_j^0 * q_j^b} \quad (2)$$

The aggregate price change between periods *t* and *t-1* can be derived as a ratio of two indices. It has the same structure as (1), except for the hybrid weights s_j^{t-1} reflecting the consumption shares of the reference basket, which are evaluated at prices of period *t-1*:

$$L_{t-1}^t = \frac{L_0^t}{L_0^{t-1}} = \sum_{j=1}^{m} s_j^{t-1} \frac{p_j^t}{p_j^{t-1}}, \quad (3)$$

Similar to (3), the inflation index for a household *i* can be defined as:

$$L_{i,t-1}^t = \sum_{j=1}^{m} s_{j,i} \frac{p_j^t}{p_j^{t-1}}, \text{ where } s_{j,i} = \frac{c_{j,i}}{\sum_{j=i}^{m} c_{j,i}} \quad (4)$$

and $C_{j,i}$ is the consumption expenditure of household *i* on goods from consumption category *j*.[3]

Assuming the same prices are used to calculate both indexes, the difference between the two indexes can be decomposed as the covariance of the difference between the CPI and household-specific shares $s_{j,i} - s_j^{t-1}$ and the deviations of the relative component prices from their mean (e.g., Hagemann 1982):

$$L_{i,t-1}^t - L_{t-1}^t = \sum_{j=1}^{m} s_{j,i} \frac{p_j^t}{p_j^{t-1}} - \sum_{j=1}^{m} s_j^{t-1} \frac{p_j^t}{p_j^{t-1}} = \sum_{j=1}^{m} \left(s_{j,i} - s_j^{t-1}\right) \frac{p_j^t}{p_j^{t-1}}$$

$$= \sum_{j=1}^{m} \left(s_{j,i} - s_j^{t-1}\right) \left(\frac{p_j^t}{p_j^{t-1}} - L_{t-1}^t\right) \quad (5)$$

Laspeyres price index, the quantities that make up the basket must be the actual quantities of the price reference period. In practice, the expenditures and quantities used for CPIs typically come from household budget surveys undertaken some years before the price reference period for the CPI (Hill 2010).

[3] Although (4) has a similar functional form as (1) and (3), the interpretation of this index is slightly different, as it no longer refers to a fixed quantity vector priced at one of the periods being compared (t or t-1).

The impact of commodity *j* on the differences between the two indexes is then determined by the difference in the price change of commodity *j* and the average rate of inflation L_{t-1}^{t}, and by the difference in the shares of commodity *j* in the two baskets.

4 Data

Two data sources were used to construct household-specific price indexes and analyze the impact of applying them in measuring poverty and inequality. The first source is price data on 12 consumption components corresponding to the two-digit Classification of Individual Consumption According to Purpose (COICOP) specification (UN 2018).[4] The time series of country-specific price indices by the COICOP two-digit groups covering the period from January 2010 to the latest month available for 2022 were obtained from the CPI data repository of the International Monetary Fund (IMF 2022a) for 47 countries in ECA (all except Kazakhstan, the Kyrgyz Republic [after January 2022], the Russian Federation [after February 2022], Tajikistan, Turkmenistan, and Uzbekistan [before January 2020]). The COICOP two-digit group price indices for Kazakhstan and the Kyrgyz Republic (after January 2022) were obtained from the countries' national statistical offices; data for Russia, Tajikistan, Turkmenistan, and Uzbekistan (before January 2020) were not available.

The second set of data corresponds to household-level consumption expenditure. This information comes from microdata from the household budget surveys of 23 countries in ECA for the latest available year. These surveys are nationally representative and include detailed information on consumption expenditure for each household. Aggregates in these surveys are harmonized by extracting variables with the same definitions and employing standardized classification and aggregation methods to achieve maximum inter-country comparability. We partition the total household consumption expenditure into the 12 two-digit COICOP components and calculate the share of total consumption expenditure allocated to each component for each household. We also compute aggregate country-level shares. In the few cases in which consumption shares at the country level were missing, we imputed them from previous rounds of the survey.[5]

[4] We focus on the two-digit COICOP classification to achieve better intercountry comparability and because of the lack of information in most of the ECA household budget surveys on the representativeness of the sample results based on more granular product classification.
[5] Table A1, in Appendix, indicates the year of the latest available survey and the sample size for each country.

Data on household consumption and detailed price data for the COICOP two-digit group for 19 countries in EMDE ECA is our primary sample of analysis.[6] This sample is complemented by data on 25 countries in the European Union and European Economic Area.[7] For these countries, we have detailed price data and aggregate household consumption statistics by quintile of the consumption distribution.

5 Inflation dispersion and consumption patterns in ECA countries

Differences along two dimensions explain differences in COL indexes across households: variation in prices across goods and services and variation in consumption patterns across households. In periods of low inflation, adjustment of prices of individual goods and services occurs infrequently; the dispersion of relative prices over time is, therefore, low. When inflation increases, however, price changes become more frequent, and the relative price dispersion expands over time (Alvarez et al., 2019). Median annual inflation in Europe jumped from 2 percent in January 2021 to around 12 percent in October 2022 (Figure 1) – values the region had not seen in more than two decades. This high inflation could lead to larger price dispersion in the region.

5.1 Heterogeneity of inflation across countries

A simple way to measure price dispersion across the 12 broad COICOP groups is to calculate the root mean square deviation (RMSD) in price changes with respect to the mean.[8] Figure 2 presents the RMSD for the 47 countries from which the data is available and where price changes correspond to the 12-month variation by December 2022.

The country with the widest dispersion in price changes across consumption groups is the Netherlands, where the RMSD in price changes was almost 22 percentage points in 2022, but this was driven by a substantial increase in the education category, which differed from a more

[6] The countries are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kosovo, the Kyrgyz Republic, Montenegro, Moldova, North Macedonia, Poland, Romania, Serbia, Türkiye, and Uzbekistan.

[7] The countries are Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

[8] Root Mean Square Deviation is calculated as: $RMSD = \sqrt{\frac{\sum_{j=1}^{m}\left(\Delta p_j - \overline{\Delta p}\right)^2}{m}}$, where Δp_j is the price change of the *j-th* consumption component, $\overline{\Delta p}$ is the mean change in prices for all consumption components, and *m* is the number of components. The change in prices is measured as the percentage point variation in prices between a given month and the same month the previous year.

homogeneous price growth among the other consumption groups. The country with the second highest dispersion is Moldova, where the RMSD was almost 18 percentage points. The large dispersion in price changes in Moldova is evident when looking at the price change by consumption group (Figure 3, left panel). While on average, the 12-month price change was 30.2 percent, the price of housing rose by 75.9 percent in the same period, and the price of communication services increased by 5.6 percent – a difference of about 70 percentage points.

Switzerland experienced the narrowest dispersion in price changes in 2022, with an RMSD of just 2.4 percentage points. Prices in Switzerland grew by 2.8 percent across consumption groups in 2022 (Figure 3, right panel). Prices of house equipment saw an increase of 5.7 percent during the same period, while prices of communication services *decreased* by 3.3 percent, — a difference of about 9 percentage points.

Across countries, price changes across consumption groups were heterogeneous. The highest median inflation in ECA was for food and beverages (17.8 percent). It was followed by housing (which includes electricity and gas), with a median inflation rate of 15.6 percent (Figure 4). The lowest median inflation across ECA was communication services at 0.9 percent, followed by education at 3.2 percent.

The heterogeneity across countries can be measured by the standard deviation of the 12-month price change for each consumption group (Figure 5). The group with the largest standard deviation is housing, which reflects the heterogeneity of the energy price shock across ECA (World Bank, 2022b). Some countries in the region -particularly in Central Asia and the South Caucasus- experienced no substantial price shock in electricity and gas because their fossil fuel supply was unaffected. In contrast, countries in the Western Balkans and throughout the European Union faced a surge in energy prices as natural gas supplies from Russia were disrupted. The price changes in transport also showed significant cross-country variation. On the other hand, price changes in communication services and clothing were similar across countries.

5.2 Differences in household spending on broad consumption goods

Differences in households' exposure to inflation depend on how inflation rates differ across the goods and services they consume and how different their consumption baskets are. In countries in which households spend approximately the same proportions of their budget on each consumption group, household-specific inflation will not vary significantly across households. The opposite will

happen in countries where households have very dissimilar consumption baskets. A diversity index measures how different consumption patterns are in a given country. Chai et al. (2015) propose an index based on whether the probability that two currency units drawn randomly from the expenditure of a household are spent on different expenditure categories is different from the same probability calculated at the country level.[9] According to this index, the country in the EMDE ECA sample with the least diversity in consumption expenditure across households is Moldova, and the country with the greatest diversity is North Macedonia (Figure 6).[10] In Moldova, households up to the eighth decile differ mainly in the consumption share of food and beverages; the remaining share of their consumption is split proportionally among other consumption groups. In contrast, in North Macedonia, consumption shares across groups change rapidly by decile.

6 Heterogeneity of inflation by household characteristics

The evidence presented in the previous section shows that consumption shares differ across the populations of ECA countries and that prices of the main components of household consumption grew at different rates in 2022. These two factors point to the possibility of significant variability in inflation across households. This section explores the drivers of such variability by examining its correlation with household characteristics.

Assuming that the shares of consumption components do not change between the two time periods, we can construct an inflation index for individual households by applying (3) to the household consumption basket and the prices for consumption components.[11] COL inflation rates will differ across households because each household consumes a unique basket of goods and services.

Household-specific COL inflation indexes can be used as dependent variables in the descriptive regression analysis to explore the heterogeneity of the impact of price changes by household

[9] This diversity index is calculated by the formula:

$$D_{BI} = 1 - \frac{\sum_{j=1}^{N}\left\{(s_{j\cdot})\left[\sum_{k=1}^{K}\left(\frac{s_{jk}}{s_{j.}}\right)\left(1-\left(\frac{s_{jk}}{s_{j.}}\right)\right)\right]\right\}}{\sum_{k=1}^{K} s_{.k}(1-s_{.k})},$$

where, s_{jk} referes to the share in the total expenditures of the whole population of the expenditures of individual j on good k, and $s_{j.} = \sum_{k=1}^{K} s_{jk}$ and $s_{.k} = \sum_{j=1}^{N} s_{jk}$, N is the total number of individuals and K is the total number of expenditure categories. This index can be interpreted as one minus the ratio of the probability that two currency units drawn randomly from the expenditures of an individual are spent on different expenditure categories to the probability that two currency units drawn from the expenditures of the whole population are spent on two different expenditure categories.

[10] Microdata from the 2020 Household Budget Surveys in EU and EEA countries has not yet been released.

[11] These are the standard assumptions for calculating the CPIs in most countries (Kints and Breunig 2021).

characteristics.[12] Many studies discussed in section 2 indicate that the burden of inflation is not equally distributed across households from different parts of the income distribution and that it differs based on household characteristics. This literature motivates our empirical specification:

$$L_i = \boldsymbol{\beta X_i} + \boldsymbol{\pi D_i} + \boldsymbol{\gamma R_i} + \varepsilon_i \,, \tag{6}$$

where L_i is the inflation rate experienced by household i, $\boldsymbol{X}_i$ is a vector of household characteristics (including household size, household size squared, the share of children and elderly in the household, whether female heads the household, and whether a household member is unemployed); $\boldsymbol{D}_i$ is a set of dummy variables indicating the decile of consumption expenditure distribution a household belongs to; $\boldsymbol{R}_i$ are regional variables, including urban/rural and, for some countries, regional dummies; $\boldsymbol{\beta}$, $\boldsymbol{\pi}$, and $\boldsymbol{\gamma}$ are the estimated coefficients, and ε_i is an error term. For this analysis, we rely on microdata on expenditure consumption in 19 EMDE ECA countries.

Figure 7 displays the magnitudes and significance levels of the regression coefficients estimated separately for each country. The estimations of (4) reveal that household size is a statistically significant determinant of inflation for most countries in our sample. In 16 of 19 countries, larger households appear to face lower inflation than smaller households, holding total consumption expenditure constant. In most countries, the magnitude of this effect appears to be non-linear and to decrease with household size, indicating that the more substantial effect may be evident when comparing single-person households with two- or three-person households. This effect should not be interpreted as evidence that larger households pay lower prices for the same good than smaller households do; in our analysis, prices for a given good or service are the same for all households. Rather, this effect indicates that larger households allocate proportionally more spending to goods and services for which inflation is lower than do smaller households.

The location of residence also affects the levels of inflation households face. In 13 of 16 countries for which estimation was possible, urban households seemed to experience lower inflation than rural households, with a median difference of 0.3 percentage points. Exceptions include Moldova, North Macedonia, and Poland, where urban households appeared to face inflation 0.4 to 0.7 percentage points higher than that faced by rural households.

[12] A similar approach to identify the groups differentially affected by high inflation was used by Michael (1979) and Hagemann (1982).

Our estimations reveal no clear cross-country relationship between the rates of inflation and household composition in terms of age, gender of household head, or employment status. However, a clear correlate of inflation is the consumption decile of the household. The magnitude and significance of the coefficients on the consumption decile dummies indicate that poor households consistently face higher inflation than households in the top decile. The median estimates suggest that a household in the poorest decile of the consumption distribution faces an inflation rate that is 1.5 percentage points higher than a household in the top decile with the same characteristics in terms of size, age, gender of the household head, employment, and location.

The regression analysis identifies consumption deciles and household size as characteristics that can be useful for calculating aggregate, group-specific inflation rates. These group-specific inflation rates illustrate the evolution of COL inflation and may be relevant for policy purposes, as household-specific indexes cannot be routinely estimated outside specific surveys.

The group-level COL indexes are calculated by aggregating household-specific indexes (4). The "democratic" index $L_{G,t-1}^{D,t}$ (7) assigns equal weights to every household (or group) in calculating the aggregate inflation index.[13]

$$L_{G,t-1}^{D,t} = \sum_{i \in G} w_i L_{i,t-1}^{t} = \sum_{j=1}^{m} s_{j,G}^{D} \frac{p_j^t}{p_j^{t-1}}, \quad (7)$$

where group-level shares are derived by averaging the shares of all households *i* in group *G*:

$$s_{j,G}^{D} = \sum_{i \in G} w_i s_{j,i}.$$

The "plutocratic" index $L_{G,t-1}^{P,t}$ (8) adopts a weighting scheme in which the importance of households is proportional to their expenditure share in aggregate expenditures:

$$L_{G,t-1}^{P,t} = \sum_{j=1}^{m} s_{j,G}^{P} \frac{p_j^t}{p_j^{t-1}}, \; s_{j,G}^{P} = \frac{\sum_{i \in G} w_i C_{j,i}}{\sum_{j=1}^{m} \sum_{i \in G} w_i C_{j,i}} \quad (8)$$

Figure 8 shows the distribution of the COL inflation rates relative to the mean inflation by household per capita consumption deciles or quintiles. For all EMDE ECA countries, except Belarus, households from the lowest deciles experience the highest inflation (Figure 8, panel a). This correlation reveals the regressive effect of inflation. Households in the lowest decile of the consumption distribution face inflation rates that are, on average, 1.2 percentage points higher than

[13] As we are using household sample surveys, w_i sampling weights are of course needed for the aggregation.

the average COL inflation in their country and 2.3 percentage points higher than the inflation rate faced by households in the top decile of the consumption distribution. In Moldova, the inflation rate of the basket of goods and services consumed by households from the lowest decile is 1.8 percentage points higher than the average inflation in the country and 5.7 percentage points higher than the inflation faced by the richest households. In North Macedonia, the inflation rate for the lowest decile is 3.1 percentage points higher than the average inflation in the country and 5.2 percentage points higher than the inflation faced by the households in the top decile. A similar pattern holds for the other countries in the sample except for Belarus, where wealthier households seem to experience inflation that is higher than the mean inflation and inflation faced by the poor. The magnitude of the difference is relatively small, with households in the top decile facing inflation 0.3 percentage points above the average and 0.8 percentage points higher than the inflation of the bottom decile.[14]

These differences in inflation between the lowest and highest deciles of the income distribution are within the ranges found by other studies – such as the 1.2 percentage points difference observed between the top and the bottom deciles in a sample of 25 European countries in 2001–2015 by Gurer and Weichenrieder (2020) and the 1.5 percentage point difference found by Kints and Breunig (2021) in Australia during a period of relatively low inflation (2011 – 2018). Kaplan and Schulhofer-Wohl (2017) find that lower-income households in the US faced higher inflation than wealthier households in 2004 - 2013, with an annual interquartile difference of 6.2–9.0 percentage points.

Qualitatively similar patterns of regressive inflation are observed for EU/EEA countries (Figure 8, panel b), for which information is available only by quintiles. In this sample, the widest inflation gap between the poorest and wealthiest households (about 8.1 percentage points) is observed in Latvia. Norway shows no clear relationship between household consumption level and COL inflation rates. The average difference in inflation between the poorest and richest households in

[14] In Belarus, the consumption categories with the largest price increases were transport (21.2 percent annual increase by December 2022), followed by miscellaneous goods and services (17.6 percent) and alcohol and tobacco (16.8 percent). The first two are categories for which the share of consumption allocated by richer households is larger than for poor households. In the case of alcohol and tobacco, the share is larger for poorer households than for richer ones, but the difference in small.

the EU/EEA countries (about 1.6 percentage points) is slightly lower than for EMDE ECA countries.[15]

The median COL-based inflation exceeds the median CPI-based inflation for all deciles or quintiles except the top ones (Figure A1 in the Appendix). The official CPI inflation exceeds COL inflation across all households in Greece, the Kyrgyz Republic, and Spain. The significant difference between the average COL- and CPI-based inflation appears to have emerged only around the middle of 2021; the median difference between both indicators was close to zero until that point (Figure A2). This finding suggests that CPI-based inflation can underestimate COL inflation when price increases are uneven across goods and services, as happened during the inflationary shock of 2022.[16]

Figure 9 shows the distribution of COL inflation rates by household size for 19 EMDE ECA countries. In Moldova, large households appear to face much lower levels of inflation compared to smaller households. This difference reaches 4 percentage points for single-member households.[17] Similar patterns are observed for many countries in the region, including Croatia, North Macedonia, and Serbia. On the other hand, the pattern reverses in Uzbekistan, where inflation is slightly higher for larger households than for smaller ones. These results indicate that although the relationship between inflation and household size is more heterogeneous across countries than across consumption deciles, for some countries, changes in inflation rates by household size should be considered when designing economic policies. The lower inflation rates experienced by larger households could be explained by economies of scale on household size that result in lower relative shares of some groups of products compared to these shares in the budgets of small-size households (e.g., Deaton 1998). Typically, the largest economies of scale are on

[15] Our results – which show that poor households throughout Europe experience consistently higher inflation than the average households and that the gap between these households and the wealthiest households is even wider – are consistent with country-specific estimations for the same set of EU countries by Claeys et al. (2023). In contrast, Jaravel (2022) finds that post-pandemic inflation in the US was higher for the middle class (primarily because of inflation for gas and vehicles) than for the poor. Chakrabarti et al. (2023) report higher levels of inflation for middle-income households in the US at the end of 2021 and early 2022. However, by December 2022, the bottom 40 percent of the US population experienced the highest inflation of any income groups.

[16] World Bank (2022c) finds that, before the energy and food price shock of the war in Ukraine, average household inflation was below CPI inflation in Bosnia and Herzegovina, Kosovo, Montenegro, and Serbia but above the CPI in Albania and North Macedonia.

[17] Fessler and Fritzer (2013) report that one-person households in Austria in 2009/2010 experienced a 2.4 percentage point higher inflation rate than households with five or more members.

housing and food consumption. These are the categories for which prices increased the most in the ECA region in 2022.

We can analyze the sources of the differences between the COL and CPI inflations using decomposition (5). The impact of a particular consumption component on that difference is determined by the absolute difference in the share of that component in the COL and CPI consumption budget and the magnitude of the price change for that component. If the share of a component is small or the differences in the shares between two baskets are small, even significant price changes will have a negligible impact on the difference between COL and CPI inflations. Table A2 in the Appendix presents the decomposition of the COL and CPI differences by 12 consumption components separately for each country in our sample.

For the majority of the countries, differences in COL and CPI inflations are influenced by the differences in the share of food between the COL and CPI baskets, and by the high level of food inflation. The effects of other components are more heterogeneous across the countries. Surprisingly, energy prices (included in the housing component), while contributing to the increasing gap between the two inflations in Albania, Belarus, Moldova, and Uzbekistan, reduced that gap in Turkey, Poland, and Montenegro. Similarly, the transport category widened that gap in Armenia, Bulgaria, Georgia, Croatia, Serbia, and Turkey and narrowed the gap in Bosnia and Herzegovina, Belarus, Moldova, and Uzbekistan.

7 Implications of using COL and CPI to estimate poverty and inequality

To understand the economic significance of using COL inflation instead of standard CPI inflation, we simulate the poverty and inequality rates using COL inflation and compare them with rates calculated based on CPI inflation.

Figure 10 shows the simulated poverty headcount and poverty gap rates at the $6.85 (PPP 2017) poverty line for the 19 EMDE ECA countries (Foster et al. 1984). Panel (a) of Figure 10 demonstrates that COL-based poverty is consistently higher than CPI-based poverty for virtually all countries in the region, and this difference widened during periods of high inflation in 2022 (arrows pointing north-northeast in panel a). Absent changes in nominal income, using the COL inflation rates rather than the standard CPI in 2022 would yield a 1 percentage point higher poverty headcount rate for the average country in EMDE ECA. The same difference in 2021 was, on

average, 0.5 percentage points. COL-based poverty rates are almost 2.7 percentage points higher than rates derived from CPI inflation in Kazakhstan in 2021, for example, and that difference grew to 4.2 percentage points in 2022. Similarly large differences in the COL and CPI rates are observed in Türkiye (0.7 percentage points in 2021 and 2.2 in 2022) and Moldova (1.2 in 2021 and 3.9 in 2022).

Poverty gaps simulated using the COL and CPI approaches also differ more when inflation is high (panel (b) of Figure 10). The gaps in 2022 are larger than in 2021 for all countries in our sample (all arrows point to the north-northeast). The COL-based poverty gap rate for the average country is 0.6 percentage points higher in 2022 and 0.3 percentage points higher in 2021 than the CPI-based poverty gap. The most significant differences are in Azerbaijan (1.7 percentage points), Kazakhstan (1.6 percentage points), Moldova (1.4 percentage points), and Türkiye (1.1 percentage points). As with poverty rates, the differences between the two methods are smaller when inflation rates are low (2021).

Figure 11 plots the Gini coefficients of per capita consumption expenditures calculated based on the two measures of inflation. As expected, the COL-based measure of consumption inequality is higher than the CPI-based inequality in most ECA countries. The most significant differences are in Moldova (1.3 Gini points), Azerbaijan (1.2 points), and North Macedonia (0.9 points). In Belarus, that difference is negative but small (-0.2 points). The differences between the COL- and CPI-based Gini's are significant enough to alter the cross-country inequality rankings for the Kyrgyz Republic, Kosovo, and Serbia.[18] The differences in inequality measures are comparable to those that Guter and Weichenrieder (2020) find in 25 European countries. Their analysis shows that ignoring the differential inflation across the income distribution underestimates the Gini index in those countries by 0.4 points.

[18] The results of this section are based on a democratic weighting scheme for calculating inflation indexes. The democratic weighting scheme assumes equal weights for every household (or group) in calculating the aggregate inflation index. The CPIs are based on a "plutocratic weighting scheme" where the importance of households is proportional to their expenditure share in aggregate expenditures. Thus, the part of the differences between COL- and CPI-based results presented in this paper could be attributed to the differences between the plutocratic and democratic approaches, the so-called "plutocratic bias" (Ruiz-Castillo et al. 2000).

8 Conclusions and policy implications

In this study, we have calculated the inflation rates faced by individual households across 19 EMDE ECA countries during 2022 by constructing a cost-of-living index for each household. We also provide limited results for 25 EU/EEA countries. Our analysis shows that owing to differences in consumption patterns and differences in price increases across goods and services, the poorest households faced significantly higher inflation than the wealthiest households in almost every country in ECA in 2022. Moreover, the average inflation estimated by the cost-of-living index was higher than the CPI inflation.

Our results suggest that estimates of poverty and inequality based on the actual changes in the COL households face may be higher than estimates made using a uniform CPI across households and that the CPI might be a particularly unreliable instrument for assessing the extent to which household living costs increase during periods of high inflation, such as 2022. Using the CPI to measure inflation in such situations could lead to policies with potentially unintended redistributional consequences. Not considering diverging inflation patterns might be especially harmful in times of lower growth because of the negative relationship between the marginal propensity to consume and income (Fessler and Fritzer 2013).

Three assumptions affect the results presented in this paper. First, we assume that households pay the same prices for the goods and services they consume. Some evidence recently emerged that prices of the goods and services consumed by high-income households are less volatile than those of the goods consumed by the poor (e.g., Cravino et al. 2020). If this is the case, the differences in inter-decile and inter-quintile inflation might not reflect the actual inflation faced by households from lower and higher income groups.

Second, because we have no data on 2022 consumption shares, we have to assume that households did not change their consumption patterns in response to changing prices.[19] If poor households switch from high-inflation to low-inflation goods and services while wealthier groups do not alter their consumption preferences, the inflation gap between the poor and rich will be smaller.

Third, we use 12 COICOP consumption categories that agglomerate a range of goods and services that might exhibit different inflation rates and which might vary by household characteristics.

[19] The CPIs are also calculated under these two assumptions.

Using finer consumption categories might provide a more precise picture of the heterogeneous impact of inflation on the living standards of some population groups. Although relaxing these assumptions may not be feasible for the cross-country analysis presented here, it could be possible for a country-specific study.[20]

Policies to protect vulnerable populations and promote economic growth should account for the heterogeneity of inflation across households. For example, the benefit levels and eligibility criteria of many government programs are adjusted annually for inflation; increases or decreases in government benefits as a result of differences in inflation estimates could have major implications for the funding and eligibility requirements of poverty-reduction programs and government budgeting (Garner et al. 1996). Using the CPI to adjust wages may also be misleading. The negative correlation between inflation and income might result in wage increases slightly above the CPI inflation not being enough to prevent a real income loss for the poorest households. The inflation indicators that precisely capture the actual COL of the poor are essential to designing efficient poverty alleviation policies.

Our cross-country analysis provides no causal explanation for the source of household group heterogeneity in the impact of the high prices of goods and services in 2022. Exploring the specific channels that drive this group variation in each country might help to fine-tune social protection policies.

[20] We can assess how switching from COPCOP-2 to COICOP 3-digits or finer levels of detalization would affect our results. For example, for Bulgaria, the difference in inflation rates between the first and the tenth deciles declines from 2.7 percentage points when using the COICOP-2 classification to 2.5 percentage points when using the COICOP-3 classification, and to 3.4 percentage points when using the COICOP-5 digit classification.

References

Alvarez, F., Beraja, M., González Rozada, M., and P. A. Neumeyer, (2019). "From Hyperinflation to Stable Prices: Argentina's Evidence on Menu Cost Models." *Quarterly Journal of Economics,* 134 (1): 451–505.

Amble, N. and K. Stewart, (1994). "Experimental price index for elderly consumers," *Monthly Labor Review*, May 1994: 11-16.

Antón, J., Braña, F., and R. Muñoz-de-Bustillo, (2016). "An Analysis of the Cost of Disability across Europe Using the Standard of Living Approach." 7, (3): 281–306

Arrow, K., (1958). "The measurement of price changes," in *The Relationship of Prices to Economic Stability and Growth,* Joint Economic Committee, US Government Printing Office, Washington, DC, pp. 77–88.

Baez, J., Inan, O., and M. Nebiler, (2021). "Getting Real? The Uneven Burden of Inflation across Households in Turkey," *Policy Research Working Paper* # 9869. World Bank.

Belser, P., Vazquez-Alvarez, R. and D. Xu, (2022). *Global Wage Report 2022-23 : The Impact of Inflation and COVID-19 on Wages and Purchasing Power.* 1st ed. ILO. Geneva.

Brachinger, H., (2008). "Wie stark sind die unterschiedlichen Bevolkerungs-gruppen von der Inflation betroffen?," *Wirtschaftsdienst,* 88: 358-363.

Chai, A. and A. Moneta, (2010). "Retrospectives: Engel Curves" (PDF). *Journal of Economic Perspectives*. 24 (1): 225–240.

Chai, A., Rohde, N., and J. Silber, (2015). "Measuring The Diversity Of Household Spending Patterns: Measuring The Diversity Of Household Spending." *Journal of Economic Surveys* 29, (3): 423–40.

Chakrabarti, R., Garcia, D., and M. Pinkovskiy, (2023). "Inflation Disparities by Race and Income Narrow," *Federal Reserve Bank of New York Liberty Street Economics,* January 18, 2023.

Claeys, G., Guetta-Jeanrenaud, L., McCaffrey, C., and L. Welslau, (2023). "Inflation inequality in the European Union and its drivers," *Bruegel Datasets*, first published 26 October.

Colavecchio, R., Fritsche, U., and M. Graff, (2011). "Inflation Inequality in Europe." *SSRN Electronic Journal*. Hamburg University, Department Wirtschaft und Politik, Macroeconomics and Finance.

Courtney, M. (2014). "Consumer Price Indices in the UK." *SSRN Electronic Journal.*

Cravino, J., Lan, T. and A. Levchenko, (2020). "Price stickiness along the income distribution and the effects of monetary policy," *Journal of Monetary Economics,* 110: 19-32.

Cullinan, J., Gannon, B., and S. Lyons. (2011). "Estimating the Extra Cost of Living for People with Disabilities." *Health Economics* 20, (5): 582–99.

Deaton, A. (1998). "Economies of Scale, Household Size, and the Demand for Food." Journal of Political Economy 106(5): 897-930.

Dimensions.AI. (n.d). "Cost of Livind AND Inflation." Accessed January 25, 2023 shorturl.at/cqrvX

Erosa, A. and G. Ventura, (2002). "On inflation as a regressive consumption tax." *Journal of Monetary Economics*, 49(4): 761-795.

European Parliament, (2022). "Eurobarometer Survey EP Autumn 2022." December 2022. https://europa.eu/eurobarometer/surveys/detail/2932.

Fessler, P., and F., Fritzer. (2013). "The Distribution of Inflation among Austrian Households." *Monetary Policy & the Economy* Q3.

Foster, J., Greer, J., and E. Thorbecke, (1984). "A class of decomposable poverty measures." *Econometrica,* 52 (3): 761–766.

Fritzer, F., and E. Glatzer. (2009). "Group-Specific Inflation Rates for Austrian Households." *Monetary Policy & the Economy* Q1-09.

Garner, T., Johnson, D. and M. Kokoski, (1996). "An experimental consumer price index for the poor," *Monthly Labor Review*, 119: 32–42.

Gurer E. and A. Weichenrieder, (2020). "Pro-rich inflation in Europe: Implications for the measurement of inequality." De Gruyter 21(1): 107-138.

International Monetary Fund, (2022a). "Fiscal Monitor. Helping People Bounce Back." IMF.

International Monetary Fund, (2022b). Consumer Prince Index online database. Available at: https://data.imf.org/?sk=4FFB52B2-3653-409A-B471-D47B46D904B5. Accessed on January 16, 2023.

Hagemann, R., (1982). "The Variability of Inflation Rates across Household Types," *Journal of Money Credit and Banking*, 14: 494–510.

Hill, P., (2010). "Lowe Indices," chapter 9: 197-216 in Diewert, W., Balk, B., Fixler, D., Fox, K. and A. Nakamura (2010), *PRICE AND PRODUCTIVITY MEASUREMENT*: *Volume 6 -- Index Number Theory*. Trafford Press.

Hobijn, B., and D. Lagakos.(2005). "Inflation Inequality In The United States." *Review of Income and Wealth* 51(4): 581–606.

Jacobs, D., Perera, D. and T. Williams, (2014). "Inflation and the Cost of Living," *RBA Bulletin*, Reserve Bank of Australia, pages 33-46, March.

Jaravel, X., (2022). "Inflation and Inequality," mimeo, LSE, London.

Kalwij, A., A., Robertus, Gardner, J., and A. Ali, (2018). "Inflation Experiences of Retirees." *Journal of Pension Economics and Finance* 17(1): 85–109.

Kaplan, G., and S. Schulhofer-Wohl, (2017). "Inflation at the Household Level." *Journal of Monetary Economics* 91: 19–38.

Kints, M. and R. Breunig (2021). "Inflation Variability Across Australian Households: Policy Implications for Inequality and Indexation," Economic Record, 97(316):1-23.

Konüs, A. (1939). "The Problem of the True Index of the Cost of Living." *Econometrica,* 7 (1): 10–29.

Lasarte-Navamuel, E., Fernández-Vázquez, E., and F. Rubiera-Morollón. (2017). "Higher Cost of Living in Urban Areas? An AIDS-Based Analysis of Food in Spain." *Regional Studies* 51, (11): 1665–77.

Lebow, E. and J. Rudd, (2003). "Measurement Error in the Consumer Price Index: Where Do We Stand?" *Journal of Economic Literature* 41: 159–201.

Lydon, R. (2022). "Household Characteristics, Irish Inflation and the Cost of Living." *Economic Letter*. Central Bank of Ireland.

Mehrhoff, J., and C. Breuer. (2010). "Is Inflation Heterogeneously Distributed Among Income Groups?" In *How Reliable Are German Aggregate Price Indices?*, Vol. F2-V2. Frankfurt, Germany: Verein für Socialpolitik.

Michael, R. (1979). "Variation across households in the rate of inflation," *Journal of Money, Credit, and Banking*, 11: 32–46.

Muellbauer, J, (1974) "Prices and Inequality: The United Kingdom Experience." *The Economic Journal* 84(333): 32.

Oldfield, Z., Leicester, A. and C. O'Dea, (2018). "The Inflation Experience of Older Households." IFS Commentaries C106. London, UK.

Pollak, R, (1980). "Group Cost-of-Living Indexes." *The American Economic Review*, Papers and Proceedings of the Ninety-Second Annual Meeting of the American Economic Association, 70 (2): 273–78.

Ruiz-Castillo, J. Ley, E and M. Izquierdo, (2000). "The Plutocratic Bias in the CPI: Evidence from Spain." *IMF Working Paper* 00 (167).

Schultze, C., and C. Mackie (2002). "At what price?: conceptualizing and measuring cost-of-living and price indexes." National Research Council.

Ulmer, M. (1946). "On the Economic Theory of Cost of Living Index Numbers." *Journal of the American Statistical Association* 41, (236): 530–42.

United Nations, (2009). "Practical Guide to Producing Consumer Price Indices", United Nations, New York and Geneva.

United Nations, (2018). "Classification of Individual Consumption According to Purpose (COICOP) 2018." *Statistical Paper* M(99). New York.

_____, (2022). "Global Impact of the War in Ukraine: Billions of People Face the Greatest Cost-of-Living Crisis in a Generation." United Nations.

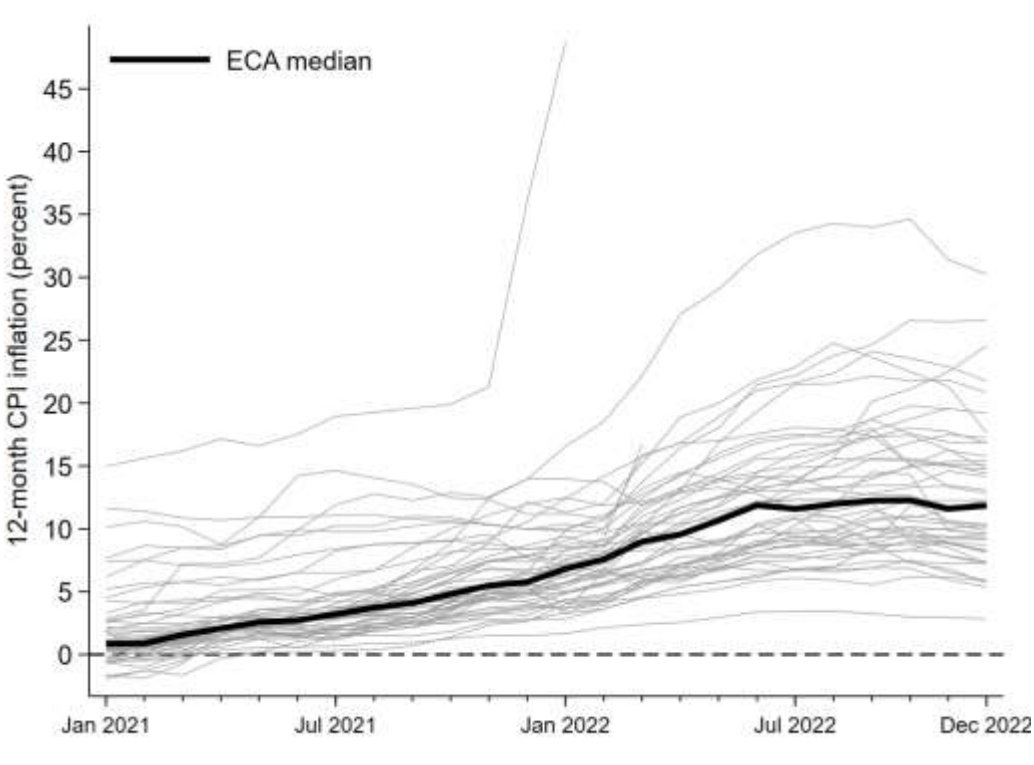
USA Bureau of Labor Statistics (USBL). (1966). "The Consumer Price Index: History and Techniques". US Government Printing Office.

World Bank, (2022a). *Europe and Central Asia Economic Update, Fall 2022: Social Protection for Recovery*. Washington, DC: World Bank.

World Bank, (2022b). "Energy Crisis: Protecting Economies and Enhancing Energy Security in Europe and Central Asia." Policy Note. Washington, DC: World Bank.

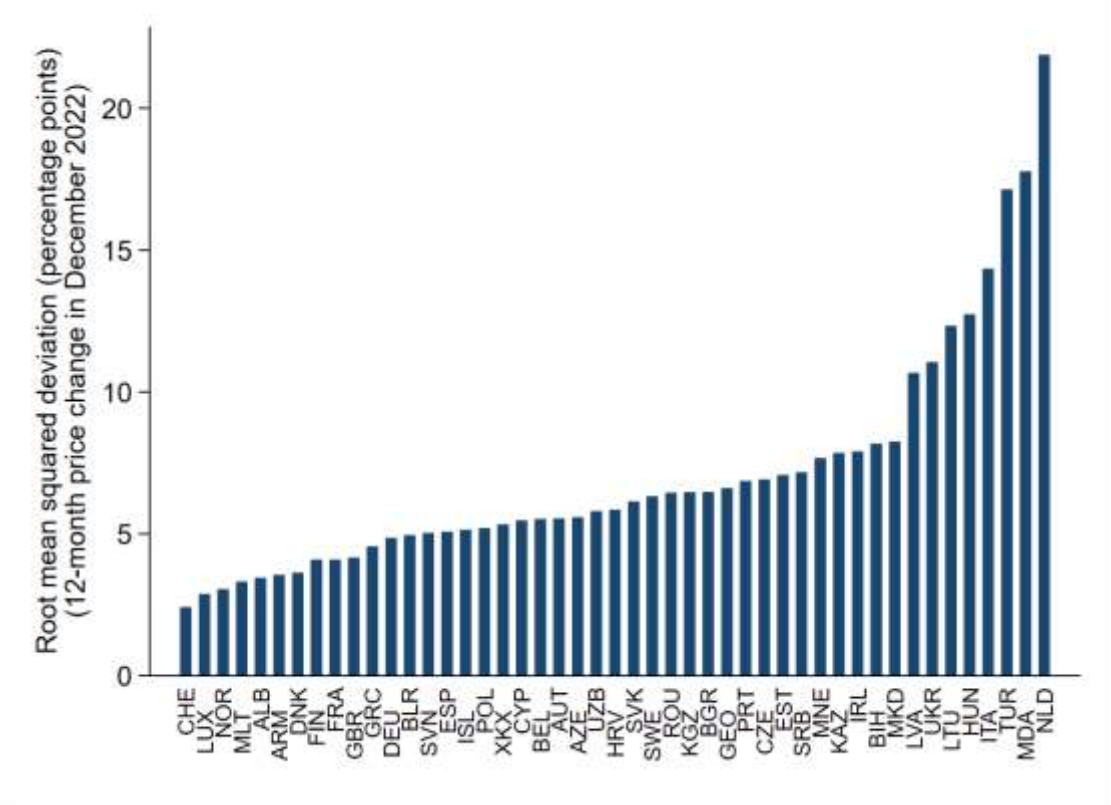
World Bank, (2022c). *Western Balkans Regular Economic Report*, No.2, Spring 2022 Washington, DC: World Bank.

Figure 1 – 12-month CPI inflation by month across Europe and Central Asia, Jan 2021 – Dec 2022



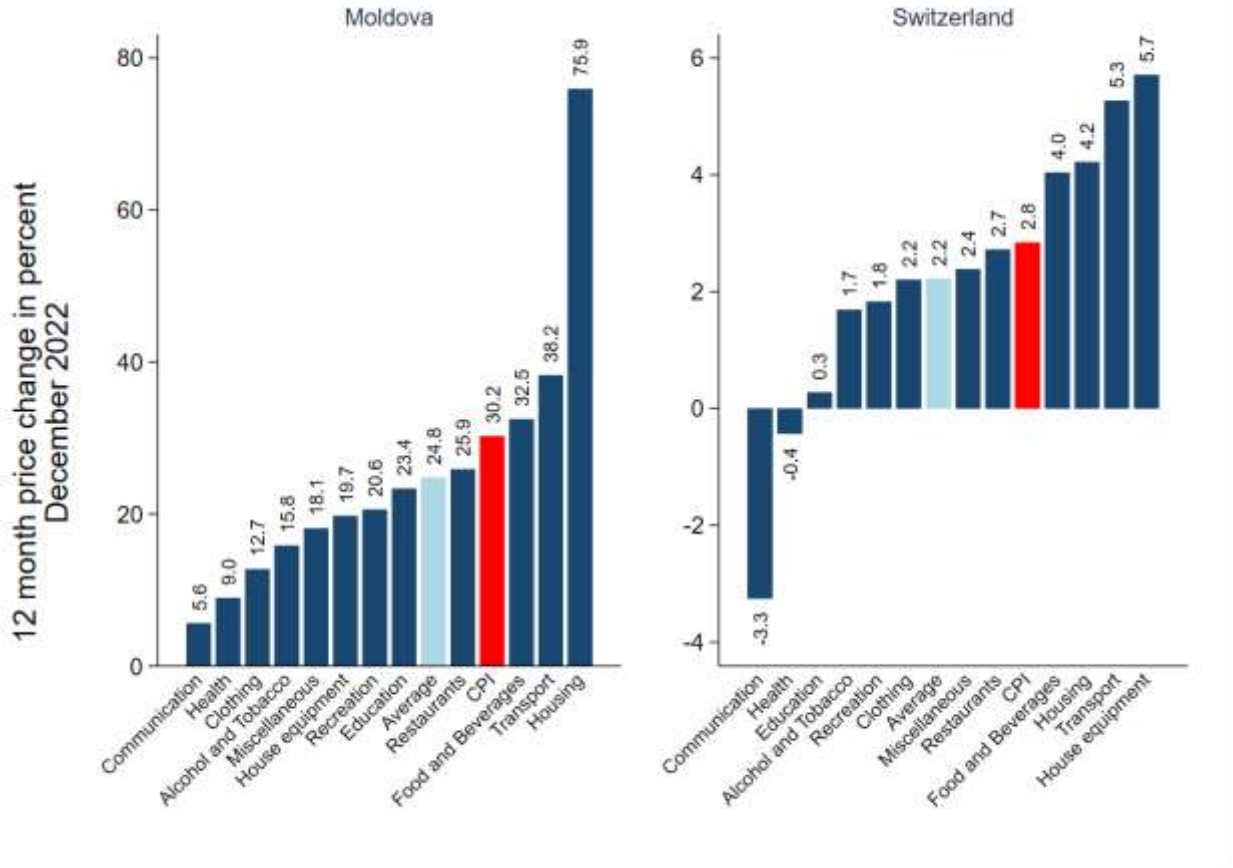
Note: this graph plots the 12-month CPI inflation by month for every ECA country (thin grey lines) and the median value for the whole region (solid black line) in the period January 2021 – December 2022 (or the latest available). The value for Türkiye is above the vertical axis range from February 2022 onwards.

Figure 2 – Dispersion in price changes across Europe and Central Asia, 2022



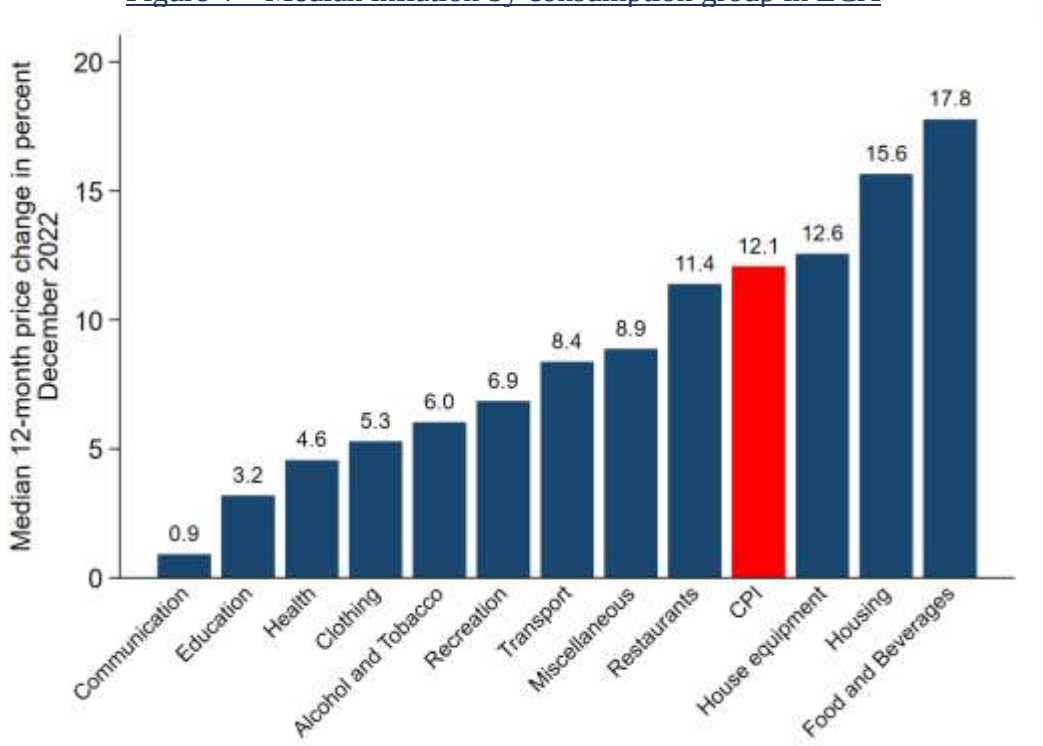
Note: this graph plots the RMSD in the 12-month price change across the 12 COICOP broad consumption groups for every country. The values correspond to December 2022.

Figure 3 – 12-month price change across consumption group in Moldova and Switzerland, 2022



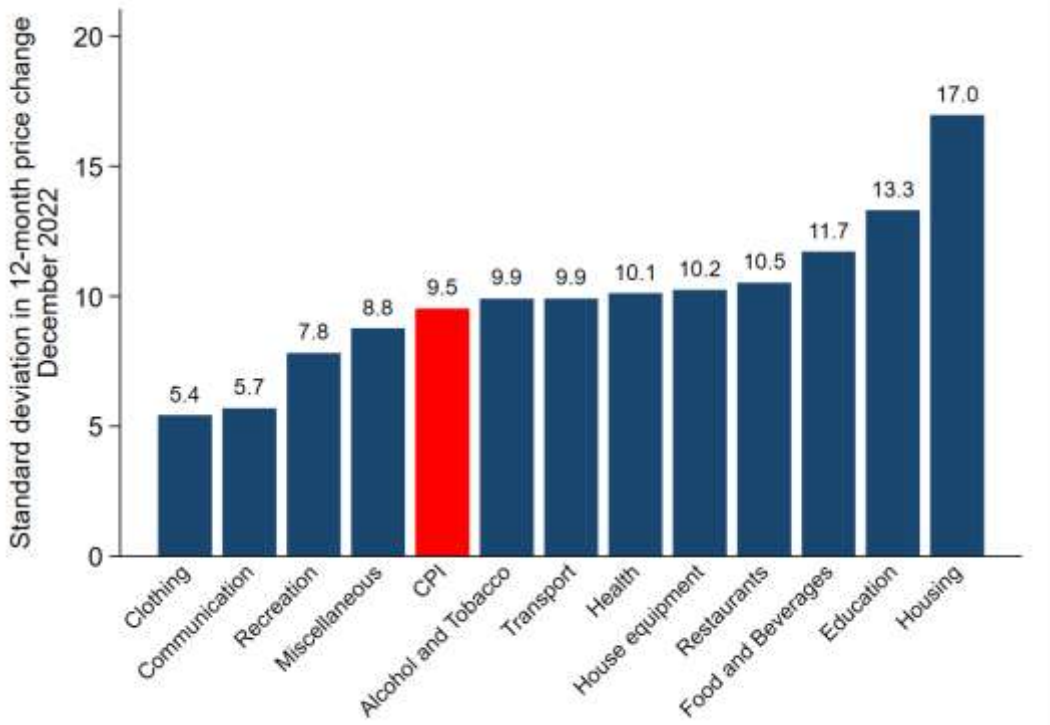
Note: this graph plots the 12-month price change by December 2022 of the 12 COICOP broad consumption groups in Moldova (left panel) and Switzerland (right panel). The bar in light blue indicates the simple average of the 12-month price across these groups. The bar in red indicates the 12-month price change of the official Consumer Price Index (CPI) in each country during the same period.

Figure 4 – Median inflation by consumption group in ECA



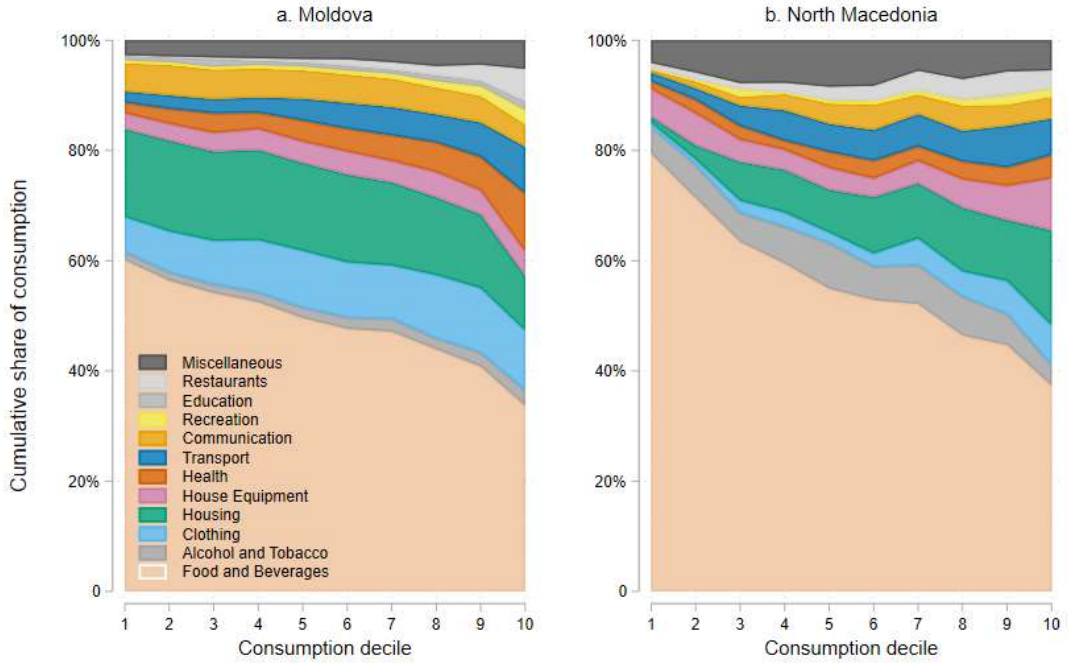
Note: this graph plots the median 12-month price change across 47 ECA countries by the 12 COICOP broad consumption groups. The bar in red indicates the median 12-month price change of the official Consumer Price Index (CPI) across 47 ECA countries. The underlying price change values correspond to December 2022.

Figure 5 – Standard deviation of inflation by consumption group across ECA, 2022



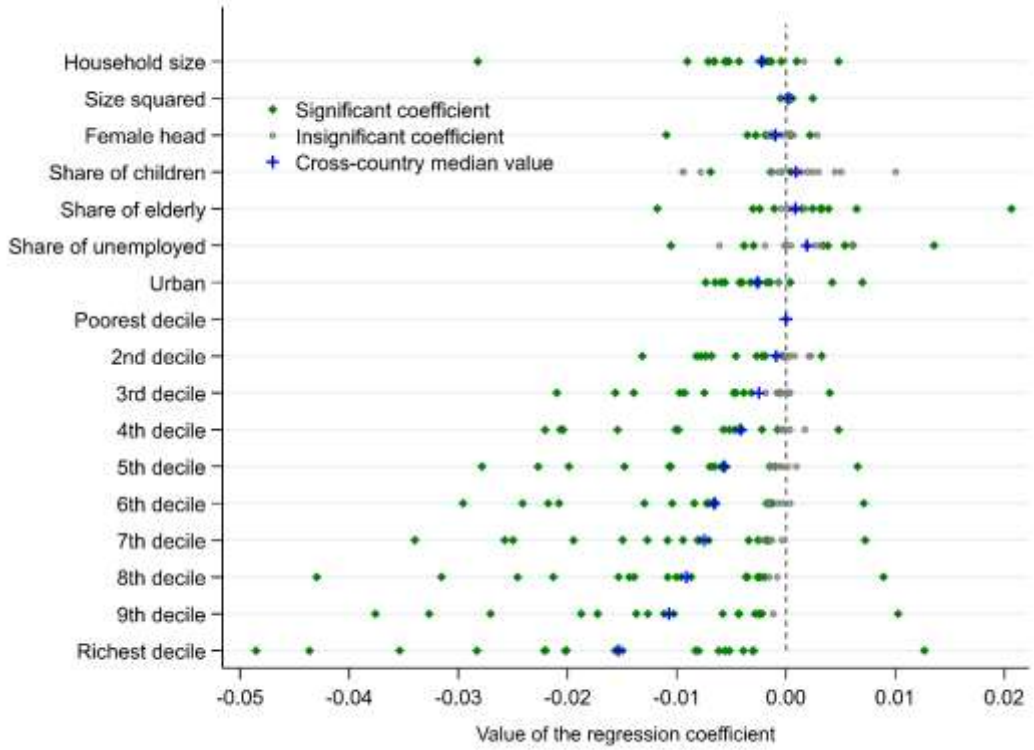
Note: this graph plots the standard deviation of the 12-month price change across 47 ECA countries by the 12 COICOP broad consumption groups. The bar in red indicates the standard deviation of the 12-month price change in the official CPI across 47 ECA countries. The underlying price change values correspond to December 2022.

Figure 6 – Composition of consumption expenditure across deciles, Moldova and North Macedonia



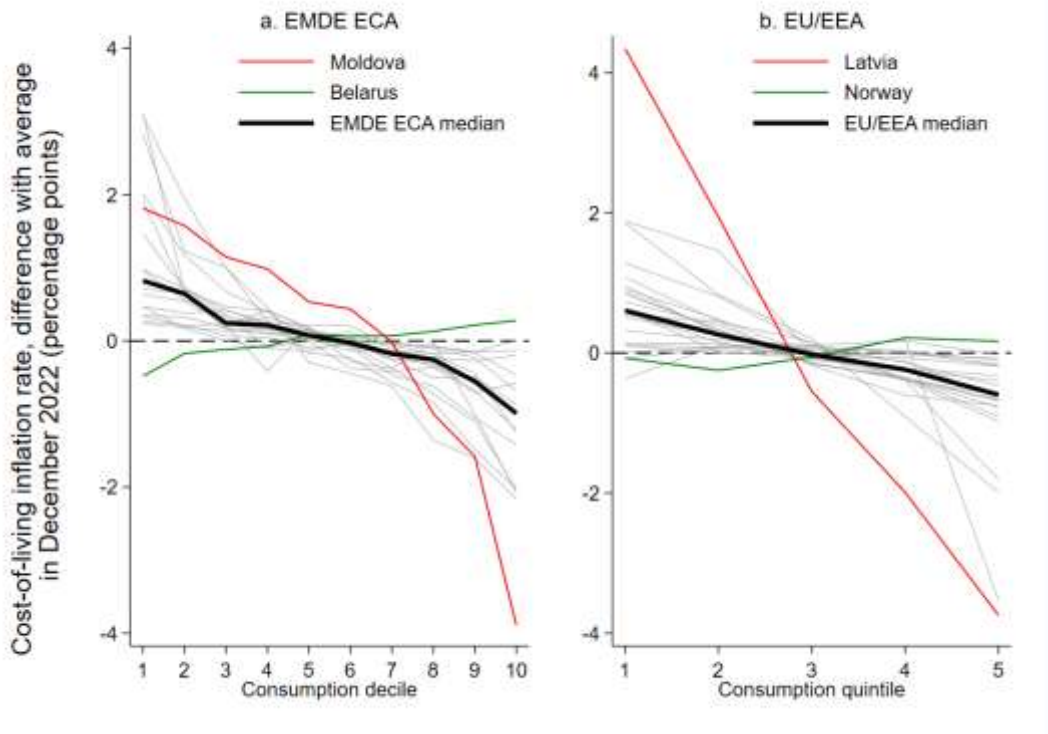
Note: this graph plots the composition of consumption expenditure across deciles in Moldova (left panel) and North Macedonia (right panel). Moldova is the country with the lowest value in consumption diversity between households among the 19 EMDE ECA countries with decile data in our sample. North Macedonia is the country with the highest value in consumption diversity among the same group. Consumption expenditure is classified into the 12 COICOP 2-digit groups, each depicted in a different color. The values for both countries were calculated from their respective Household Budget Survey for 2021.

Figure 7: Distribution of regression coefficients for EMDE ECA countries



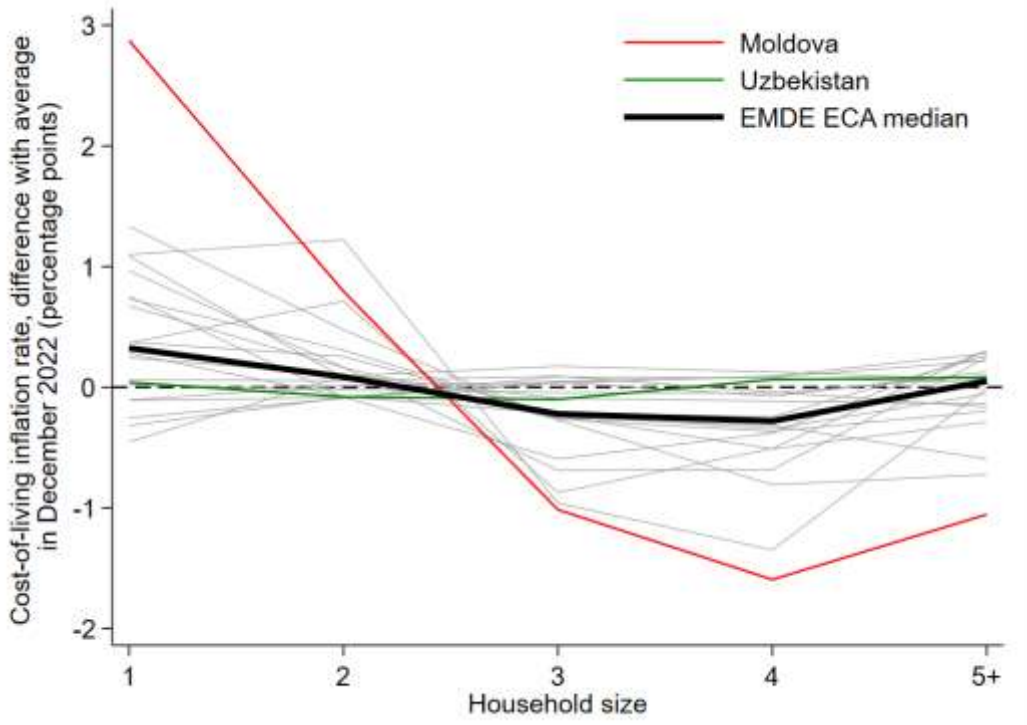
Note: this graph plots the coefficients of regression (4) estimated separately for 19 EMDE ECA countries. Each marker represents a value of the coefficient for a country; each horizontal line corresponding to the coefficients in regression (4) contains 19 country estimates (markers). The shape of the marker determines whether the coefficient is significantly different from 0 (a diamond) or not (a ring).

Figure 8 – COL12-month price change by decile or quintile across ECA



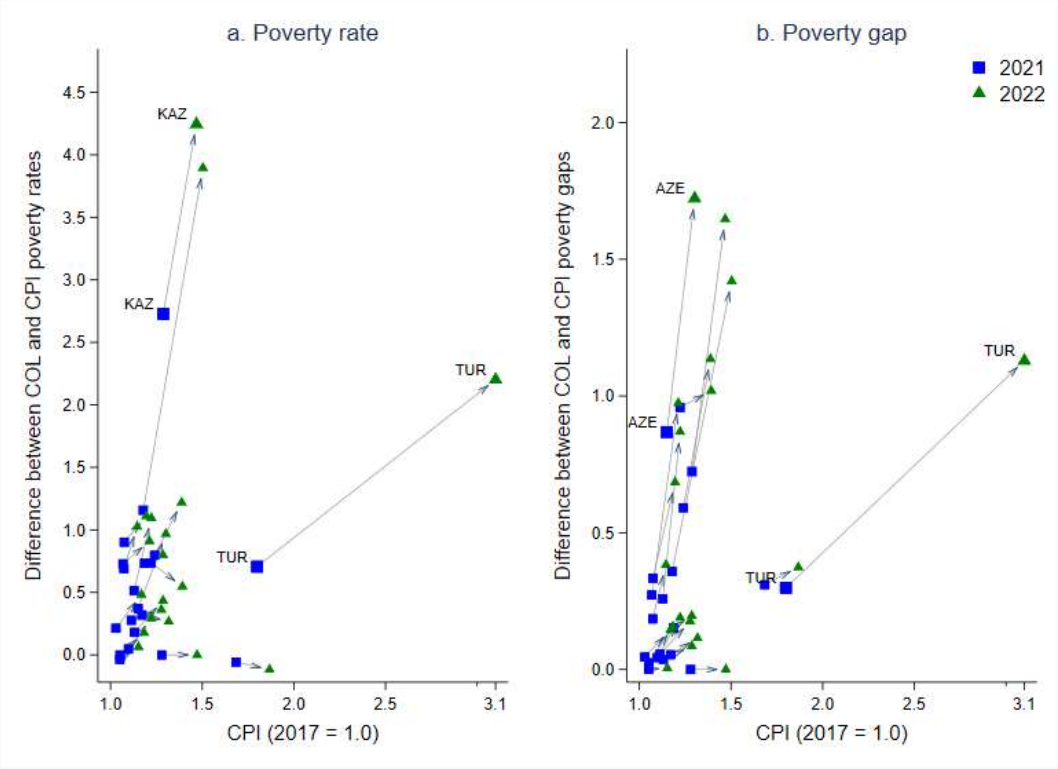
Note: this graph plots the cost-of-living (COL) 12-month price change by decile (EMDE ECA countries, left panel) or quintile (EU/EEA countries, right panel) for December 2022. The 12-month price change by decile/quintile is expressed as a difference with respect to the average COL 12-month price change. The thick black line indicates the median values within each group of countries. In the left panel, the red line highlights the values for Moldova, the country with the largest difference between the COL 12-month price change in decile 1 and decile 10, and the green line highlights the values for Belarus, the country with the smallest difference between the COL 12-month price change in decile 1 and decile 10. In the right panel, the red line highlights the values for Latvia, the country with the largest difference between the COL 12-month price change in quintile 1 and quintile 5, and the green line highlights the values for Norway, the country with the smallest difference between the COL 12-month price change in quintile 1 and quintile 5.

Figure 9 – COL 12-month price change by household size across EMDE ECA



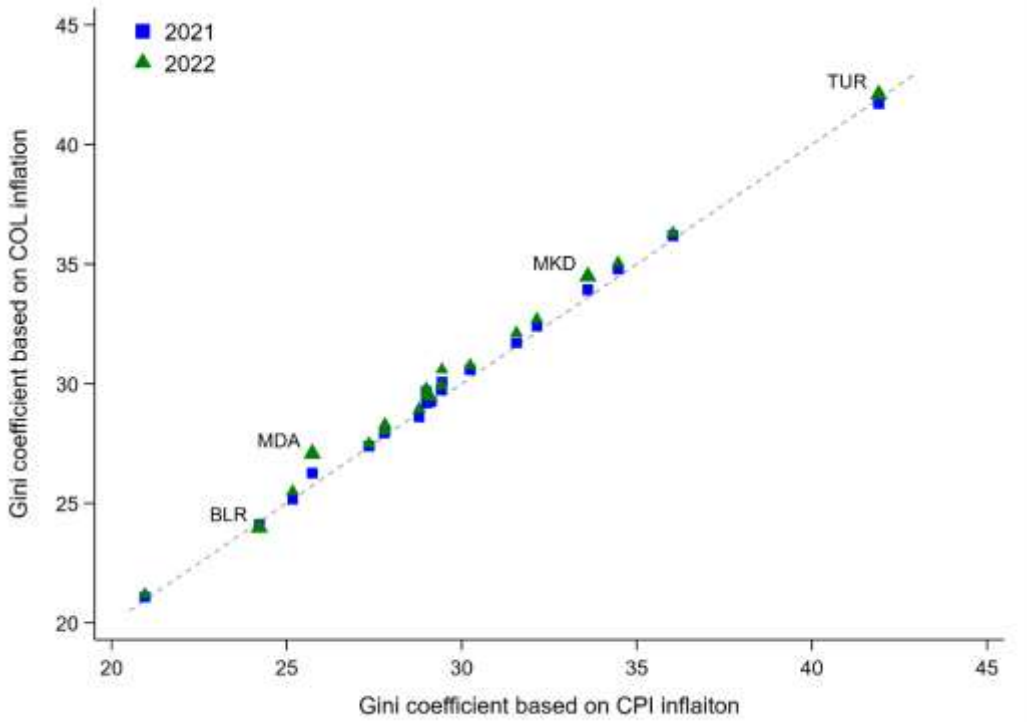
Note: this graph plots the cost-of-living (COL) 12-month price change by household size for December 2022. The 12-month price change for each household size group is expressed as a difference with respect to the average COL 12-month price change. The thick black line indicates the median values for the 19 EMDE ECA countries with HBS microdata. The red line shows the values for Moldova, the country with the largest difference between the COL 12-month price change for households of one member and households of 5 or more members. The green line shows the values for Uzbekistan, the country with the smallest difference between the COL 12-month price change for households of one member and households of 5 or more members.

Figure 10: Comparison of CPI- and COL-based poverty measures



Note: this graph plots the differences in poverty rates and poverty gap rates between the CPU-based and COL-based measures for 19 ECA EMDE countries. Each marker represents a value of corresponding poverty measure in a particular country and year. Square markers show differences between the poverty measures for 2021, and triangular markers show these differences calculated for 2022. AZE – Azerbaijan; KAZ – Kazakhstan; TUR – Türkiye.

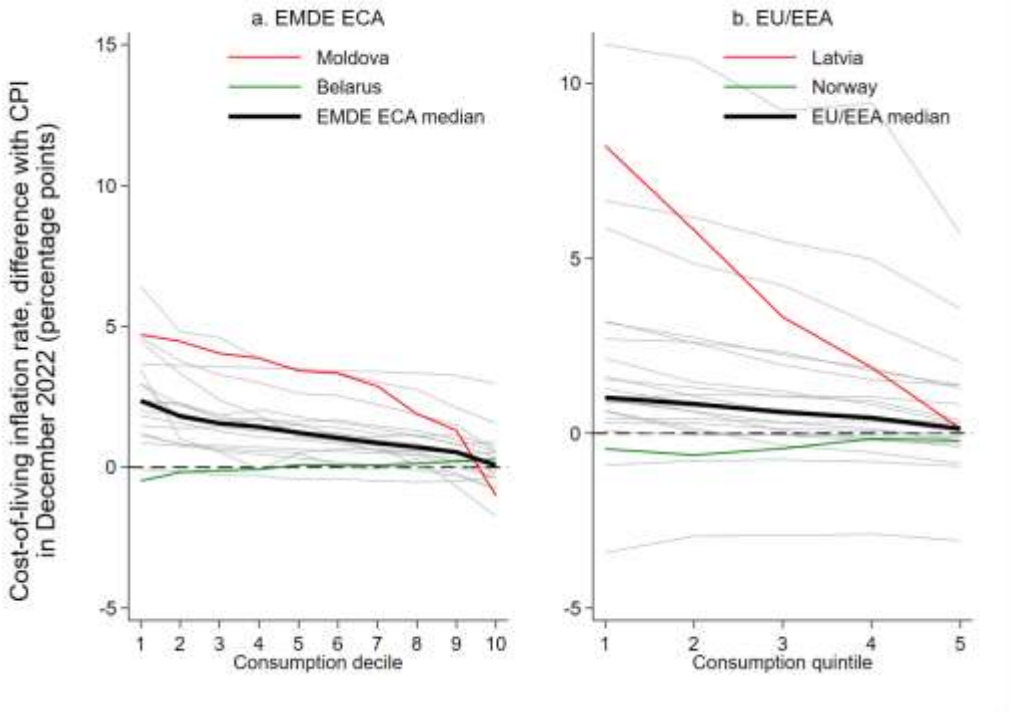
Figure 11: Comparison of CPI- and COL-based Gini coefficients



Note: this graph plots the Gini coefficients of per capita consumption expenditures for 19 ECA EMDE countries. Each marker represents a value of Gini coefficients for a particular country and year. Square markers show Gini estimated based on 2021 COL inflation, and triangular markers show Gini estimated based on 2022 COL inflation. Markers on the 45-degree dotted line indicate no difference between the CPI and COL-based Gini coefficients. The farther the estimate is from the 45-degree line the larger is the difference. BLR – Bulgaria, MDA – Moldova; MKD – North Macedonia; TUR – Turkey.

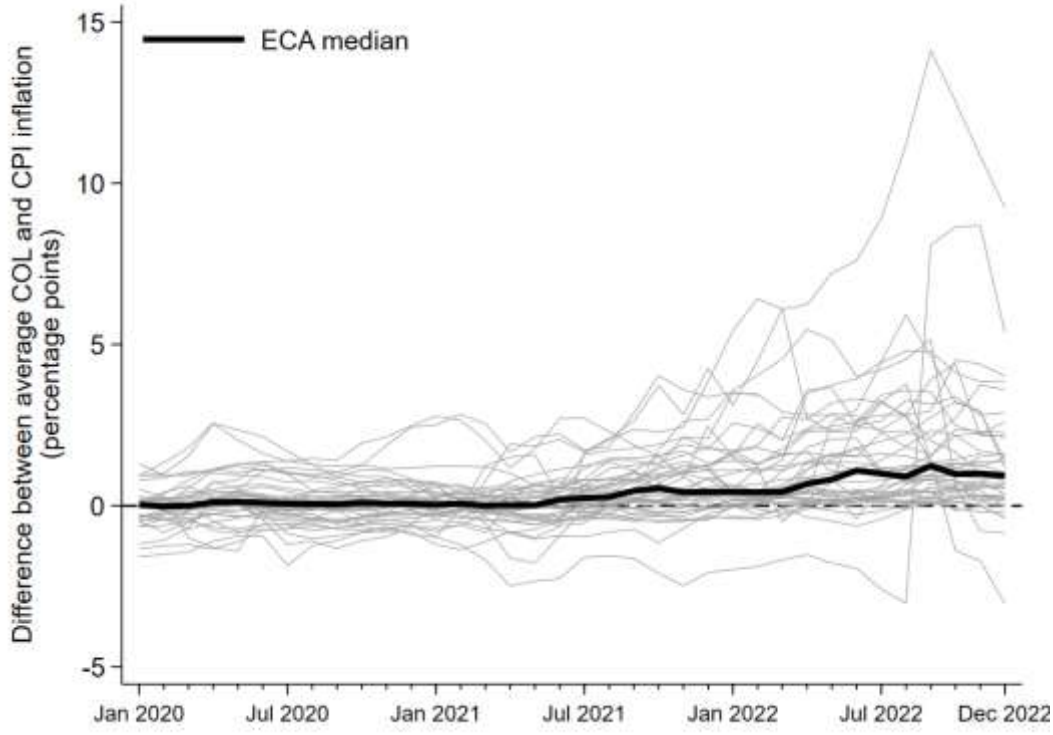
Appendix

Figure A1 – COL annual inflation by decile or quintile across ECA, difference with CPI



Note: this graph plots the cost-of-living (COL) 12-month price change by decile (EMDE ECA countries, left panel) or quintile (EU/EEA countries, right panel) for December 2022. The12-month price change by decile/quintile is expressed as a difference with respect to the CPI inflation. The thick black line indicates the median values within each group of countries. In the left panel, the red line highlights the values for Moldova, the country with the largest difference between the COL 12-month price change in decile 1 and decile 10, and the green line highlights the values for Belarus, the country with the smallest difference between the COL 12-month price change in decile 1 and decile 10. In the right panel, the red line highlights the values for Latvia, the country with the largest difference between the COL 12-month price change in quintile 1 and quintile 5, and the green line highlights the values for Norway, the country with the smallest difference between the COL 12-month price change in quintile 1 and quintile 5.

Figure A2 – Difference between COL average annual inflation and CPI annual inflation across ECA, by month



Note: this graph plots the difference between the cost-of-living (COL) average annual inflation (average across 10 deciles or 5 quintiles) and the CPI annual inflation by month for every ECA country in our sample. The difference is expressed in percentage points. The thick black line indicates the median difference across ECA at every month until December 2022. The thin grey lines plot the values for each individual country.

Table A1: Latest rounds of household survey and 2022 CPI inflation for ECA countries.

Country	Survey	Latest survey Year	Sample Size	Latest detailed inflation available Year/Month	Latest CPI annual inflation (2022) in %
Albania	HBS	2020	5,799	2022/12	7.40
Armenia	ILCS	2020	5,184	2022/12	8.84
Azerbaijan	HSMTSA	2011	6,990	2022/12	15.09
Bulgaria	HBS	2019	2,952	2022/12	16.89
Bosnia and Herzegovina	HBS	2015	7,702	2022/12	16.27
Belarus	HHS	2020	5,834	2022/12	13.34
Georgia	HIS	2020	13,313	2022/12	9.85
Croatia	HBS	2010	3,461	2022/12	13.27
Kazakhstan	HBS	2018	47,333	2022/12	20.30
Kyrgyz Republic	KIHS	2020	19,885	2022/12	14.70
Moldova	HBS	2021	4,079	2022/12	31.41
North Macedonia	HBS	2021	3,061	2022/12	19.54
Montenegro	HBS	2015	1,318	2022/12	17.48
Poland	HBS	2019	35,923	2022/12	17.72
Romania	HBS	2018	30,748	2022/12	15.32
Russian Federation	HBS	2020	193,256	(2022/2)*	9.16
Serbia	HBS	2019	6,354	2022/12	15.09
Tajikistan	HSITAFIEN	2015	2,999	n.a.	n.a.
Türkiye	HICES	2019	11,520	2022/12	84.39
Uzbekistan	L2CU	2018	4,013	2022/12	12.29
Kosovo	HBS	2017	2,232	2022/12	11.60

Note: Tajikistan and Russia have not published 2-digit COICOP group inflation data for 2022. HBS - Household Budget Survey; ILCS - Integrated Living Conditions Survey; HSMTSA - Household Survey on Monitoring Targeted Social Assistance; HHS - Household Sample Survey; HIS - Integrated Household Survey; KIHS - Kyrgyz Integrated Household Survey; HSITAFIEN - Household Survey For The Purpose Of Improvement, Targeting And Advancing The Formula Of Indirect Estimates Of Needs; HICES - Household Income and Consumption Expenditures Survey; HLCS - Household Living Conditions Survey; L2CU - Listening to the Citizens of Uzbekistan.

* Russia HBS contains no data allowing the generation of consumption shares for 12 2-digit COICOP categories.

Table A2: Decomposition of the COL and CPI differences by 12 COICOP consumption components.

Countries	COL-CPI Inflation difference	COICOP-2 Consumption Components											
		Food	Alcohol & tobacco	Clothing	Housing	Appliances	Health	Transport	Communication	Recreation	Education	Restaurants	Miscellaneous
Albania	**1.10**	0.69	0.02	-0.02	0.41	0.01	-0.01	0.00	-0.06	0.02	0.07	0.00	-0.01
Armenia	**0.46**	0.30	0.00	0.01	0.00	-0.06	0.06	0.14	0.07	-0.02	0.09	0.00	-0.12
Bulgaria	**0.60**	0.26	-0.06	0.06	0.00	0.01	0.08	0.15	0.00	0.00	0.02	0.05	0.03
Bosnia and Hercegovina	**0.10**	0.34	0.10	-0.58	-0.01	-0.02	0.15	-0.05	-0.02	0.00	0.02	0.03	0.14
Belarus	**-0.23**	0.04	-0.07	-0.01	0.27	0.01	-0.14	-0.17	-0.19	0.00	-0.01	-0.01	0.06
Croatia	**0.66**	0.47	0.10	0.00	0.02	0.01	0.02	0.20	0.02	0.04	-0.11	-0.11	0.00
Georgia	**1.18**	0.94	0.01	0.08	0.04	0.02	0.05	0.20	-0.17	0.05	0.11	-0.19	0.03
Kosovo	**1.39**	0.88	0.01	-0.07	0.07	0.08	-0.08	0.02	-0.03	0.32	0.09	0.03	0.05
Moldova	**2.10**	0.30	0.19	-0.12	1.08	0.43	0.34	-0.44	-0.01	0.18	0.01	0.08	0.05
Montenegro	**-0.02**	0.06	0.09	0.04	-0.01	-0.03	0.00	0.06	-0.17	0.01	-0.07	0.01	0.00
North Macedonia	**2.76**	1.67	-0.12	0.52	-0.02	0.04	0.13	0.10	0.11	0.29	0.19	-0.06	-0.10
Poland	**0.28**	0.19	0.23	-0.04	-0.07	-0.03	0.07	0.05	-0.04	0.01	0.01	0.00	-0.10
Serbia	**1.41**	0.53	0.16	-0.05	0.11	0.03	0.11	0.28	0.03	0.12	0.09	0.01	-0.01
Türkiye	**2.01**	0.94	0.02	0.26	-0.40	0.37	-0.03	0.71	-0.07	0.12	0.01	-0.01	0.07
Uzbekistan	**7.49**	3.56	-0.01	2.17	1.26	0.01	0.40	-1.13	0.39	0.26	0.29	0.07	0.22