CONSUMER PRICE INDEX IN UKRAINE: METHODOLOGICAL GAPS AND POLICY IMPLICATIONS

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ABSTRACT

The Consumer Price Index (CPI) is a core indicator used to measure inflation and guide macroeconomic policy. However, its accuracy is often challenged due to discrepancies between the official weighting structure and the actual expenditure patterns of households. This study addresses the methodological limitations of CPI calculation in Ukraine and highlights the need to align it with dynamic economic realities. The article analyzes the divergence between official CPI weights and real consumption data, investigates the correlation between inflation and exchange rate fluctuations, and proposes improvements to CPI methodology. By employing graphical and regression analysis, the study demonstrates that outdated CPI structures may distort inflation estimates and hinder effective policymaking. The paper proposes a dual-track approach to CPI calculation, combining provisional and refined versions to ensure timeliness and accuracy. These findings offer a framework for enhancing the reliability of inflation indicators in Ukraine and similar economies.

Keywords: inflation, Consumer Price Index (CPI), expenditure structure, macroeconomic policy, monetary policy, inflationary processes

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INTRODUCTION

The CPI has become a particularly relevant subject of study amid intensifying global and domestic economic disruptions. At the global level, persistent inflation, energy market volatility, and geopolitical instability have placed additional pressure on national economies (Nairobi & Caroline, 2021; Pan, 2018). In 2023–2024, global inflation reached multi-year highs, driven by soaring energy and food prices and exacerbated by ongoing armed conflicts in the Middle East and Eastern Europe (Wilson & Njoku, 2023). Disruptions in global supply chains have significantly affected the pricing of goods and services across markets.

In Ukraine, the CPI is influenced by a unique set of factors, primarily wartime economic conditions, currency instability, and constrained logistics. These elements have sharply affected household purchasing power and the broader price environment (Mudrak, 2022). Inflationary pressures, amplified by currency depreciation, complicated short-term economic forecasting and hinder effective financial planning.

Given these conditions, the CPI serves as a critical tool for assessing the effectiveness of economic policy, particularly monetary interventions. An accurate and timely CPI is essential for monitoring inflation and guiding decision-making in areas such as income

indexation, fiscal targeting, and investment risk assessment (Khan & Imran, 2023; Gunjal, 2023). For an open and crisis-prone economy like Ukraine's, methodological improvements in CPI calculation are key to enhancing macroeconomic credibility and investor confidence.

From a theoretical standpoint, various schools of economic thought offer divergent interpretations of the CPI's role. Keynesian economists view it as a central indicator for demand management and countercyclical fiscal policy (Blanchard & Sheen, 2013), while monetarists argue that inflation originates from monetary factors, with CPI acting as a downstream reflection of money supply trends (Friedman, 1995). Meanwhile, behavioral economists underscore the role of perception, noting that consumer responses may diverge from official inflation indicators (Akerlof et al., 2000).

On a methodological level, CPI calculations typically rely on the Laspeyres index, which measures the average price change of a fixed basket of goods. This approach, though widely adopted, has been criticized for its rigidity and inability to reflect evolving consumption patterns or quality changes (Diewert, 1988; Balk, 2012). Boskin et al. (2016) emphasize that outdated weights can lead to a systematic underestimation of inflation's true impact on households.

This article investigates whether the current methodology used in Ukraine's CPI adequately captures inflationary realities. It tests the hypothesis that the official index does not reflect actual consumption behavior and is sensitive to exchange rate fluctuations. The empirical analysis draws on data from the State Statistics Service of Ukraine, the International Monetary Fund, and the World Bank. Additionally, the study underscores the challenges of international CPI comparison due to variations in household income levels and spending structures. These theoretical and methodological issues are explored in detail in the following section.

LITERATURE REVIEW

Modern academic literature identifies several methodological limitations associated with CPI calculation. One of the fundamental concerns is the selection of the base year and the infrequent updating of the consumer basket. As consumption patterns evolve due to technological innovation and socio-economic shifts, the accuracy of CPI depends on how frequently these changes are incorporated. Bils and Klenow (2001) point out that the CPI often fails to capture quality adjustments, potentially leading to over- or underestimation of inflation.

Another important area of research is the relationship between CPI and other macroeconomic indicators, particularly producer prices. Several studies confirm a long-run equilibrium between the consumer and producer price indices (Ghazali et al., 2009), although the causality remains debated. Some argue that producer prices influence consumer prices, while others suggest the opposite (Shahbaz & Nasir, 2009).

To enhance CPI forecasting, recent studies increasingly rely on machine learning and deep learning methods. Gunjal (2023) demonstrates that these approaches can improve predictive accuracy, enabling more responsive monetary policymaking.

Empirical findings from a range of countries reinforce the need for CPI reform. Nakamura et al. (2014) show how quality adjustments can significantly shift US inflation estimates. Białek (2020) proposes a hybrid index to address substitution and quality biases. In China, Pan (2018) documents asymmetric exchange rate pass-through effects on CPI, especially for imported goods. In Nigeria, Wilson and Njoku (2023) observe a strong short-term correlation between exchange rate volatility and consumer prices. Similarly, Brodsky (2020) highlights how utility tariff restructuring distorts inflation measurements in transitional economies. Collectively, these studies support the argument that static CPI methods often fail to capture inflationary dynamics in unstable or developing economies, including Ukraine.

From a theoretical perspective, this study is grounded in multiple economic schools that conceptualize CPI as both a measurement index and a policy tool. Index number theory, particularly the Laspeyres formula, serves as the basis for most official CPI models due to its comparability and simplicity (Diewert, 1988; Balk, 2012). However, it assumes static consumption structures, which can create distortions. The Keynesian view frames CPI as a basis for countercyclical fiscal and monetary policies (Blanchard & Sheen, 2013), whereas monetarist theory sees it as a reflection of

monetary aggregates (Friedman, 1995). Behavioral economists (Akerlof et al., 2000) emphasize that CPI may fail to capture perception-based inflation, affecting consumer expectations and behavior.

To synthesize these interpretations, Table 1 below outlines how different schools of economic thought conceptualize the CPI and the corresponding methodological implications for its use in inflation analysis.

Table 1: Comparative analysis of theoretical approaches to the CPI

Economic School	Role and Interpretation of CPI	Implications for CPI Methodology
Keynesian Economics	CPI as a policy tool for demand and inflation management (Blanchard & Sheen, 2013)	Supports fixed-basket CPI for policy targeting but requires timely data updates to reflect short-term shocks.
Monetarism (Friedman)	CPI as an indicator of money supply growth outcomes (Friedman, 1995)	Emphasizes CPI's dependence on stable monetary aggregates; advocates for alignment with money supply metrics.
Behavioral Economics	CPI as a potentially biased indicator of perceived inflation (Akerlof et al., 2000)	Suggests incorporating expectation surveys and perception indices alongside CPI to adjust for psychological biases.
Index Number Theory (Laspeyres approach)	CPI as a cost-of-living measure using fixed basket (Diewert, 1988; Balk, 2012)	Highlights need to address substitution bias and update weights regularly for accuracy.
Empirical Macro (VAR and pass-through models)	CPI as an output of external and internal shocks (Wilson, 2023; Pan, 2018)	Requires dynamic CPI adjustment to exchange rate pass-through and commodity price shifts.

Source: Author's work

Given these theoretical considerations and methodological critiques, it is necessary to analyze the current methodological foundations of the CPI, particularly in the context of Ukraine. The following section outlines the methodology applied in this study and the official approaches to CPI calculation.

METHODOLOGY

A mixed-method approach is employed to assess the methodological robustness of the CPI in Ukraine and its capacity to reflect inflationary dynamics. The analysis integrates descriptive statistics, visual comparisons, and regression modeling to examine two key issues: the alignment between CPI weights and actual household expenditure patterns, and the relationship between CPI and exchange rate fluctuations. These methods support both structural and causal evaluation of the CPI's accuracy and its responsiveness to macroeconomic shocks.

The regression model treats the annual CPI as the dependent variable and the annual percentage change in the official exchange rate as the independent variable. The model is estimated using ordinary least squares (OLS) with the following specification:

$$CPI_t = \alpha + \beta X_t + \varepsilon_t \quad (1)$$

where CPI_t is the annual Consumer Price Index in year t, X_t is the annual change in the exchange rate in year t, α is the intercept, and β is the coefficient indicating the exchange rate pass-through effect, and, ε_t is the error term capturing the influence of other unobserved factors affecting inflation The model's robustness is tested using R^2 , p-values, and confidence intervals.

The CPI, although widely used to measure inflation and index household incomes, is not a complete proxy for real inflation. Its methodology is subject to structural limitations,

including outdated consumption weights, substitution and quality biases, and lags in reflecting economic change (Nakamura et al., 2014; Khan & Imran, 2023). These limitations are especially pronounced under conditions of external shock or rapid socio-economic transformation.

Following the full-scale Russian invasion in 2022, significant methodological challenges emerged. The collection of household expenditure data—crucial for recalibrating CPI weights—was disrupted. Migration flows, regional disparities, and shifting consumption priorities have likely altered expenditure structures, but these changes are not yet fully reflected in official statistics. As a result, CPI data post-2021 may no longer accurately capture inflationary pressures or household experiences.

Given these constraints, the primary empirical analysis focuses on the period 2014–2021, which offers the most consistent and reliable data. Partial updates for 2022–2024 are incorporated using IMF and NBU sources, allowing for cautious extensions of trend analysis. However, findings should be interpreted considering ongoing data limitations and heightened economic uncertainty.

To complement CPI and visualize the cumulative erosion of purchasing power, the Inflation Value Index (IVI) is introduced as an auxiliary metric. Unlike CPI, which tracks year-on-year price changes, the IVI captures the compounded impact of annual inflation and highlights structural inflationary burdens over time. It is particularly useful in contexts where short-term CPI fluctuations understate long-term inflation dynamics.

The IVI is calculated as:

$$IVI_t = IVI_{t-1} * (1 + CPI_t), \quad (2)$$

where IVI_t is the Inflation Value Index in year t, IVI_{t-1} is the index value in the previous year, and CPI_t is the annual Consumer Price Index.

To support the quantitative and graphical analyses, the study relies primarily on data from the State Statistics Service of Ukraine covering the period 2014–2021, which offers the most consistent and complete information on household consumption. Due to the disruption of household survey collection following the full-scale Russian invasion in 2022, detailed post-war expenditure data are unavailable. However, to illustrate more recent shifts in CPI component weights, the analysis also incorporates summary data from international sources, particularly the International Monetary Fund, for 2022–2023. While the core findings are grounded in the pre-war period, this approach enables cautious observations about ongoing trends and highlights the need to update inflation metrics under evolving economic conditions.

The graphical analysis of the dynamics in the weights of CPI components reveals changes in its structure. For instance, food and non-alcoholic beverages, which are key elements of consumption, lost seven percentage points in weight over the analyzed period. At the same time, transportation, alcoholic beverages, and healthcare experienced significant growth. These trends are critical for analyzing consumer behavior and economic policy, as they reflect both economic and social changes in society.

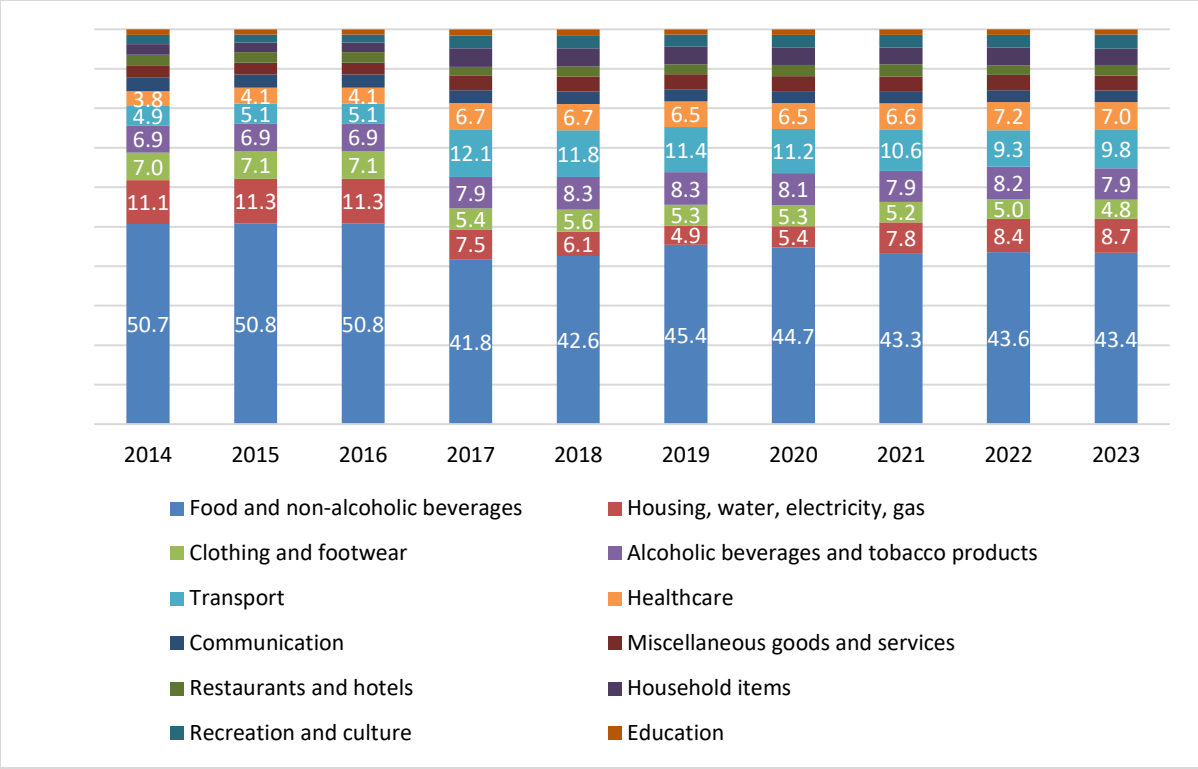

Figure 1: Dynamics of the weights of components in the CPI calculation by the State Statistics Service of Ukraine for the period 2014 to 2023, %

Source: Authors' elaboration based on data from the State Statistics Service of Ukraine and the International Monetary Fund.

Several factors can explain these shifts. One key factor is the rise in household incomes, enabling consumers to spend less on basic needs and more on other goods and services. This assumption appears valid since the analyzed period in Ukraine coincided with years of economic growth and political stability. Another explanation is the shift in consumer priorities, such as a growing preference for durable goods or services. For example, the increased weight of transportation, alcoholic beverages, and healthcare may indicate a gradual transition toward consumption of non-essential or premium goods and services.

The next step is the analysis of the shares of different components in household expenditure. The analysis covers the period from 2014 to 2021 because official data for later years is not available. First, the general structure of household expenditures is presented based on official statistics. This structure includes consumption and non-consumption expenditures. During the analyzed period, non-consumption expenditures ranged from 6.8% to 8.7%, and consumption expenditures remained above 90% of total household expenditures. Consumption expenditure was the main part of household budgets.

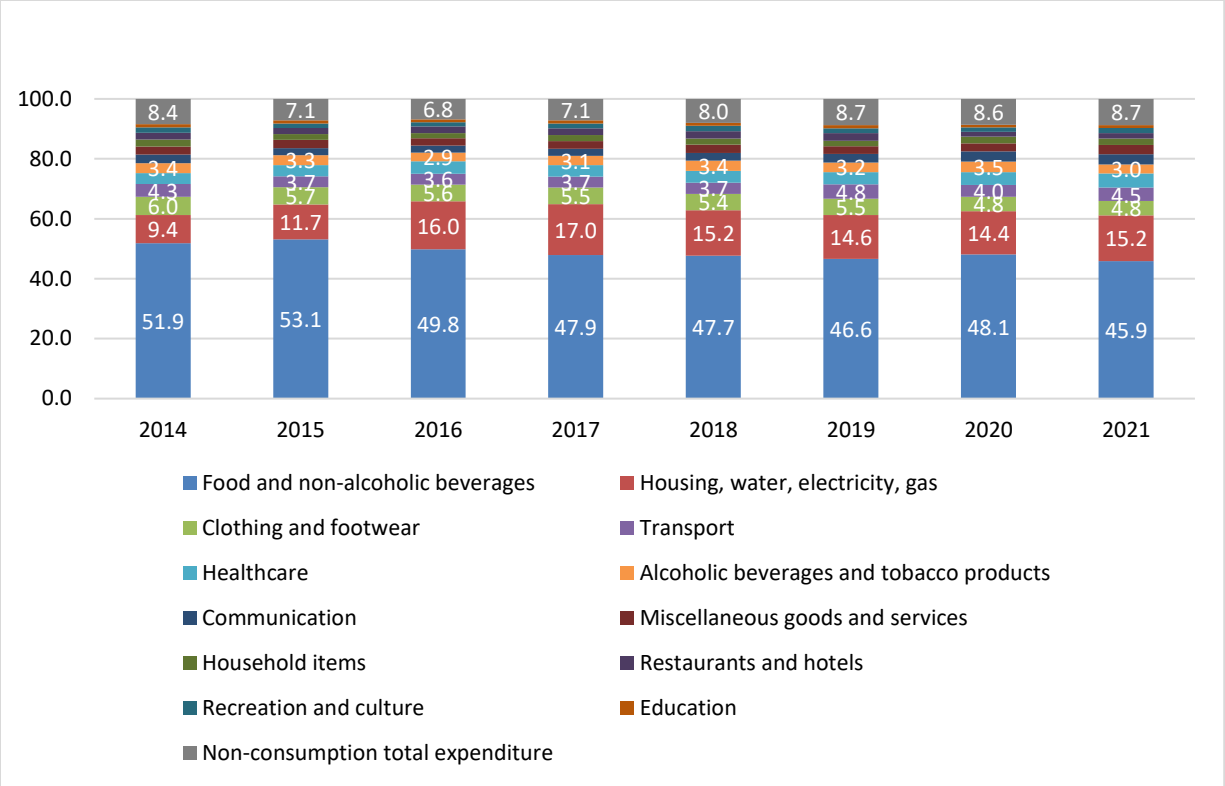

Figure 2: Structure of total household expenditures in Ukraine in 2014–2021, % of total.
Source: Authors' elaboration based on data from the State Statistics Service of Ukraine

Further, the analysis focuses solely on consumption expenditures, excluding non-consumption components. This approach is necessary to enable a direct comparison with the structure of weights used in calculating the CPI. By treating consumption expenditures as 100%, it becomes possible to identify the share of each category, such as food, transport, and healthcare, within total consumption. This method allows for accurate alignment with the CPI weighting system, which is based exclusively on consumption expenditures. Normalizing consumption expenditures to 100% thus helps to compare actual household spending patterns with those applied for inflation calculations.

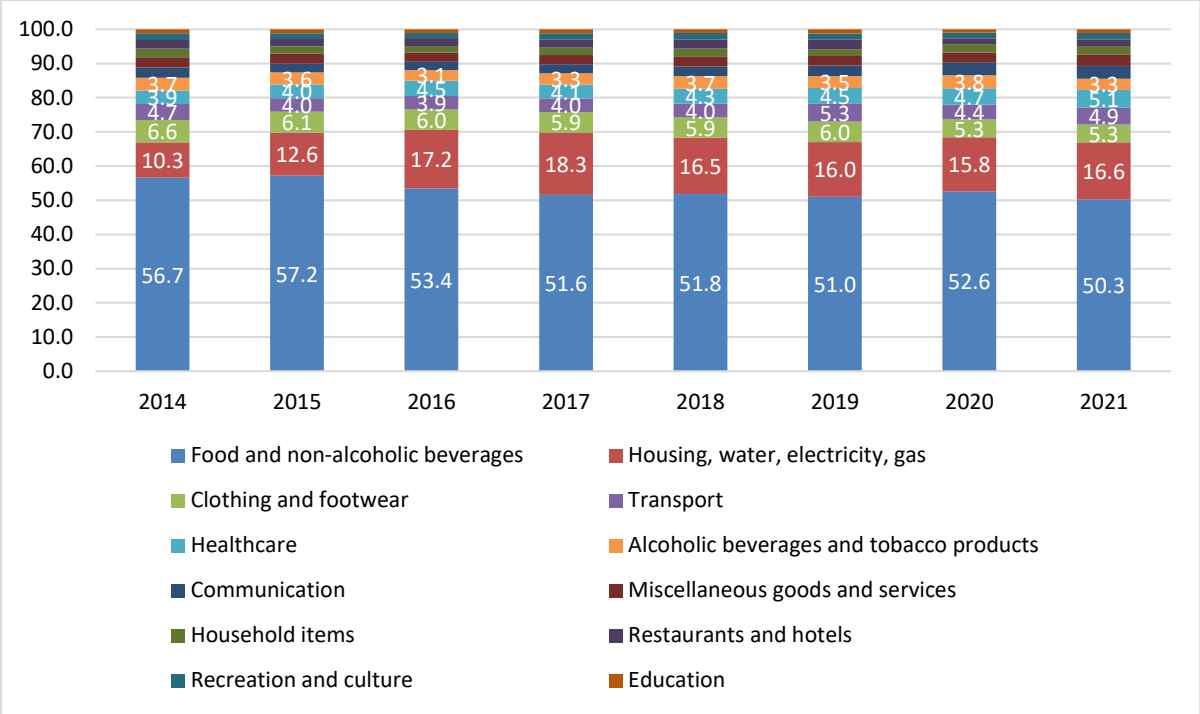

Figure 3: Structure of consumption expenditures in Ukraine in 2014–2021, % of consumption
Source: Authors' elaboration based on data from the State Statistics Service of Ukraine

The analysis focuses on the structure of household consumption expenditures, highlighting discrepancies between the actual shares of spending and their weights in the CPI. The results of the graphical analysis reveal significant differences between official CPI weights and the real distribution of consumption expenditures.

In particular, food and non-alcoholic beverages hold the largest share in household consumption. In 2021, this category accounted for 50.3% of total consumption expenditures, while its weight in CPI was 43.3%. Thus, the actual importance of food in household budgets remains higher than its role in the CPI.

A similar situation is observed in the housing, water, electricity, and gas categories. The share of these expenditures increased from 10.3% in 2014 to 16.6% in 2021, while the corresponding CPI weight declined from 11.1% to 7.8%, indicating that price changes in this sector are not fully reflected in inflation measurements.

Conversely, transportation expenditures demonstrate an opposite trend. Although their share in consumption decreased from 4.7% in 2014 to 4.9% in 2021, the weight of transport in the CPI significantly increased from 4.9% to 10.6%, indicating a higher impact of transport prices on inflation calculations compared to the actual share of household spending on transport.

These divergences demonstrate the need for regular updates of the CPI weighting structure to ensure that inflation measurements accurately reflect real household spending patterns and price dynamics.

For a clearer presentation, these trends are summarized in Table 2, which compares the official CPI weights and the actual structure of consumption expenditures. Categories where CPI weights exceed actual expenditures are marked in green, categories with underestimated weights are marked in red, and categories where weights and expenditures are aligned remain unmarked.

Table 2: Analysis of the alignment between household consumer expenditures and their weights in the CPI in Ukraine for the period 2014–2021, %

Structure of consumer expenditures	%	2014	2015	2016	2017	2018	2019	2020	2021
Food and non-alcoholic beverages	Share in CPI	50.7	50.8	50.8	41.8	42.6	45.4	44.7	43.3
	Expenditures	56.7	57.2	53.4	51.6	51.8	51.0	52.6	50.3
Alcoholic beverages and tobacco products	Share in CPI	6.9	6.9	6.9	7.9	8.3	8.3	8.1	7.9
	Expenditures	3.7	3.6	3.1	3.3	3.7	3.5	3.8	3.3
Clothing and footwear	Share in CPI	7.0	7.1	7.1	5.4	5.6	5.3	5.3	5.2
	Expenditures	6.6	6.1	6.0	5.9	5.9	6.0	5.3	5.3
Housing, water, electricity, and gas	Share in CPI	11.1	11.3	11.3	7.5	6.1	4.9	5.4	7.8
	Expenditures	10.3	12.6	17.2	18.3	16.5	16.0	15.8	16.6
Household items	Share in CPI	2.6	2.5	2.5	4.7	4.6	4.5	4.5	4.2
	Expenditures	2.5	2.2	1.8	2.2	2.3	2.0	2.4	2.4
Healthcare	Share in CPI	3.8	4.1	4.1	6.7	6.7	6.5	6.5	6.6
	Expenditures	3.9	4.0	4.5	4.1	4.3	4.5	4.7	5.1
Transport	Share in CPI	4.9	5.1	5.1	12.1	11.8	11.4	11.2	10.6
	Expenditures	4.7	4.0	3.9	4.0	4.0	5.3	4.4	4.9
Communication	Share in CPI	3.4	3.3	3.3	3.2	3.1	3.1	2.9	2.9
	Expenditures	3.1	2.6	2.5	2.6	2.8	3.1	3.7	3.7
Recreation and culture	Share in CPI	2.4	2.0	2.0	3.2	3.3	3.0	3.2	3.2
	Expenditures	2.0	1.6	1.5	1.7	2.0	1.8	1.6	1.9
Education	Share in CPI	1.4	1.3	1.3	1.6	1.5	1.3	1.4	1.4
	Expenditures	1.2	1.2	1.1	1.2	1.1	1.2	1.0	1.1
Restaurants and hotels	Share in CPI	2.9	2.7	2.7	2.2	2.5	2.5	2.9	3.1
	Expenditures	2.5	2.2	2.4	2.5	2.6	2.8	1.8	2.0
Miscellaneous goods and services	Share in CPI	3.0	3.0	3.0	3.7	3.8	3.8	3.9	3.9
	Expenditures	2.9	2.9	2.7	2.7	2.9	2.8	3.0	3.4

Source: Authors' elaboration based on data from the State Statistics Service of Ukraine

The graphical analysis of the results reveals persistent discrepancies between actual household consumption patterns and the weighting structure used in the CPI. These inconsistencies are evident across nearly all major expenditure categories. For instance, in 2021, alcoholic beverages and tobacco products accounted for 7.9% of the CPI, whereas households spent only 3.3% of their total consumption on these items. Similarly, transportation was assigned a CPI weight of 10.6%, while its actual expenditure share was merely 4.9%. The most striking gap is observed in housing, water, electricity, and gas, where the CPI weight stood at 7.8% compared to an actual spending share of 16.6%.

The food and non-alcoholic beverages category consistently demonstrate a similar pattern. In 2014, this category constituted 56.7% of household consumption but held a 50.7% weight in the CPI—a gap of 6 percentage points. By 2021, the spending share had declined to 50.3%, yet the CPI weight fell even further to 43.3%, widening the discrepancy to 7 percentage points. These structural imbalances distort inflation measurements by amplifying the influence of less essential goods and underestimating the impact of price changes in critical categories. The slow revision of CPI weights diminishes the index's capacity to reflect real-time inflationary

pressures, reducing its relevance for policymaking.

This misalignment highlights the need for regular updates to weighting coefficients in order to capture dynamic shifts in household behavior. The rapidly changing economic environment, marked by crises, migration, and income volatility, requires CPI methodologies to be both adaptive and responsive to actual expenditure patterns.

To place Ukraine's CPI structure in a broader perspective, a cross-country comparison is presented. This comparative set includes countries selected based on varying income levels, regional diversity, and economic contexts: the United States, Germany, and Italy as high-income economies; Poland as an upper-middle-income Eastern European country; Ukraine as a war-affected emerging economy; and South Sudan as a representative of low-income countries in Sub-Saharan Africa. The selected countries illustrate how income level correlates with the relative weight of food in the CPI.

In high-income countries, food occupies a marginal share in the index—for example, only 8.3% in the United States (GDP per capita: USD 82,769), 11.9% in Germany, and 17.1% in Italy. In contrast, Ukraine (GDP per capita: USD 5,070) assigns 43.4% of its CPI to food, a proportion more than twice as high as in Poland (27.0%) and far below that of South Sudan (71.4%, GDP per capita: USD 1,080). These differences reflect Engel's Law, which posits that the proportion of income spent on food declines as income increases.

Accordingly, the structure of the CPI in lower-income or crisis-affected countries makes them significantly more vulnerable to food price shocks. Food inflation in such contexts has disproportionate social and political implications, as it directly affects the welfare of a majority of the population. Therefore, CPI design in these economies must account for both economic structure and social sensitivity to basic goods pricing.

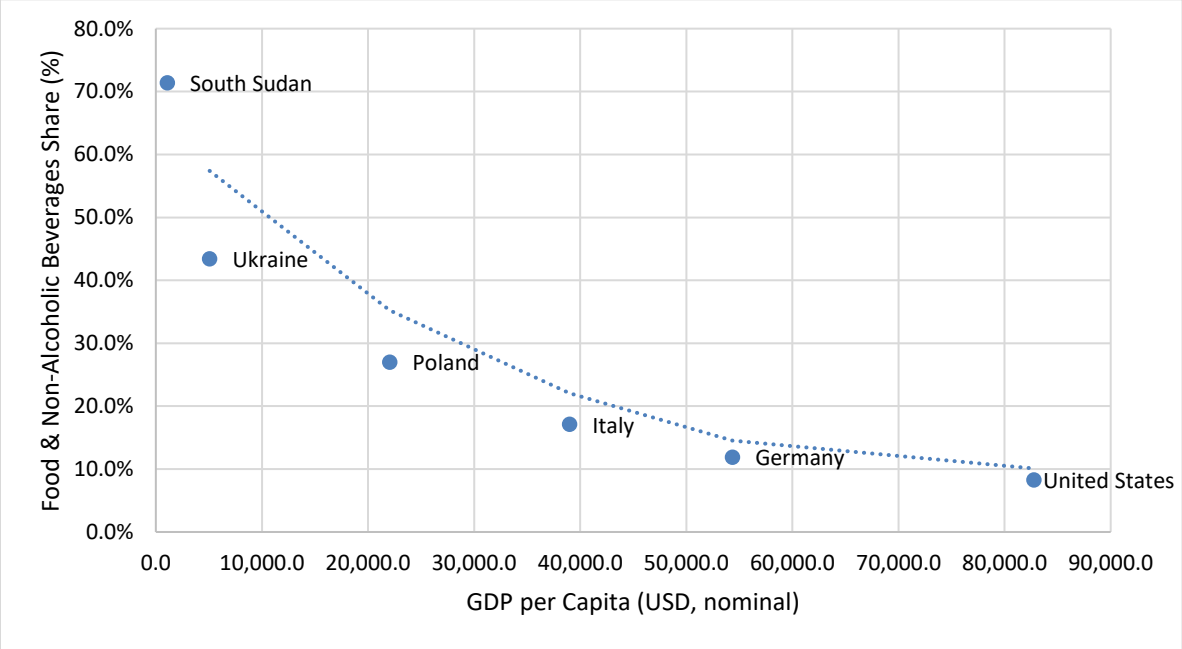

Figure 4: Correlation between GDP per capita and share of food and non-alcoholic beverages in CPI (data for 2023)

Source: Authors' elaboration based on data from the International Monetary Fund and, World Bank.

To better understand the long-term effect of inflation on Ukrainian households, let us consider how the price of a simple good has changed since the introduction of the national currency. If a hypothetical product cost 1 hryvnia in September 1996, by the end of 2024, its price, based on average annual inflation rates, would have reached 47.7 hryvnias - almost a 48-fold

increase. At the same time, the official average annual exchange rate of the hryvnia fell to 40.15 UAH/USD, reflecting both inflationary pressures and currency depreciation accumulated over nearly three decades.

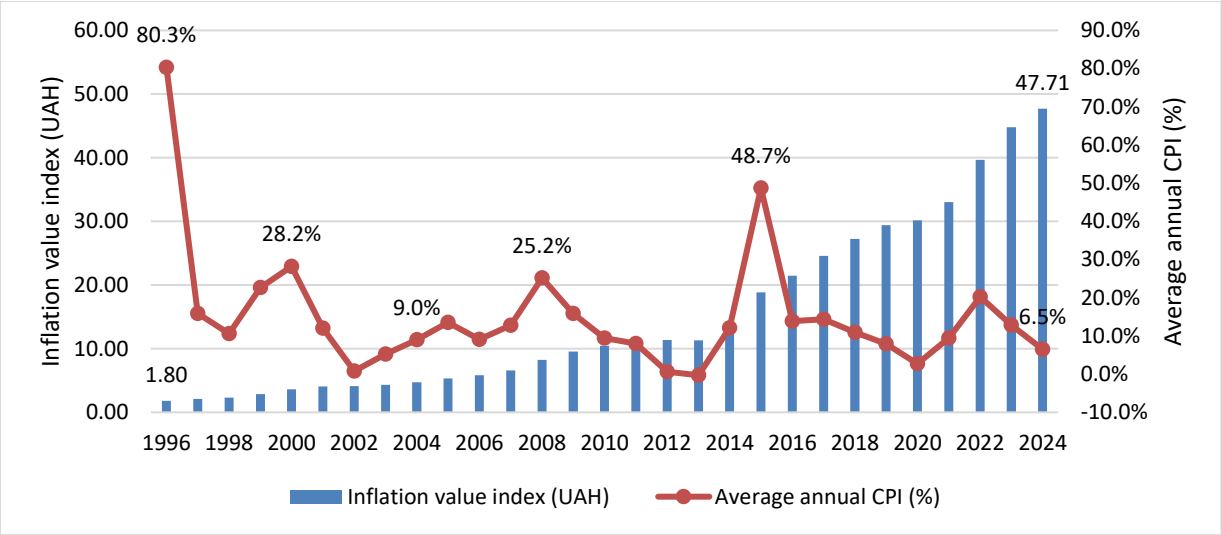

Figure 5: Dynamics of the purchasing power of the hryvnia and official inflation from 1996 to 2024
Source: Authors' elaboration based on data from the State Statistics Service of Ukraine

From the graphical data presented in Figure 5, it can be observed that the growth rate of the inflation value index outpaces the average annual CPI. This phenomenon is attributed to several factors, the most significant of which are as follows:

- The consumer basket used for CPI calculation evolves more slowly than economic realities. In contrast, production costs, reflected in the inflation value index (IVI), can respond more rapidly to rising prices of critical resources.
- The CPI may "mute" real changes due to the use of averaged data, which does not always reflect the dynamics of individual components. For example, price decreases in certain goods may offset increases in others, slowing the average annual CPI.
- Methodological differences in IVI calculation account for not only consumer goods and services but also other expenses such as investments, depreciation, rent, and construction. The costs of these components may increase more rapidly than consumer prices.
- Exchange rate instability can increase the cost of imported goods and resources, impacting the inflation value index.

Identifying exchange rate instability as a key factor driving the discrepancy between the CPI growth rate and the inflation value index, we will further analyze the dynamics of exchange rate changes and official inflation from 1997 to 2024 (Figure 6).

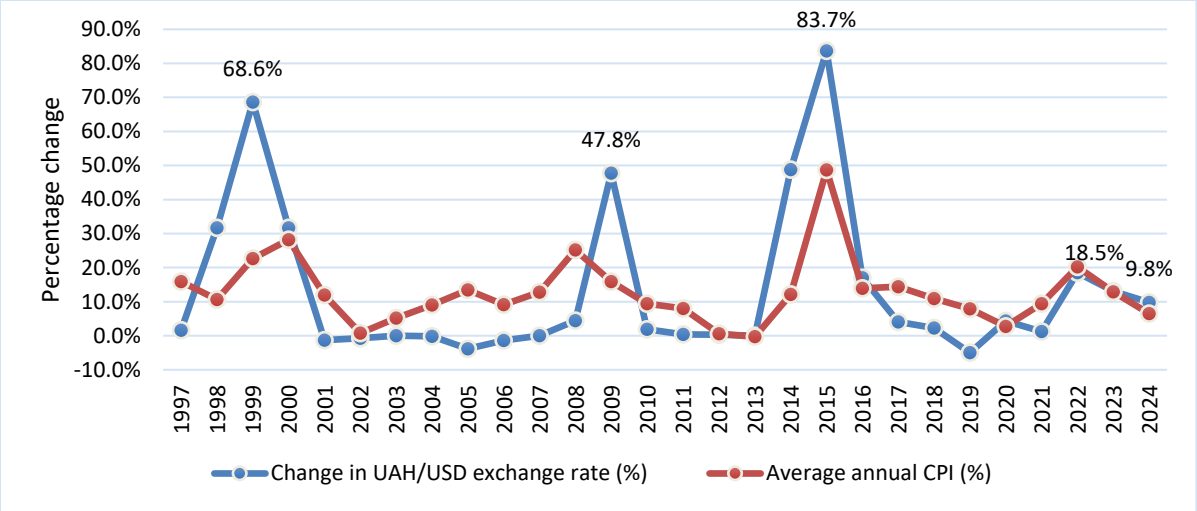

Figure 6: Dynamics of the official exchange rate of the hryvnia to the US dollar and the inflation rate from 1997 to 2024

Source: Authors' elaboration based on data from the State Statistics Service of Ukraine and the National Bank of Ukraine

The interpretation of the results from the graphical analysis of the dynamics of the official exchange rate of the hryvnia against the US dollar and the inflation rate for the period from 1997 to 2024 reveals a correlation between the analyzed indicators. The correlation between the changes in the official exchange rate of the hryvnia to the US dollar and the inflation rate suggests the following:

- An increase in the US dollar exchange rate (devaluation of the hryvnia) is accompanied by rising inflation. This is typical for economies where a significant share of consumer goods is imported, as currency devaluation leads to higher prices for imports.
- A rise in the value of the US dollar relative to the hryvnia may increase the cost of imported goods and services, creating additional inflationary pressure.
- Monetary policy implemented by the National Bank of Ukraine, which uses the exchange rate as a tool to combat inflation (e.g., foreign exchange market interventions to stabilize the hryvnia), may also contribute to this correlation.
- Such correlation may indicate a strong dependence of Ukraine's economy on external factors, such as commodity prices, external debt, or the balance of payments. Exchange rate changes can act as a trigger for domestic price changes.
- Inflationary expectations and business behavior can lead to anticipations of further price increases, pushing businesses to raise prices and consumers to increase spending.

The presence of correlation between the official exchange rate and inflation serves as a necessary preparatory step for further study of the impact of the inflation value index on the hryvnia-to-dollar exchange rate. Therefore, it is considered appropriate to analyze the dynamics of the cost of a hypothetical product indexed to official inflation and the official exchange rate of the hryvnia to the US dollar.

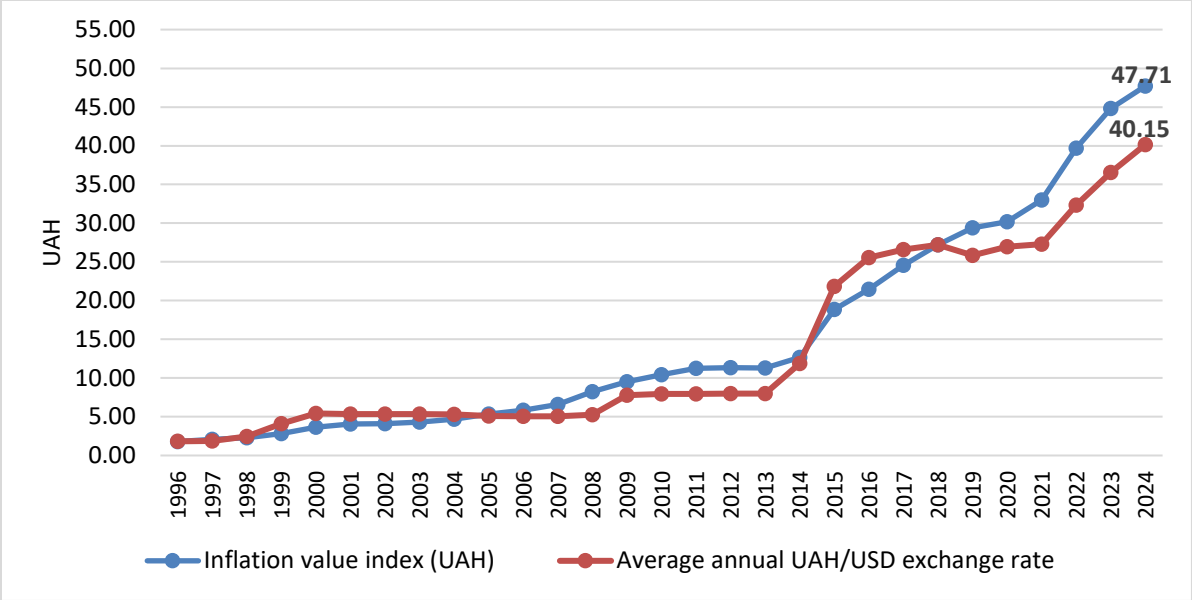

Figure 7. Dynamics of the cost of a hypothetical product indexed to official inflation and the official exchange rate of the hryvnia to the US dollar from 1996 to 2024

Source: Authors' elaboration based on data from the State Statistics Service of Ukraine and the National Bank of Ukraine

The data presented in Figure 7 graphically illustrates the strong correlation between the studied indicators, with numerous points of intersection. However, since 2018, a trend has emerged where the inflation rate increasingly outpaces the rate of currency devaluation. By the end of 2024, the gap between these rates had grown to 18.8%. This trend of inflation outpacing devaluation highlights that inflation is a multifactorial phenomenon influenced not only by the exchange rate but also by structural economic issues, monetary policy, inflationary expectations, and administrative regulations. This dynamic underscore the need for a comprehensive approach to combating inflation, which includes measures to enhance competition, stabilize the economy, and control the money supply.

The stability of the national currency's exchange rate largely depends on controlling inflation, making CPI monitoring a critically important task. To empirically validate this relationship, the regression model described earlier in the methodology section is now applied to historical data from 1997 to 2024. The results are presented below.

$$Y = 0{,}087 + 0{,}305 * X + \in \quad (3)$$

In this equation, Y denotes the average annual Consumer Price Index (CPI), expressed as a percentage. X represents the annual percentage change in the official exchange rate of the hryvnia to the US dollar. The coefficient 0.305 indicates that a 1% change in the exchange rate corresponds to an average increase of 0.305% in the CPI. The constant term 0.087 reflects the expected level of CPI in the absence of exchange rate fluctuations. Finally, $\in$ denotes the model's random error term, capturing the influence of other unobserved factors.

Table 3: Regression analysis results of the impact of hryvnia-to-dollar exchange rate fluctuations on average annual CPI in Ukraine (1997–2024)

Indicator	Regression Coefficient	Multiple R	R^2	F-value	p-value
Average annual CPI change	0.305	0.711	0.505	26.56	2.24×10^{-5}

Source: Author's work

The regression analysis results indicate a moderate but statistically significant relationship between exchange rate changes and the average annual CPI. The correlation coefficient (R = 0.711) shows a medium-strength association between the two variables, while the R^2 value (0.505) suggests that 50.5% of the variation in the CPI is explained by exchange rate fluctuations.

The regression coefficient (0.305) is statistically significant and demonstrates that a 1% change in the hryvnia-to-dollar exchange rate corresponds to an average increase of 0.305% in the CPI. The intercept value (0.087) and the overall F-statistic also confirm the reliability of the model. The confidence interval for the slope coefficient ranges from 0.183 to 0.427, and the standard error of the estimate is 0.071, indicating relatively low deviation of the predicted CPI values from the actual ones.

These results confirm that the exchange rate plays an important role in driving inflationary trends in Ukraine. Monitoring this relationship is essential for inflation forecasting and economic policy design. The findings highlight Ukraine's vulnerability to external price shocks and underline the need for a stable and consistent monetary and exchange rate policy framework.

DISCUSSION

The results of this study confirm and extend previous empirical findings on the interaction between inflation and exchange rate dynamics in Ukraine. While earlier research has predominantly relied on correlation analysis or descriptive comparisons, this study provides a formal regression-based estimation of the exchange rate pass-through effect. The model shows that 50.5% of the annual variation in CPI can be attributed to changes in the hryvnia-to-dollar exchange rate, emphasizing the significant role of external and monetary factors in domestic inflation.

These findings are consistent with the conclusions of Trofymchuk (2023), who identified a strong correlation between exchange rate depreciation and CPI growth. However, unlike Trofymchuk's use of Pearson's coefficient, this study applies a linear regression framework, producing a statistically robust estimate of the pass-through coefficient. The value of 0.305 implies that a 1% depreciation of the national currency leads to a 0.305% increase in the CPI on average: demonstrating a moderate but systematic inflationary response to exchange rate movements.

The analysis also complements the work of Mudrak (2022), who emphasized domestic cost-push factors such as agricultural prices and utility tariffs as key inflation drivers. While Mudrak focused on internal structural pressures, this study highlights the additional contribution of external shocks, particularly those originating in currency markets. Together, these findings underscore the multifactorial character of inflation in Ukraine, which arises at the intersection of domestic constraints and international price transmission.

Beyond this, the research offers a novel contribution by comparing official CPI weights with actual household consumption patterns. The results expose structural misalignments: essential goods such as food and housing are persistently underweighted in the index, whereas less critical categories—such as alcoholic beverages or transport—are often overrepresented. This divergence introduces a behavioral and distributional bias into CPI-based inflation estimates, which can misguide both macroeconomic assessment and targeted policy interventions.

An additional contribution of the study lies in

its forward-looking policy proposal. Building on the methodological critiques of Boskin et al. (2016) and Białek (2020), the study introduces a two-tier CPI model that includes (1) a provisional index for short-term monitoring, based on forecasted weights, and (2) a refined index constructed from actual expenditure data drawn from surveys, digital transactions, and retail records. This framework is designed to increase the responsiveness and credibility of inflation statistics, particularly under volatile socio-economic conditions.

In summary, this study validates well-established inflationary mechanisms while also advancing methodological improvements and offering practical recommendations for reforming CPI calculation in Ukraine. The evidence confirms that inflation is not solely determined by internal price dynamics but is significantly influenced by exchange rate volatility. These conclusions support the need for an integrated approach to inflation monitoring—one that takes into account both the structural composition of household expenditures and the macroeconomic exposure to external shocks. Such an approach is essential for designing effective inflation-targeting strategies, especially in crisis-prone or transitional economies like Ukraine.

CONCLUSION AND RECOMMENDATION

The analysis reveals significant misalignments between the official CPI weighting structure and actual household expenditure patterns in Ukraine. Essential categories such as food, housing, and utilities, constituting a substantial share of household budgets, remain persistently underweighted in the index. This structural distortion leads to a systematic underestimation of real inflationary pressure and weakens the CPI's effectiveness as an instrument for assessing price dynamics and informing policy decisions.

The regression results confirm a statistically significant and economically meaningful relationship between inflation and exchange rate movements. More than half of the annual variation in the CPI is explained by fluctuations in the hryvnia-to-dollar exchange rate, highlighting Ukraine's vulnerability to imported inflation and underscoring the need for consistent monitoring of currency trends as part of inflation control strategies.

The static nature of the current CPI methodology, based on fixed consumption weights, limits its capacity to reflect dynamic shifts in consumer behavior, particularly in periods of crisis, income shocks, or regional disruptions. To address these limitations, this paper proposes a two-track framework for CPI construction. The first track consists of a provisional index based on forecasted expenditure weights, designed to support timely macroeconomic responses. The second track involves a refined index, calculated retrospectively using actual data from household surveys, digital transaction records, and retail platforms. Together, these instruments would enhance both the responsiveness and the credibility of inflation measurement in Ukraine.

Incorporating high-frequency, behavior-sensitive data into index construction would strengthen the analytical capacity of Ukraine's statistical system, support more effective monetary and fiscal policy, and improve transparency and trust among domestic and international stakeholders. Such a reform would align Ukraine's inflation metrics with emerging international standards that prioritize real-time, multidimensional indicators.

This research contributes to the academic discourse by providing empirical evidence of the dual vulnerability embedded in Ukraine's CPI system, methodological rigidity, and sensitivity to external price shocks. Unlike prior studies that focus solely on structural critiques, this analysis combines expenditure-level comparisons with formal econometric modeling to quantify the nature and magnitude of these weaknesses. The findings suggest that inflation in Ukraine is shaped by both internal consumption asymmetries and externally transmitted volatility through the exchange rate channel.

Reforming CPI methodology should thus be viewed as a macroeconomic priority rather than a technical adjustment. Inaccurate inflation indicators risk distorting monetary policy signals, misguiding income indexation, and underestimating the living cost pressures faced by low-income households. The proposed dual-index system offers a pragmatic pathway to reconcile the need for timely inflation insights with the demand for methodological rigor.

Future research should examine the institutional feasibility of implementing such a model within Ukraine's statistical architecture, including the integration of digital data sources,

privacy protections, and alignment with Eurostat and IMF protocols. Ultimately, modernizing the CPI is essential not only for improving statistical quality but also for reinforcing policy effectiveness, public trust, and macroeconomic resilience in a period of persistent uncertainty.

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