

Approaches to measuring inflation in developed countries and methodological implications for Uzbekistan

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Abstract

This article analyzes the main approaches to measuring inflation in developed countries and develops methodological implications for Uzbekistan. Based on the experience of the United States, the European Union, the United Kingdom, Japan, and Australia, the study examines systems of consumer price indices, core inflation indicators, weighting and aggregation methods, as well as emerging trends in the use of digital data sources. The results show that in developed economies, inflation measurement is not limited to a single aggregate index; rather, it is based on a comprehensive system of indicators designed for different purposes, supported by modern data sources and continuous methodological updates.

Keywords: Inflation; consumer price index; CPI; PCE; HICP; CPIH; Core inflation; Price statistics; International experience; Uzbekistan; Methodology; Digital data

1. Introduction

The reliable measurement of inflation represents a fundamental statistical task necessary for the effective formulation of macroeconomic policy, monetary regulation, social protection mechanisms, and the assessment of real household incomes. In modern conditions, price statistics systems are no longer limited to measuring a single aggregate inflation rate; instead, they encompass a diversified system of indices, specialized aggregates, and complementary analytical indicators designed to meet various policy and research objectives [1].

In developed economies, the institutional and methodological framework for inflation measurement has reached a high level of sophistication. It incorporates multiple dimensions, including consumer inflation, core inflation, housing costs, real transaction prices, and the integration of digital data sources. For instance, in the United States, both the Consumer Price Index (CPI) and the Personal Consumption Expenditures (PCE) index are applied; in the European Union, the Harmonised Index of Consumer Prices (HICP) is used; in the United Kingdom, CPIH and RPI are calculated; while in Japan, several underlying inflation indicators are employed simultaneously [2].

In the context of Uzbekistan, the improvement of inflation measurement methodology has become increasingly relevant. The digitalization of the economy, structural changes in consumer markets, the emergence of new retail formats, and the expansion of statistical data sources require a reconsideration of traditional price observation approaches. Therefore, the study of international experience is not only of theoretical importance but also has significant practical implications for national statistical development [3].

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The main objective of this study is to conduct a systematic analysis of inflation measurement approaches in developed countries and, on this basis, to formulate methodological conclusions for Uzbekistan. The research tasks include a comparative evaluation of key international models, the identification of modern methodological trends, and the development of recommendations adapted to the national statistical system [4].

2. Literature Review

The contemporary scientific and methodological literature on inflation measurement can be categorized into four major research directions.

The first direction focuses on the theoretical foundations of price index construction, including the formation of consumer baskets, weighting methodologies, and aggregation formulas. In this context, methodological frameworks developed by institutions such as the Bureau of Labor Statistics (BLS), Eurostat, and the International Monetary Fund (IMF) play a key role in establishing the conceptual basis of inflation measurement [5]. These approaches emphasize statistical consistency, representativeness, and the accurate reflection of consumption structures.

The second direction examines the development of multiple inflation indicators, including core inflation and specialized aggregates. Particular attention is given to methodological differences between indicators such as CPI, PCE, core PCE, CPIH, and housing-adjusted indices. These indicators are designed to capture underlying inflation trends by excluding volatile components such as food and energy, thereby providing more reliable signals for economic policy analysis [6].

The third direction addresses issues of international comparability and standardization. The implementation of harmonized methodologies, such as the HICP framework, along with classification systems like COICOP and ECOICOP, ensures cross-country comparability based on unified statistical principles. This dimension is essential for global economic analysis and for maintaining consistency in inflation measurement across different national contexts [7].

The fourth and rapidly developing direction concerns the integration of digital and alternative data sources into inflation statistics. Statistical agencies increasingly employ scanner data, transaction-level data, web-scraping techniques, and other forms of big data to enhance the accuracy and timeliness of inflation estimates. These innovations represent a new stage in the evolution of price statistics methodologies [8].

The analysis of existing literature indicates that inflation measurement in developed countries has evolved beyond simplified models based on a single aggregate index. Modern approaches are characterized by a multi-layered system of indicators, diversified data sources, the use of specialized aggregates, and strong methodological coherence [9]. Consequently, inflation measurement is increasingly viewed not merely as a statistical computation but as a comprehensive system involving data architecture, classification frameworks, and user-oriented indicator design.

However, despite the extensive body of international research, there remains a lack of systematically developed methodological conclusions tailored to the specific conditions of Uzbekistan. The scientific contribution of this study lies in moving beyond descriptive analysis and synthesizing international experience into practical recommendations that can be effectively adapted to the national price statistics system [10].

3. The U.S. Experience: CPI and PCE Approaches

A key feature of the U.S. approach to inflation measurement is the simultaneous use of at least two major indicators. The Bureau of Labor Statistics (BLS) constructs the Consumer Price Index (CPI) based on the out-of-pocket expenditures of urban consumers; that is, prices are recorded at the level actually paid by consumers. Price data are collected throughout the month across different pricing periods, implying that monthly indices are formed based on temporally distributed observations [1; 2].

In contrast, the Personal Consumption Expenditures (PCE) price index, produced by the Bureau of Economic Analysis (BEA), is more closely aligned with the national accounts system and reflects price changes in goods and services consumed by households. The core PCE index excludes food and energy components, allowing for a more stable assessment of underlying inflation trends [3; 4]. The fact that the U.S. Federal Reserve prioritizes core PCE in its analytical framework underscores the indicator's high relevance for policy analysis.

This experience provides an important methodological implication for Uzbekistan: alongside the general CPI, the development of core inflation measures and specialized aggregates for targeted analysis can significantly enhance both statistical and analytical capabilities.

4. European Union Experience: HICP and Harmonized Methodology

In the European Union, the Harmonised Index of Consumer Prices (HICP) represents a benchmark institutional model for official inflation measurement. According to Eurostat methodology, the HICP is developed based on the principle of cross-country comparability and is regulated by unified rules applied across all member states [5; 6]. This approach emphasizes not only index calculation but also classification systems, weighting structures, data aggregation methods, and methodological consistency.

The *HICP Methodological Manual* serves as a practical reference document for statistical agencies, providing detailed guidelines on observation units, representative items, weights, quality adjustment procedures, special aggregates, and chain-linking techniques [5]. The HICP framework demonstrates the critical importance of methodological standardization in producing internationally comparable inflation indicators.

For Uzbekistan, this experience is significant in two respects. First, it highlights the necessity of high-level standardization in classification and aggregation processes. Second, it enables the development of inflation indicators in a format suitable for international comparisons.

5. The United Kingdom Experience: CPIH, CPI, and RPI System

In the United Kingdom, the primary focus is on the differentiation of inflation indicators. According to the Office for National Statistics (ONS), CPIH, CPI, and RPI are calculated as fixed-quantity price indices, with price data collected for hundreds of representative items [7]. CPIH includes owner-occupiers' housing costs as a key component, which distinguishes it from the standard CPI.

This approach demonstrates that the consumer basket can be enriched with additional components reflecting broader household expenditure patterns. The availability of multiple indicators allows users to interpret inflation from different analytical perspectives.

Moreover, in recent years, the ONS has actively implemented alternative data sources, including scanner data, web-scraped data, and new aggregation methods as part of its consumer price statistics transformation program [8; 9; 10; 15]. This reflects the dynamic and evolutionary nature of the UK's approach to inflation measurement.

6. Japan and Other Developed Economies: Specific Features

The Japanese experience highlights the importance of using refined indicators to assess price dynamics in conditions of persistently low inflation. The Bank of Japan employs various core CPI measures and underlying inflation indicators to track stable inflation trends [11; 12]. Particular attention is given to isolating the effects of volatile components such as energy and food.

In Australia, the use of transaction data and scanner data has emerged as a distinct methodological direction. According to the Australian Bureau of Statistics (ABS), transaction data are characterized by high volume, high frequency, and their ability to reflect actual purchase prices [14].

These developments indicate that modern inflation monitoring increasingly relies on multiple data sources. In addition to traditional price collection methods, web-scraping, scanner data, transaction-level data, and administrative records are becoming essential components of statistical systems. Consequently, the modern model of inflation measurement is based on a multi-source data architecture, enabling more accurate and timely analysis of price dynamics.

7. Analysis and Results

A comparative assessment of inflation measurement practices across developed economies reveals substantial methodological diversity, reflecting differences in institutional frameworks, analytical objectives, and data infrastructures. However, despite this diversity, a number of common structural principles can be identified, including the use of multiple indicators, methodological standardization, and increasing reliance on digital data sources .

To synthesize these practices, the following table presents a structured comparison of key approaches and their methodological implications.

Table 1 Comparative Overview of Inflation Measurement Approaches

Dimension	International Practice	Implications for Uzbekistan
Indicator system	Multiple indices (CPI, PCE, HICP, CPIH) used in parallel for different analytical purposes	Develop a multi-layered system including headline CPI, core inflation, and sectoral indicators
Methodology	Standardized frameworks (e.g., chain-linked Laspeyres, harmonized classifications)	Strengthen methodological consistency and adopt international classification standards (COICOP 2018)
Data sources	Integration of traditional surveys with scanner, transaction, and web data	Expand use of digital data sources through phased and validated integration
Analytical focus	Use of specialized aggregates (housing, core inflation, market-based indicators)	Develop targeted indicators for monetary policy, social analysis, and sectoral monitoring

Recent developments in inflation measurement demonstrate a clear shift toward the integration of digital and alternative data sources. National statistical offices, particularly in advanced economies, increasingly utilize scanner data, transaction-level data, and web-scraped information as part of their core statistical infrastructure.

Eurostat's ongoing development of multilateral index methods and scanner data integration further illustrates that price statistics are evolving beyond traditional observation-based systems. These innovations allow for improved coverage, higher frequency updates, and better representation of real market dynamics.

For Uzbekistan, these trends are especially relevant, as the country is actively exploring the incorporation of web-scraping technologies, electronic transaction data, and other alternative sources into its CPI framework. However, international experience suggests that such integration requires robust methodological foundations, including classification systems, validation procedures, weighting mechanisms, and aggregation techniques.

Moreover, the transition toward multi-source statistical systems implies not only technological advancement but also the need for a new governance model. Standardization of data flows, metadata management, product identification systems, and audit trails are becoming critical components of modern price statistics.

8. Discussion of Results

The findings of the comparative analysis highlight several key insights.

First, the effectiveness of inflation measurement systems in developed countries is strongly associated with the flexibility and differentiation of their indicator frameworks. Rather than relying on a single aggregate index, these systems employ a range of specialized indicators—such as core inflation measures, housing-adjusted indices, and behavior-based metrics—allowing for more nuanced economic analysis and policy formulation.

Second, classification systems and data structures play a strategic role in ensuring methodological consistency and comparability. Harmonized frameworks such as HICP, ECOICOP, and COICOP 2018 facilitate cross-country comparisons and enable the integration of new data sources without compromising statistical coherence.

Third, while digital data sources significantly enhance the scope and timeliness of inflation measurement, they also introduce new methodological complexities. Issues such as dynamic product assortments, quality adjustment, data validation, and multi-source integration require advanced statistical techniques and continuous methodological refinement.

Based on the analysis of international practices, several key methodological directions can be identified for Uzbekistan.

Table 2 Key Methodological Recommendations

Area	International Practice	Recommendation for Uzbekistan
Indicator system	Multi-indicator framework (headline + core + sectoral indices)	Expand CPI framework to include core inflation and segment-specific indicators
Classification	Harmonized systems (HICP, COICOP, ECOICOP)	Strengthen national classification based on COICOP 2018
Data integration	Use of scanner, transaction, and web data	Gradually integrate digital data sources with proper validation
Aggregation methods	Chain-linked indices and dynamic weighting	Improve weighting systems and adopt advanced aggregation techniques

9. Conclusion

In conclusion, inflation measurement in developed economies has evolved into a complex, multi-dimensional system that extends far beyond the calculation of a single aggregate index. The use of multiple indicators, standardized methodologies, and digital data integration represents the core of modern price statistics.

For Uzbekistan, the key methodological implication is the need to transition toward a more comprehensive system that combines traditional CPI measurement with the development of additional indicators, strengthened classification frameworks, improved aggregation methods, and deeper integration of digital data sources.

Importantly, international experience should not be replicated mechanically but adapted to national conditions, taking into account the structure of consumer markets, institutional capacity, and data availability. The future development of Uzbekistan's inflation statistics system should therefore be based on a balanced combination of multi-level indicators, multi-source data integration, and consistent methodological governance.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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