CURRENT CHALLENGES RELATED TO
THE CONSUMER PRICE INDEX (CPI)

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1. Introduction

The purpose of this study is to contribute to the maintenance and compilation of the consumer price index (CPI) in the current extreme situation caused by the Russian military aggression against Ukraine. In these extreme conditions, official statistics is faced with the task of maintaining the regularity, completeness and quality of the production of statistical information, including the CPI, which is one of the key economic indicators.

The study focuses on the interaction between the ideal and conditional concepts of the index and their practical implementation is considered as a potential source of compilation improvement. The author argues that the main factor of the modern criticism of the CPI is the systematic deviation of the practical form of the index from its theoretical foundations. One way to solve this problem is to use new sources of information, especially big data cash registers. In today's extreme conditions, cash data can extensively address the issue of limited and untimely access to data sources needed to compile the CPI, as well as promptly take into account the changes in consumption patterns caused by significant migratory flows from the dangerous areas, and changes in the supply offer due to the rupture of supply chains.

2. General issues

The CPI is one of the oldest statistical indicators, which is always in high demand and scrupulous attention from society. The CPI has gone through various stages of its development, both in terms of theoretical justification and methodological provision, and in terms of its practical implementation (10). But despite numerous efforts to improve the quality of the index, the CPI continues to be exposed to numerous critical remarks from experts and the general public. The question rightfully follows as to why, for more than a hundred years, the CPI has continued to provoke criticism, and what is the source of the so-called "imperfection" of the CPI, as well as what may be the ways to solve the issues in modern conditions.

The officially accepted formula for calculating and aggregating the CPI is the Laspeyres Index. And the central issue is the fact that according to current practice, both at the highest level of aggregation and at the level of elementary indices, the CPI is not a true Laspeyres index (5). In this regard, two questions arise: - Why is the Laspeyres formula recommended for calculating the aggregate CPI? - What is the reason that in practice there has been such a significant deviation from the chosen theoretical formula?

Finding out the answers to these questions is important for being able to go beyond the established limits of the index compilation in order to adapt it to modern extreme conditions. The choice of the theoretical formula of the index and the further departure from its classical form in practical statistical activities are due to the

simultaneous coexistence of theoretical, methodological and practical principles of the CPI. The source of problems in the implementation of the CPI is in the plane of constant confrontation of theory and practice. The path from index theorizing to its practical implementation can be outlined using the following three levels (9): -Defining the ideal concept of the index, which is not directly observed, but the existence of which is a postulate of current classical theories. - Defining a conditional concept that is generally acceptable and complements the ideal concept with a number of formulated conditions, thus bringing it closer to reality. -Practical implementation of the conditional concept through its empirical validation through a series of experimental observations and estimates followed by full-scale statistical observations and index calculations using real data.

In this regard, W. Erwin Diewert and Robert J. Hill proposed concepts such as a true index and an exact index. The true index corresponds to the concept of an ideal index. Such an index represents a goal, namely a phenomenon that needs to be measured. The exact index, in turn, is a practical implementation of the conditional concept of the index, while the latter is a transitional link between true and empirical indices. That is, the exact index is considered acceptable if it corresponds to the true index under the existing conditions with a sufficiently high level of approximation (3).

Intervention in order to adapt the CPI formula to the extreme conditions of war in Ukraine is possible at all three levels. The most radical changes obviously occur when reviewing the theoretical foundations, namely the ideal concept of the index.

3. The ideal CPI concept

The ideal concept of the CPI is based on both the theory of consumer behaviour and the theory of indices, while its conceptual framework is the System of National Accounts (SNA). The ideal consumer price index should measure the overall price evolution of all products (goods and services) consumed by a representative consumer.

Different approaches have gradually been developed to find an index formula that can best meet the requirements formulated for the ideal CPI concept. Today, there are two major schools for measuring inflation in the consumer sector of the economy: the Consumer Price Index (CPI) and the Cost of Living Index (CLI).

Most economic indices, including price indices, are based on the Divisia index, named after the French economist François Divisia, who in 1926 proposed a theoretical construct for building index number series for continuous market data on prices and quantities (6). But in reality, economic data metrics are discreet, not continuous. Therefore, the reference to Divisia dynamic index numbers are usually the time series that exploit the Divisia's idea but are built for discrete time periods, which can be done using various formulas discussed below.

The general argument for choosing an index formula corresponds to three key approaches, such as the economic approach, axiomatic approach and stochastic approach (4).

The ideal concept is a scientific hypothesis about the possibility of measuring inflation in the consumer sector of the economy using the chosen formula, which must meet a number of established requirements. The implementation of the theoretical concept is possible under the condition of its certain approximation. Such approximation is the expression of declared but difficult to observe phenomena through

other, more accessible or simpler ones, which is common practice in economic research. The process of approximation of the ideal CPI occurs through finding the conditional concept of the CPI.

4. Conditional CPI concept

The conditional concept of the CPI is the transitional link that allows further empirical testing of the theoretical (ideal) concept, and determines the methodological principles of the index. Expression of the ideal concept through the conditional concept reflects the real conditions for the economic agents of each country and the primary data accessibility.

According to the conditional concept, the CPI is an indicator of the monthly average change in the level of prices paid by urban consumers for the market basket of goods and services (7), which, however, must be substantially clarified in the light of the extreme conditions of war.

The choice of formula for the conditional CPI concept depends on a number of factors and is related to the chosen approach and practicality. In terms of the ideal concept and in accordance with the requirements formulated within the economic, axiomatic and stochastic approaches, the best properties are shown by superlative indices, especially by the Törnqvist index (1). However, direct use of index formulas is influenced by such factor as accessibility and timeliness of inflow of primary data necessary for CPI compilation on a regular basis. The only formula of the Laspeyres index assumes the use of data that can (with some conditions) be obtained at the time of the operational calculation of the index by official statistics.

5. Practical implementation and new sources of information

In the context of the transformation of the ideal concept (through the stage of the conditional concept) to its practical implementation, it is important to take into account the impossibility of direct use not only the ideal but also the conditional concept.

The Laspeyres formula allows inclusion to the common system of calculation of other formulas for the lowest levels of aggregation. As it is not possible to obtain a weight structure at these levels, so the formulas of Carly, Jevons and Dutot are the basis for elementary sub-indexes. Besides, the attempt to improve the quality of the aggregate index through the use of numerous adjustments based on inclusions in the basic formula gives a compilation of the practical concept of the index. This, in turn, significantly distances practical concept from the conditional concept, which is a potential source of systematic criticism.

Is it possible to resolve this contradiction? And how can this be taken into account when constructing a consumer price index in the current extreme situation? As the experience of recent years shows, great prospects in this sense exist in the development of fundamentally new sources of information and in new technologies for primary data registration, processing and storage.

Today, in statistical practice, such sources of primary data are traditionally used to build the CPI, such as: 1. Household budget survey; 2. Price collection survey: price registration is carried out by price collectors from different outlets and often with use of electronic devices; 3. Data of websites where relevant goods or services are sold: data are registered either by statisticians manually or with the help of web scraping and special mobile applications. Some institutions provide statistical services with their

own Application Programming Interface (API) for direct access to pricing information. Collecting data with the API is often simpler and clearer than long-term support for web scraping code; 4. Administrative data: files of administrative records on prices and levels of consumption of certain social services and goods.

Alternative sources that different countries have been developing recently are: - Third-party data are data collected by a third party that contains prices for goods or services obtained from several sources. - Corporate data (that is that owned by corporations or companies) is a set of data obtained directly from the headquarters of a company that collects data in its own outlets or collects it on sales websites.

The most promising source of information on the evolution of consumer prices in corporate data is direct cash data of sales outlets (data of cash registers). Cash register data refer to transactions that reflect both the price paid for each unit of goods and the number of units of goods purchased.

A fundamental component of the price index number theory and, accordingly, the ideal CPI concept is the availability of real-time information on household expenditures. Until recently, such information was not available, so theoretically perfect formulas, such as superlative indices, could not be used in statistical practice. Access to cash data allows not only to improve the CPI estimates, but also to bring the aggregate index formula closer to its ideal concept (7).

The comprehensive nature of cash data allows for more accurate statistics and the possibility of creating more detailed versions of consumer price indices, for example, by specific segments of consumption.

The possibility of directly obtaining cash data from supermarkets allows at the same time to better cover the urban population and include data on rural consumption, thereby significantly increasing the level of representativeness of the CPI, both nationally and regionally. This, in turn, brings the practical concept of the aggregate consumer closer to its ideal vision.

Cash data allow us also to quickly identify new products that need to be added to the CPI basket, or products that are obsolete and that should be removed in order to update and match the basket to the actual structure of household consumption. The same applies to the timely recording of changes in the structure of household consumption caused by mass migratory flows of the population during the war.

Thanks to detailed cash data, it is also possible to choose index formulas that can take into account the lowest level of substitution aggregation carried out by the consumer due to rising prices during the two observation periods (8).

In general, cash data better control the concept of price to be measured by the CPI than traditional methods, as the prices reflected on price tags may differ from the prices actually paid by the consumer through various promotions.

Today, there are two common approaches to the use of cash data: sampling data collection (classical one) and exhaustive data collection. The exhaustive data collection has been developed and implemented in Danish statistical practice since 2013. The use of the exhaustive data collection was primarily aimed at reducing differences in the approaches used by statisticians for different sales outlets and consumer goods within the Danish CPI. That is, it is possible to apply a generalized approach and an index formula to a significant number of goods and services, which significantly reduces the

compilation nature of the practical CPI formula mentioned above. Today, this approach is still used for homogeneous groups of goods. According to the proposed methodology, the price index is calculated as the ratio of the turnover index and the weighted quantity index, i.e. it is the Geary-Khamis method applied to time series. At the same time, the quantitative scales for homogeneous goods are updated monthly during the current year, based on the prices and quantities of sales registered by sales outlets, which is highly relevant in wartime. The advantage of this method is that it does not cause bias in chain indices, because at the end of each year such price indices coincide with transitive indices (2).

6.   Conclusion

The current challenges in the field of price statistics are both new and ancient, i.e. related to the conceptual framework of the CPI. The revision of the paradigm of primary data sources allows for a significant reduction in the methodological and organizational limitations imposed by the extreme conditions of Russia's military aggression against Ukraine. In the conditions caused by the war, new source of information allows regular estimates of the consumer price index for a large number of goods without the loss of quality, and control the structure of consumption both in general and by region, and opens prospects for reducing discrepancies between conventional concept of the CPI, its ideal concepts and their practical application.

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БЮДЖЕТНЕ ПЛАНУВАННЯ ЯК ЗАСІБ ЗАБЕЗПЕЧЕННЯ ЗБАЛАНСОВАНОСТІ БЮДЖЕТУ В УМОВАХ ВІЙНИ В УКРАЇНІ

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Основним інструментом, який уряд використовує для впливу на суспільне виробництво та реалізацію економічної політики країни, є бюджет. Бюджетне планування відіграє важливу роль у фінансовому плануванні та прогнозуванні і повинно відповідати вимогам фінансової політики держави. Важливо підкреслити, що успішне виконання бюджету залежить від правильного визначення бюджетних показників.

Доречна розробка бюджетного планування є необхідною для підвищення якості та ефективності досягнення бюджетних цілей і посилення впливу бюджетного регулювання на соціально-економічний розвиток країни. З метою посилення впливу бюджетної стратегії на соціально-економічний розвиток суспільства, необхідно приймати заходи, спрямовані на збалансованість та прозорість бюджету, цільове використання бюджетних коштів, забезпечення якісного виконання бюджетів на різних рівнях, поліпшення міжбюджетних відносин [1] та здійснення ефективного фінансового контролю.

Метою цього дослідження є висвітлення можливостей бюджетного планування як важливого компонента бюджетного процесу. У контексті трансформаційних процесів особливо важливим є забезпечення передбачуваного розвитку економіки країни, що неможливо без проведення комплексного аналізу у сфері бюджетного планування та оцінки макро- і мікроекономічних показників як основного інструменту державного регулювання економічних процесів.

Планування бюджетних доходів є складним процесом, який вимагає уважного врахування численних фінансових, економічних і політичних факторів, що впливають на формування доходів та витрат в бюджеті будь-якого рівня. Успішність прийняття та виконання державного бюджету України визначає ефективність урядової діяльності. Процедура складання державного бюджету в Україні регулюється Бюджетним кодексом України. Цей процес включає в себе планування доходів і витрат на наступний рік і середньострокову перспективу, яка охоплює плановий бюджетний період і наступні два [2].