Developing price statistics for internationally traded services – practical experience from Statistics Sweden

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Abstract

Sweden, as a small open economy heavily reliant on international trade, has witnessed a significant surge in the trade of services over recent decades. In 2019, the ratio of trade in services to GDP, current prices, rose to 29%, up from 10% in 1980, highlighting the growing importance of this sector. Consequently, the interest in expanding the coverage of the economic statistics has increased, specifically considering the area of price statistics. Producer price indices for internationally traded services is a relatively unexplored part of the economic statistics and finding detailed publications of this statistics is challenging. Statistics Sweden have compiled service producer price indices (SPPI's) for exports and imports since 2020 and is publicly available at the webpage of Statistics Sweden.

This paper aims to share Sweden's experiences and success in the development and compilation of quarterly SPPI's, describing the challenges encountered in creating a robust data frame for sampling and weights calculations from multisource statistics. A major obstacle faced was the lack of classification concordance between SPPI and the trade value data source, which adhere to the extended balance of payments services classification (EBOPS), while the SPPI follow a national version of the Statistical classification of products by activity (CPA). Bridging this classification gap was crucial for establishing a high-quality data frame, aiding in the classification of data at the lowest possible level. Another fundamental challenge that is addressed in the paper is the process of establishing representative price measures.

Insights shared in this paper contribute to the broader discourse on improving statistical methodologies, particularly in the context of international trade in services and the quality of official price statistics. Official price statistics are widely used as input in other areas of the official economic statistics. For instance, SPPI's are used to calculate GDP in constant prices, enabling users to separate between price and volume changes in the nominal GDP figures. Consequently, high-quality price statistics extends beyond the intrinsic value for the individual statistical survey, as it also is an improvement for the overall quality of official economic statistics.

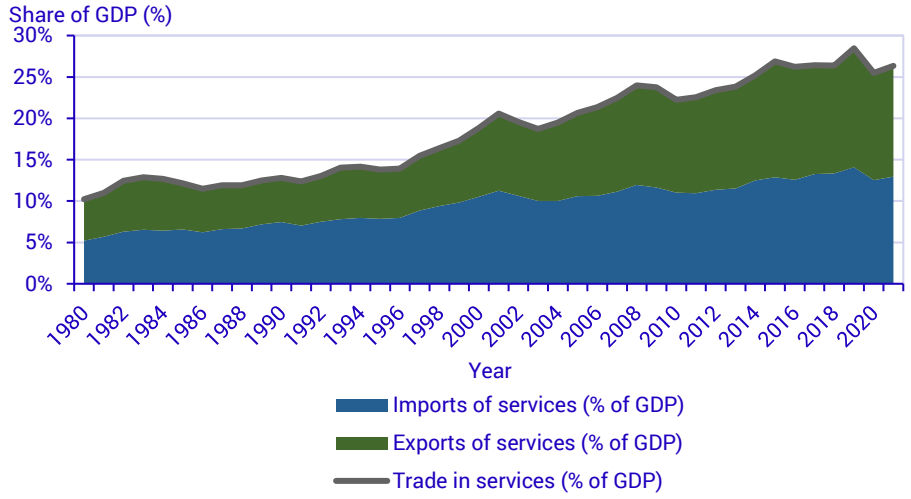
Keywords: producer price index for services, price deflators, economic statistics, classification concordance, international trade

1. Introduction

Service producer price index (SPPI) aims to measure the average price development for different types of services in the economy. As a part of the family of producer price indices, SPPI is a key measure to understand the macroeconomic conditions and inflationary pressure in the service industry. The main user of the SPPI is the National Accounts, who use the index as price deflators when converting nominal values of service output into volume measures. Utilizing the most appropriate price deflator in the volume computation enhance its precision and facilitates a deeper understanding of economic growth.

Statistics Sweden have compiled SPPI since the 1990's and covered only three service areas initially (accommodation services, rental fees for real estates and domestic flights). The coverage has expanded continuously, with a primary focus on domestic services. In later years, SPPI users have raised its interest in price index for internationally traded services, i.e. exported and imported services, motivated by its growing importance in the Swedish economy. Illustrated by figure 1, the ratio of internationally traded services to GDP was 29% in 2019, up from 10% in 1980. Without these SPPI's, users must approximate the price development with alternative price statistics. This practice carries the inherent risk that the approximation does not reflect the actual price development, which can be particularly pronounced if price trends between services and markets (exports/imports) diverge. Responding to this need, Statistics Sweden have compiled SPPI for exports and imports since 2020[1].

Figure 1: The ratio of Sweden's international trade with services (sum of exports and imports, current prices) to GDP. Time period: 1980 – 2021. Source: Statistics Sweden.



[1]For more information of the quarterly publications, see the product page of SPPI: https://www.scb.se/en/finding-statistics/statistics-by-subject-area/prices-and-consumption/producer-and-import-price-index/producer-and-import-price-index/

When expanding SPPI to exported and imported services it is fundamental to have data on the market structure to determine which services to include in the index. Ideally, the data delineates specific services, quantifies their economic importance, and specifies the entities that is trading with the services. Such information can then be used by the SPPI to construct a data frame for sampling services, calculating weights and as an initial source for price collection. Fortunately, this type of data is available in the survey of Foreign Trade in Services which is compiled by Statistics Sweden on behalf of the Swedish central bank, the Riksbank.

However, using the Foreign Trade Statistics does not come without challenges. The main challenge is a lack of classification concordance. More specific, the Foreign Trade Statistics follows EBOPS 2010 whereas the SPPI follows a national version of the CPA[2]. Both classifications are product-oriented but follows different hierarchical structures. Identifying services within the SPPI's classification require some kind of key between the two classifications. Another challenge in developing SPPI for internationally traded services has been to establish representative price measurements for the service area.

The remainder of the report will briefly describe the SPPI and its role in the economic statistics. Followed by an overview of the main challenges and the results of the new SPPI markets. The report ends with some concluding remarks of our experience from this work.

2. Service producer price index – a brief overview

2.1 The service producer price index for exports and imports

SPPI for exports and imports can described, from a domestic point of view, as domestic producers selling services to non-residents (SPPI exports) and residents buying services from non-residents (SPPI imports)[3].

The coverage of services is allocated to the sections H, I, J, M and N in the CPA. Moreover, SPPI for exports covers BtoAll transactions, whereas SPPI for imports are restricted to B2B, meaning that B2C transactions are excluded. The concept of prices align as closely as possible

[2]The national version of the CPA is called Swedish Standard Classification of Products by Activity 2015 (Statistics Sweden, 2024a), abbreviated SPIN. SPIN has a hierarchical structure with six levels. The first four levels of SPIN correspond to the first four levels (up to subgroup) in CPA. However, CPA's fifth level (five-digit level, category) is not found in SPIN. The first five levels of SPIN follow the code structure according to The Swedish Standard Industrial Classification (SNI), after which the sixth level consists of a sequentially numbered two-digit addition. Due to the international recognition of CPA and the close correspondence between SPIN and CPA, the report will refer to the CPA, instead of the SPIN.

[3]More details about Statistics Sweden's SPPI compilation can be found in the quality declaration (Statistics Sweden, 2024b) and the presentation of the statistics (Statistics Sweden, 2024c).

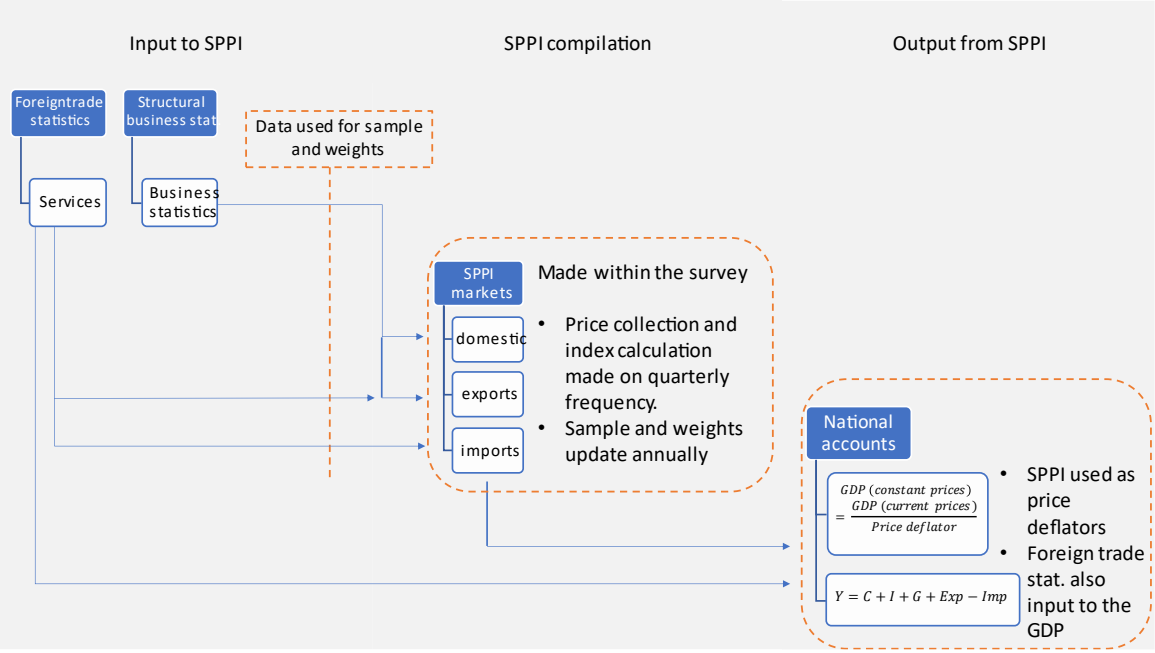
with the National Accounts in order to construct an index that are fit for use as price deflators. For instance, prices should be based on transactions including discounts, rebates, etc., but excluding taxes, VAT and custom duties. The index is compiled in the domestic currency, the Swedish Krona. Prices collected in trade currencies are converted by Statistics Sweden. The sampled observation unit is a combination of enterprise, service, and market (exports/imports). The sample and weights are updated annually.

2.2 SPPI's role in the system of economic statistics

To highlight the quality improvements as SPPI for exports and imports are introduced, it is helpful to identify SPPI's role in the system of economic statistics. First of all, SPPI produce high-quality price deflators which contribute to enhance the accuracy of volume changes in the GDP measure. Moreover, SPPI is a price indicator for the early stages of the distribution chain, making the index a valuable indicator of the price pressure as services trickle through the economy. On the input side, SPPI makes use of available business statistics to lay the foundation of the index. Specifically, the Foreign Trade Statistics and the Structural Business Statistics are used when doing sampling and weight calculations. Additionally, the Foreign Trade Statistics is also used in National Accounts to measure the exports and imports in the Swedish economy. Figure 2 illustrates an overview.

Having separate surveys for different economic measures facilitate compilers to address the complex issues encountered when measuring economic variables. Ultimately, the surveys are integrated into a coordinative system which caters the requirements of National Accounts.

Figure 2: SPPI in the system of economic statistics.



Considering EU requirements, the European Business Statistics Regulation (EC) of 27 November 2019 regulates that SPPI's must be produced quarterly in unadjusted form. The reference period is the quarter with the coverage of NACE sections H, I, J, L, M (excluding M701, M72, and M75) and N. Currently, there are no requirements to produce statistics disaggregated by the export/import of services. Instead, the motivation to produce these statistics is to satisfy the strong user need at National Accounts.

3. Main challenges

3.1 Classification concordance

As mentioned above, Foreign Trade in Services adhere to the EBOPS 2010 classification, while SPPI follows a national version of the CPA. These two classifications are product-oriented but follows different hierarchical structures meaning that services identified in EBOPS are not necessarily mapped one-to-one with services in CPA. For instance, *Air transport with freight* in EBOPS links to five subcategories in CPA, illustrated in table 1. This means that enterprises reporting trade values to *Air transport with freight* in the Foreign Trade Statistics cannot be linked to a unique subcategory in CPA.

Table 1: Classification concordance issue – EBOPS to CPA.

EBOPS (3-digit)	**CPC (5-digit)**	**CPA (6-digit)**
3.2.2 - Air transport with freight	65311	51.21.12 Air transport services of letters and parcels
	65319	51.21.11 Scheduled air transport services of intermodal containers
		51.21.13 Scheduled air transport services of other freight
		51.21.14 Non-scheduled air transport services of other freight
	66032	51.21.20 Rental services of freight air transport equipment with operator

This is an issue as SPPI aims to identify services and draw samples at the lowest classification level possible, which becomes especially important if services at the lowest classification level have different price trends. To manage this issue, the SPPI staff have manually allocated enterprises' trade values (exports/imports) to the lowest level possible in the CPA. This allocation was supported by information from other sources. For exports, enterprises' export values have been compared to the production values reported in the Structural Business Statistics. Additionally, manual research and information reported in the questionnaire have been used to allocate these trade values in the CPA classification.

The first mapping made between EBOPS and CPA created an initial product link between the classifications. Over time, this product link must be updated as enterprises enter and leave

the market. This work is resource demanding and resource constrains must be balanced with the allocation precision. As a result, services are not necessarily always allocated to the lowest CPA level and some samples are therefore made on more aggregated service areas. From SPPI's point of view, it would certainly facilitate if the surveys' classifications were more aligned. Table 2 shows the mapping between CPA and EBOPS on an aggregated level.

Table 2: Aggregated mapping – CPA and EBOPS.

CPA sections	EBOPS sections
H - Transportation and storage services	parts of 3 - transport
I - Accommodation and food services	parts of 4 - travel
J - Information and communication services	9 - information services, parts of 8 - intelluctual property charges and 10 - other business services
M - Professional, scientific and technical services	parts of 10 - other business services
N - Administrative and support services	parts of 8 - intelluctual property charges and 10 - other business services

3.2 Price measurements

When calculating price changes there are two important conditions for the price measurement: 1) follow comparable services over time and 2) representativity of the service area. The comparability condition means to adjust for quality changes that appear in the service before calculating the price index. This ensures that the index measures *pure* price changes, i.e. price changes are not influenced by volume changes (which should be captured in the GDP measure). The representativity condition concerns that pure price changes reflect the prevailing economic condition of the service area.

Comparability over time is managed by using a suitable method for measuring the price and monitoring the quality of the service. There are several pricing methods that can be used in a price index and different service areas usually require different pricing methods[4]. The main pricing methods are listed in table 3. When needed, survey respondents are supported by SPPI staff to find suitable pricing methods. In addition, the respondents are asked to report up to five price determining characteristics of the service and update these characteristics when needed. That way, SPPI staff monitor quality changes and can apply suitable adjustments techniques when such changes appear.

[4] The SPPI manual describes pricing methods and quality adjustment techniques in detail (OECD/Euorstat, 2014).

Table 3: Main pricing methods in the Swedish SPPI for exports and imports.

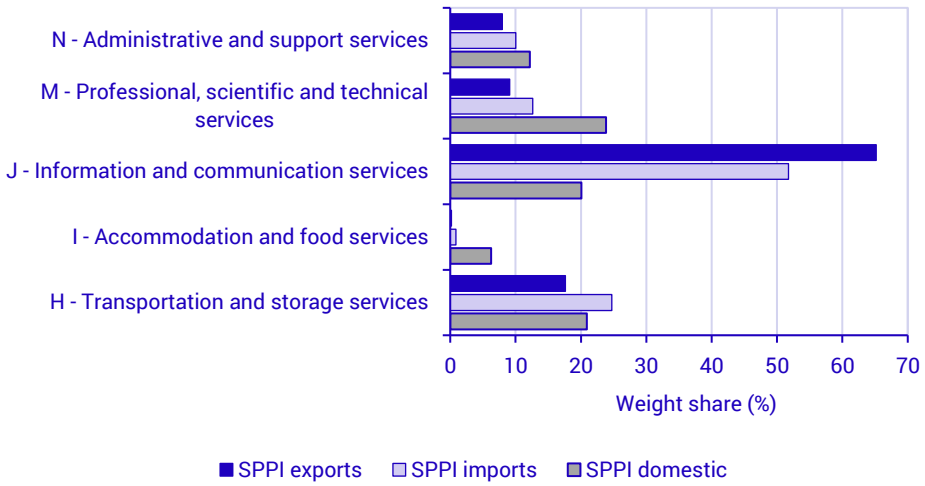
Pricing method	CPA sections
Contract pricing	H, J and N
Percentage fee method	J and N
Time-based method	J and M
Direct use of prices of repeated services	When applicable
Unit value method	When applicable

The representativity condition is closely related to the sampling procedure, which is done as a PPS sample with enterprise's revenue/costs (exports/imports) used as the allocation variable. Another aspect is how the sampled enterprises select services to report. Respondents are guided to report services available on the open market and representative for the enterprise's revenue/costs in the service area. However, some large multinational enterprises report transfer prices, i.e. transactions with the enterprise's own foreign affiliations. Such prices can fluctuate greatly and might not be representative of price changes on the open market. Statistics Sweden's current praxis is to include but closely monitor transfer prices.

4. Results

Looking at the main results of the two new markets for SPPI it is evident that the markets have similar weight distribution among SPPI's sections, figure 3. Most of the weight is allocated to section J (information and communication), followed by section H (transportation and storage). As a reference, weights for the domestic SPPI are also presented, which is more evenly distributed. Note, that the domestic SPPI covers more sections than shown in the figure.

Figure 3: SPPI weights. Time period: 2023. Source: Statistics Sweden.



The annual rate of change and the main contributions[5] to the aggregated SPPI's, figure 4, shows that there was a price surge in parts of 2021 and 2022. Section J, the section with largest weight, is a large contributor in both markets. During the price surge in 2022, section J was the main contributor to the SPPI for exports, whereas the main contributions in SPPI for imports came from sections J and H. The increase in service prices started to be more moderate in 2023, which is similar to other price statistics (e.g. CPI, PPI).

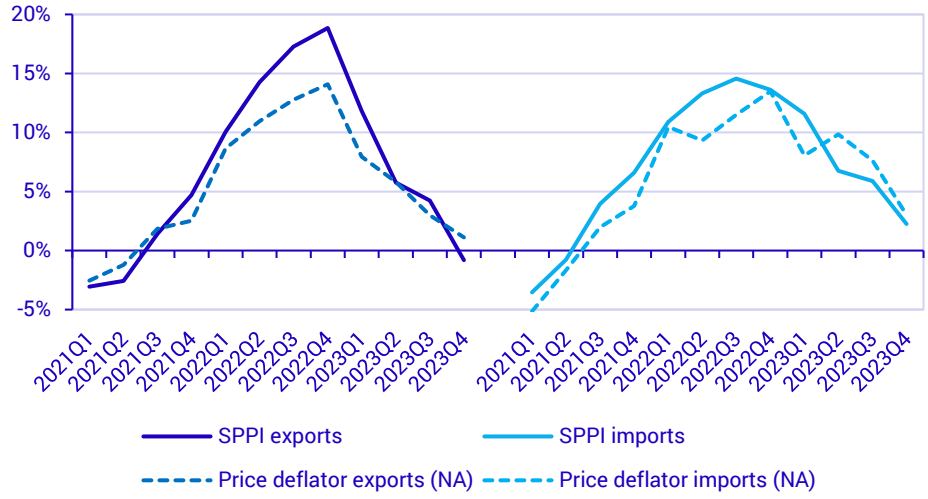
Figure 4: Annual rate of change (%) – SPPI and contributions from main sections. Time period: 2021Q1 – 2023Q4. Source: Statistics Sweden.

Finally, to relate the SPPI output to the National Accounts, aggregated SPPI's has been compared to implied price deflators from the National Accounts[6], illustrated in figure 5. This rough comparison indicates that the indices have similar trends, but with some differences. For instance, during the price surge in 2022 and parts of 2023 the implied price deflators in National Accounts tended to have smaller price increases compared to the SPPI aggregates. The differences appear because National Accounts have gradually implemented the new SPPI's in their calculations, meaning that some SPPI's at lower classification levels might be missing in National Accounts' price deflators. There are also methodological differences which contribute to the index differences, for instance private persons imports of services is not included in the SPPI for imports but should be covered in the National Accounts. However, the National Accounts should have benefited overall by getting more precise price deflators from the SPPI.

[5] The contributions are calculated according to the formula (9.25) in the PPI manual (IMF, 2004). However, it should be noted that SPPI is calculated as a chained index.

[6] Derived by applying $\frac{\Delta Value}{\Delta Volume} = \Delta Price$ on services' export and import components in the GDP measure calculated from the expenditure side.

Figure 5: Annual rate of change (%) – aggregated SPPI vs implied price deflators in National Accounts (NA). Time period: 2021Q1 – 2023Q4. Source: Statistics Sweden.



5. Conclusions

SPPI strengthen the economic statistics by contributing to more accurate price indices for internationally traded services. Even though import/export falls outside EU regulations for the SPPI:s statistics, it serves an important purpose in enhancing the quality of the statistical economic system. National Accounts is a vital user of this statistics and a good cooperation is important to coordinate the production of economic statistics. The staff of SPPI and National Accounts have a meeting at least once a year to discuss current issues.

Some service areas pose greater challenges in establishing representative price measurements, such as licensing fees and advertising services. The complexity of these services makes it difficult to ensure that *pure* price changes are caputerd in the price measuremet. The staff of SPPI are continuously working with these issues to ensure that the quality of SPPI is meeting user's expectations. Their expertise should serve as a suitable qualification for making improvements in this area.

Acknowledgment

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