

Modernising CPI Production

PPI as an Official User

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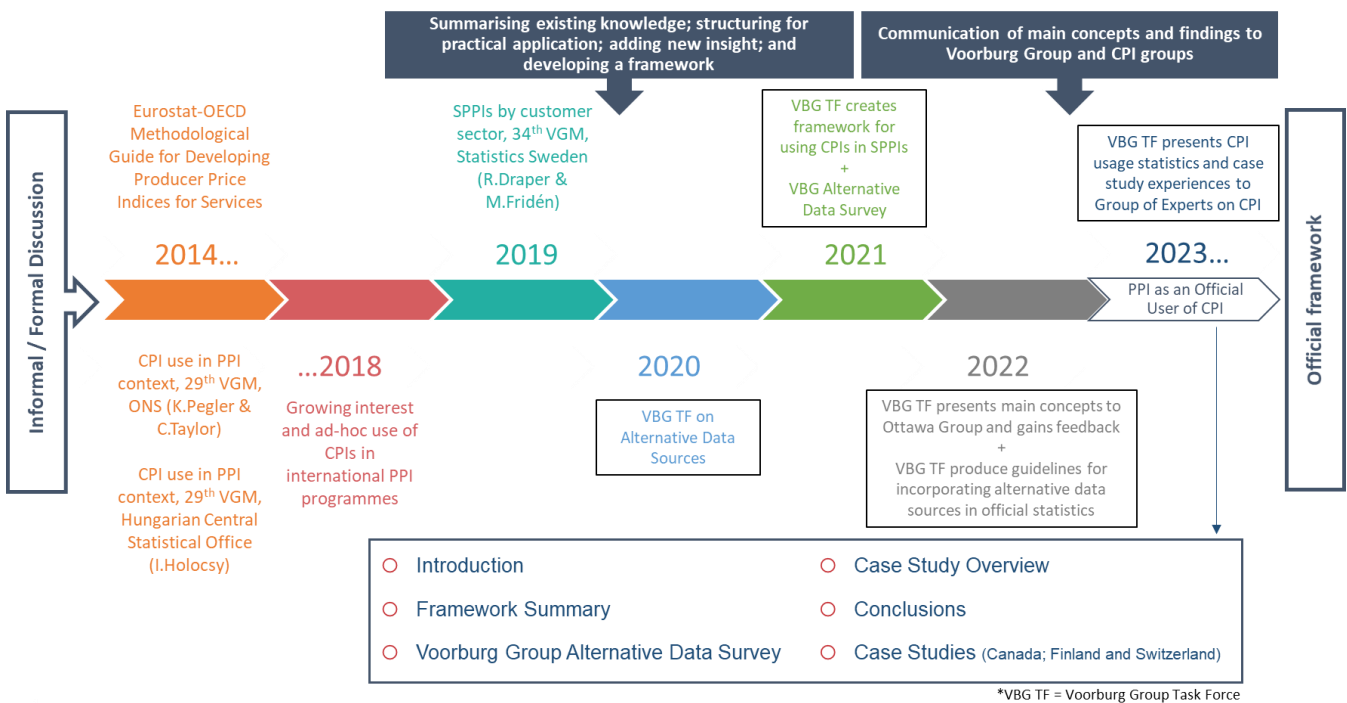
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1 INTRODUCTION

For over 30 years, the Voorburg Group on Service Statistics (VBG) has worked towards expanding Producer Price Index (PPI) coverage to services by establishing and maintaining an internationally comparable methodology for measuring output and producer price indices for the service industries. Whether a country is expanding to include an activity for the first time or re-evaluating data availability, VBG members have increasingly incorporated Consumer Price Indices (CPIs) into their PPI programs. Common solutions, where appropriate, have the potential to simultaneously reduce costs and the level of burden on both statistical institutions and respondents, whilst also providing a swift route to higher levels of coverage.

To compliment member based efforts and an earlier expansion of the SPPI Development Guide¹, the Voorburg Group has in recent times embarked on a number of task forces to work towards the formalization of a framework for the use of CPI. Furthermore, a VBG member survey has been augmented to collect information on the usage of alternative data sources, including the use of CPI, in the production of SPPIs.



The VBG member survey results indicate that PPI programmes are indeed utilising CPIs to a large degree in the coverage of service based activity. This naturally raises the question of how this relationship and dataflow should be managed and raises if PPI should be considered as an official user.

This companion paper builds upon and is complimentary to the largely theoretical paper, Alignment of Methodology and Scope between Services Producer Price Indices (SPPIs) and Consumer Price Indices (CPIs): Developing a framework for using CPIs in SPPI calculation², by enhancing the discussion with practical success cases from three VBG member countries.

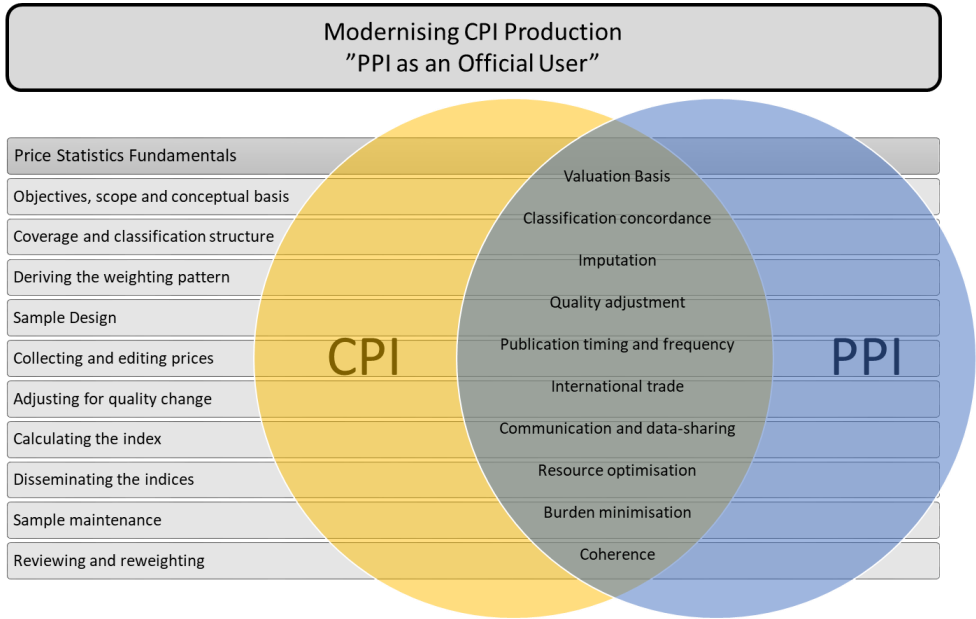
¹ [Eurostat-OECD Methodological Guide for Developing Producer Price Indices for Services: Second Edition.](#)

² [Alignment of Methodology and Scope between Services Producer Price Indices \(SPPIs\) and Consumer Price Indices \(CPIs\):](#)

Chapter two provides an overview of the framework for using CPIs in SPPI calculation. Chapter three presents results from the VBG alternative data survey with a focus on CPI usage. Chapter four gives a summary of the three practical case studies. Chapter five summarises the major conclusions. Chapter 6 includes the three case studies in their entirety as self-contained bodies of work.

2 A FRAMEWORK FOR USING CPIs IN SPPI CALCULATION

The theoretically driven companion paper sets the foundation for a framework leveraging common fundamentals³ to address obvious and subtle divergences in concepts and purpose. The framework, from the PPI perspective, lays the foundation for judging if a CPI is fit-for-purpose as an alternative data source. From the CPI perspective it provides a set of criteria to be aware of when delivering CPIs for use by PPI. This section of the paper provides a selection of key aspects from the framework, and is in some instances an extract from the companion paper, giving context to the case studies and for important considerations for CPI statisticians when considering PPI as an official user. A full and detailed discussion of these aspects can be found in the companion paper, Alignment of Methodology and Scope between Services Producer Price Indices (SPPIs) and Consumer Price Indices (CPIs): Developing a framework for using CPIs in SPPI calculation (2021).



Valuation Basis. Differences in the valuation basis (or valuation principle) require adjustment when such differences impact price development differently for the purposes of CPI versus PPI. Where CPIs aim to measure transactions in purchasers’ prices; SPPIs aim to measure transactions in basic prices.

The System of National Accounts (SNA) defines the *basic price* as the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, by the producer as a consequence of its production or sale. It excludes any transport charges invoiced

[Developing a framework for using CPIs in SPPI calculation.](#)

³ The ten steps for price statistics development provides common fundamentals for consideration and can be found in three official price statistics manuals including: An Overview of the Steps Necessary for Developing PPIs (PPI Manual; 2004; p50-60); An Overview of the Steps Necessary for Developing XMPIs p59-70; and Chapter 1 (CPI Manual; 2020; p1-27)

separately by the producer. Basic prices exclude any taxes on products the producer receives from the purchaser and passes on to government but include any subsidies the producer receives from government and uses to lower the prices charged to purchasers⁴.

SNA also defines the concept of *purchaser's price* which corresponds to the amount paid by the purchaser, excluding any VAT or similar tax deductible by the purchaser, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place.⁵

The figure below⁶ gives an overview of the official differences between basic and purchasers' prices:

Basic prices (PPI)
+
Taxes on products excluding invoiced VAT
-
Subsidies on products
+
VAT not deductible by the purchaser
+
Separately invoiced transport charges
+
Wholesalers' and retailers' margins
=
Purchasers' prices (CPI)

If CPI data is used in the compilation of SPPIs it must at least be adjusted from valuation at purchasers' prices to basic prices, as basic prices are more conceptually correct to the remuneration that producers actually receive. Explicit fees that are added to the price at the point of sale, such as value added tax and excise duties, are typically calculated as a percentage of the price and therefore easy to remove from the CPI data. Removing the implicit fees (taxes on products other than VAT, freight, and insurance) is more difficult because they are hard both to identify and to quantify. Additionally, adjustments should be made for subsidies on products and services which are not included in CPIs.

Nomenclature and Imputation. The compilation of the SPPI and the CPI are based on different classification structures. The PPI can be compiled according to industry or product classification, for example, International Standard Industrial Classification of All Economic Activities (ISIC) and Central Product Classification (CPC). "The CPC classifies products based on the physical properties and the intrinsic nature of the products as well as on the

⁴ *System of National Accounts (2008)*, Page 101

⁵ When a purchaser buys directly from the producer, the purchaser's price may exceed the producer's price by: (1) The value of any non-deductible VAT, payable by the purchaser;(2) the value of any transport charges on a good paid separately by the purchaser and not included in the producer's price; and (3) If purchasers buy output not from the producer directly but from a wholesaler or retailer, it is necessary to include their margins in the difference between basic and purchasers' prices also.

⁶ *System of National Accounts (2008)*, Page 103 (§ 6.69)

principle of industrial origin”⁷. The CPI is compiled according to the Classification of Individual Consumption According to Purpose (COICOP). “COICOP classifies individual consumption according to purpose”⁸.

Although efforts have been made for a certain level of harmonization to exist between different classification standards differences need to be duly noted. When concordance between nomenclatures is less certain matching must be implemented at more specific and detailed levels.

A typical example of where classifications are misaligned is honey.

- Industry classifications, for example, ISIC Rev.4 – Honey classified to 0149 Raising of other animals as “bee-keeping and production of honey and beeswax”.
- Product classifications, for example, CPC 2.1 – Honey classified to 029 Other animal products as 02910 Natural honey.
- Consumption classifications, for example, COICOP 2018 – Honey classified to 01.1.8 Sugar, confectionery and desserts (ND) as 01.1.8.3 Jams, fruit jellies, marmalades, fruit purée and pastes, honey (ND).

In each nomenclature honey is classified and aggregates with a different group of products. Misalignment of nomenclatures at higher levels of aggregation presents an issue when imputation is necessary. This was especially of concern during the pandemic where imputations were much more broad based and deep in the aggregation structure. The Voorburg Group has produced an initial attempt at a concordance utilising the European CPA product nomenclature defined at the 6-digit level of detail and COICOP 2018 defined at the 4-digit level of detail⁹.

Communication about PPI’s use of CPIs and in turn CPI’s provision of information about periodic imputations is therefore very important so that each statistic can make informed decisions in the support of each other.

⁷ [Central Product Classification, Ver.2.1 \(2015\)](#), Page 4

⁸ [Classification of Individual Consumption According to Purpose \(2018\)](#), Page 24

⁹ see [An attempt to define concordance between CPIs and SPPIs.xls](#)

International trade in services and Supply-Use Tables. The SPPI measures changes in the price received for services provided by domestic companies to the domestic market and to export. The CPI measures changes in the prices for all services available for the consumer, including imported services. Where large shares of domestic production are destined for export and/or large shares of resident demand are fulfilled by imports the CPI may not be a fit-for-purpose replacement for PPI. Detailed information from supply-use tables can be utilised to understand international trade impacts as well as understand the extent of household final consumption. These calculations will result in either the CPI being a full replacement, partial replacement (with direct collection required for production destined to domestic businesses and/or export) or not deemed fit-for-purpose.

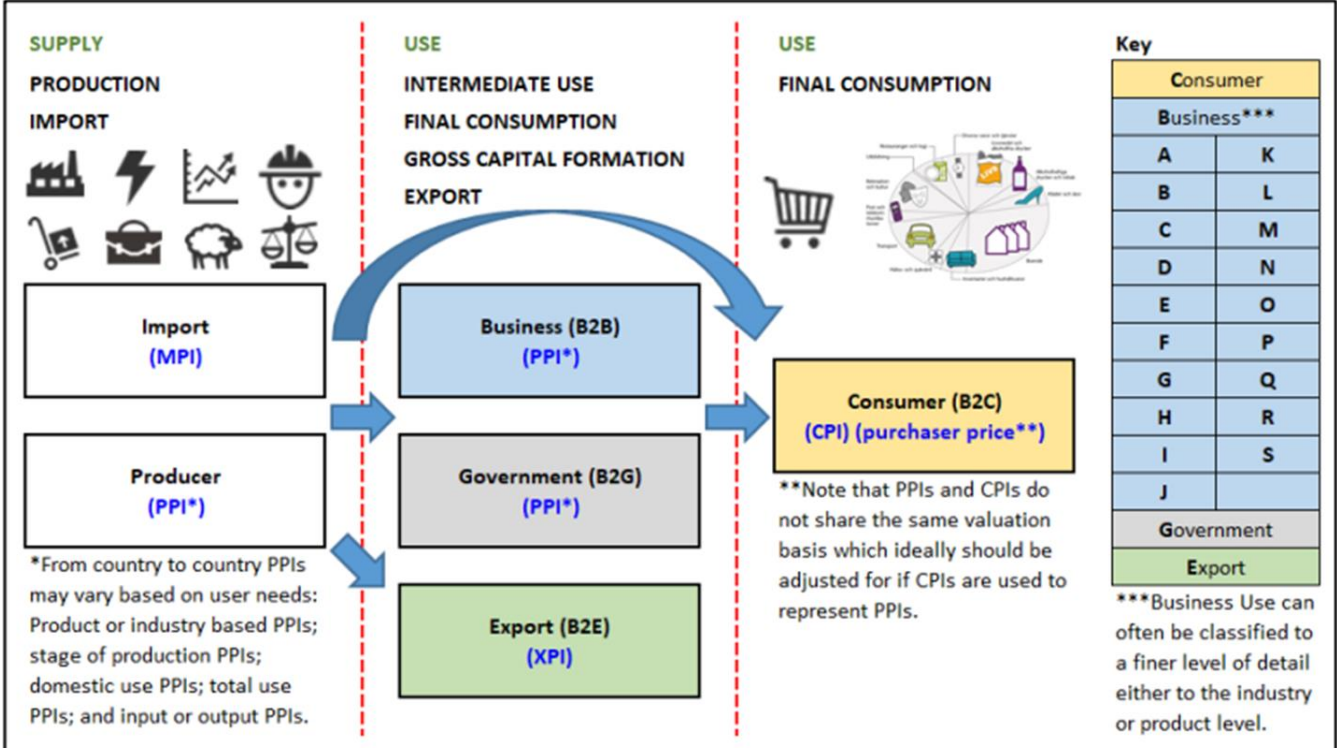


Diagram originates from R.Draper and M.Fridén (Statistics Sweden, 2019) – “SPPIs by customer sector - ”the Swedish experience” (34th Voorburg Meeting).

3 VOORBURG GROUP ALTERNATIVE DATA SURVEY

Each year the Voorburg Group conducts a survey to assess SPPI coverage by member countries. Since 2021 this survey has included questions on the usage of alternative data to fulfil coverage either entirely or in combination with traditional direct collection methods. The predominant alternative data source is the use of CPI and the predominant industries are: Transport and storage; Accommodation and food service activities; and Information and communication. The increasing usage of CPIs within PPI programmes pushed the agenda forward for the Voorburg Group to produce the more official framework documentation.

CPI frequency as an alternative data source for a particular 4-digit classification.		
Class	Name	Frequency
H	Transportation and storage	
4911	Passenger rail transport, interurban	8
4921	Urban and suburban passenger land transport	9
4922	Other passenger land transport	7
4923	Freight transport by road	2
5011	Sea and coastal passenger water transport	6
5110	Passenger air transport	6
5221	Service activities incidental to land transportation	4
5310	Postal activities	3
5320	Courier activities	2
I	Accommodation and food service activities	
5510	Short term accommodation activities	7
5520	Camping grounds, recreational vehicle parks and trailer parks	4
5590	Other accommodation	2
5610	Restaurants and mobile food service activities	11
5629	Other food service activities	4
5630	Beverage serving activities	5
J	Information and communication	
5811	Book publishing	4
5813	Publishing of newspapers, journals and periodicals	5
5911	Motion picture, video and television programme production activities	2
5914	Motion picture projection activities	4
6020	Television programming and broadcasting activities	2
6110	Wired telecommunications activities	5
6120	Wireless telecommunications activities	3
K	Financial and insurance activities	
6419	Other monetary intermediation	3
L	Real estate activities	
6810	Real estate activities with own or leased property	3
6820	Real estate activities on a fee or contract basis	4
M	Professional, scientific and technical activities	
6910	Legal activities	3
7120	Technical testing and analysis	2
7420	Photographic activities	2
N	Administrative and support service activities	
7729	Renting and leasing of other personal and household goods	2
7912	Tour operator activities	3
P	Education	
8510	Pre-primary and primary education	2
8521	General secondary education	2
8522	Technical and vocational secondary education	3
R	Arts, entertainment and recreation	
9311	Operation of sports facilities	4
9312	Activities of sports clubs	2
S	Other service activities	
9601	Washing and (dry-) cleaning of textile and fur products	3
9602	Hairdressing and other beauty treatment	5
9603	Funeral and related activities	4
9609	Other personal service activities n.e.c.	2

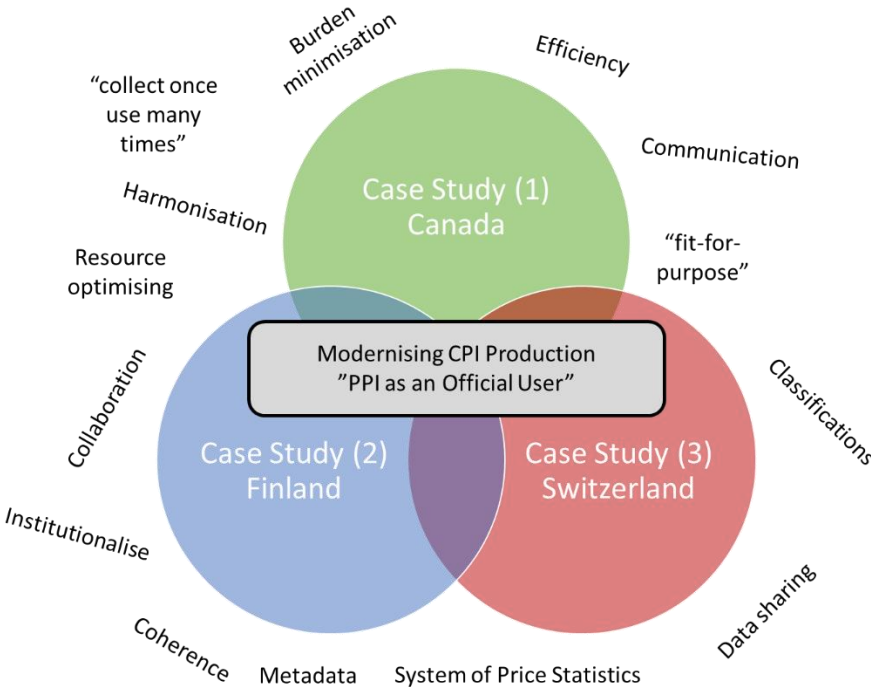
This table shows the frequency of CPI usage per 4-digit class as per industry classification. The survey was based on a sample of 15 countries: Australia, Canada, China, Denmark, Ireland, Japan, Latvia, México, Poland, Republic of Korea, Spain, Sweden, Switzerland, United Kingdom and United States. Full results are available via the Voorburg Group website and are updated on an annual basis.

The results show that the use of CPI to fulfil coverage in PPI has become a widely accepted practise. Implementation has naturally begun in those activities that are predominantly sold to households with the expectation that dialogue amongst stakeholder will lead to further use.

The case studies provide examples of where these discussions are taking place and value is being leveraged. In these instances PPI can be considered to be verging on becoming an official user and even more so an important collaborator.

4 CASE STUDY OVERVIEW

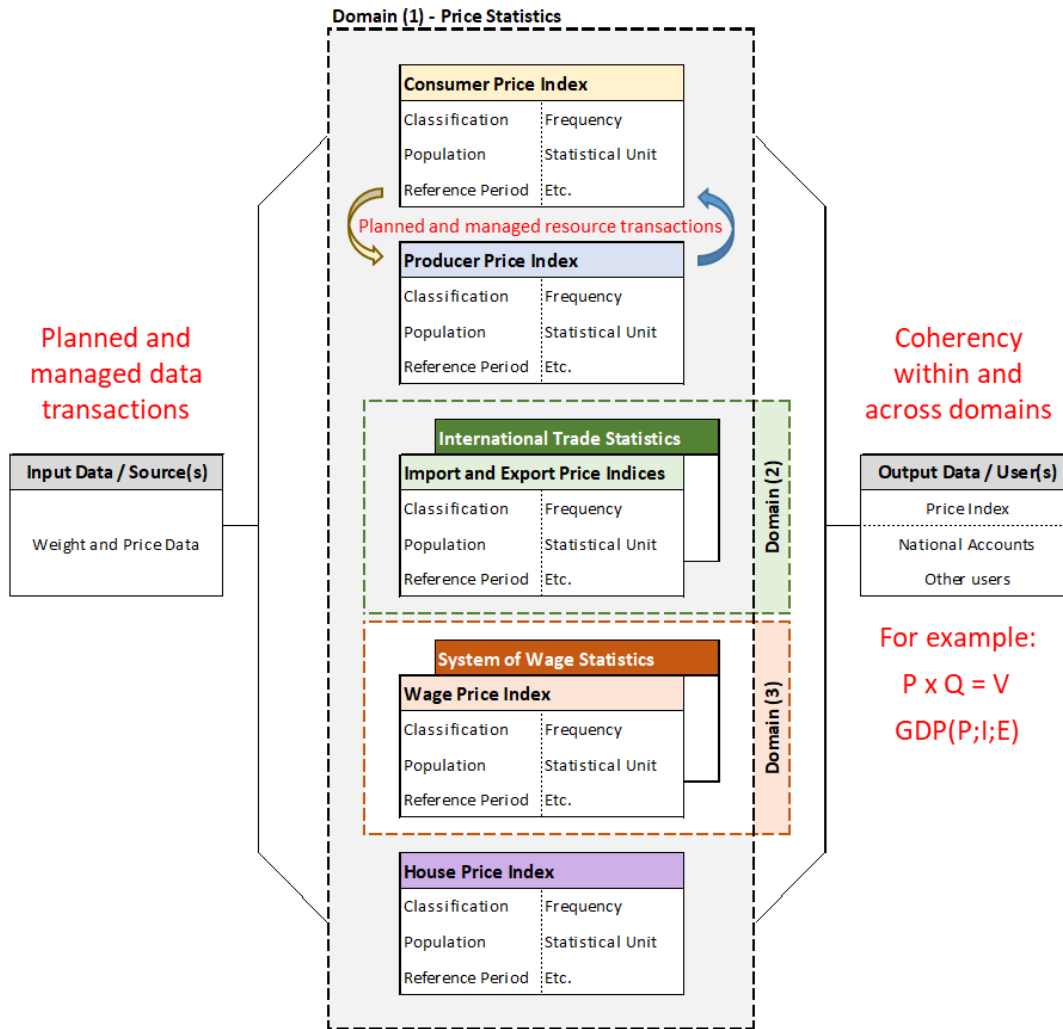
The case studies from Switzerland, Finland and Canada present compelling and practical insight into how a structured and integrated approach can be a significant enabler in creating value, mitigating risk whilst also being cost effective.



The cases provide practical guidance for other countries looking to implement a more integrated approach in the production of CPIs and PPIs including insight around the challenges faced when implementing such paradigm shifts in their respective offices. Some common themes throughout the case studies are the importance of cooperation; harmonisation; coherence; communication; resource optimisation and burden reduction.

Multi-disciplinary collaborations are also exemplified between business statistics, price statistics and national accounts where a balance of perspectives are key in collective improvements to evolving methods, standards and concepts. These benefits are felt both from technical and strategic perspectives encompassing not just methodological considerations but also quality and cultural aspects where collaboration and harmonization is key to a modern, coherent and sustainable production of CPIs, PPIs and more broadly economic statistics.

Integrated Example - System of Price Statistics



What these case studies show is that in many respects PPIs aren't just a user of CPIs but an essential collaborator harking back to the concept of seeing price statistics as a system rather than individual outputs. This coordinated approach seems to translate to harmonised statistics with data based on standardised concepts, definitions, and classifications. This in-turn maximises opportunities that statistics are able to be used and correlated between statistical products and across statistical domains in a coherent manner.

5 CONCLUSION

The CPI represents a viable opportunity to increase and/or replace coverage in the production of service based PPIs. Conceptual differences between the PPI and CPI, which are consistent with the primary uses of the two measures, need to be carefully considered in order to ensure accurate and a theoretically and practically sound suite of price indicators.

The Voorburg Group Alternative Data Survey shows a clear prevalence of CPI being utilised in a widespread fashion. This essentially shifts the conversation from the extent to which CPI is being utilised to what is best practise in managing this use going forward. A more formalised and harmonised approach, exemplified in the case studies, shows a promising value-add opportunity.

The framework for using CPIs in PPIs presents the more technical aspects for consideration concerning concepts and methods and the case studies provide, in more practical terms, a look beyond the technical to the strategic with an emphasis on communication and formalised data and metadata sharing. The framework also serves as a guide to CPI regarding aspects important to PPI as an official user.

Beyond a user based relationship there exists an opportunity for more extensive collaboration. Shared data collection, taking into account the needs of both CPI and PPI, takes a front row seat with the retail industry and scanner data a salient example.

This paper, as well as its companion paper, lay theoretical technical foundations and practical strategic experiences to support institutions and researchers alike in implementing their own solutions in the utilisation and management of CPI as an alternative and sustainable data source for the coverage of PPIs.

6 CASE STUDIES

6.1 CASE STUDY 1: CANADA

Authors: Xin Ha

Voorburg Group Meeting 2023

Taskforce: CPI use in the context of PPI

Title: CPI and PPI's partnership at Statistics Canada

***Abstract:** This case study illustrates the collaboration of consumer and producer price indices at Statistics Canada, covering how CPI and PPI benefit from each other, and which aspects should be considered to enable mutually beneficial cooperation. Currently PPI utilizes CPI in three different ways: data sharing, proxies, and direct use of calculated indices. This increases efficiency and reduces response burden. The case study also presents the usage of PPIs in the CPI. Finally, the collaboration between PPI, CPI and the national accounts is introduced to promote coherent and transparent use of deflators.*

Key concepts: Using CPI in producing PPI, National Accounts

Background

For a long time, Statistics Canada's efforts in producing PPIs were concentrated in the goods sector of the economy. Among these indices, the most significant was the Industrial Producer Price Index, a price index measuring prices within the manufacturing industry. However, with the growing importance of the service sector within the Canadian economy, development of the SPPIs began in the early 2000s. This resulted in the formation of a separate Producer Prices Division responsible for outputting produce price indices, which has so far cumulated in over twenty-five price indices measuring the trades, transportation, finance, insurance, telecom, and professional services at both a product and industry classification level.

At Statistics Canada, while the calculation of the PPIs and CPIs are handled by different divisions, an effort is made to work together to find synergies where possible.

To understand the differences between the CPI and PPI within the Canadian context and how the CPI is used within the PPI and vice versa, the case study will be organized as follows. First, an overview of the PPI program will be explained. Next, the use of the CPI in PPIs is explored. Finally, an analysis of how collaboration between the CPI, PPI and system of national accounts can result in better outputs for all three programs.

Overview of PPI Program

Data Collection and Type of Price Collected

In the PPIs, data is collected in three ways. The most common way is with electronic questionnaires (EQs). The EQs are sent to respondents who can then fill it out online and submit it electronically. This is convenient for the respondent, saves on cost and increases timeliness. Another way of collecting data is using administrative data. This could be data from third parties or directly from the respondent. Usually, administrative data are much larger

data files that are a rich source of data and can significantly improve the quality of a price index. The third way of collecting data is by web scraping. Although this is an effective method to collect many data points, it is sometimes difficult to know if the price collected is a transaction price.

When collecting prices from respondents, it is not always possible to distinguish between business-to-all, business-to-business, and business-to-consumer. For example, for the couriers price index, prices are collected online directly from the respondent website. In this case, it is not possible to distinguish who the courier is offering its service to is a consumer or business. As such, Statistics Canada does not make this distinction when publishing the price indices.

Calculation of Price Indices

At Statistics Canada, there is a centralized application that is used to calculate the CPI and some of the PPIs that was developed jointly by both divisions. However, more recently, some of the PPIs have been calculated using open-source tools such as R, the reason being that the centralized application was slow and inflexible. For example, calculation times were slow, the type of indices that could be calculated were limited i.e. Laspeyres-type indices, and required IT support to make updates or fix bugs. Using open-source tools allows for much more flexibility. Calculation times are faster, many more types of price indices can be calculated, and updates or fixes can be implemented faster without requiring IT support. This new process has resulted in many efficiencies such as reducing the amount of time spent on production, leading to more time spent on improving existing price indices and developing new price indices¹⁰.

Use of CPIs in PPIs

The use of CPIs in PPIs within the Statistics Canada framework is threefold: data sharing, the use of CPIs as proxies, and the use of CPI as a total replacement for a PPI.

Data Sharing

Recently, CPI has leveraged the use of administrative data sources more and more. In some of these cases, the data source can be used in the PPI context as well. An example is the use of scanner data. If retailers can provide data on margins, it can be used as a replacement for survey data to measure the margin movements of the retail services industry. This not only reduces the response burden, but also increases the accuracy of the measurement since instead of using a sample of the data from the respondent, a census of the data is used. This is precisely what is occurring now within the Retail Services Price Index. Where possible, respondent data is being replaced by scanner data when margin information is available. As noted, this leads to much better estimates, reduces the response burden from filling out electronic questionnaires and is timelier since scanner data is received soon after the end of reference period.

Use of CPI Proxies in PPIs

Another use of the CPIs within the PPI is their use as proxies. Due to the different publication dates of the different PPIs, in certain situations where the PPIs are not timely for the preliminary GDP estimates, CPIs are used as proxies to help our System of National Accounts partners deflate their current dollars figure to real GDP before the actual PPIs numbers are available. Thus, for preliminary estimates, CPI can be used and when PPIs data is available, it will be used in the revision to produce the final estimates.

Total Replacement

Sometimes it is necessary to use a component of the CPI as total replacement for the PPIs. There are a few reasons that this might occur. First, the data used to calculate the price index of the product or industry does not

¹⁰ [Modernisation of Retail Services Price Index](#) – 2022 Voorburg Group Meetings

necessarily have a clear partition between the consumer and producer side. Thus, using one index to represent both the consumer and producer movement is sufficient. Second, acquiring a data set to calculate the movements within the producer sector might not be feasible, and to the analyst's determination, the CPI represents a reasonable approximation to be used as a total replacement. An example where total replacement is occurring is in the traveller's accommodation sector where the CPI component is used to capture the price movements of business travel.

Considerations of Using CPIs in PPIs

The CPI is a measure of prices paid by households for final demand goods whereas the PPI is a measure of prices received by producers. The products sold by producers could be either intermediate inputs or final demand goods. As such, the pricing concept between the CPI and PPI often do not align but this is not always the case. Furthermore, sometimes the pros of using the CPIs in the PPIs even given the differences outweigh the cons of not having any measure. In the following, a couple of examples from the Statistics Canada experience illustrate the decision-making process when deciding whether to use the CPIs in the PPIs.

In the first example, as already written, the traveller's accommodation component in the CPI is used to capture the price movements of business travel accommodation in the PPI. A couple of factors were considered when taking this decision. First, access to a data source outlining the prices paid by businesses was difficult to come by and thus, it was not possible to distinguish the prices paid by individuals or businesses. The main data source available were the websites of the various hotel chains. Second, although it is known that the prices paid by individuals and businesses differ, through research, it was determined that the actual price movements do not differ much. This is because businesses, when negotiating with hotel chains, often receive a set percentage off the published rates. Since the discount is a fixed percentage, the price movements between individuals and businesses will not differ. As a result, it was decided that the price movements in the CPI component of traveller's accommodation was a good enough approximation of business travellers.

The next example relates to the retail services industry. This is an industry where the pricing concepts between the PPI and CPI align very similarly. The prices paid by households without taxes are what is received by producers. Removing taxes from the prices is a simple exercise which will allow for the usage of these prices in the PPIs. With the collection of scanner data from retailers for use in the CPI, it can also be leveraged for use within the PPIs.

Collaboration of CPI, PPI, and National Accounts

In Statistics Canada, there is constant communication between the teams of the CPI, PPI, and National Accounts on how the price indices are used by the National Accounts. There are regular meetings to discuss the needs of the National Accounts and to present developmental price indices that are being produced within the PPIs to understand if it would be useful for them and more importantly, if conceptually it is measuring the same concept as the National Accounts. Through these meetings, existing price indices are improved, and missing gaps can be filled.

Unfortunately, it is not possible to cover the entire universe due to constraints, and there will be gaps where price indices do not exist for a certain product or industry. In these circumstances, the National Accounts will derive their own implicit price indices using such data as wages, and industry turnover information.

Finally, the classification systems among the three different areas are not always the same. This will present problems when trying to concord between the different classifications as it is not always the case where a perfect match can be found. Thus, improved coordination between the different classifications will lead to better use of the price indices.

Future Considerations

In general, the CPIs and PPIs measure different sectors of the economy and from a first glance, there might not be much of a role for the CPIs in the PPIs. However, the delineation between the CPIs and PPIs are not always clear and the two sectors often intersect such as in the retail services industry. With the proliferation of scanner data use, it is now possible to have such a rich data set in the calculation of price indices. In the acquisition of such data sets, if the needs of PPIs are taken into consideration along with the CPIs, the opportunity exists to satisfy the needs of both measures. This is just one example and there are others where the sharing of data sources could be beneficial such as in the automotive, insurance and telecommunication industries. Thus, it is encouraged, in the future provision of large administrative data sources, both the demands of the CPIs and PPIs are taken into consideration.

6.2 CASE STUDY 2: FINLAND

Authors: Siiri Pesonen and Susanna Tåg

Voorburg Group Meeting 2023

Taskforce: CPI use in the context of SPPI

Title: CPI and SPPI’s partnership at Statistics Finland

Abstract: *This case study aims to illustrate the collaboration of consumer and producer price indices at Statistics Finland. The case study covers how CPI and PPI benefit from each other, and which aspects should be considered to enable mutually beneficial cooperation. Currently SPPI utilizes CPI in three different ways; customized data collection, joint data collection and calculation, and direct use of calculated indices. This increases efficiency and reduces response burden. The case study also presents the Deflator Group, which formally facilitates collaboration between price indices, volume indices and national accounts and promotes coherent and transparent use of deflators.*

Key concepts: Using CPI in producing SPPI, Deflator group

Background

Statistics Finland's first indices of SPPI were published in 2004. In the beginning only BtoB prices were included in the index. Cooperation with CPI began around 2009, when first BtoAll indices were formed. At first, BtoAll indices were only delivered to Eurostat, but in 2014 Statistics Finland began to publish a national BtoAll index. The use of CPI in SPPI increased as the mentions of BtoAll indices and division of the indices by end user became more common in the drafts of EBS regulation. Statistics Finland has published BtoAll, BtoB, and BtoC indices since 2018.

SPPI utilizes CPI data in three different ways: data collection customized for SPPI by CPI’s interviewers and from APIs, joint data collection and calculation, and direct use of CPI’s published indices. Not only do producer price indices benefit from CPI, but CPI also utilizes PPI’s data on electricity prices. All mentioned ways require teamwork at setup phase and communication whenever there are changes in data, calculation methods, economic landscape, or requirements of either of the statistics. Therefore, the two price indices not only use each other’s data but produce data together.

Source	Classification	Used in	Sharing
CPI	Accommodation, CPA 55	SPPI, BtoB	Data collection
CPI	Technical testing and analysis services, CPA 71.20	SPPI, BtoB	Data collection
CPI	Passenger air transport services, CPA 51.10	SPPI, BtoB	Data collection, calculation
CPI	Telecommunication services, CPA 61.1 and 61.2	SPPI, BtoB	Data collection, calculation

PPI	Electricity, CPA 35.11	PPI, CPI	Data collection, calculation
CPI	Multiple product groups, see detailed list in Annex I	SPPI, BtoB and BtoC	Direct use of CPI
CPI	Multiple product groups, see detailed list in Annex I	SPPI, BtoC	Direct use of CPI

Customized data collection

Along with CPI's own data collection of consumer prices, BtoB price data is also collected for SPPI's use. As the information comes from same enterprises, responding to only one price survey is practical and more efficient. The data is gathered by SPPI's specifications and not used in the compilation of CPI.

Customized data collection is utilized in accommodation (prices of hotel rooms for one person on Wednesdays or Thursdays, under CPA 55) and technical testing and analysis services (prices of roadworthiness inspections for heavy traffic, under CPA 71.20). These price observations are imported to SPPI's production system and treated like other SPPI's price observations.

Joint data collection and calculation

For passenger air transport services (CPA 51.10) and telecommunication services (CPA 61.1 and 61.2) CPI takes care of data collection and handling as well as price change calculation for both statistics. The data include separate data sets for both statistics, thus both price indices receive prices according to their own requirements. Calculated microlevel indices are imported into SPPI's production system. This is practical when a large price dataset is available from a single source for both statistics.

Flight prices are collected from Amadeus API and the python program used in the collection is maintained by CPI-team. Telecommunication data for consumers and businesses is received directly from teleoperators. CPI and SPPI teams negotiate the terms of the data collection together, but CPI maintains calculation. As CPI handles all communication with the enterprises and all price data is included in one data export, response burden of the enterprises decreases.

Direct use of CPI indices

SPPI also utilizes CPI's published indices in BtoC index as well as in BtoB index when applicable. When BtoC-prices make up most of the market or BtoC prices serve as a good proxy for SPPI, this method can be applied. CPI indices are either processed as a part of SPPI's price observations or used alone as a direct replacement of SPPI.

CPI indices are used in the following service groups: *passenger transport services; postal services; accommodation and food services; information and communication services; rental and leasing services; technical testing and analysis services; rental and leasing services of motor vehicles; tour operator services; cleaning services; education services; arts, entertainment and recreation services and other services.* (Detailed list in Annex I)

CPI as PPI's user

Consumer price index may benefit from producer price data, as well. For example, in the fall of 2022 CPI switched to PPI's electricity price data as it covered better the necessary aspects of the electricity market. For similar reasons, consumer price index has utilized PPI's data on electricity prices in the past, too.

Although price indices at Statistics Finland aim to take all applicable statistics into consideration when setting up a data collection, PPI could not meet CPI's requirements for the timeliness of data. The data collection was set up in the past by the standards of Regulation (EU) 2016/1952 on natural gas and electricity prices. As PPI's production schedule differs from CPI's, the survey on electricity prices is closed after CPI is calculated for that month.

Flow of collaboration between price indices, volume indices and national accounts

At Statistics Finland, collaboration between price indices, volume indices and national accounts is both formal and informal. The deflator group was founded to formally facilitate cooperation and convey information between price indices and deflator users. Much of the day-to-day work and smaller ongoing developments, however, happen more informally through conversations between the affected statistics.

Introducing the Deflator Group

Statistics Finland established the so-called deflator group in 2016. The deflator group is a cross-cutting cooperation group that brings together different price and volume statistics, in particular business statistics, price statistics and national accounts. The group's goal is to achieve a more consistent use of deflators which would lead to more harmonized economic figures.

The deflator group is responsible for the common deflators used in short-term volume statistics for manufacturing and services as well as for national accounts. Volume statistics for construction and trade are part of the group, as well, and use the common statistical production system, although they have their own statistic specific deflators.

There were several reasons for setting up the group. First, economic trends in short-term volume indices and national accounts required harmonization. In addition, European Business Statistics regulation (EBS) was under development, which brought new statistical needs, such as the introduction of the monthly index of services production. There was also an urgent need for a new production system of volume indices.

Consistency in deflator use means that we want to apply the same methods when, for example, combining deflators and creating weight structures and product-price links. Aligned product-price links indicate that a product is deflated with the same price index across all statistics.

Initially, the work of the group also included the development of a common statistical production environment. All the methods, structures and product-price links of deflators are maintained in a common production system for deflators called Deflaattori.

The group maintains and develops deflators together and it is important to share information between price and volume statistics to achieve the most coherent statistics possible. The group has regular meetings and a communication channel where it is easy to discuss current news and development with each other.

Success factors for collaboration between CPI and PPI

Collaboration between price indices is successful when communication is open, processes are transparent, and each statistic's specific needs are taken into consideration from the beginning. On-going communication is essential especially when there are changes in the economic landscape or legislation.

For instance, VAT of passenger transport services was reduced from 10 per cent to 0 per cent from January to April 2023. As CPI's indices on passenger transport services are used directly in SPPI, ignoring the VAT change would have led to a biased producer price index.

Open communication is important regarding methodological improvements, as well. For example, CPI switched the index formula used in telecommunication services' microlevel data according to a recommendation from Eurostat. Because CPI team oversaw telecommunication data for both indices, they knew the same improvement could be implemented into SPPI. Thus, the methodological improvement was implemented quickly to both statistics.

An additional but not crucial success factor at Statistics Finland is sharing the same production system and thereby similar processes and database structure. This makes the technical side run more smoothly. Another component to facilitate cooperation is organizational structure; as Statistics Finland the same team is responsible for data collection and processing for both consumer and producer prices.

Future considerations

Price statistics currently share a production system, but price data is still widely treated as being specific to a certain statistic. In most cases, price data cannot truly be processed only once for the use of multiple statistics. Instead, data must be copied from one statistic's database to another. Sharing a common data pool for all price data and describing the observations with the required classifications, price measures and other metadata would enable a truly unified price data pool. Improving and integrating the price data pool further into a common commodity data pool is among the strategic goals of Statistics Finland.

Annex I. CPI indices in SPPI

CPA	CPA name	COICOP	In BtoB index	In BtoC index
491019	Other passenger rail transport services, interurban	07.3.1.1.1.2 Long-distance train journeys	X	X
49311	Urban and suburban railway transport services of passengers	07.3.1.1.1.1 Short-distance train journeys	X	X
493121	Urban and suburban scheduled road transport services of passengers	07.3.2.1.1 Urban and suburban passenger transport	X	X
493211	Taxi services	07.3.2.2 Passenger transport by taxi and hired car with driver	X	X
493911	Interurban scheduled road transport services of passengers	07.3.2.1.2 Long-distance passenger transport by coach	X	X
501012	Sea and coastal passenger water transport services on cruise ships	07.3.4.1 Passenger transport by sea	X	X
50101201	Sea and coastal passenger water transport services on cruise ships, route traffic	09.6.0.2.2 Cruises abroad	X	X
511	Passenger air transport services	07.3.3 Passenger transport by air		X
522124	Parking lot services	07.2.4.2.1.2 Parking fee	X	X
53101	Postal services under universal service obligation	08.1 Postal services		X
55101	Room or unit accommodation services for visitors, with daily housekeeping (except time-share)	11.2 Accommodation services		X
56	Food and beverage serving services	11.1 Catering services	X	X
58131	Printed newspapers	09.5.2.1.2 Subscription to a newspaper	X	X
58141	Printed journals and periodicals	09.5.2.2.2 Subscription to a periodical		X
5914	Motion picture projection services	09.4.2.1.1 Cinemas	X	X
592	Sound recording and music publishing services	09.4.2.3.2 Music services	X	X
60201	Television programming and broadcasting services	09.4.2.3.1 Subscription to cable TV and pay-TV		X
61	Telecommunications services	08.3 Telephone and telefax services		X
682011	Rental and operating services of own or leased residential real estate	04.1.1 Actual rentals paid by tenants		X
68311	Real estate agency services on a fee or contract basis	04.6.4.1.1.1 Estate agents' commission	X	X
712014	Technical inspection services of road transport vehicles	07.2.4.3.2.1 Road worthiness tests	X	X

77111	Rental and leasing services of cars and light motor vehicles	07.2.4.1.1.1 Car rental	X	X
7912	Tour operator services	09.6.0.2.1 Package international holidays	X	X
812111	General home cleaning services	05.6.2.9.1 Cleaning		X
812213	Furnace and chimney cleaning services	04.4.4.9.1 Chimney sweeping		X
855	Other education services	10 EDUCATION	X	X
855311	Car driving school services	07.2.4.3.1.1 Driving lesson	X	X
90	Creative, arts and entertainment services	09.4.2.1.2 Theatres and opera houses	X	X
931	Sporting services	09.4.1.1.1 Sporting event	X	X
931	Sporting services	09.4.1.2.3 Other sporting services	X	X
93111	Sports facility operation services	09.4.1.2.1 Swimming pool fees	X	X
93131	Services of fitness facilities	09.4.1.2.2 Fitness centres and gyms	X	X
93211	Amusement park and theme park services	09.4.1.1.2 Fairgrounds and amusement parks	X	X
952912	Repair services of bicycles	07.2.3.0.2.1 Bicycle maintenance		X
9601	Washing and (dry-)cleaning services of textile and fur products	03.1.4.1 Cleaning of clothing		X
96021	Hairdressing and other beauty treatment services	12.1.1 Hairdressing salons and personal grooming establishments	X	X
96041	Physical well-being services	06.2.3.9.1.1 Neck and shoulder massage	X	X

6.3 CASE STUDY 3: SWITZERLAND

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Voorburg Group Meeting 2023

Taskforce: CPI use in the context of SPPI

Abstract: *This paper aims to showcase the use of CPIs in SPPIs in the Swiss Federal Statistical Office, exploring the benefits and drawbacks of this approach and the theoretical concepts behind each index. This case in particular, discusses a part of the problem in the use of CPIs in the context of SPPIs. In the process of writing this document it became evident the lack of shared principles that can facilitate, regulate and ignite collaborative and systematic uses of CPIs as an established alternative data source for SPPI's.*

Keywords: *SPPI as an Official user of CPI, official alternative data sources, benefits, drawbacks, case study.*

Introduction

This document is structured as a case study including a large theoretical description of the underlying intricacies of the concepts that differentiate and relate data from CPIs and SPPIs.

The first section, “Background”, presents the elements that have defined the collaboration between CPIs and SPPIs, from the human relationships to the organizational aspects that, in this particular case, have played a major role. Moreover, we present shortly the actual use of CPI data, which will be presented in more detail later in the section outcomes. We will as well shortly mention some of the aspects that could require further analysis.

In the second section, “Issues regarding the use of CPIs in SPPIs”, we present four main problems that should be looked upon. In particular we discuss that there is a possibility that the current use we make of CPI data is limited and there could be a potential for additional applications. Moreover, we give mention to some of the conceptual issues that must be clarified when taking data from CPIs.

The third section, “Essential differences between CPIs and SPPIs”, sets a conceptual framework for the underlying conceptual differences that set apart both indices.

The section “Outcomes” presents the current cases in which and how we use CPI data at the Swiss Federal Statistical Office while at the end exemplifying with the cases of the postal services and the telecommunications.

Finally, we put forward the main takeaways of this document in the concluding remarks.

Background

The SPPI in Switzerland is dated to the beginning of the twenty-first century when the first indices were published in 2001, whereas PPIs date back to 1914. The Swiss SPPI is younger compared to the 30-plus years of experience of other country members of the Voorburg Group.

Nevertheless, the organizational structure of the Swiss Federal Statistical Office has, ever since the beginning, facilitated the exchange and closeness between teams working in different domains of Price Statistics. Due to this structure, where CPI and PPI belong to the same unit and physically, since 1998, share an open space office; exchange between teams has occurred naturally. Thus, high cooperation exists within the Price unit, which has been reinforced by the establishment of formal collaborative projects in transversal working groups for all price statistics. These working groups share methods, know-how, brainstorming, and guidelines for practice harmonization. As of today, there are no transversal working groups in data collection, price data conceptualization and risk management. Mainly, because each statistic is responsible for ensuring its own methodological aspects, thus, there is no specific position dedicated to overseeing all collaborations between CPI and SPPI in a general way.

The collaboration for the purpose of data sharing between CPIs and SPPIs has been informal yet custom. It began in 2001 with the Gas and electricity sector, followed by the Telecommunications sector, and later extended to many other sectors. In total, there are 16 areas of cooperation, as we will observe ahead. The collaboration between the two price statistics, although not formalized, is officially communicated to our users, as in the following example of Water supply and sewerage. This is done via our Base Method publication:

... The supply of water and sewerage, together with waste management, recycling and remediation activities constitute Section E of the NOGA, the Swiss version of the NACE: Until now, only the collection of waste paper and scrap metal recycling were included in the PPI. The supply of water and sewerage are henceforth included in the index of goods for the domestic market. These economic activities are actually of significant importance to the national economy and the “private businesses” group of clients’ accounts for a sizeable share of their turnover. As a reminder, household expenses for water supply and sewerage are already included in the Consumer Price Index (CPI). In the domestic market PPI, total turnover (B2AII) is divided between the client groups “businesses” (B2B) and “households” (B2C). For the B2C index, the figures are retaken from the CPI. ...

While in Switzerland the use of CPIs has been focused on the retake of indices or prices for the Business to Consumer segment, the current discussion on alternative data sources has initiated critical reflections about additional applications of CPI data, such as, a CPI index that would match the profile of an SPPI, or behave so close that the CPI can be used as a proxy of the Business to All.

Yet there are issues related to the usability of CPIs in the context of SPPIs that must be tackled beforehand. It is to be highlighted that further understanding is indeed necessary, as noted by Draper R, et al., 2022, since numerical differences are to be observed for example, in the presence of higher or lower proportions of imports or when the prices of imports vary at a different rate than the domestic equivalent .

The implications of these differences could be that for an SPPI, where exports are known to be negligible, sourcing data from an CPI where imports are low or close to zero, the data would be ready to be used, since SPPIs are focused on domestic production. Therefore, the absence of imports in a sector could secure in some cases, that the difference between the domestic and international markets is meagre thus, could be a good candidate or an exact match for an SPPI.

Additionally, other aspect that could influence the usability of a CPI data is the case when the bundles of products consumed by the Business-to-Consumers and a Business-to-Business segments are close, case in which the corresponding price movements could also follow each other. Consequently, it would be possible to argue that such a CPI could be a good proxy or a match for an entire SPPI.

There is a lack of data about the numerical implications of using CPI proxy data, neither exist a comprehensive analysis of the implications of preferring one aggregation type over the other (either a single Business-to-All or a horizontally aggregated index {B2C+B2B+B2X}), which suggests there is a need for further studies in this domain.

Even in the absence of common guidelines and good practices, many countries have been already sharing CPI data for SPPI purposes. This is the case in France, where 19% of their SPPIs are derived from CPI data, and in Sweden, where this percentage reaches 17% . In Switzerland, the approach has been rather conservative. Data sourced from CPI prices or indices, are used only for the Business-to-Consumer segment to build a Business to All horizontal aggregate, with the Business-to-Business segments separately collected and calculated by the SPPI team.

The experiences of other countries have sparked a reflection about the potential additional synergies that may lay in the cooperation between the two indices. The fact that data are scarce and costly to collect is a common reality for all countries. In Switzerland this phenomenon is accentuated by the way in which data can be collected. Although price statistics are mandatory for the surveyed enterprises, there are no legally binding actions that can be used to obtain data. Thus, the possibility of increasing the usability of available data is highly valuable and will be further considered.

Issues regarding the use of CPIs in SPPIs

As beforehand mentioned, like many other countries, in our unit, on the one hand, we are confronted with the difficulty of finding high-quality data; on the other, we have the constant demand to increase the coverage of our indices. This challenge has led many organizations to become innovative, sourcing and using data as effectively as possible. First to increase coverage at a relatively low price, second to act effectively with the available resources, and third, to reduce the constant burden on enterprises.

The following table, taken from the "Guidelines for Incorporating Alternative Data Sources in Official Statistics" developed by the Voorburg Group, gives an overview of the different alternative data sources that can be used and are used by NSOs in the context of SPPIs.

Alternative Data sources classification

Source	Type	Origin	Code	Description
TRADITIONAL	STRUCTURED	Questionnaire (paper, phone and/or electronic)	QNR	The traditional way of collection price information by asking firms for the information via telephone, paper or electronic questionnaires. This is the default and not an alternative data source.
		Web Prices (manual)	WPR	The price collection data is derived from websites manually. The data source itself is considered an unstructured data source not designed for statistical purposes.
EXTERNAL	UNSTRUCTURED	Webscraping (automated)	WSC	The price collection data is derived from websites automatic systems. The data source itself is considered an unstructured data source not designed for statistical purposes.
		Administrative Data Source	ADM	Data which are derived from the operation of administrative systems by public agencies (e.g. data collected by government agencies for the purposes of registration, transaction, regulation and record keeping). Data is often structured for administrative purposes and is highly transferable for statistical purposes.
	Corporate Datasets	COR	Survey respondent provided datasets obtained directly from corporate headquarters in lieu of data collectors collecting data in respondent stores or on their websites. Data pertains to the particular company that is providing said data is often structured for organisational purposes and is highly transferable for statistical purposes.	
	Trade Associations	TAD	Industry based surveys that the target industry is producing for themselves.	
	STRUCTURED	Data Vendors (commercially available structured data)	DVS	Data acquired from companies that actively collect and sell data as a business activity. Often such companies provide data on a contractual basis with defined terms and conditions.
		Consultancies (mandated specific task) (transformed data)	CON	Consulting company and/or specialist company is contracted to collect and/or compile data for a specific purpose (mandated or otherwise). Often such companies are utilised on a contractual basis with defined terms and conditions.
		Credit card and bank data	CCD	Financial information collected at the moment of a transfer of funds between a card holder's account and a business account. Data is graded based on the level of metadata available about the transaction. This source is considered a structured data source.
	BOTH	Other alternative data sources n.e.c.	OTH	Other types of alternative data sources not elsewhere classified. For example, transaction-level data from email receipts (like UBER email receipt data). Other special data delivery from third party data collectors not elsewhere classified.
INTERNAL	STRUCTURED	Consumer Price Index	CPI	Data is sourced directly from the Consumer Price Index
		Producer Price Index	PPI	Data is sourced directly from the Producer Price Index
		Structural Business Statistics	SBS	Surveys utilised for benchmarking purposes
		National Accounts	NA	Price indices derived from volume and value data (implicit price indices)

Source: Guidelines for Incorporating Alternative Data Sources in Official Statistics¹¹

Given the fitness to be used for a Service Producers Price Index, one of these alternative data sources, has been adapting already collected structured and internally available data from the Consumer Price Index. This possibility has been explored since the beginnings of the years 2000s. Both teams of the CPI and SPPI have identified many areas of synergy and have been working on the following sectors:

¹¹ Guidelines for Incorporating Alternative Data Sources in Official Statistics, A. Dawson, R. Draper, S. Kilbey, K. Virgin. 37th Voorburg Group, Cross-Cutting Paper, 2022

Areas of cooperation¹²:

Source	Branch	Index usage	Sharing
CPI	Gas	PPI	Index
CPI	Electricity	PPI	Index
CPI	Postal services	SPPI	Prices
SPPI	Lawyer services	CPI	Index
CPI	Facility Management	SPPI	Index
SPPI	Transport of passengers with boat	CPI	Index
SPPI	Recreational Boats	CPI	Index
SPPI	Cleaning of common areas	CPI	Index
SPPI	Vehicle's expertise	CPI	Prices data
SPPI	Chimney sweeper	CPI	Index
CPI	Medicaments	SPPI	Prices data, & methodology
SPPI	Rent of private transport	CPI	Index
CPI	Telecommunications	SPPI	Index
CPI	Accommodation	SPPI	Index
CPI	Flights	SPPI	Index
CPI	Water supply	SPPI	Index
CPI	Sewage	SPPI	Index

Source: Federal Statistical Office (FSO)

Other areas of cooperation

Index production by	Topic	Sharing
CPI, PPI	Hedonic Models for Personal computers, Laptops; Servers.	Methodology
Price indices	Imputation methodology	Methodology
Price indices	Webscraping	Methodology
Price indices	Index utilization	Methodology
Price indices	Multilateral indices	Methodology

Source: Federal Statistical Office (FSO)

In our experience there are four main issues related to the use of CPIs in the context of SPPIs that deserve particular attention:

¹² The list includes also the cooperation between PPI and CPI (not only SPPI).

First, as of today, in Switzerland, the SPPI and CPI work conjointly whenever a retake of the CPI for the Business-to-Consumer (B2C) segment (then used for a Business-to-All (B2All) aggregate) has been identified. It is also the case that the CPI retakes an index or the prices collected by the SPPI. Yet there are no cases in which a complete retake has been done, namely, using a B2C as a match for a B2All. Looking at the experiences of other countries where this experience has been made, implies a possibility for further applications of CPI data in the future.

Second, Due to differences in the valuation principles that each index uses and the end objective they measure, these two indices take into account different aspects of prices. Under certain conditions, these differences have to be carefully treated, in order to use the data from one index to build the other. Basically, the focus of CPIs is the variation on prices of domestic consumption (which may include imports) and SPPI focuses on the variations of prices of domestic production (which includes exports and excludes imports, yet services have low percentages of exports).

One way to visually differentiate between valuation principles used typically by CPIs and SPPIs:

Valuation principles differences

Price measure	Definition	Components	Use	Users
Basic Prices	Prices received by producers	Amount <u>received</u> for each unit produced minus taxes and adding subsidies received.	Output PPI	PPI
Purchaser Prices	Price paid by consumers	Amount <u>paid</u> by consumer for each product/service Including taxes and excluding subsidies	CPI	CPI / PPI (some cases)

Source: Federal Statistical Office (FSO)

Market Segment and price typology



Source: Federal Statistical Office (FSO)

Third, not only we need to take into consideration the conceptual differences at the level of valuation principles, but correspondingly we require sufficiently detailed imports and exports data in the services sector. Additionally, it is also necessary to have the respective percentages for the B2C and B2B segments, to be able to evaluate whether or not certain CPI would be a suitable candidate for an SPPI retake.

The identification process for new potential cooperation axes could be rendered simpler if this information were available and structured. Thus far detailed, complete data around these topics are scarce. On the one hand, since services are intangible, the process of Customs clearance is different. Given that the main available granular data corresponds to customs data, we do not have enough services branches covered in this regard. On the other hand, although there is some imports and exports data from other sources, these are highly aggregated and the nomenclature used differs from the one used by the SPPI. Therefore, from today's standpoint, we need more detailed and structured data to produce a complete comprehensive study of new axes of cooperation.

Fourth, there are only informal case to case agreements between CPI and SPPI teams on data collection and sharing, therefore there is a lack of formal structure which oversees the exchanges between CPIs for SPPIs. The issue is that the lack of common agreement can be costly and it may induce the establishment of bad practices because methods that are not well enough adapted for CPIs retakes at different levels could be used. In addition, it could also happen that, there would have been other opportunities for CPI retakes, yet they have not been identify due to the lack of formal principles.

Essential differences between CPIs and SPPIs

The Consumer Price Index (CPI) is a widely used economic indicator based on the average change over time in the prices households pay for a representative basket of goods and services. While the Services Producer Price Index (SPPI) primary focus is to measure the average changes over time in the prices of services at the first marketing stage or as defined by Eurostat as "output indices for services that provide measures of the average movements of prices – value at basic prices – received by domestic service producers."

The Consumer Price Index Manual (ILO) states that the CPI should "report the prices that households pay for the goods and services covered by the index. The expenditures and prices recorded are those paid by consumers, including taxes on products and considering all rebates and subsidies and most discounts, even if they are discriminatory or conditional."

Furthermore, when a part of the price is reimbursed by the government or a social security organization, "the market price minus the amount reimbursed should be entered in the CPI."

Eurostat-OECD Methodological Guide for Developing Producer Price Indices for Services states that "first, in theory, the SPPI should cover services provided for all uses (B to C, B to B, B to G..., B to all), intermediate and domestic final consumption, and for exports." and "Second, should measure changes in the price of products rather than industries." Correspondingly, it should measure all outputs as defined in national accounts and follow it as closely as possible.

As the SPPI guide does not define the valuation principles, consequently the PPI manual definition is the general framework, however we are aware that transportation costs are negligible for services for the most part.

The PPI manual (IMF) states that, in the case of an output-oriented PPI, "the relevant prices for a PPI should be the basic prices received by the establishment" and refers explicitly to "The basic price is the amount to be received by the producer from the purchaser for one unit of a good or service produced as output, and or service produced as output, minus taxes and adding subsidies received, on that unit as a result of its production or sale. It excludes any separately charged transportation costs by the producer."¹³

CPI vs. SPPI

Index	Focus	Differences
CPI	domestic consumption	Includes products and services produced by a foreign country, excludes domestic products exported
SPPI	domestic production	Includes products and services produced domestically but consumed by a foreign country

Source: Federal Statistical Office (FSO)

As noted above, the two statistics are based on different valuation principles. The CPI focuses on domestic consumption, purchaser’s prices, thus the price paid by domestic consumers for goods and services, which includes imports and taxes but excludes exports, while the SPPI attention is on domestic production, base prices (prices without any taxes, fees, or margins) or purchasers’ prices (without taxes), which includes exports. An important clarification needed in this regard is the fact that when we talk about the prices, these follow the domestic concept, prices collected in Switzerland only, whereas weights (consumption expenditure or volume) follow the national concept, thus consumption of Swiss residents in Switzerland and abroad. The relevance of these conceptual differences is key in the retake when for example, the behaviour of the domestic market differs largely from the international market, and the presence of imports is high.

Hence, the usability of CPI data should be well considered and if it fulfils the criteria of the SPPI, treated and used as a good fit. As mentioned, the data will have to be treated to account for the elements that differentiate CPIs from SPPIs. The treatment will depend on at which level the retake of the data takes place, and whether are the prices or the final index that is being used. In short, the main factors differentiating CPIs from SPPIs that must be considered for treatment are:

- Taxes and subsidies;
- Imports and exports;
- Percentages of B2B and B2C
- The different methodology used by CPI when a whole index is considered;

Notably, when a whole index will be retaken, the methodology which was used to calculate it must be taken into account, specially, the weighting mechanism. In Switzerland for the calculation of the highest levels of aggregation, SPPIs (and PPI/IPI) follow the Young's method whereas CPIs follow Lowe's

¹³ <https://www.imf.org/external/pubs/ft/ppi/2010/manual/ppi.pdf>

method.¹⁴ It is necessary to remember that the weighting of SPPIs (or PPIs) are calculated on the basis of production values (or turnover), while CPIs' weights derive from private households' consumption expenditure or volume, which follow the national concept (consumption of residents in Switzerland and abroad). At a finer level of aggregation, SPPIs are generally structured by enterprise size classes, while the CPI is generally structured by region and distribution channel. At the lowest level of aggregation (aggregation of price relations), the method is the same and is based on a Jevons index.

No data is available to represent how big of a difference the methodology could induce. This is an open question that requires further understanding.

Outcomes

In practice at the Swiss Federal Statistical Office the following scenarios have been analysed and applied for several services. Currently there are three possible scenarios in which CPI prices or indices are used for the B2C segment.

- i. In the first case, the prices collected by CPIs are individually adapted for the calculation of a B2C segment for the SPPI B2All aggregate. To take in these prices the value of the VAT-like (ad valorem tax) is removed. Afterwards they are simply introduced in the calculation with the standard SPPI methods. This method works in all cases, whether the tax rate changes or not.
- ii. In the second case, the index calculated by the CPI is retaken for the calculation of the B2C segment. This is the case of a VAT that through time remains stable.

Since the tax (or subventions) stays stable, there is no influence over the price relations:

Where

$p_t^{i,j}$ represents the current price of product or service i in a cell of index j
 $p_0^{i,j}$ represents the price in the base period times the tax.

$$\frac{p_t^{i,j} (1 + \alpha\%)}{p_0^{i,j} (1 + \alpha\%)} = \frac{p_t^{i,j}}{p_0^{i,j}}$$

With $p_{..}^{i,j} = price\ without\ tax$

14 The hypothesis is that the value of production stays constant between the reference period of the weighting and the base period. This hypothesis presupposes that either the prices and the quantities do not change between the reference period of the weighting and the base period, or they change inversely and in the same proportion so that the final production value does not change (substitution elasticity of 1). Whereas CPIs Index Positions are weighted annually following the Lowe method, adapted for the price changes, regions and distribution channels nevertheless are changed only every 5 years.

This means that the calculation of any index based on these price relationships will be identical. Thus, the inclusion of prices or indices linked to a tax such as VAT can be done without special treatment as long as it does not vary.

The forehand relationship does not hold for a unitary tax, which reduces the positive or negative development without tax. Only when it is a percentage of the value, the price relationship remains unaffected, which is generally (and in Switzerland) how VAT works.

$$\frac{p_t^{i,j} + \alpha}{p_0^{i,j} + \alpha} = \frac{p_t^{i,j} \left(1 + \frac{\alpha}{p_t^{i,j}}\right)}{p_0^{i,j} \left(1 + \frac{\alpha}{p_0^{i,j}}\right)} \neq \frac{p_t^{i,j}}{p_0^{i,j}}$$

- iii. In the third case, the index calculated by the CPI is adapted for the calculation of the B2C segment when there is a variation on the ad valorem tax rate.

When the ad valorem tax is adapted (ex. VAT), an overall correction is always possible at levels where a geometric mean is applied, whereas aggregation by the arithmetic mean only allows an overall correction under certain conditions. It is to be noted that quality adjustments can potentially impact this relationship but that issue will not be tackled here.

Indeed, given an increase from $\alpha_0\%$ to $\alpha_t\%$, for a product i within a cell j , the price relationship becomes:

$$\frac{p_t^{i,j} (1 + \alpha_t\%)}{p_0^{i,j} (1 + \alpha_0\%)}$$

With $p_0^{i,j}$ = price without tax

It is then clear that the corrective factor $\frac{(1+\alpha_0\%)}{(1+\alpha_t)}$ allows us to return to the tax-free relationship $\frac{p_t^{i,j}}{p_0^{i,j}}$

Condition 1: all cells have the same tax rate

If the indices of cells j are geometrically averaged and then arithmetically aggregated with weights w^j to obtain the index position, and each cell is subject to the same rate:

$$\frac{(1+\alpha_t\%)}{(1+\alpha_0\%)} \sum_{j=1}^k w^j \sqrt[n_j]{\prod_{i=1}^{n_j} \frac{p_t^{i,j}}{p_0^{i,j}}}, \text{ avec } \sum_{j=1}^k w^j = 1$$

The corrective factor $\frac{(1+\alpha_0\%)}{(1+\alpha_t)}$ again allows for a return to a tax-free index. This factor can also be applied at higher levels of aggregation as long as the same rate is applied to each product.

Condition 2: different tax rates, same distribution within the different cells

It is also possible to consider a global correction if different rates coexist within each cell but in the same proportions. The correction factor then becomes a weighted geometric average of the different rates:

$$\prod_{p=1}^P \left[\frac{(1 + \alpha_0^p\%)}{(1 + \alpha_t^p\%)} \right]^{\frac{n_p}{n}}$$

Where $\frac{n_p}{n}$ corresponds to the share of products subject to the rate $\alpha_{...}^p$.

The examples of the Postal Services and Telecommunications

In our treatment of the Postal Services, we used the method number one, above mentioned. Thus, we adapt the CPI prices to build a B2C segment for the B2All aggregate.

In this case two different rates apply to different kinds of services in the sample, since letters that are less than 50 grams, according to the law/ordinance on the Post Office, are defined as a universal service, and therefore exempt of ad valorem tax, while those destined to foreign countries will be taxed, and all other postal services at the current ad valorem tax level¹⁵.

If the index would be taken over, a far more complex corrective mechanism would be needed and specially during a year when a new VAT would be introduced. However, as the amount of prices for this index is not too high, the procedure can be simplified by adapting the prices before calculating the B2C segment for the SPPI.

In the case of the Telecommunications, we are in the case scenario number two, where the ad valorem tax (or subventions) stays stable, and there is no influence over the price relations. Nevertheless, next year there will be a passage to a new ad valorem tax and we will be confronted with the case number 3 when the change will take place.

In both cases, the only risk is a change in VAT, yet whenever there is a VAT adjustment, the method number three will be used to adjust for the variation with the passage to the new VAT.

More generally, an overall correction is always possible at levels where a geometric mean is applied, whereas aggregation by the arithmetic mean only allows an overall correction under certain conditions.

Conclusions

As the use of CPIs has informally become an established regular practice, there is a common need to generate fundamental knowledge concerning the use of CPIs as an official alternative data source for

¹⁵ 7,7% VAT rate 2023.

SPPIs, thus creating a pathway from informality to formal practices and methodologies. This cannot only benefit the profiting aspect of sharing experiences and examples of unknown possibilities for some NSOs but also increase dormant synergies and a more efficient use of available resources.

This can be done by sharing know-how and practical experiences; thus, we can contribute to the development of shared best practices for SPPIs and CPIs cooperation. This will help both teams to establish a shared action path in the planning and conception from the starting point to ensure the needs of both indices are taken into account, when possible, with the purpose of data sharing in the background.

The discussion we are opening can make us aware of the possible drawbacks and challenges that can be found when working with this particular alternative data source. As we discuss CPIs and SPPIs theoretical and practical differences, we can in the future guarantee higher-quality indices and help us minimize the establishment of bad practices while possibly increasing synergies between SPPI and CPI teams.

As observed in Switzerland and other countries like Sweden, and France, CPIs represent an opportunity for higher coverage at an effective cost, even with critical conceptual differences, in selected cases they remain a great option as an alternative data source.

Although human relationships have been at the core of data sharing between the two indices, further use of CPIs as an alternative data source should be the result of careful studies and deliberate decision-making processes. It is desirable to establish pathways for working together from the beginning, at the data collection level, ensuring that it can be indeed used by all implied users. This is an excellent opportunity to think about how much resources can be pulled together (economically speaking, but also in know-how terms); this could represent a form of effective work that can benefit both parties.

The following elements are key for the development of such a framework:

1. CPIs are used for SPPI under informal agreements between teams, reciprocally CPI use SPPIs.
2. These practices are not aligned and are country specific.
3. There is no formal shared guideline for SPPI and CPI cooperation.
4. Mostly focus on a Business to Consumer approach to build Business to All, aggregates.
5. There is potential for a wider use of CPIs. Yet this will require the study of the numerical differences when using different kinds of approaches, CPIs as a proxy for SPPIs, cases of perfect match, CPIs as a B2All and not only B2C segment of a B2All aggregate.

Elements of consideration when working with CPI data vs SPPI data

Consideration	CPI	SPPI
Valuation principles	Purchaser’s price	Base price
International trade in services	includes imports	Domestic market and exports (exclude imports)
Classification	COICOP	NOGA
Product / Industry	Product/Service	SPPI can be industry based or product based

Calculation methodology	Low (annual weighting)	Young (Weights remains constant over five years)
VAT	Included	Excluded

Source: Federal Statistical Office (FSO)

Following the example of many other countries, Switzerland has tried to apply what is known about retaking data and indices from CPIs for the use of SPPIs in a conservative matter, ensuring quality and low risk. Yet we could go further if global guidelines, methodologies, and good practices were defined and recognized internationally.

Internally, at the SPPI, there are significant data gaps that must be filled before further steps can be taken. Imports and exports data on the tertiary sector are highly aggregated which does not allow us to use what is available at the level of National Accounts. Although from September 2023, we can expect higher granularity, the depth of desegregation will not be greater than a four-digit NOGA (Swiss NACE) level.

Once data are available, there is a latent need to implement internally at the SPPI, the use of Supply-Use tables. Adapting the nomenclature and letting aside aspects that are non-relevant for the identification of CPI candidates will be the main challenge.

Simple schematic of supply-use tables

Supply

Products	Industries			Imports	Trade and transport margins	Taxes less subsidies on products	Total
	Agriculture	Industry	Services activities				
Agricultural products	Output by product and by industry at basic prices			Imports by product	Trade and transport margins by product	Taxes less subsidies on products by product	Total supply by product at purchasers' prices
Industrial products							
Services							
Total	Total output at basic prices by industry			Total imports	Total trade and transport margins	Total taxes less subsidies on products	Total Supply at purchasers' prices

Use

Products	Industries			Final uses			Total
	Agriculture	Industry	Services activities	Final consumption	Gross capital formation	Exports	
Agricultural products	Intermediate consumption by product and by industry			Final uses by product and by category			Total use by product at purchasers' prices
Industrial products							
Services							
Value added	Value added by component and by industry, at basic prices						Value added
Total	Total output at basic prices by industry			Total final uses by category			

Source: Guidelines for Incorporating Alternative Data Sources in Official Statistics¹⁶

Supply-use tables are a great tool for visualizing complete information for the consideration of new candidates for index retake for both CPIs or SPPI because they can showcase a detailed and structured overview of a branch see table: Simple schematic of supply-use tables (above). The supply-use tables provide for example, data on the

¹⁶ Guidelines for Incorporating Alternative Data Sources in Official Statistics, A. Dawson, R. Draper, S. Kilbey, K. Virgin. 37th Voorburg Group, Cross-Cutting Paper, 2022

importance of imports, a key element while evaluating the applicability of a CPI for an SPPI. As highlighted in the paper of Draper et al. 2022, “SUTs provide an objective and practical basis to determine whether a CPI for a given product would constitute a good proxy for a product or industry PPI”¹⁷.

The current discussion on alternative data sources has initiated serious reflections about further possible applications of CPI data for SPPI purposes, considering the main commonalities and plenty of benefits that this source represents. Moreover, for Switzerland, it would be interesting to learn from other countries experiences using CPIs as a perfect match for an SPPI or proxy for a Business to All, since there are no cases in which we have observed this possibility.

Finally, CPI data as an alternative data source represent additional benefits and economies while collecting data once and using it repeatedly is cost-effective, efficient, and a winning strategy for NSOs, their users, and collaborators.

¹⁷ Guidelines for Incorporating Alternative Data Sources in Official Statistics, A. Dawson, R. Draper, S. Kilbey, K. Virgin. 37th Voorburg Group, Cross-Cutting Paper, 2022