29th Voorburg Group Meeting on Services Statistics

Dublin, Ireland
September 22nd- 26th, 2014

Cross Cutting Topics Part 3

Maintaining Representative Turnover and SPPI: Re-stratification, Resampling, Rebasing, and Updating Weights.

UK Improvements to Maintenance of Representative SPPIs.

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1. Purpose of this Paper

This paper highlights a number of issues that can be experienced when attempting to maintain representative SPPIs, specifically those aspects which relate to the collection of representative prices and their aggregation into indices representative of the various sections of the service sector. These issues are then related to examples experienced by the United Kingdom (UK) Office for National Statistics (ONS) Services Producer Price Indices (SPPI) team. The paper will examine current production practices, explain the current programme of improvements that are being undertaken and then highlight the expected benefits.

As the work detailed is currently ongoing, it is hoped that this paper will encourage other producers of SPPIs to provide comments, feedback and advice as appropriate, as well as generally encouraging the sharing of information about current practices and development work between Voorburg group member countries.

2. Background

Ensuring the representativity of Services Producer Price Indices (SPPI) has been a longstanding issue for the ONS. In the majority of similar indices, for example the Producer Price Index (PPI), this representativity has been ensured by sampling from, and applying weighting patterns based on, appropriate turnover data. The UK PPI uses the PRODCOM survey but the SPPI has no such equivalent on which to base its sample, or to generate an appropriate weighting structure. The requirement to isolate Business to Business (B2B) turnover for SPPI, as required by the Short Term Statistics regulation, only adds to the difficulty of the task as this is not a variable that is readily available.

This issue is also exacerbated by other factors. For many service industries the Statistical Classification of Products by Activity (CPA) classification system is either not very detailed or does not seem to fit to the activities undertaken in the UK service sector. This makes it difficult to know what services should be priced and how these should be grouped into an industry structure. The other issue is the rapidly changing nature of service provision. Compared to manufacturing where, whilst the products being produced may change, the type of product and the methods used to produce goods are relatively static over time, the nature of service provision is such that completely new services can emerge rapidly and existing services can become unrepresentative just as quickly. This provides a problem in terms of collecting representative prices, as these services can emerge and become a key part of the industry before they are identified and included within the industry structure. This can result in an index with an unquantifiable sampling error, the existence of which is near to impossible to identify without suitable turnover data.

The majority of the enhancements proposed to the UK SPPI will be dependent on the collection of suitable turnover data underpinning the SPPI. This will be collected in the Services Turnover Survey, which is undergoing significant changes. The key changes are explained in this paper.

3. Issues Experienced with Current UK Practices

3.1 Drawing a Representative Sample

Currently, the UK SPPI uses the Inter-Departmental Business Register (IDBR) as a sampling frame. The lack of a PRODCOM equivalent makes the IDBR the only available option. However, this is far from an ideal sampling frame for the SPPI. The IDBR does not hold any information about the various service activities that a company undertakes, just the industry that they are in. For instance, we may know that a company is classified as an Accountancy firm, but we do not know if they specialise within a particular area of the industry or provide a variety of services. This makes it impossible to design a sample that is optimised for the industry structure.

The current method used in the UK SPPI is to sample based solely on which industry the respondent is coded to on the IDBR and then rely on the respondent to return prices for services that they consider representative of their service provision. Ideally this should ensure that prices are returned only for services that are representative of service provision in the UK, as the companies providing the services should be in an ideal position to identify what is representative. The down side to this is that there is no control of the number of prices that are included in each service area. This can lead to a sample allocation that is far from ideal, with the possibility that too few items may be collected for one service; potentially impacting quality, and/or too many for another; which is a waste of resources and unnecessary respondent burden.

3.2 Respondent Fatigue

The UK SPPI currently uses a longitudinal sample. This essentially means that once a contributor is recruited into the survey they are not removed until they cease to provide services within the industry. This can lead to issues when attempting to ensure the representativity of the prices provided. Respondent fatigue is a significant issue. This refers to respondents who have been within the sample for so long that they are no longer considering their response thoroughly enough, often just returning the same price as the previous quarter in an effort to complete the form with the minimum time and effort taken. This obviously has an unacceptable effect on the index, and it takes time and resource to then contact these respondents and attain a representative price.

3.3 Maintaining Representative Item Specifications

Another issue experienced by the UK when using a longitudinal sampling method is that once the item specification is set up, it is often not changed unless the respondent contacts the office to state that the service is no longer representative. This can result in prices being received for services which are no longer representative of service provision within an industry. Again, identifying these problem items and resolving the situation takes time and resource.

3.4 Identification of Disaggregated Service Sector Turnover

In order to provide information on the issues stated above, detailed turnover data at as disaggregated a level as possible is vital. Current available sources of UK service sector turnover, for example the Annual Business Survey (ABS), usually do not provide data at a disaggregated level and, where they do, the breakdown does not align to the structures used in the UK SPPI. This results in the data being of limited use in producing a representative SPPI, as it does not allow for the identification of the services being provided within an industry and allocation of weights to these services.

Where there is no alternative than to use these data sources, for example in the calculation of industry weights, the current practice is to use a combination of data sources to attempt to impute a value that is representative of service sector turnover shares. This use of imputation is far from ideal and it has already been identified that this can lead to unsuitable proxy data being calculated, dependant on the assumptions that have been made in the course of the imputation. Often the type of bias varies dependant on the characteristics of the particular industry, making comparisons across multiple industries an uncertain process.

3.5 Identification of Business to business Turnover

The identification of B2B turnover is another significant difficulty, as these data are not published for the UK service sector. As such, estimations of this B2B share have previously been estimated using 'Supply and Use' tables produced by the UK National Accounts, with intermediate consumption being used as a proxy for the transactions that take place between businesses. The main issue with this is the lack of detail included in the Supply and Use tables. For the most part, they show data equivalent to Standard Industrial Classification (SIC) 2007 divisions. This means that imputation and approximation are required to create proxy data at the industry level. Through improvements to the 2010 Services Turnover Survey, a more representative B2B value is available for most industries, though the small sample size has resulted in data for some industries not being deemed of suitable quality to be used. Where that is the case, proxy values have been calculated from ABS data. Whilst this situation is seen as an improvement, ideally there would be no imputation at all.

It is worth noting that the identification of B2B turnover is only required to meet Eurostat requirements. The work being undertaken in the Framework Regulation for Integrating Business Statistics (FRIBS) project may change the basis on which turnover data should be collected.

To improve upon any of these situations requires a change to current practises.

4. Proposed Approach to Ensure Representativity

To resolve the issues pertaining to maintaining representativity, ONS has begun a programme of improvements to the way that SPPI is constructed. One of the key improvements being the enhancements made to the Services Turnover Survey. As previously stated, Services Turnover Survey data have always been used to supplement the calculation of SPPI weights and sample allocations. The aim of the new approach is for the Services Turnover Survey to underpin the whole of the SPPI; providing all turnover data, a complete sampling frame and providing information to inform on developments to be made to indices.

The key improvements that should ensure greater representativity in the UK SPPI are:

4.1 Increase in Services Turnover Survey Regularity

The first step in making the Services Turnover Survey suitable for underpinning the SPPI is to increase its regularity. Under the current proposal the Services Turnover Survey will be run every two years, compared to the current approach of undertaking the survey once every five years. This increase in regularity will be useful for a number of reasons. Significantly it increases the suitability of the Services Turnover Survey as a sampling frame, as the more recent the data you are sampling from the less likely you are to encounter problems with units being lost over time (i.e. companies going out of business but still existing for selection in the sampling frame) and the more representative of the current market that sample is going to be. The regularity of the Services Turnover Survey has been one reason for the use of the IDBR as a sampling frame for SPPI.

The second use of this increased regularity is in development work. As previously stated, it can be difficult to identify new services as they emerge in the service sector. The enhancements to the Services Turnover Survey will ensure that every industry will have an "Other Turnover Generated" section. This will allow for the monitoring of the market share of services that we do not directly include in the price index. Once those services reach a significant proportion, investigation can begin into what those services are, if they should be introduced into the index structure and how this would be achieved. The same will also be true for removing services once their turnover share no longer justifies their inclusion.

The more regular Services Turnover Survey will also allow for much easier inclusion of new industries into the SPPI. Currently when a new industry is to be included in the SPPI it involves a significant and resource intensive period of industry investigation and consultation with industry experts. It can often be difficult to get the cooperation of a representative group of these experts, and so the approach taken to measuring the industry can be skewed towards the opinions of the people who did respond. The use of the Services Turnover Survey will allow us to begin our development work by asking a large number of contributors within the industry to provide us with information about where their turnover is generated. This information can then be collated into a representative index structure. This approach is especially attractive as contributors will be obligated to reply by law, hence the representativity of the structure should be far more assured.

4.2 Increase in Services Turnover Survey Sample Size

The 2013 Services Turnover Survey is currently being run with a sample size of 20,000 respondents, an increase from the 8,000 used in the 2010 survey. This sample size was chosen partly to bring the size of the Services Turnover Survey into line with PRODCOM, but also due to budgetary constraints.

This larger sample size will be used to ensure that the quality of the data below the industry level will be higher and more suitable for both weighting purposes as well as sample selection at the most disaggregated levels of the industry structure. The expectation is that this will resolve the issues seen in some of the more disaggregated levels of the 2010 Services Turnover Survey, which led to imputation and proxy data being used in aspects of the last rebasing project.

The size of the Services Turnover Survey sample will be reviewed upon completion of the 2013 Services Turnover Survey in April 2015.

4.3 Introduction of Services Turnover Survey as a Sampling frame

The improvements to the Services Turnover Survey will also allow for a significant change to the sampling methods. In place of using the IDBR as a sampling frame, which brings the issues previously described, the Services Turnover Survey will be used for all future sampling. This will help to ensure the representativity of the SPPI.

The regular Services Turnover Survey data will allow for the introduction of sampling that is based around the whole industry structure, targeting the services provided within an industry, rather than just sampling the overall industry. This will ensure that a prescribed number of items can be collected for each service, ensuring that the overall sample allocation for SPPI can be used effectively and efficiently, removing the current issue of over and/or under sampling of services within an industry. This will ensure that resources are saved by not sampling and recruiting unnecessary items, but also by not having to quality assure items that are not required in the sample in the first place. This also shortens the recruitment process, as

there will be no need to work with contributors to identify where their services should be included within the index structure, as we will specifically ask them to provide one that fits within a particular area of the industry structure. This will allow resources to be directed towards quality assuring the data that is required. It will also remove the issue of respondents being selected from the IDBR who actually generate no B2B turnover, which is a drain on resources and a source of sampling error.

4.4 Introduction of Rotational Sampling

The current use of the longitudinal sample has been noted as a significant issue for the UK SPPI, as already specified in this paper. The enhanced Services Turnover Survey data will allow for samples to be rotated, by providing a source of up to date sampling information. This will help to ensure that prices for new services are being recruited into the survey and prices for less representative services will be removed over time. The current expectation is that the sample for each industry would be rotated every two years, though work reviewing the required regularity is ongoing.

5. Current position/progress

Forms for the enhanced Services Turnover Survey were dispatched in July 2014 with a return date of August 2014. The first data estimates should be available around February 2015, though this will largely depend on the resource required to undertake the recoding of the "Other Service Turnover" areas of the index structure. This relates to turnover returned by a respondent classified to one industry for activities associated with a different industry. For instance, a company who generate the majority of their turnover from cargo handling activities may also provide some storage and warehousing services. Where this is the case, this turnover will be allocated to the appropriate industry to provide more accurate totals. As this has not been completed before, there is some uncertainty over how long this will take, though it is currently estimated at 5 months.

The improvements to the sampling methodology are also in progress. Currently the possibility of developing a fully automated system is being investigated. The costs and time scales involved are being investigated and these projections should be available by September 2014. If it is not feasible to build a fully automated system, a semi-automated system will be proposed based on the available budget. This will ensure that a rotational sampling policy will be available. The current proposed date for introducing this is quarter 2 2018, though this depends heavily on consultation with the business area responsible for building the system.

The developments to index structures will begin after the 2013 Services Turnover Survey has been completed. The finalised data will be analysed and a development plan drawn up based on this. The scope of this work and the time scales involved have not been finalised, but any changes will need to be completed in time to be included in the next Services Turnover Survey, due to run in 2016.