Methodological Improvements to National Accounts for Blue Book 2015: Non-Profit Institutions Serving Households

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Date: 19 May 2015

Executive summary
This article covers further improvements to the measurement of Non-Profit Institutions Serving Households (NPISH) estimates, first introduced in Blue Book 2014 (ONS, 2014c), and their impact on other sectors. These will be introduced when revised figures for the UK National Accounts, consistent with Blue Book 2015, are published in September 2015.

ESA 1995 changes improve the measurement of GNI and ensure increased comparability of GNI across the European Union (EU). They will have an impact on the estimation of the UK’s GNI, which is used in the calculation of the UK's contribution to the EU budget.

In the National Accounts, the NPISH sector mostly produces non-market output but also some own-account and market output. To produce this output, it purchases goods and services from other sectors for use as intermediate consumption. While by National Accounts conventions, NPISH non-market output is used up as final consumption by the NPISH sector, any NPISH market output can be consumed by any other sector; and any NPISH intermediate consumption can be supplied by any other sector.

The new estimates of NPISH output and intermediate consumption introduced in Blue Book 2014 (ONS, 2014a) included much higher estimates of its market output and intermediate consumption. At the time, the upward revision to output was met almost entirely by increasing estimates of Household Final Consumption Expenditure (HHFCE), while the upward revision to intermediate consumption was met by increasing estimates of market sector supply, both of which provided a secondary impact on GNI in addition to the new NPISH activity itself. However, since then, further analysis has enabled better estimates of this secondary impact to be constructed.

The improvements which will be implemented in Blue Book 2015 reduce the whole-economy impact of the new NPISH estimates on GNI as follows:

1. New analysis shows that some of the new National Council for Voluntary Organisations (NCVO) data are likely to already have been captured in the Annual Business Survey (ABS), and so the impact on Household Final Consumption Expenditure (HHFCE) and Private Non-Financial Corporations’ (PNFC) market sector output is reduced.
2. They further reduce the impact on HHFCE and PNFC market output as, on review, coherence adjustments previously applied to take account of, amongst other things under recording of NPISH output, could be decreased.

This article provides an overview of the key changes, associated methodology and impacted transactions, but it does not aim to provide a numerical assessment of the impacts. This can be found, along with the impact of other methodological improvements to ensure comparability in the measurement of GNI across EU Member States, in this article ‘Impact of ESA 1995 Changes on Current Price Gross National Income Estimates, 2002 to 2010’ also being published today.

1 Introduction
Gross National Income (GNI) is an important statistic within the National Accounts, and it is used in the calculation of a Member State’s contribution to the EU budget. Many users of
Official statistics will be more familiar with Gross Domestic Product (GDP). GNI or, as it was previously known, Gross National Product (GNP), describes the total primary income received by residents of a country and links the economic activity described by GDP with the destination of the income so generated.

Due to the administrative importance of the GNI statistic, the EU statistical office (Eurostat) carries out regular audits of the methods and data used to estimate GNI. In 2012, following a comprehensive audit of the methods used across EU countries, a number of areas for improvement were identified which all Member States needed to address. These improvements are known as ‘reservations’. The UK National Accounts addressed a number of these reservations in Blue Book 2014, and all the remaining outstanding UK reservations are being addressed in the Blue Book 2015 consistent update of the Quarterly National Accounts, that will be published in September 2015.

One of the improvements is to the estimation of the impact of new production, income and expenditure estimates for the NPISH sector on estimates for other sectors within the economy, and on GDP overall. This article provides a technical overview of the current and new balancing approaches. It does not provide a numerical assessment of the impact, which can be found in the article titled ‘Impact of ESA 1995 Changes on Current Price Gross National Income Estimates, 2002 to 2010.

Any methodological changes to the National Accounts that Eurostat formally requests of Member States are called ‘reservations’. The reservation on NPISH states:

A review of the new compilation process of Non-Profit Institutions Serving Households (NPISH) has to be carried out with a view to improving the estimation methods and the coverage of the NPISH units (applicable to years from 2002 to 2010).

The explicit concern of the reservation was met in Blue Book 2014, by implementing an improved methodology for calculating NPISH sector production, income and expenditure via new source data from the National Council for Voluntary Organisations (NCVO) (ONS, 2014b). New NPISH time series from 1997 to 2012 were generated for:

- Non-market output
- Market output
- Intermediate consumption
- NPISH final consumption expenditure
- Compensation of employees (COE)

No revisions were made to NPISH own-account production or non-market capital consumption, as these are generated from separate sources, which are considered adequate.

However, any revisions to a given sector must be assessed against estimates for other economic sectors and balanced into figures for the economy as a whole to align the production, income and expenditure approaches to GDP. This is carried out via the ‘Input-Output Supply and Use’ process (‘Supply and Use’), whereby economic transactions relating to each approach to GDP, defined by industry and/or product and estimated from numerous distinct sources, are confronted in a holistic framework to determine levels of supply, demand and GDP.

At the time of the introduction of the new NPISH estimates in 2014, it was assumed that there was no overlap between the new NCVO NPISH data and data already collected from other sources for production and expenditure, mainly the Annual Business Survey (ABS) and the Living Costs and Food Survey (LCF). On that basis, the additional NPISH market output from the NCVO-based estimates was balanced off almost entirely by increasing HHFCE, which the sector primarily serves, and the additional intermediate consumption by the NPISH sector was balanced off by increasing market output and Gross Operating Surplus (GOS) in the PNFC sector. As a result, the overall impact on the UK economy was approximately...
double the direct impact from the new NPISH sector revisions alone (see Table A2.1, ONS 2014d).

Since then, new analysis in two areas has revised the impact on the PNFC and Household sectors:

1. Firstly, a data matching exercise has been carried out which has compared how respondents to the NCVO are legally classified on the Inter-Departmental Business Register (IDBR), which provides the sample frame for the ABS. Any results from the ABS for producers classified as NPISH are excluded, but where a respondent appearing in the NCVO NPISH data is classified as a market producer on the IDBR and appears in the ABS sample, double-counting will occur. The matching exercise provides estimates of the likelihood of double-counting by NPISH industry which allow estimates of how much NPISH activity is already being measured in the ABS and how much is new.

2. Secondly, a detailed analysis of Supply and Use coherence adjustments has been carried out. Coherence adjustments are applied manually to align the three approaches to GDP after all conceptual and coverage adjustments have been applied. Where new source estimates bring the raw data closer to balanced levels, coherence adjustments can be reduced in absolute terms or removed entirely. This analysis takes the revised feed-through levels from (1) as its starting point and from this work, it has been possible to reduce the level of coherence adjustments and therefore further reduces the secondary impacts on GDP/GNI.

2 National Accounts concepts

In the UK National Accounts, in compliance with our legal requirements under the European System of Accounts 2010 (ESA 2010) (Eurostat, 2013) and, before that, ESA 1995 (Eurostat, 1996), total output can be split into three categories:

1. Market output
2. Own-account output
3. Non-market output

Both government and NPISH units are classified as non-market producers on the basis that the bulk of their output is non-market; that is, it is provided either free at the point of delivery or sold at economically insignificant prices, while such units also produce lower levels of market and own account output than other sectors. Other sectors produce mostly market output, some own-account output but no non-market output.

2.1 How are different types of output used?

By convention, non-market output is recorded as being entirely consumed by the producing sector as no tangible purchases are made by the consuming sectors – the goods and services are effectively free to consume. Own-account output, which comprises internal capital production of software and construction output, is also consumed by the producer, but market output can be consumed by any economic sector. Accordingly, any revisions to the estimates of a sector’s market output must be assessed against the strength of existing data for other sectors and balanced appropriately. This may be carried out by either (i) switching market output between sectors without impacting on total market output, (ii) carrying through the full impact of the revision at sector and whole economy level, or (iii) as some combination of (i) and (ii).

2.2 How is intermediate consumption supplied?

All sectors, including NPISH, must consume goods and services to produce their own final outputs; this concept is defined as intermediate consumption. These goods and services can be sourced from any sector, including the producer’s own, but in the UK they tend to be
sourced from the PNFC sector as it is the largest. Accordingly, any revisions to the estimates of intermediate consumption by a given sector must be assessed against existing estimates of market supply (the source of the goods and services used up in intermediate consumption) and balanced where necessary. As for revisions to output, this may be carried out by either (i) by switching intermediate consumption between sectors without impacting on total market output, (ii) carrying through the full impact of the revision at sector and whole economy level, or (iii) as some combination of (i) and (ii).

2.3 How is balancing carried out?

Annual, current price estimates of GDP are determined through the Supply and Use process. This is a standardised framework in which a country’s estimates of all the transactions relating to each independently-sourced approach to GDP are recorded by product type and industry and reconciled to form a single GDP estimate. By confronting these distinct sources in an exhaustive framework covering product supply and demand and industry inputs and outputs, differences in concepts, coverage and consistency can be estimated and accounted for (ESA2010, paras. 9.15-9.18).

The reconciliation process involves assessing the relative strengths of each annual data source, comprising a mixture of surveys, administrative data and models, as well as relevant information from other economic indicators. Most annual sources are only available after a two year lag, so in a given year, T, the UK Supply and Use process balances a new year’s data (T-2) for the first time, plus revisions to two previous years’ data (T-3, T-4). In addition, any agreed methodological changes impacting on earlier years are also balanced through the process.

3 Data sources and methodology

3.1 Current approach

When the new NCVO-based NPISH estimates were included in the 2014 National Accounts, it was assumed that they represented entirely new activity for that sector and, in turn new activity for the sectors supplying and demanding NPISH production.

The new NPISH estimates revised up previously estimated levels of non-market and market output. It was assumed the revision to non-market output was fully consumed by NPISH final consumption expenditure, while the revision to new market output was met by higher HHFCE for the main part with a remaining small portion consumed as exports of services. NPISH’s intermediate consumption was also substantially revised up using data from the NCVO source; this increase was met by increasing estimates of market supply by the PNFC sector.

3.2 New approach to be implemented in September 2015

No revisions have been made to the new NCVO estimates of activity in the NPISH sector introduced in Blue Book 2014; hence the revisions for the NPISH sector remain as before. However, two strands of work have been carried out to assess the impact of the NPISH revisions at whole economy level:

1. How much, if any, of the increase in NPISH production may already be captured in existing source data?
2. How much of the revision to NPISH estimates reduces or removes the need for existing Supply and Use coherence adjustments?
3.2.1 Reduction due to the likely overlap with existing market sector data from the ABS

The review of the assumption in the 2014 National Accounts that all the NCVO-based NPISH data were entirely new was informed by a new data matching exercise, which aimed to determine which NPISH respondents to the NCVO might already have been included in the ABS results.

The ABS uses the IDBR as its sample frame, within which recorded enterprises are assigned a legal status corresponding to a particular sector. The results taken from the ABS by the National Accounts exclude data collected for the NPISH, Government and Financial Corporations sectors as more robust data are available from other sources. The exclusion of NPISH results from the ABS data assumes that all units are classified to the correct sectors on the IDBR; hence there is no overlap with the new NCVO NPISH data. To test this, individual returns to the NCVO were matched to their IDBR entries where possible using a mixture of Companies House numbers (where common to both sources), company names and company addresses. Where matched, the legal statuses (sectors) were compared. As both sources include estimates of turnover, this was used to indicate how much economic activity may already be included in the ABS results and therefore already included in the production and expenditure estimates.

The results suggest that, overall, around one-tenth of NCVO NPISH turnover is likely to already be included in the ABS data, though the results vary significantly by industry. NPISH activity is dominated by large healthcare and education service providers, and for these two industrial groups virtually no double-counting was indicated. Conversely, for industrial groups with very minor NPISH activity such as legal services and landscaping services, very high levels of double-counting were indicated.

Because of the lack of a consistent shared marker in the NCVO and IDBR data, only around 10 per cent of the NCVO enterprises were matched. On that basis, the specific industry scaling factors derived from the turnover analysis were simplified to take values of 1 (no overlap), 0.5 (some overlap) and 0 (high overlap) to avoid any spurious accuracy. These factors determined how much of the new NCVO NPISH data were considered to be additional at whole-economy level and how much were already included and therefore had to be switched out of existing market sector estimates into the NPISH sector. In terms of their explicit operation:

- A factor of 1 meant that no overlap with the ABS data was assumed, so 100 per cent of the NPISH data revision for that industry fed through for the NPISH sector and at whole economy level
- A factor of 0.5 meant that a 50 per cent overlap with the ABS data was assumed, so while 100 per cent of the NPISH data revision for that industry fed through for the NPISH sector, 50 per cent was switched out of existing market sector estimates into the NPISH sector, and so the whole economy impact was 50 per cent
- A factor of 0 meant that a 100 per cent overlap with the ABS data was assumed, so while 100 per cent of the NPISH data revision for that industry fed through for the NPISH sector, all of it was switched out of existing market sector estimates into the NPISH sector, and so the whole economy impact was 0 per cent

By applying these industry-specific scaling factors, the impact at whole economy level from this first stage of the reassessment was a reduction of around 30 per cent in revisions to output, intermediate consumption and Gross Value Added (GVA); in other words, around 30 per cent of the NPISH revisions implemented in Blue Book 2014 were judged to already be within existing estimates scored within the market sector, so this amount was switched between the market and NPISH sectors without having any impact at whole-economy level. It should be noted that the percentage impact of the revisions increases over time. This is because the old NPISH model (pre-Blue Book 2014) relied on forecasts which fall...
increasingly out-of-step with the new NCVO NPISH estimates. As a result, the revisions to impacts on other sectors being implemented for Blue Book 2015 also follow this trend.

3.2.2 Reduction via assessment of existing Supply and Use coherence adjustments

The Supply and Use tables construct estimates of GDP on the production, income and expenditure approaches using multiple sources, including various surveys whose results are subject to statistical errors. Even when all of the sources have been adjusted for coverage and conceptual issues, coherence adjustments are required to correct for differences ascribed to statistical errors at that time. However, as national and international work drives improvements to methods, some or all of any differences previously ascribed to statistical error may instead be identified as coverage or conceptual issues, and so the coherence adjustment can be reduced or removed. As the new NCVO NPISH data are more accurate than the estimates they replace, an assessment was made of the reduced NPISH revisions described in section 3.2.1 against the coherence adjustments remaining at the end of the last Blue Book (Blue Book 2013) before these changes were introduced.

The assessment looked at the revisions by industry for NPISH intermediate consumption and NPISH market output. In more detail:

3.2.2.1 Coherence adjustments to intermediate consumption

In Blue Book 2014, the upward revisions to NPISH intermediate consumption were entirely met by upward revisions to PNFC market output. Accordingly, two sets of coherence adjustments were assessed in this respect, by industry: those to intermediate consumption itself, and those to PNFC market output, as a change to intermediate consumption could potentially reduce an adjustment on either component. An example of the decision process for a given industry is provided below:

- If a revision for NPISH Industry X intermediate consumption was +100 and the existing coherence adjustment on intermediate consumption by industry X was +200, then the NPISH revision could be entirely absorbed by reducing the coherence adjustment to +100 and leaving the published level of intermediate consumption for industry X unchanged.
- Conversely, if the existing coherence adjustment on market output for industry X was -500, then the NPISH revision of +100 could be entirely absorbed by revising intermediate consumption by 100 and reducing the coherence adjustment on output to -400, leaving the published level for intermediate consumption and output by industry X both 100 higher.

For each industry, the choice between whether to target a reduction in coherence adjustments on intermediate consumption or output was made by assessing how many years’ estimates could be improved by each approach; the approach which provided improvements to the most number of years was then used. It should be noted that in either case – either where intermediate consumption at the published level did not change or both intermediate consumption and output changed by equal amounts – the effect on GVA was neutral.

Over the period 1997 to 2012, around 65 per cent of the revision described in section 3.2.1 for NPISH intermediate consumption was absorbed by reducing (in absolute terms) or removing these existing coherence adjustments. In comparison to the original revision implemented in Blue Book 2014, this amounts to an overall reduction of around 75 per cent.

3.2.2.2 Coherence adjustments to market output

In Blue Book 2014, the upward revisions to NPISH market output were entirely met by upward revisions to HHFCE. Accordingly, two sets of coherence adjustments were
assessed in this respect, by product: those on market output itself, and those on HHFCE, as again an existing set of coherence adjustments for either component might be improved. If an existing coherence adjustment on PNFC market output had the same sign as the NPISH market output revision, it could be wholly or partially unwound, reducing the impact of the NPISH revision on published levels. Alternatively, by carrying the NPISH market output revision through, the implied increase in HHFCE might serve to reduce an existing HHFCE coherence adjustment of the opposite sign by increasing the published level of HHFCE closer to the raw level. An example of the decision process for a given product is provided below:

- If a revision for NPISH product X market output was +200 and the existing coherence adjustment on market output of product X was +400, then the NPISH revision could be entirely absorbed by reducing the coherence adjustment to +200 and leaving the published level of market output of product X unchanged.
- Conversely, if the existing coherence adjustment on HHFCE of product X was -300, then the NPISH revision of +200 could be entirely absorbed by revising market output of product X by +100 and reducing the coherence adjustment on output to -200, leaving the published levels for market output and HHFCE of product X both 100 higher.

As for the industry adjustments, for each product, the choice between whether to target a reduction in coherence adjustments on market output or HHFCE was made by assessing how many years’ estimates could be improved by each approach; the approach which provided improvements to the most number of years was then used. It should be noted that in this case, any decision resulting in reductions to revisions to market output and HHFCE reduced the revision to GVA (i.e. the effect was non-neutral)

Over the period 1997 to 2012, around 70 per cent of the revision described in section 3.2.1 to NPISH market output was absorbed by reducing (in absolute terms) or removing these existing coherence adjustments. In comparison to the original revision implemented in Blue Book 2014, this amounts to an overall reduction of around 80 per cent.

4 Impact of the changes

The impacts on GDP by sector are as follows:

- No changes have been made to the original revisions applied to the NPISH sector (S.15) in Blue Book 2014.
- The offsetting revisions originally applied to market output, intermediate consumption and profits in the PNFC sector (S.11) have been substantially reduced; in addition, some minor negative adjustments that had been applied to exports of services have been removed.
- The offsetting revisions originally applied to HHFCE in the Household sector (S.14) have also been substantially reduced.

5 Conclusions

The new method provides a more robust approach to the incorporation of new NCVO-based NPISH sector economic estimates into estimates for the whole economy. It reduces the impact of the upward revisions to the NPISH sector introduced in Blue Book 2014 on the PNFC and Household sectors and on GDP overall. It does so firstly by accounting for any of the new NCVO production data likely to have already been captured in ABS estimates and, secondly, by assessing where any remaining offsetting revisions may serve to reduce or remove any existing coherence adjustments and therefore have a lower impact at whole economy level.
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7 References


