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Northern Ireland Composite Economic Index: Development of a quarterly output measure for NI

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Abstract: This paper presents the methodology and results of an experimental Composite Economic Index developed by the Northern Ireland Statistics and Research Agency (NISRA). The aim of the Index is to provide a short term measure of the performance of the NI economy using a mainly output based approach. It combines existing official statistics series from the Index of Services, Index of Production, Index of Construction, Agriculture and public sector employee jobs based on their relative share of annual GVA to provide a chain-linked measure of total quarterly economic activity for NI. The index is not a comprehensive measure of quarterly Gross Domestic Product as there are no income and expenditure components. However the composite methodology has been applied to the equivalent UK series and the results correspond well with the UK GDP series.

Keywords: composite, economy, output, Northern Ireland, public sector, private sector, services, production, construction, agriculture, index, GDP
*JEL Classifications:*C43, R15

1. INTRODUCTION

Existing official statistics produced by the Northern Ireland Statistics and Research Agency (NISRA) provide information on quarterly private sector output in the Production, Construction and Services sectors and for both Public and Private sector employee jobs. However, these statistics are published as separate indices and do not readily provide a summary measure of how the whole Northern Ireland economy is over time or relative to other geographies.

The NICEI has been developed in response to the recognised need for a timely overall measure of the performance of the Northern Ireland economy. The objective of this paper is to present work done on the development of an experimental Northern Ireland Composite Economic Index (NICEI) and to seek user views on its utility.

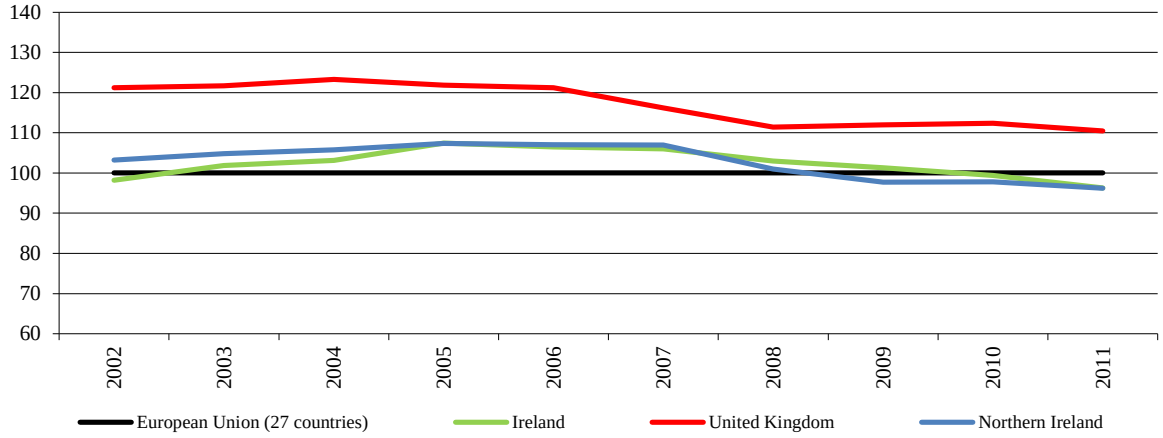
2. BACKGROUND

There is a range of existing annual official statistics series that provide information on the performance of the whole Northern Ireland economy relative to other regions of the UK, that are published by the Office for National Statistics (ONS). However, these are not available on a particularly timely basis due to the diversity of the sources and the inevitable lag time associate with for example revenue returns. For example, the latest available data for NI Regional Accounts Gross Value Added (GVA) by industry, published in December 2012, refers to the year 2010. Total GVA for NI is available for 2011 at that time, but it will be December 2013 before an update on whole economy performance in 2012 becomes available, this is some two years after the end of the reference period for the total GVA and three years after the reference period for a GVA by industry breakdown. Similarly, the most recent ONS measure of Gross Disposable Household Income refers to 2011, with the current measures of Gross Fixed Capital Formation and Individual Consumption Expenditure relating to 2010. NISRA publishes the Annual Business Inquiry which provides industry level data nine months after the (financial) reference year, but this mainly relates to the private sector. More timely quarterly sectoral output and employee jobs series are published by NISRA at t +12/16 weeks, but as noted these are reported as separate indices, so there is no quarterly measure of overall economy output for the NI economy.

For the UK, Scotland and Ireland economic activity is quantified by a quarterly measure of Gross Domestic Product (GDP). Estimates of GDP can be arrived at by separately considering the value added created by producing goods and services in an economy (the production approach), the sum of all income generated by such activity (the income approach) or the sum of all final expenditures (the expenditure approach). These estimates are reconciled into a comprehensive single measure of the value of economic activity (GDP) by integrating data from a very wide range of sources within a single internationally agreed framework of National Accounts.[1] However, the full range of data sources required for a comprehensive measure of GDP is not currently available at a Northern Ireland level. NISRA is currently examining the feasibility of producing one central component of such accounts – Supply Use Tables, and these are expected to inform the future development of the NICEI.

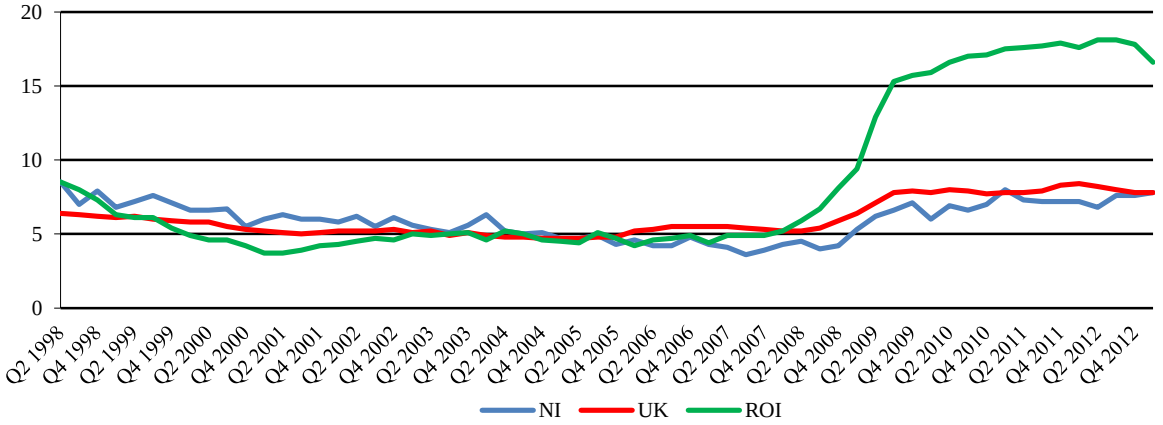
In the absence of such a quarterly measure of GDP for Northern Ireland users refer to other sources to inform comparisons between Northern Ireland, the Republic of Ireland and the UK as a whole. Different dimensions of economic and labour market activity such as those illustrated (below) can suggest that NI and the ROI are either fairing similarly (gross adjusted disposable income) or quite differently (unemployment rate) in response to the economic downturn of 2007/08, depending on the measure chosen.

Figure 1. Gross Adjusted Disposable Income EU27, NI, UK & ROI (EU27 = 100)



Source: Eurostat

Figure 2. Unemployment rate in NI, UK & ROI



Source: Labour Force Survey & Central Statistics Office (figures are seasonally adjusted)

NISRA engagement with users has made clear that even in the absence of a quarterly National Accounts framework, a more comprehensive and timely measure of whole economy performance would be useful to add to existing measures.

[1] For further information please see "UK National Accounts – a short guide"

The NICEI has therefore been developed as an appropriate short term indicator for the NI economy making the best use of available official statistics. Support for the development of the NICEI methodology was provided through the UK Statistics Authority's Quality Improvement Fund whose valuable assistance is acknowledged. This paper reports NICEI estimates up to Q4 2012 (please note that more recent publications of the Index are available on the DETI website).[2]

3. METHODOLOGY

The approach adopted was to combine private sector output measures from existing surveys: the Index of Services (IOS), the Index of Production (IOP), the Index of Construction (IOC) and Public sector employee jobs data from the Quarterly Employment Survey (QES), to provide a proxy measure of what might be classed in broad terms as total economic activity. Output data for the Agriculture sector was provided by the Department of Agriculture and Rural Development (DARD). It is important to recognise that the NICEI is not a comprehensive measure of quarterly Gross Domestic Product that meets the full requirements of the System of National Accounts. Rather, it relies heavily on quarterly surveys of businesses' sales and public sector employee jobs weighted to their relative shares of annual Gross Value Added to approximate to a measure of GDP.

Despite these constraints, it is considered that the NICEI will provide a useful quarterly short-term measure of changes in Northern Ireland economic activity to help inform economic decision making. Obtaining user views on whether the approach adopted meets these requirements is therefore important to inform its ongoing development. The development of the index is presented in the following sub-sections.

3.1. Quality Improvement Fund assistance from the Office for National Statistics (ONS)

As stated, in the preliminary stages of development, assistance was provided by ONS methodologists through the Quality Improvement Fund (QIF) to support ongoing improvements to official statistics. ONS examined the investigative work that had been done in NISRA and a report from their Consultancy Service concluded:

- A whole economy index could be constructed from the existing indices and other sources to give a broad indicator of the behaviour of the NI economy.
- The whole economy index should be produced as an annual chain-linked weighted aggregate of the existing IOP, IOC and IOS plus an index for the Agricultural sector and an index for the Public sector.
- The weights used to aggregate the series should be based on GVA by industry for Northern Ireland from Regional Accounts.
- For the Agricultural and Public sectors quarterly output data are not available; therefore in the absence of constant price data, the only option for a quarterly volume index is to use employment as a proxy for output.
- The quality of the indicator could be improved by introducing the following changes to the input series:
  - Introduce annual chain-linking into the IOP and IOS to ensure annual weights are more up-to-date and relevant to the current economic situation;
  - Reconcile the ABI based weights used in the IOP and IOS with the GVA estimates in the Regional Accounts. This ensures that the whole economy index for Northern Ireland is consistent with the United Kingdom Index;
  - Extend the coverage of the IOP and IOS to include activity in the Public sector, as the annual Regional GVA estimates by industry groups (NUTS 1.3) cover both private and public sector activity; and
  - Develop suitable measures of quarterly output for the Agriculture and Public sectors.

[2] http://www.detini.gov.uk/deti-stats-index/stats-surveys/ni-composite-economic-index-_nicei_.htm

3.2. Input data

The two main criteria for selecting data sources were that the data should be sufficiently robust and should together provide coverage of the whole economy. NISRA's existing published quarterly indices namely the IOS, IOP, IOC and QES have been assessed in recent years by the UK Statistics Authority as meeting the standards of the Official Statistics Code of Practice.[3] These statistics have also undergone a considerable programme of development in terms of improved sample design, improved grossing and estimation, the introduction of chain-linking and the introduction of new industrial classification systems.[4] Recent improvements in both the IOS and IOP input series are reflected in the Composite Economic Index results i.e.:

- Q2 2011 results published on the 12th October 2011 were the first to be produced on a SIC 2007 basis, rather than on a SIC 2003 basis as previously, for both series. For this conversion matrices were constructed to convert industries from a SIC03 to a SIC07 basis and a back series of data was produced up to Q1 2011 on a SIC07 basis. This was then linked to the grossed data from Q2 2011 onwards (collected on a SIC07 basis), using a linking factor for the data previously held on a SIC03 basis.

$$\text{Linking factor} = \frac{\text{Turnover for Q2 2011}}{\text{Turnover for Q1 2011}}$$

*Turnover values were taken from the Inter Departmental Business Register (IDBR).

- For both the IOP and IOS the samples were redrawn and increased in number to give a more up-to-date representation of companies in the sectors and increase the accuracy of the results due to the larger sample sizes. The IOS sample was increased from about 1,500 companies to 1,900 companies, while the IOP sample was increased from about 500 companies to 650 companies.

- The IOS produced results using annual chain-linking for the first time for Q1 2011 in July 2011, while the IOP followed one quarter later with Q2 2011 results published in October 2011.

- Historically the IOP turnover was not grossed and this has now been revised with an appropriate back series. In contrast the IOS had always been grossing (using a turnover based approach).

- For the IOP the GVA weights used in the apportionment were changed over from the Annual Business Inquiry (ABI) to those in the published Regional GVA Accounts. The IOS series had already been weighting their results using GVA weights from Regional Accounts.

- Under the IOP some companies had been supplying physical units of production, as a proxy to turnover, which were then used as input, but now all but one company provides turnover figures, which leads to greater consistency.

- The X-12 ARIMA software package was used for seasonal adjustment.

Together the IOS, IOP and IOC cover their respective elements of the private sector economy. These input indices were all adjusted so that the same year was made equal to 100 before input. Forms of input were therefore still required for the Agricultural sector and the Public sector, which are proportionally larger in Northern Ireland than in the UK.

The methodology report from the ONS (discussed above) analysed current price data for the Agricultural sector available from the Regional Accounts and the NI Department of Agriculture and Rural Development (DARD), and concluded that the two data sources were not consistent. It recommended that in the absence of constant price data, the best option for a quarterly volume index is to use employment as a proxy for output. The impact on the whole economy index will be small as these industries make up less than 2% of the total GVA.

However, subsequent discussions with DARD identified that whilst there was no quarterly output data available for the Agricultural sector, a gross output volume index is available on an annual basis from DARD, and it was decided to use these figures as input into the NICEI. For the first publication DARD provided quarterly output data for 2012 which was used as input. However since then DARD has produced a back series of quarterly output data which is now used as input to the NICEI from Q1 2013.

[3] For further information please see http://www.statisticsauthority.gov.uk/assessment/code-of-practice/
[4] http://www.ons.gov.uk/ons/guide-method/classifications/development-projects/operation-2007/index.html

No output data for the Public sector is readily available in Northern Ireland and as an alternative Public sector employee jobs from the QES was used. Financial data from the Combined Online Information System (COINS) was investigated as an alternative input measure but it was decided not to use this at this stage as the expenditure data was irregular with larger volumes of spend occurring in the last quarter of each year. This is however an area of potential future development. At present a method of estimating Public sector compensation of employees across is being explored using salary data from the Annual Survey of Hours and Earnings (ASHE) and employee jobs from the QES.

3.3. Weighting and Combining the Data

A method of combining the input data from the various sectors was required to produce indices for the Private sector, the Public sector and an overall Composite Economic Index. Before the data was input they were all rebased to the same year. Output series were then produced as weighted aggregates of the above input series, where the weights were based on private sector Gross Value Added (GVA) by industry obtained for Northern Ireland from Regional Accounts produced by ONS. GVA at industry level for NI is available though only up to one year earlier than for all industry GVA. The Private sector split for each of the industry groupings and for the Public sector as a whole of total published GVA was estimated by using the ratio of Private/Public sector jobs from total employment.

The four components of employment were sourced as follows:-

- Numbers of Employees were taken from the Quarterly Employment Survey;
- Self-employed were taken from the Labour Force Survey;
- HM Forces were taken from the MOD website; and
- Those in Government Training and Employee Schemes were sourced from the Department for Employment and Learning (DEL).

Indices for the private Services, Production, Construction and Agricultural sectors and for the Public sector were produced in this way and were adjusted so that 2009=100 in each case.[5]

An index number is a convenient form of expressing a series in a way that makes it easier to see changes in that series. The numbers in the series are expressed relatively, with one number in that series chosen to be the 'base' (usually expressed as 100) and other numbers being measured relative to that base. In this case 2009 was selected as the base year therefore all numbers in the indices are expressed relative to their values in 2009.

The reason 2009 was chosen for the base year is that this was the base year used by the main input indices at the time i.e. IOP and IOS. 2009 was maintained as the base year for the NICEI to facilitate comparisons with these indices.

Please note that the figures presented within the NI Construction Output bulletin prepared by the Central Survey Unit use 2005 as the base year as per Eurostat guidelines to facilitate comparison with other EC member states. For the purposes of the development of the NICEI we rebased construction figures to 2009=100 to allow comparison with other component sectors. For this reason the construction figures within the NI Construction Bulletin will differ to those within this publication.

3.4. Annual Chain-Linking

In line with standard National Accounts practice chain-linking was used to combine the private Services, Production, Construction and Agriculture sectors to produce an index for the Private sector, which was then combined with the index for the Public sector to give an overall index for the economy. This followed the recommendation of the Statistics Authority QIF project.

Annual chain-linking is a method for aggregating volume measures on a yearly basis, it can be thought of as rebasing every year rather than having a fixed base year to which all subsequent years are weighted. In this way dynamic changes in the structure of the economy are better reflected in the index. Instead of referring back to value shares from the most recent base year, volume measures for each year are produced in prices of the previous year. These volume measures are then 'chain-linked' together to produce a continuous time series, preserving the growth rates of the underlying component series.

The advantage of calculating volume measures in this form is that they may be summed to obtain equivalent measures for higher levels of aggregation, ensuring coherence between the weights used for aggregation and current price GVA data. In effect, these volume measures are the numerators of the ratios used to calculate Laspeyres indices for the relevant base prices.[6]

[5] Please note that for the most recent publication relating to Q1 2013 the reference year has been rebased to 2010 = 100.
[6] For further information please see "The effects of annual chain-linking on the output measure of GDP", ONS

Annual chain-linking was introduced into the existing methodology between Q4 of the previous year and Q1 of the following year in line with the recommendation of the System of National Accounts 1993 (SNA93). This provided a suitable method of combining the sectors to produce a Private sector index and combining it with the Public sector index to produce an overall Composite Economic Index.

Chain-linking has the following advantages:-

- Annual weights are more up-to-date and are therefore more relevant to the current economic situation;
- Although the index will be subject to revision each year when new weights are introduced, the revisions will be smaller than those that would occur using a fixed-base weighted methodology with the base year revised at say five yearly intervals;
- Turnover is often used as a proxy for GVA in quarterly indices under the assumption that the turnover to GVA ratio remains fixed over time. Chain-linking reduces the inaccuracies caused by this assumption of a stable relationship. Using annual weights the assumption only has to hold from one year to the next; and,
- Every year becomes a link year, so there is no subjective choice about the base year.

Annual chain-linking works in the following way (taking the Production sector as an example):

Step 1

First of all to calculate each private sector index, the proportion of GVA for that sector is estimated by ratioing the published GVA for that sector by the proportion of private sector employment in that sector.

$$\text{Private sector GVA for Production} = \text{Total GVA for Production} \times \frac{\text{Private Sector Employment in Production}}{\text{Total Employment in Production}}$$

Step 2

Then two different sets of volume measures, Current Year's prices and Previous Year's prices, are calculated from this Private sector GVA and the input index for Production.

$$\text{Volume at Current years prices} = \text{Private sector GVA for the year} \times \frac{\text{Input index for the quarter}}{\text{Sum of Input indices for that year}}$$

$$\text{Volume at Previous years prices} = \text{Private sector GVA for the year} \times \frac{\text{Input index for the quarter}}{\text{Sum of Input indices for the previous year}}$$

Step 3

Two different growth rates are calculated:

i. The growth rate between Q4 and Q1 of the next year uses Previous Year's prices for Q1 and Current Years prices for Q4; and
ii. The growth rate between all other quarters uses Previous Year's prices for both quarters.

$$\text{Growth rate Q4 to Q1} = \frac{\text{Volume this quarter at Previous Year's prices}}{\text{Volume last quarter at Current Year's prices}}$$

$$\text{Growth rate all other quarters} = \frac{\text{Volume this quarter at Previous Year's prices}}{\text{Volume last quarter at Previous Year's prices}}$$

Using these growth rates, indices for the Private sector components i.e. Production, Services, Construction and Agriculture are calculated making the base year 2009=100 as well as an index for the Public sector.

The index for the Public sector was calculated in the same way taking Public sector GVA as the difference between total GVA and the total of that calculated for the Private sector components.

Note that the quarterly growth rates for each of these private sector components and the Public sector should be the same as the quarterly growth rates for the corresponding input series and this was checked at this stage of the process.

3.5. Combining the Indices

The final step was to combine the Private sector components to give a total Private sector index and then combine this with the Public sector index to give the overall Composite Economic Index. This is where the Current Year's prices and the Previous Year's prices already calculated were used:

- Total Private Sector GVA was taken as the sum of the GVA in the sectors making up the Private sector;
- Similarly, both Current Year's prices and Previous Year's prices for the relevant sectors were summed to give total Current Year's prices and Previous Year's prices for the Private sector; and
- From these Current Year's prices and Previous Year's prices, growth rates were calculated in the same way as for the individual sectors and these were used to construct an index for the Private sector.

The same method was used to combine the Private sector index with the Public sector index to give the overall Composite Economic Index.

As a check these combined indices were compared with weighted averages of the constituent indices, using the percentage of GVA as weights and were found to be very close. This illustrates a practical benefit of annual chain-linking in that it provides an appropriate method of combining individual indices, using yearly updated weights (in this case GVA).

3.6. Seasonal Adjustment of the Indices

This was the last step carried out to produce the final figures. There are two methods of seasonal adjustment of combined data series:

1. **Direct** adjustment involves inputting unadjusted figures and seasonally adjusting the output series; and

2. **Indirect** adjustment involves using seasonally adjusted input figures and then testing the output figures for seasonality.

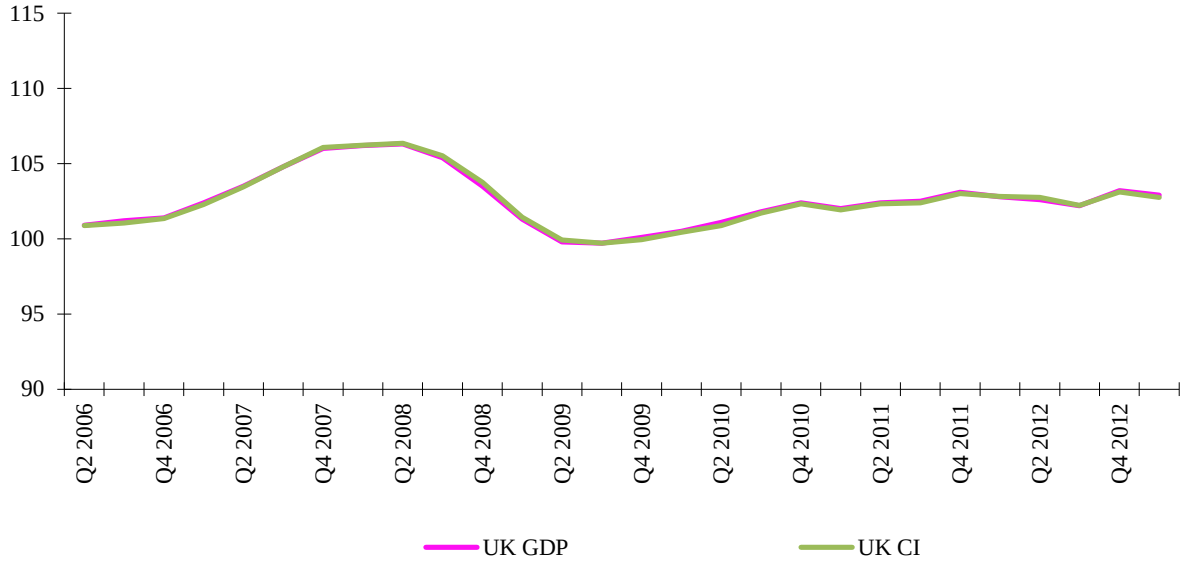
The indirect adjustment method was used as is recommended where the input series display different seasonality patterns, which is the case here. Seasonally adjusted input figures were available for all the input series except the Agricultural data, which is currently input on a yearly basis, except for 2012. When the output series for the Private sector and the overall Composite Economic Index were tested for seasonality there was no residual seasonality found.

Please note that in the earlier stages of development X11 Arima was used for seasonal adjustment of the input series, but results have been produced using X12 Arima since October 2010.

3.7. Validation of Methodology

In order to validate the methodology employed a Composite Index was constructed for the UK (UKCI) using the same methodology as for the NICEI and the equivalent UK data series (e.g. short term output series). This new series was compared with UK GDP. The two indices had very similar profiles showing the same pattern of rises and falls (Figure 3), with an average absolute difference of less than 0.1 percentage points.

Figure 3. Comparison of UK GDP with "UK Composite Index"



The salient points:

- Both maximum values occurred in Q1 2008, with minimum values in Q2 2009; and
- UKCI maximum value was 106.4, GDP maximum was 106.3; both minimum values were 99.7.

The results suggest that the methodology is sound and provides a reasonable approximation to the official UK quarterly measure of GDP, at least in the short term.

In addition, other NI labour market data was examined to see if trends there were consistent with the results produced for the NICEI. Again this data broadly supported the findings from the NICEI; the outcomes of these comparisons are given in more detail in the following Results section.

3.8. Limitations of the Methodology

The above methodology for producing a NI Composite Economic Index has a number of recognised limitations:

- The main limitation is that the index is not a comprehensive measure of Gross Domestic Product that meets the international standards of the System of National Accounts. It relies instead on sales data for Private sector output and employee jobs for the Public sector. These quarterly "output" based estimates are based solely on sales data as a proxy for Gross Value Added, so no account is taken of changes in the costs of purchases, changes in stocks or productivity improvements to provide a measure of the true change in the value added. Sales may therefore increase while GVA (Gross Operating Surplus and/or Compensation of Employees) is falling.

  Data are also not available to provide estimates based on the income or expenditure approach. The IOC does take account of potential double counting of intermediate consumption by excluding work done by sub-contractors, but the IOS and IOP (as in the equivalent UK series) do not adjust for such effects. That said, the principal correcting factor is that the individual series are weighted back to their relative shares of Regional Accounts' GVA, thereby ensuring that they are representative of the most recent GVA information available. The development of input/output tables for Northern Ireland to link turnover to GVA would further assist in the input data for the index. This is an area of future development for NISRA.

- Any weaknesses in the input series will be carried across to the Composite Economic Index. While current results produced for the IOS and IOP have corrected most of the main known weaknesses in these two series (as detailed previously) there still remains further investigation into whether any issues arise because of potential sample attrition. The IOS and IOP were originally sampled in 2005 and 2006 respectively. This has been addressed with new samples selected in 2011 which have been updated with adjustments for any new "births" each quarter. Sample refresh with quarterly rotations will occur from 2013 onwards.

- Regional Accounts GVA estimates are not available separately for Private and Public sector activity and so the split has to be estimated by using Private/Public split from employment. It is acknowledged that this is not an ideal way to apportion GVA as it is likely that the Private sector would produce more GVA per head than non-market public services. This is an area for development and work is ongoing to develop a more accurate method to disaggregate Regional GVA between the Public and Private sectors (using ASHE data).

- There is a time lag in Regional Accounts GVA figures by industry, which is used for weighting the input figures e.g. figures released at industry level in December 2012 only go up to 2010.

- Regional Accounts GVA is currently measured using the income approach, which involves adding up the income generated by resident individuals or corporations in the production of goods and services. It is calculated gross of deductions for consumption of fixed capital, which is the amount of fixed assets used up in the process of production in any period. However, an ONS project[7] is underway to develop estimates of real regional GVA growth using a production approach.

- No output data for the Public sector are currently available in Northern Ireland. This means that the best available option (after investigation of available financial data) for a quarterly volume index was to use employment as a proxy for output.

- For the Agricultural sector quarterly output data are not currently available and an annual gross output index published by DARD is used as input for all years except 2012 (where quarterly data has just become available). This is an area for development going forward and we intend to make use of quarterly data which should become available from DARD and AFBI.

4. RESULTS

Results for Q4 2012 for the experimental NICEI are presented in the preceding section. Disaggregated results for the Private and Public sectors, with the former being broken down into the Service sector, the Construction sector, the Production sector and the Agricultural sector are also presented. Gross Domestic Product (GDP) data for the UK, Scotland and Ireland are included for illustrative purposes, though it should be noted these are not strictly comparable measures.

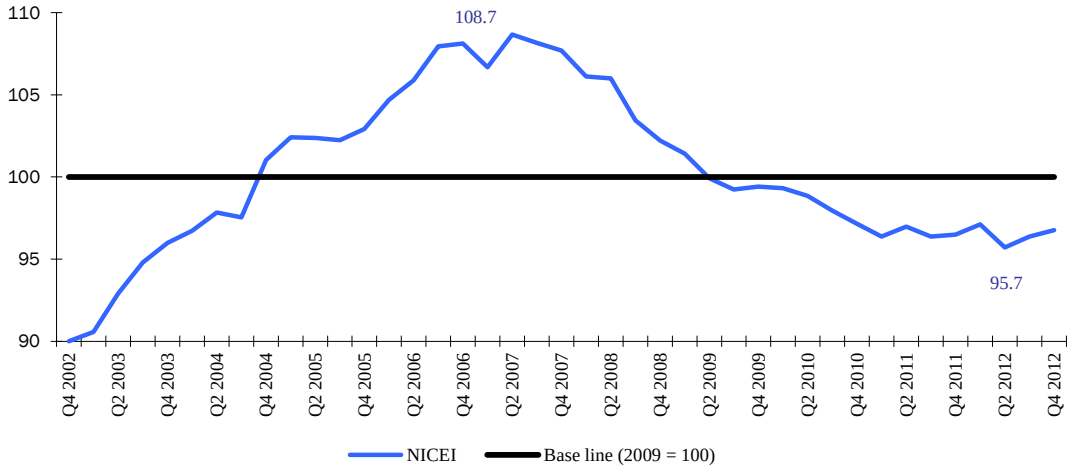
4.1. Composite Economic Index results Q4 2012[8]

Results for the NICEI show that in Q4 2012 it increased by 0.4% from the previous quarter and is currently 0.3% above the level reached in Q4 2011. The Index increased in three of the last four quarters and has returned to levels previously recorded in Q1 2004. However, it remains some 11.0% below the peak value (108.7) recorded in Q2 2007 and is currently close to its minimum (95.7) reached in quarter Q2 2012 (Figure 4). This suggests that in Q4 2012, any recovery in Northern Ireland still had some considerable way to go to demonstrate evidence of real growth. It should also be noted that to the extent that the peak activity in 2007 was unsustainable, not all of the ground lost would be expected to be recovered in the short or even medium term.

[7] Allsopp Regional GVA(P) Project: Methods Development of Regional GVA on production basis

[8] Please note that more recent results have subsequently been released by NISRA, these are available at http://www.detini.gov.uk/deti-stats-index/stats-surveys/ni-composite-economic-index-_nicei_.htm

Figure 4. NI Composite Economic Index 2002-2012

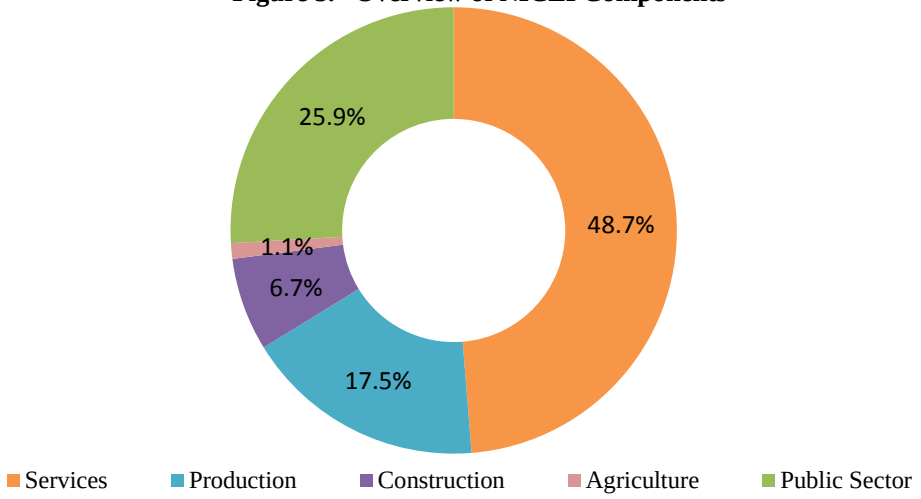


Please note that a detailed table with the indices for the NICEI and its components is presented in Appendix I.

4.2. NI Private Sector and Public Sector Indices

The Private sector can be considered in broad terms to account for some 74% of the share of total Gross Value Added (GVA) with the Public sector accounting for some 26%[9] of total GVA (Figure 5). Given Northern Ireland's reliance on the public sector, it is of interest to track the relative performance of the public and private sectors.

Figure 5. Overview of NICEI Components

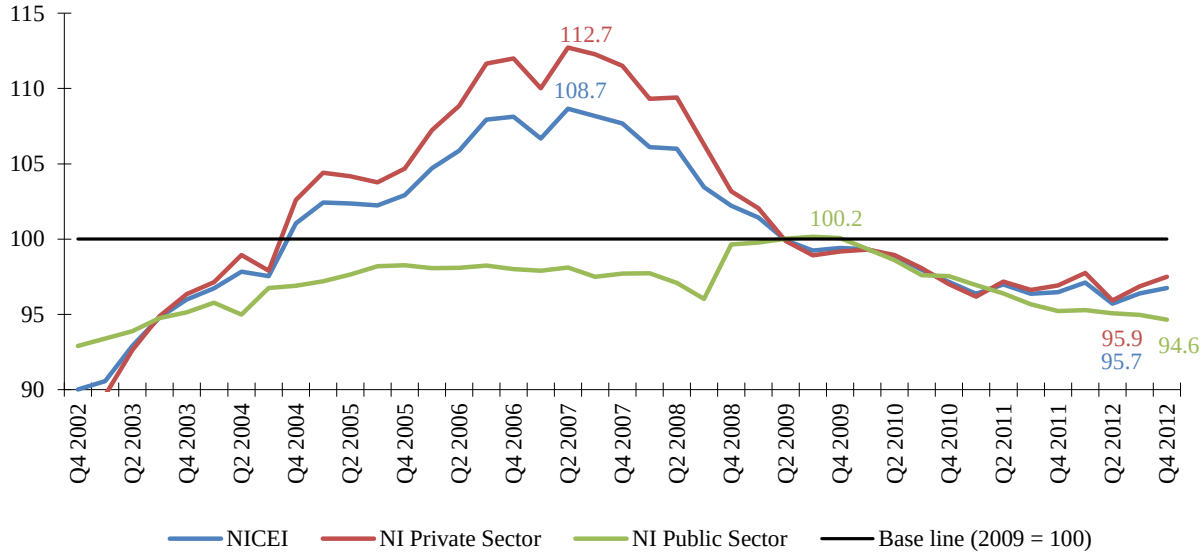


Results for the Private sector show a similar pattern to that for the whole economy. The index has risen in three of the last four quarters with an increase of 0.6% over both the quarter and the year to Q4 2012. The private sector index has returned to levels previously recorded in Q1 2004 and is currently 13.5% below the maximum value reached in Q2 2007 (Figure 6).

The Public sector index initially showed more resilience to the general downturn in the economy than the Private sector index, but has been on a mostly downward trend since Q3 2009. The index has fallen in three of the last four quarters, experiencing a fall over the quarter (0.4%) and the year (1.1%) to Q4 2012. The index has returned to levels previously recorded in Q3 2003 and is currently 5.5% below its maximum value recorded in Q3 2009.

[9] The public/private share of GVA is based on the public/private share of employee jobs by industry sector applied to the Regional Accounts GVA 2010.

Figure 6. Overview of Composite Economic, Private Sector and Public Sector Indices Q4 2012[10]



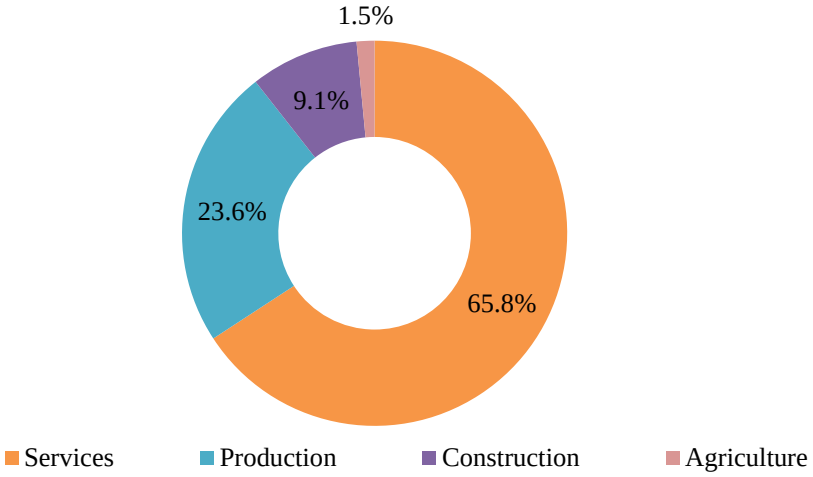
The Composite Economic Index and Private sector Index both peaked in Q2 2007 and showed similar trends in rises and falls with both reaching a minimum value in Q2 2012, whilst the Public sector peaked over two years later in Q3 2009 and fell to its minimum value two quarters later in Q4 2012.

More recently, the Private sector experienced a rise of 0.6% in the last year and a fall of 1.7% over the last 3 years. However, the Public sector is 0.6% and 5.4% below the values one and three years ago respectively.

4.3. NI Private Sector Sub-Indices

The Private sector output component of the index used weighted measures of the following published indices: the Index of Services (IOS), the Index of Production (IOP) and the Index of Construction (IOC) together with output data for the agricultural sector (Figure 7). Within the Private sector the Service industries account for the largest share (66%) of Regional Accounts GVA, followed by the Production (24%), Construction (9%) and Agriculture (2%) sectors.

Figure 7. Overview of NICEI Private Sector Components based on share of GVA



[10] The numbers highlighted on the graph indicate the maximum and minimum values reached by each index

Service Sector (66% of private sector GVA)
As the Service sector makes up the largest share (currently around 66%) of Private sector GVA its performance is similar to that described for the Private sector. The Service sector increased by 0.7% to 98.9 in Q4 2012. Since reaching a maximum value of 111.2 in Q3 2006, the index has fallen in sixteen out of twenty-five quarters. The current quarter results represent a return to levels previously recorded in Q4 2004.

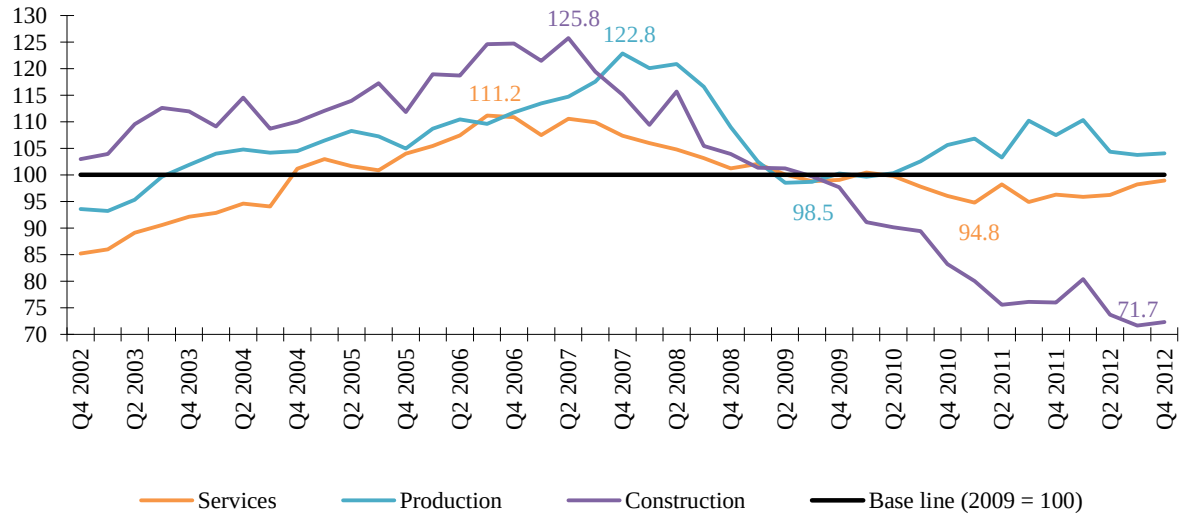
Production Sector (24% of private sector GVA)
The Production sector makes up the next largest share (currently around 24%) of Private sector GVA and its performance differs from that of the overall Private sector. The Production sector index increased by 0.3% to 104.0 in Q4 2012. Since reaching its maximum value of 122.8 in Q4 2007 there have been ten rises and ten falls in the last twenty quarters. Although the fall in the Production sector is larger than that for the Service sector it occurred over a shorter period of time. The index has returned to levels previously recorded in Q1 2004.

Construction Sector (9% of private sector GVA)
The Construction sector makes up around 9% of Private sector GVA. The Construction sector index rose by 0.9% from its minimum value of 71.7 in Q3 2012 to 72.3 in Q4 2012. Prior to this there were 18 falls in the 22 quarters from the peak value of 125.8 reached in Q2 2007. This sector experienced the largest fall (43.0%) from the maximum to minimum value.

Figure 8 below provides an overview of the performance of each of these sub-sectors from 2002-2012.

Please note that results are not published separately for the Agriculture sector as DARD are currently working on their own index and as such have requested that results are not published in case revisions have to be made. It is noted however that this sector contributes marginally to the overall NICEI, equating to c.1.5% of the private sector.

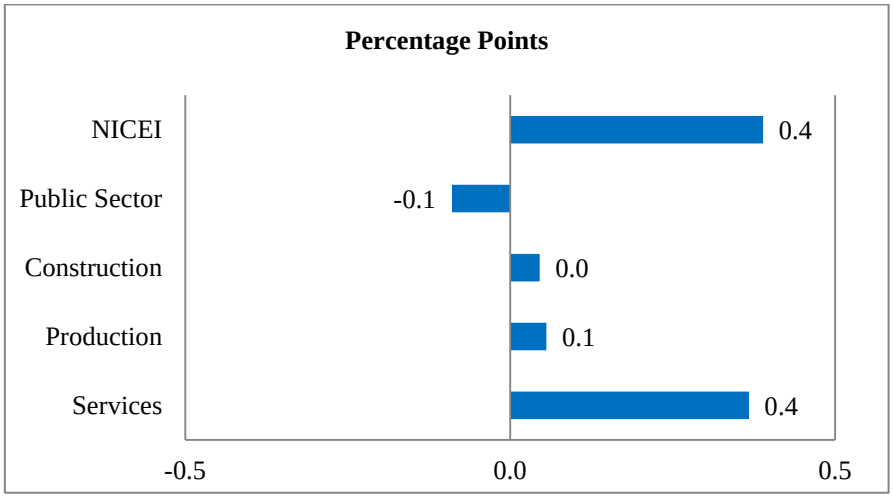
Figure 8. Overview of Private sector sub-indices 2002-2012[11]



4.4. Contribution to changes in the NICEI
The increase in the Composite Economic Index over the quarter (0.4%) reflected the combined influence of changes in the Private Sector components of Production, Construction, Services and Agricultural sectors and the Public Sector over the quarter. Within the Private Sector the largest contribution to the increase over the quarter came from the Service sector (0.4 percentage points); with smaller contributions from the Production (0.1 percentage points) and Construction (0.05 percentage points) sectors (Figure 9).

[11] The numbers highlighted on the graph indicate the maximum and minimum values reached by each index.

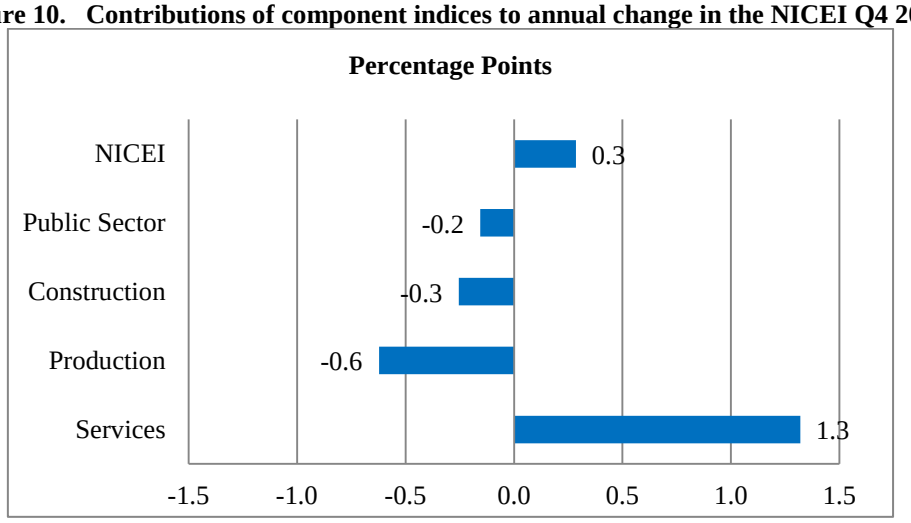
Figure 9. Contributions of component indices to quarterly change in the NICEI Q4 2012



The increase of the Composite Economic Index over the year (0.3%) was driven by an increase in Services (1.3 percentage points), which was partially offset by smaller decreases in the Production (0.6 percentage points) and Construction (0.3 percentage points) sectors (Figure 10).

Over the quarter the Public Sector index has had a downward contribution (-0.1 percentage points) to the overall increase in the NICEI (0.4 percentage points). Similarly the index has had a downward contribution (-0.2 percentage points) to the NICEI annual growth (0.3 percentage points).

Figure 10. Contributions of component indices to annual change in the NICEI Q4 2012



4.5. Comparison of NI Composite Economic Index with Gross Domestic Product for UK, Scotland and Republic of Ireland

The NICEI is not strictly equivalent to the Office for National Statistics quarterly measure of change in GDP for the whole UK economy. This is because the ONS measure is based on a broader range of sources including output, income and expenditure estimates of economic activity, whereas the NICEI is based on output and employee jobs data. Comparisons with UK GDP measures are therefore approximate.

However, it is considered that the NICEI provides an appropriate short term indicator for the NI economy in advance of more complete figures from other sources such as annual Regional Accounts information for NI from ONS. Charting the relative progress of NI's economic performance is of particular interest to users and a comparison of the NICEI with GDP for the UK, Scotland and ROI is provided below.

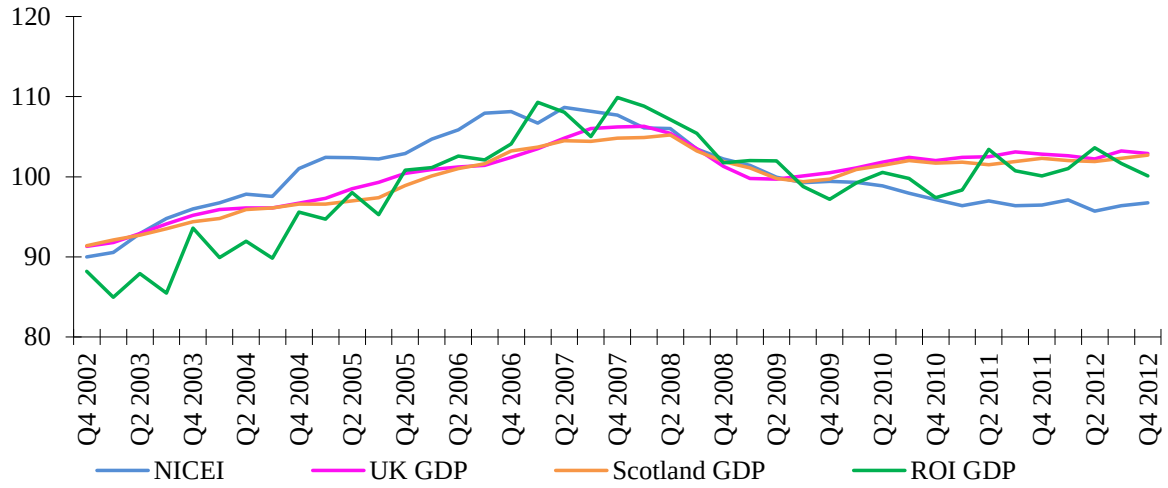
While the performance of the UK and Scottish measures of GDP are very similar, the profile of the economic index for Northern Ireland is notably different. In NI the maximum output was reached in Q2 2007, three quarters earlier than in the UK (Q1 2008), four quarters earlier than Scotland (Q2 2008), and two quarters earlier than the ROI (Q4 2007). Since then the NI measure has fallen in sixteen of the twenty-two quarters, and increased in six quarters; rising in Q4 2009, Q2 and Q4 2011, and Q1, Q3 and Q4 2012.

The minimum level of 95.7 was reached in Q2 2012, and the index now stands just 1.1% above the minimum value. In contrast GDP in the UK, Scotland and ROI at Q4 2012 are further above their minimum levels reached in Q2 2009 (3.2%), Q3 2009 (3.3%) and Q4 2009 (3.0%) respectively.

However, the NI maximum output of 108.7 was greater than that in Scotland (105.2) and the UK (106.3). Hence the fall from maximum to minimum levels in the NICEI was 11.9%, higher than in the UK, Scotland and ROI where it was 6.2%, 5.5% and 11.5% respectively.

Using the current measure as a best estimate, NI first recorded two successive quarterly decreases in Q4 2007. This is earlier than the UK (Q3 2008), Scotland (Q4 2008) and the ROI (Q2 2008).

Figure 11. Comparison of NI Composite Economic Index and GDP for UK, Scotland and ROI (2009=100)



An overview of the data within these indices and the quarterly changes experienced is presented in Appendix II.

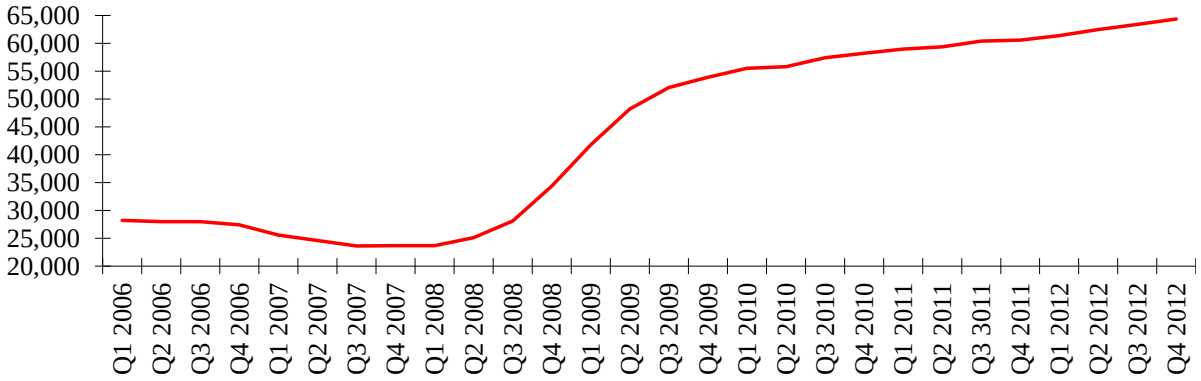
4.6. Comparison with other economic statistics

As discussed in Section 2 an analysis of other economic statistics was undertaken in order to see if trends there were consistent with the results produced for the NICEI.

Unemployment data

The level of Claimant Count unemployment reached its most recent highest level of 64,400 in the current quarter Q4 2012. This constituted a rise of 40,800 from the latest minimum of 23,600 in Q3 2007, which is one quarter after the NICEI reached its maximum value, which means that output was falling for one quarter before it translated into increased unemployment.

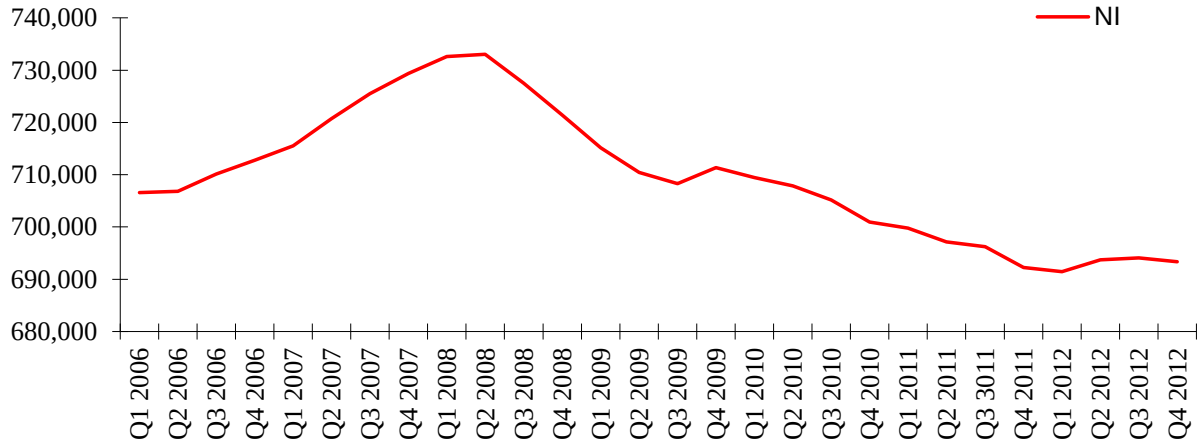
Figure 12. NI Claimant Count Unemployment



Employment data

NI Employee jobs (seasonally adjusted) peaked at 733,020 in Q2 2008, later than both the deterioration in the NICEI and the Claimant Count. The peak in employee jobs was reached one year after the peak in the Composite Economic Index which means that it took 4 quarters for the fall in the NICEI to translate into a fall in employee jobs. However, the employee jobs reached a minimum in Q1 2012, one quarter earlier than the NICEI. It should of course be recalled that the employee jobs series takes remitted account of declining job opportunities among the self employed which may explain the profile relative to the Composite Index.

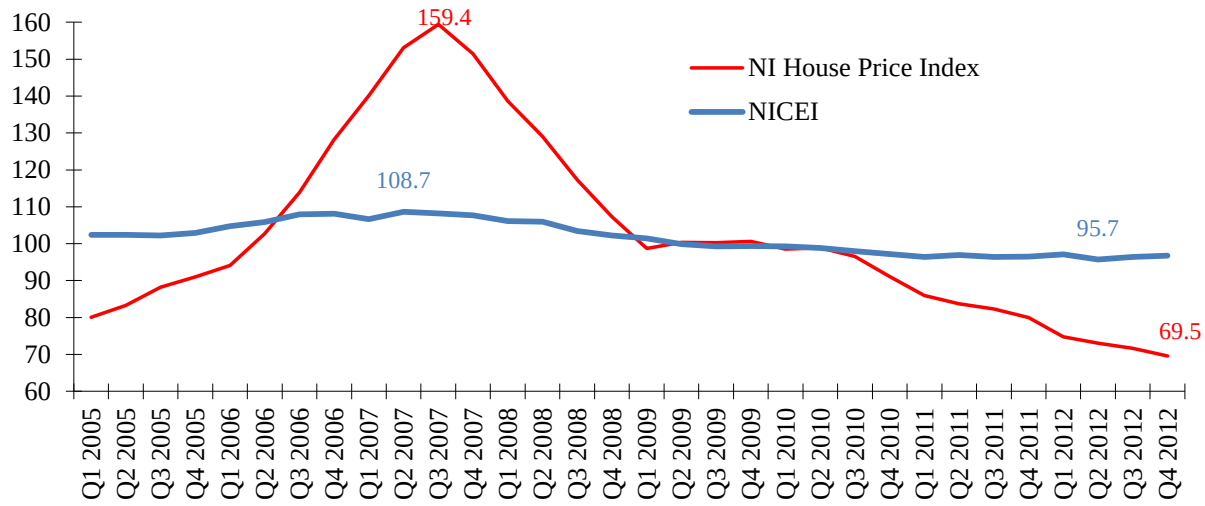
Figure 13. NI Employee Jobs



House Price data

The Land and Property Services standardised indices of residential house prices shows that average house prices in Northern Ireland peaked in Q3 2007, the same quarter as unemployment reached its minimum, and one quarter after the NICEI peaked. It has also been on a downward trend since (with only a marginal rise occurring in quarter 2 2009) to Q4 2012, though at the time of writing, NI house prices posted their first increase in Q2 2013. From this maximum, prices fell by over one half (56%) to the minimum value in Q4 2012.

Figure 14. Comparison NI Average House Price & NICEI (2009=100)



4.7. Commentary

The NICEI series reached its peak value (Q2 2007) three quarters before the UK GDP series (Q1 2008). The rate of increase in Northern Ireland output to Q2 2007 was also more marked than in the UK as a whole and the duration of the downturn has been more protracted. It should be noted though that there have been three quarter on quarter increases out of the last four quarters in 2012 in the NI series, providing some indication of a recent return to growth over the year (0.3% annual growth to Q4 2012 compared to Q4 2011). However, the NI index has only returned to values previously recorded in Q1 2004.

NISRA has subsequently published 1st quarter results for 2013 from the Composite Index, since this paper was first presented to the Society on the 30th May 2013. These results indicate that the index has lost some of the gain previously reported and in Q1 2013 remained close to its minimum value recorded in Q2 2012. However, other more recent indicators provide some evidence of rising house prices in Q2 2013 and declining unemployment up to June 2013. Quarter 2 Composite Index results will be awaited with interest to see if the reported gains in these series are reflected in a return to growth in output as reported by the Composite Index.

The Composite Index tells a story of very rapid growth in output to Q2 2007, with a steep decline to Q3 2009, and a relatively flat profile since late 2010 to the end of 2012. The peak in activity recorded by the Index preceded the rapid decline in employee jobs by about a year, suggesting that it took a while for declining output to translate into a fall in employee jobs across the economy. That said, one of the most sensitive indicators of unemployment, the benefits based measure, had begun to increase from late 2007, and as such was in better agreement with the index. The index also supports the idea that this was a construction led peak in economic output to Q2 2007, and equally a construction led decline with that element of the index having lost 42% of its volume from that time and remaining well below its 2002 levels (when the index started). The Composite Index suggests that Northern Ireland's return to growth has been more sluggish than that of the UK, Scotland or the Republic of Ireland. Over the last three years Northern Ireland has had either the highest or second highest UK regional unemployment rate in terms of those in receipt of unemployment related benefits. This tends to confirm the Index's message of continued difficulties in returning to sustainable growth.

5. CONCLUSION AND DISCUSSION

In this paper we have demonstrated how the NICEI methodology has been developed based on best practice guidance from the Office for National Statistics using available official statistics as input. We have shown that when the methodology is applied to the equivalent datasets in the UK to develop a UK Composite Index the outcome is reassuring as it is found to have similar trends as to the UK GDP series. This exercise provides encouragement that the methodology employed is sound and provides a reasonable approximation to the official UK quarterly measure of GDP, at least in the short term.

Moreover, the analysis of other official economic statistics suggests that while the NICEI is in broad agreement, it further adds to the understanding of the performance of the economy by making available a mainly output based measure. The comparison with the other sources provides a sense check on the NICEI outcomes and provides reassurance that the methodology is reasonable. It is noted that the scale of the changes in the NICEI output based measure is of a different order of magnitude to that recorded in ONS's income based measure of Northern Ireland's Regional Gross Value Added. This partly reflects the fact that NICEI output measures are deflated while the ONS measures are in current basic prices. However, it also means caution should be exercised when interpreting the NICEI over longer time periods.

It is considered that at this stage the NICEI meets the demand for an integrated measure of short term change using mainly output based measures across the whole economy. Whilst it is not quarterly GDP it uses similar input sources as ONS's preliminary estimate of GDP, and when the methodology is applied to the equivalent UK series it closely matches GDP trends.

Areas for future development of the measure include:

- Liaison with DARD regarding provision of back series of quarterly output data for Agriculture;
- Investigation into the use of employment data weighted by wages to apportion GVA into Private and Public sectors;
- Incorporate IOS and IOP input figures due to be re-sampled this year;
- Further investigation into sample attrition
- Investigate any users suggestions received after publications; and
- Development of Supply and Use Tables for NI.

In line with the Code of Practice for Official Statistics the Composite Index is designated as an "experimental" statistic as it is subject to ongoing development. NISRA therefore welcome the view of users of the index to inform its future development. Views can be communicated to the authors by emailing: statistics@detini.gov.uk

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APPENDIX I:
Overview of NICEI and component indices

The table below provides an overview of the index tables for the Composite Economic Index and its constituent indices. The arrows in the cells indicate whether the index has increased/decreased/remained constant from the previous quarter.

Key:		Maximum value reached
		Minimum value reached

	Quarter	Composite Economic Index	Private sector	Public sector	Services	Production	Construction
2002	4	**90.0**	89.0	92.9	85.2	93.6	103.0
2003	1	**90.6**	89.6	93.4	86.0	93.2	104.0
	2	**92.9**	92.6	93.9	89.1	95.3	109.5
	3	**94.8**	94.9	94.8	90.6	99.7	112.6
	4	**96.0**	96.3	95.1	92.1	101.9	111.9
2004	1	**96.7**	97.1	95.8	92.9	104.0	109.1
	2	**97.8**	98.9	95.0	94.6	104.8	114.5
	3	**97.5**	97.9	96.8	94.1	104.2	108.7
	4	**101.0**	102.6	96.9	101.2	104.5	110.0
2005	1	**102.4**	104.4	97.2	103.0	106.4	112.1
	2	**102.4**	104.2	97.7	101.7	108.3	113.9
	3	**102.2**	103.8	98.2	100.9	107.3	117.3
	4	**102.9**	104.7	98.3	104.0	105.0	111.8
2006	1	**104.7**	107.2	98.1	105.5	108.7	118.9
	2	**105.9**	108.9	98.1	107.4	110.4	118.7
	3	**107.9**	111.7	98.2	111.2	109.6	124.6
	4	**108.1**	112.0	98.0	110.9	111.8	124.7
2007	1	**106.7**	110.0	97.9	107.5	113.5	121.5
	2	**108.7**	112.7	98.1	110.6	114.7	125.8
	3	**108.2**	112.3	97.5	109.9	117.5	119.4
	4	**107.7**	111.5	97.7	107.4	122.8	115.1
2008	1	**106.1**	109.3	97.7	106.0	120.1	109.4
	2	**106.0**	109.4	97.1	104.8	120.9	115.7
	3	**103.4**	106.3	96.0	103.2	116.6	105.4
	4	**102.2**	103.2	99.6	101.2	109.0	103.9
2009	1	**101.4**	102.0	99.8	102.0	102.5	101.3
	2	**99.9**	99.9	100.0	100.1	98.5	101.2
	3	**99.2**	98.9	100.2	98.8	98.7	99.7
	4	**99.4**	99.2	100.1	99.1	100.2	97.7
2010	1	**99.3**	99.3	99.3	100.4	99.7	91.1
	2	**98.9**	98.9	98.6	99.8	100.3	90.2
	3	**98.0**	98.1	97.6	97.8	102.6	89.4
	4	**97.2**	97.0	97.5	96.0	105.6	83.2
2011	1	**96.4**	96.2	96.9	94.8	106.9	80.0
	2	**97.0**	97.2	96.4	98.2	103.3	75.6
	3	**96.4**	96.6	95.7	94.9	110.2	76.1
	4	**96.5**	96.9	95.2	96.3	107.5	76.0
2012	1	**97.1**	97.7	95.3	95.9	110.3	80.4
	2	**95.7**	95.9	95.1	96.2	104.4	73.7
	3	**96.4**	96.9	95.0	98.2	103.7	71.7
	4	**96.8**	97.5	94.6	98.9	104.0	72.3

APPENDIX II:
Comparison of NI Composite Economic Index with GDP for UK, Scotland and ROI (2009=100)

		NI		UK		Scotland		ROI	
	Quarter	Composite Economic Index	% quarterly change	GDP	% quarterly change	GDP	% quarterly change	GDP	% quarterly change
2002	4	90.0	-	91.3	-	91.4	-	88.2	-
2003	1	90.6	0.6%	91.8	0.5%	92.1	0.8%	84.9	-3.7%
	2	92.9	2.6%	92.9	1.2%	92.7	0.7%	87.9	3.5%
	3	94.8	2.0%	94.1	1.3%	93.5	0.9%	85.5	-2.8%
	4	96.0	1.2%	95.2	1.2%	94.4	1.0%	93.6	9.5%
2004	1	96.7	0.8%	95.9	0.7%	94.8	0.4%	89.9	-3.9%
	2	97.8	1.2%	96.1	0.2%	95.9	1.2%	91.9	2.3%
	3	97.5	-0.3%	96.1	0.0%	96.1	0.2%	89.8	-2.3%
	4	101.0	3.6%	96.7	0.6%	96.6	0.5%	95.6	6.4%
2005	1	102.4	1.4%	97.3	0.6%	96.6	0.0%	94.7	-0.9%
	2	102.4	0.0%	98.5	1.2%	97.0	0.4%	98.0	3.5%
	3	102.2	-0.1%	99.3	0.8%	97.4	0.4%	95.3	-2.8%
	4	102.9	0.7%	100.4	1.1%	98.9	1.5%	100.8	5.8%
2006	1	104.7	1.7%	100.9	0.5%	100.1	1.2%	101.1	0.3%
	2	105.9	1.1%	101.2	0.3%	101.0	0.9%	102.6	1.4%
	3	107.9	2.0%	101.4	0.2%	101.6	0.6%	102.1	-0.5%
	4	108.1	0.2%	102.4	1.0%	103.2	1.6%	104.1	2.0%
2007	1	106.7	-1.3%	103.5	1.1%	103.7	0.5%	109.3	5.0%
	2	108.7	1.9%	104.8	1.3%	104.5	0.8%	108.1	-1.1%
	3	108.2	-0.5%	106.0	1.1%	104.4	-0.1%	105.0	-2.8%
	4	107.7	-0.4%	106.2	0.2%	104.8	0.4%	109.9	4.6%
2008	1	106.1	-1.5%	106.3	0.1%	104.9	0.1%	108.8	-1.0%
	2	106.0	-0.1%	105.4	-0.8%	105.2	0.3%	107.1	-1.5%
	3	103.4	-2.4%	103.5	-1.8%	103.2	-1.9%	105.4	-1.6%
	4	102.2	-1.2%	101.3	-2.1%	101.9	-1.3%	101.8	-3.5%
2009	1	101.4	-0.8%	99.8	-1.5%	101.1	-0.8%	102.0	0.3%
	2	99.9	-1.5%	99.7	-0.1%	99.8	-1.3%	102.0	0.0%
	3	99.2	-0.7%	100.1	0.4%	99.4	-0.4%	98.8	-3.1%
	4	99.4	0.2%	100.5	0.4%	99.7	0.3%	97.2	-1.6%
2010	1	99.3	-0.1%	101.1	0.6%	100.9	1.2%	99.2	2.1%
	2	98.9	-0.5%	101.8	0.7%	101.4	0.5%	100.5	1.3%
	3	98.0	-0.9%	102.4	0.6%	102.0	0.6%	99.8	-0.8%
	4	97.2	-0.8%	102.0	-0.4%	101.7	-0.3%	97.4	-2.4%
2011	1	96.4	-0.8%	102.4	0.4%	101.8	0.1%	98.3	1.0%
	2	97.0	0.6%	102.5	0.1%	101.5	-0.3%	103.4	5.2%
	3	96.4	-0.6%	103.1	0.6%	101.9	0.4%	100.8	-2.6%
	4	96.5	0.1%	102.8	-0.3%	102.3	0.4%	100.1	-0.6%
2012	1	97.1	0.7%	102.6	-0.2%	102.0	-0.3%	101.0	0.9%
	2	95.7	-1.4%	102.2	-0.4%	101.9	-0.1%	103.6	2.5%
	3	96.4	0.7%	103.2	1.0%	102.3	0.4%	101.7	-1.9%
	4	96.8	0.4%	102.9	-0.3%	102.7	0.4%	100.1	-1.5%

VOTE OF THANKS PROPOSED BY STEVE MACFEELY,
CENTRAL STATISTICS OFFICE & UNIVERSITY COLLEGE CORK

It is my great pleasure to propose the vote of thanks to Dr. Gillan and his co-authors. It is a particular pleasure to propose that vote here in Belfast. In a previous role in CSO I visited Belfast a number of times to meet with James and his colleagues. I was always made feel most welcome, so it is a treat to be back visiting NISRA again.

To begin with I would like to congratulate NISRA on developing and successfully launching their new quarterly composite economic index. Launching any new statistical product is typically a worrying time – especially an economic indicator at a time of high economic volatility coupled with very high levels of interest and scrutiny – and usually desperation for signs of 'green shoots'.

Furthermore, the NICEI is a more complex proposition than simply a proxy for a quarterly national account, as it is in fact a proxy for a quarterly regional account. This makes the ambition all the greater, both in building the index but also for interpretation and comparative analysis, as it is well understood that GVA or GDP are not necessarily the best or most appropriate measures of regional economic output. I'll return to this point in a moment.

From a national accountant perspective, one might wonder why NISRA undertook such a brave and ambitious project, as there are mixed views on the need for and the contribution that quarterly national accounts make. No doubt the insatiable demand for more and quicker data along with the onerous demands coming from Europe probably made this project unavoidable. However quarterly accounts are generally viewed as of lesser quality and prone to higher volatility than their annual equivalents and consequently, they are subject to significant revisions. Although, this is perhaps an unintended benefit of the composite index, in that it may not need to be revised or at least the revisions are likely to be modest, making it attractive to users?

The paper has outlined the methodological structure adopted to compile the index and it has also given a fairly comprehensive and balanced view of the strengths and weaknesses of the index. So there is no need to rehearse them again. Furthermore, the index appears to yield stable and plausible results.

As noted in the paper, the index is compiled using the output or production approach, as the income or expenditure approach is not possible from the current data sources available. From a production approach perspective, the private sector coverage is reasonably comprehensive. That turnover indexes for services (IOS), manufacturing (IOP) and construction (IOC) already exist, along with a quarterly employment survey (QES) and are generally considered robust (i.e. they have met the standards sufficient to be conferred Official Statistics by the UK Statistics Authority) means much of the private-sector economy has been covered. Although these measures do not take account of purchases and productivity the fact they are weighted by GVA controls for much of the loss.

The agriculture sector is the notable and noted exception. Although according to the Q4-2012 QES, agriculture accounted for less than 2% of total employment, so it may not be the most serious gap. In any event, the paper notes that new quarterly output data are becoming available from the Dept. of Agriculture and Rural Development (DARD) and the Agri-Food Biosciences Institute (AFBI) which will address this gap.

The approach whereby public sector employment is used as a proxy for output is both reasonable and pragmatic, as is the method taken to weight sectors to latest available annual GVA. Furthermore the chain-linking should yield a more stable progression over time.

So, combining the elements noted in the paper, allows for the compilation of a good proxy estimate of GDP at factor cost. But in the context of a region, and a region in receipt of significant transfers it is relevant to ask whether this is the most appropriate or meaningful measure of output? An adjustment for net taxes (i.e. taxes less subsidies) would allow the derivation of GDP at market prices. This measure would presumably give a better measure of the underlying performance and growth in the underlying economy.

Another issue worthy of consideration is the impact of MNEs and particularly the impact of net factor income flows abroad. The comparison of the composite index with quarterly GDP in the UK and Ireland, where the relative volatility of the quarterly GDP in Ireland is striking, illustrates why this issue might be important. In large measure, the volatility in the Irish series arises from the impact of MNEs and re-domiciled PLCs operating in Ireland. Dividends, retained earnings and inter-group loans have all in one way or another distorted or

contributed to the complexity of direct and portfolio investment flows. Of course in the Irish case, the loans under the framework programme have also impacted on 'other' investment income. The net result is that from an Irish perspective, it has long been argued that GNP is a better measure of underlying economic activity. From my own research I would also suggest this holds true when comparing and trying to understand the performance of regional economies.

Although the impact of FDI on GVA is not discernible, the DETINI Business Register, notes that over 1% of enterprises in Northern Ireland are foreign owned, compared with roughly 2% in the Republic. This suggests that MNEs could also play an important role in the Northern Ireland economy. Although, it should be noted that a third of these enterprises are ROI owned and so may not exert the same influence on the Northern Ireland business economy as they do south of the border. Nevertheless, the derivation of an estimate of GNP might prove a useful addition.

The paper notes that a Supply-Use Table is being developed for Northern Ireland and the ambition to extend the model to incorporate an expenditure approach. This will require the compilation of household and government consumption expenditure, investment of GFCF and measures of international (including cross-border trade). An extension of the model will allow the reconciliation or confrontation of approaches. It will also introduce all the problems associated with confronting and balancing accounts – be careful what you wish for!

To conclude, I would like to congratulate Dr. Gillan and his colleagues at DETI and NISRA on their work. It gives me great pleasure to propose this vote of thanks and I wish them well with their future work.

DISCUSSION

Tom Healy: This paper is very welcome. It signals a big step forward in the provision of up to date measures of economic activity in Northern Ireland. The congruence of the measure vis-à-vis GDP data in the case of the UK is reassuring. My question concerns how far it might be possible for NISRA in association with ONS to go in filling some of those vital gaps in sub-national accounting. I am referring to the values of C, I, G, X and M as well as the Northern Ireland component of government taxes and subsidies as measured in national accounts.

Bill Keating: I would like to congratulate the speaker on this initiative and on a very interesting paper. The approach involves estimating the performance of the Northern Ireland economy from the output side only. In a full national accounting system, estimates from two, or even three, sides would have to be reconciled. It is both a consolation and a challenge to have just one estimate. A former colleague used to say that the compilation of the accounts was easier when you had only one estimate of a variable; it was not challenged by other, perhaps conflicting, data.

However, it does of course help to come at GDP from two sides. These must be reconciled and it leads to questions regarding which are the weaker aspects that could be subject to change. The compilation in an input output framework is the ultimate in reconciling and balancing data. In this regard, you mention plans to get data on purchases. There can be great resistance in business to one-off inquiries of this type so it may be prudent to give them advance notice."