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# Understanding productivity in Northern Ireland



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## 1. Abstract

Productivity is one of the key economic policy priorities, featuring in the Programme for Government, Economic Strategies and Departmental plans. Within the research community, considerable effort is being devoted to try to understand the apparent slowdown in productivity growth at the national level and in Northern Ireland (NI). Whilst productivity features in many Economic Strategies and plans, with considerable weight being placed on improvement, it remains poorly understood by many and is often confused with the wider measure of standards of living (GDP per capita or GVA per capita). GVA is made up, in the main, by wages and profits with wages accruing to employees and profits accruing to enterprises. Furthermore, at a regional level there are considerable concerns over the veracity of the published data which means that it is difficult to measure the impact of productivity boosting policies.

This paper examines current published data in order to better understand the factors that are responsible for relatively lower productivity in NI than the UK average and the widening of the gap in recent years. It breaks down the components that underpin NI's income disparity (as measured by GVA per capita) with the UK and explores the impact of NI's sectoral composition in determining the size of the productivity gap between NI and the UK average.

Further research in relation to some elements of the data might provide policy makers in NI with a more detailed understanding of why NI's standards of living and productivity apparently lag so far behind the UK average.

## 2. Introduction

The Economic Advisory Group (EAG) commissioned the Ulster University Economic Policy Centre (UUEPC) to develop a Competitiveness Scorecard for Northern Ireland on a similar basis to that which is produced for the Republic of Ireland by its National Competitiveness Council. The Competitiveness Scorecard, which was published by EAG<sup>1</sup> during August 2016 reveals that productivity is an area of relative weakness in the NI economy. EAG members commissioned this more in-depth analysis on productivity from UUEPC as a follow up research project.

Productivity is a topic that generates a significant amount of interest and debate in both the academic and policymaking fields. At the national level, the focus has been on the UK “productivity puzzle” as growth has been exceptionally weak since the 2008 financial crisis. Research carried out by the Bank of England<sup>2</sup> suggests that a range of factors can explain part, but not all of the apparent weakness. Of the 16 percentage point (pp) shortfall since the financial crisis; cyclical explanations (such as spare capacity within firms) and more persistent factors (such as reduced investment, impaired resource allocation and unusually high firm survival rates) explain 6 – 9 pp’s of the gap and measurement issues (both employment and output) account for around 4pp’s, leaving between 1 and 6pp’s unexplained. These factors are relevant to NI, as in the rest of the UK.

Whilst productivity has slowed at national level and the UK has lost some ground relative to competitor nations, the gap between NI and the UK average has been persistent and widening<sup>3</sup> for many years despite being the target of a number of economic strategies. A number of authors, including Dr. Esmond Birnie of PwC<sup>4</sup> &<sup>5</sup>, Paul MacFlynn of the Nevin Economic Research Institute<sup>6</sup> and Shapira, Doyle, Ward & Kuah<sup>7</sup> have noted concerns about declining relative productivity in NI and the importance of growth, which will allow employers to pay higher wages and drive economic growth in NI in the medium to longer term.

This paper seeks to provide a comprehensive analysis of productivity evidence and issues for NI, including:

- How income and productivity are defined and measured:
- Analysis of regional and sectoral productivity data:
- Estimates of how much of the income gap is due to relatively lower productivity:
- Discussion of measurement issues and their impact:
- Illustrate how much lower productivity is as a result of what NI does or how it does it: and
- What would be required to close the income and productivity gaps with the UK average.

The paper then suggests areas for policy consideration that could help to improve productivity and in turn, grow the NI economy.

## 3. Measuring income, per capita income and productivity

It is helpful to illustrate the statistical concepts that are employed within this paper in advance of discussing the analysis and results.

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<sup>1</sup> <http://eagni.com/portfolio-items/ueepc-northern-ireland-competitiveness-report-2016/?portfolioID=9>

<sup>2</sup> <http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q201.pdf>

<sup>3</sup> GVA per hour worked and GVA per productive job

<sup>4</sup> <http://pwc.blogs.com/northern-ireland/2016/02/northern-ireland-productivity-amongst-lowest-in-the-developed-world.html>

<sup>5</sup> <http://pwc.blogs.com/northern-ireland/2015/08/productivity-single-biggest-challenge-to-northern-irelands-recovery.html>

<sup>6</sup> <http://www.agendani.com/addressing-northern-irelands-productivity-puzzle/>

<sup>7</sup> [https://www.research.manchester.ac.uk/portal/en/publications/competitiveness-and-innovation-profiles-of-three-small-open-economies-new-zealand-singapore-and-republic-of-ireland\(a59ca58f-5ccc-40ce-a7c8-3e7636e080cd\).html](https://www.research.manchester.ac.uk/portal/en/publications/competitiveness-and-innovation-profiles-of-three-small-open-economies-new-zealand-singapore-and-republic-of-ireland(a59ca58f-5ccc-40ce-a7c8-3e7636e080cd).html)

### 3.1. Income

Gross Value Added (GVA) is the total value of income generated by the economy. In simple terms, GVA is the total amount of wages and profits. In 2014, GVA in Northern Ireland was £34.4bn<sup>8</sup>, or 2.1% of the UK total. GVA can be measured in three ways; the income method (wages plus profits), production method (value of output of goods and services minus input costs) or final expenditure method (spending on completed goods and services).

$$\text{Gross Value Added} = \text{Wages} + \text{Profits}$$

### 3.2. Per capita income

GVA per capita measures the level of income per person in an economy and is a commonly used method of comparing the standard of living across different economies. However, it is widely recognised that this indicator is limited in that it does not include a range of qualitative factors, such as air quality or levels of stress that impact upon the overall wellbeing of citizens. Measuring wellbeing or happiness has, in recent years, become more important as Economists such as Joseph Stiglitz and Thomas Picketty and many Governments look beyond GDP to measure and explain progress and prosperity, rather than focussing on factors that influence wealth and general wellbeing rather than just income. The per person measure in this metric takes account of the whole of the population, i.e. those below 16, above 65 and also those of working age who are not employed, who can be thought of as the future potential and past productive capacity of the labour force. It essentially measures the value of economic output per person in an economy. NI's GVA per capita was £18,682 in 2014, which was higher than just two other UK regions – Wales and the North East of England.

$$\text{Gross Value Added Per Capita} = \text{GVA} / \text{Population}$$

### 3.3. Productivity

Productivity is the ability to produce outputs (such as goods or services) taking into consideration the amount of inputs (such as raw materials, capital and labour) used to produce them. It measures the value of output relative to the inputs that are used in the process of its creation. Total Factor Productivity (TFP) is another economic indicator which measures the amount of output produced by labour and capital, although it is not employed for the purposes of this paper. The measure used for the majority of the paper is;

$$\text{Productivity} = \text{Gross Value Added} / \text{employment}$$

The measures of productivity used later in this paper are GVA per person employed and GVA per hour worked. The latter is perhaps a more meaningful measure of productivity, as it cannot be skewed by part time working, overtime or reductions in the working week.

$$\text{Productivity} = \text{Gross Value Added} / \text{total number of hours worked}$$

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<sup>8</sup> <http://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2015>

## 4. NI's relative economic performance

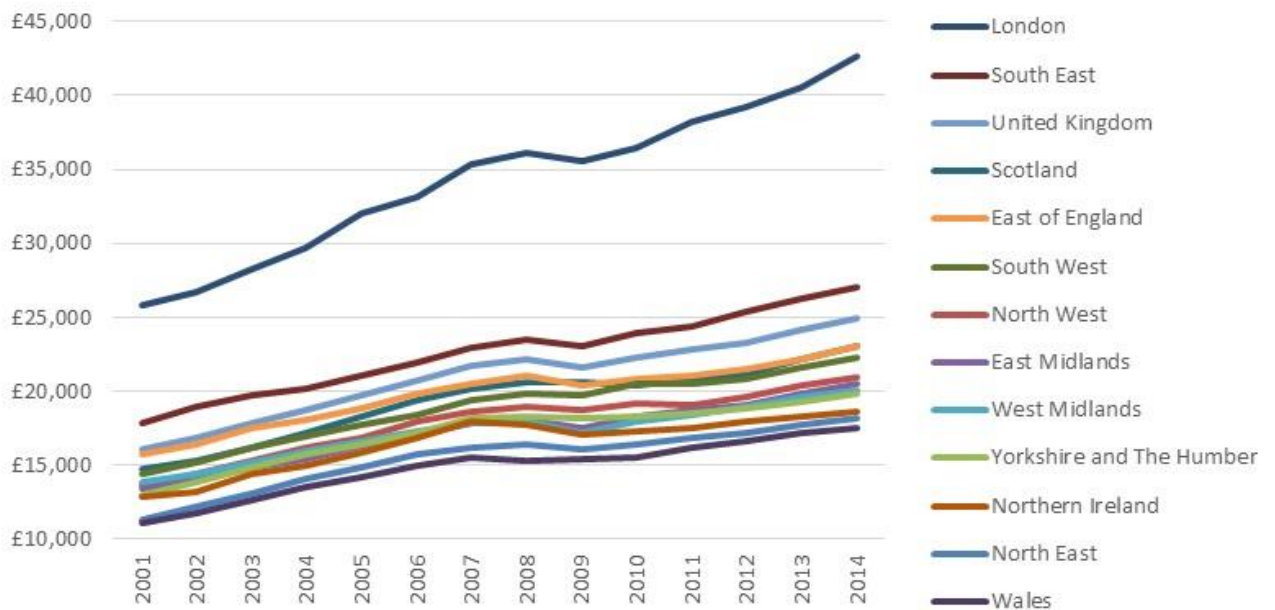
### 4.1. Income

GVA in NI was £34.4bn of GVA in 2014, growing at 2.5% in nominal terms over the year. NI population accounts for 2.9% of the UK total, whereas GVA makes up 2.1% of the UK total, which demonstrates that wages and profits are relatively lower in NI than GB. If NI generated 2.9% of the UK's GVA – equal to its population share – it would produce £45.9bn, £11.6bn more than it currently does.

### 4.2. Relative income levels

NI's current<sup>9</sup> GVA per capita is £18,682, 25% below the UK average (ranked 10<sup>th</sup> of the 12 UK regions). Figure 1 illustrates that there has been limited convergence between the UK regions and also that the "London effect" skews the UK average. It is important to note that GVA is measured on a workplace basis and therefore commuters from the East and South East of England contribute to London's GVA, but not to its population, inflating the figure as a result. Inter-regional commuting is less common outside the south eastern corner of England and as a result the impact on regional GVA data is more modest (although this point illustrates why GVA per capita data has very limited use at a city level).

Figure 1 - GVA per capita, nominal terms, UK regions, 2004 - 2014

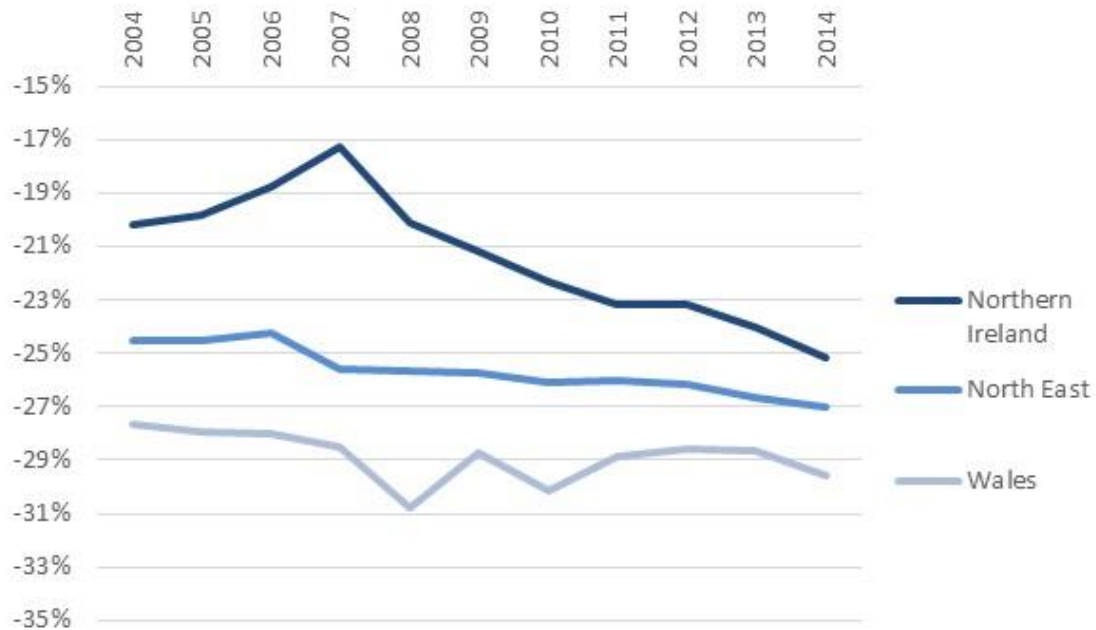


Source: ONS Regional Accounts

Over the last decade, NI's GVA per capita grew by 2.3% per annum, which was the weakest of the UK regions. The result is that NI's relative income now lags further behind the UK average and the gap is greater than at any point during the last decade, as illustrated by figure 2.

<sup>9</sup> 2014 is the latest year for which there are available data

Figure 2 - GVA per capita differential to UK average, 2004 - 2014, selected regions



Sources: ONS Regional Accounts & UUEPC analysis

This evidence demonstrates that there is an income gap between the NI economy and UK average at a macroeconomic level and worryingly, that the income gap has continued to widen since the 2008 recession. It is essential to understand the individual factors that contribute to relatively lower levels of income in NI in order to inform appropriate policy responses. These factors include: how many people are of working age, the proportion of the working age that are available for employment, the proportion of those available for employment that are employed, the number of hours those who are employed work, and finally how productive those employees are for each hour that they work.

## 5. Decomposing the income gap

A research monograph published by ERINI<sup>10</sup> in 2006 calculated the relative contribution of five contributory factors to the regional GVA gap with the UK average. The five constituent elements were:

1. Productivity (how much wages and profits are produced per hour worked);
2. Employment rate (proportion of the labour force who are employed);
3. Activity rate (Proportion of the working age population who are employed or unemployed – i.e. in work or actively seeking work);
4. Hours worked; and the
5. Dependency ratio (working age population as a proportion of the total population).

Following this methodology and using the same data sources, it is possible to calculate the relative contribution of these factors to the current regional GVA gap. It should be noted at this point that there are four potential sources of employment data for NI that could be used in this calculation. They are;

- Workforce Jobs:

<sup>10</sup> <http://eservices.afbini.gov.uk/erini/pdf/EriniMon7.pdf>

- Productive Jobs:
- Labour Force Survey: and
- Labour Force Survey reconciled to workforce jobs.

In addition to replicating the ERINI methodology, the Labour Force Survey is the recommended source for total employment data and also for calculating the employment and activity rates. For sectoral analysis, NISRA have recommended that productivity jobs data for NI is used in the calculations. Further explanation of each of the sources and their uses is included in Annex A.

Figure 3 demonstrates that lower productivity is the most significant explanatory factor, followed by the economic activity rate, of lower standards of living in Scotland, NI, Wales and the North East of England.

*Figure 3 - Decomposition of regional GVA per head gap for selected UK regions, 2012-2014 average*



Sources: Regional Accounts (GVA), Labour Force Survey (labour force & total employment), Annual Survey of Hours and Earnings (hours worked), Nomis (mid-year population and working age population estimates), UUEPC analysis

In NI, the main driver of the income gap is lower productivity (measured as output per hour worked, 18.5 percentage points (pp) out of 24%). The next most significant driver is lower economic activity rates, at 6.7pp. Northern Ireland's 16+ employment rate, the dependency ratio and hours worked are broadly in line with the UK average. These findings are similar to those of the ERINI research carried out a decade earlier.



## 6. Productivity

The evidence demonstrates that relatively low productivity in a UK context is the most significant factor in terms of the income gap and that boosting productivity to UK levels could make a significant difference to income levels in NI. Clearly, productivity matters a great deal for the success of the NI economy.

Productivity matters a great deal in a regional context, but also in a national context, as published evidence demonstrates that it is the main determinant of national living standards<sup>11</sup>. Paul Krugman made a statement more than two decades ago about productivity, which is as relevant now as it was then. Krugman said:

***Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.***

Paul Krugman, *The Age of Diminishing Expectations* (1994)

In the context of the recent BREXIT vote for the UK, productivity will matter a great deal over the next decade for the UK to maintain its relative standard of living in an international context. That will in turn, bring greater focus onto productivity in the regions of the UK, as they will all be required to play their part in boosting overall UK productivity.

### 6.1. Declining relative productivity

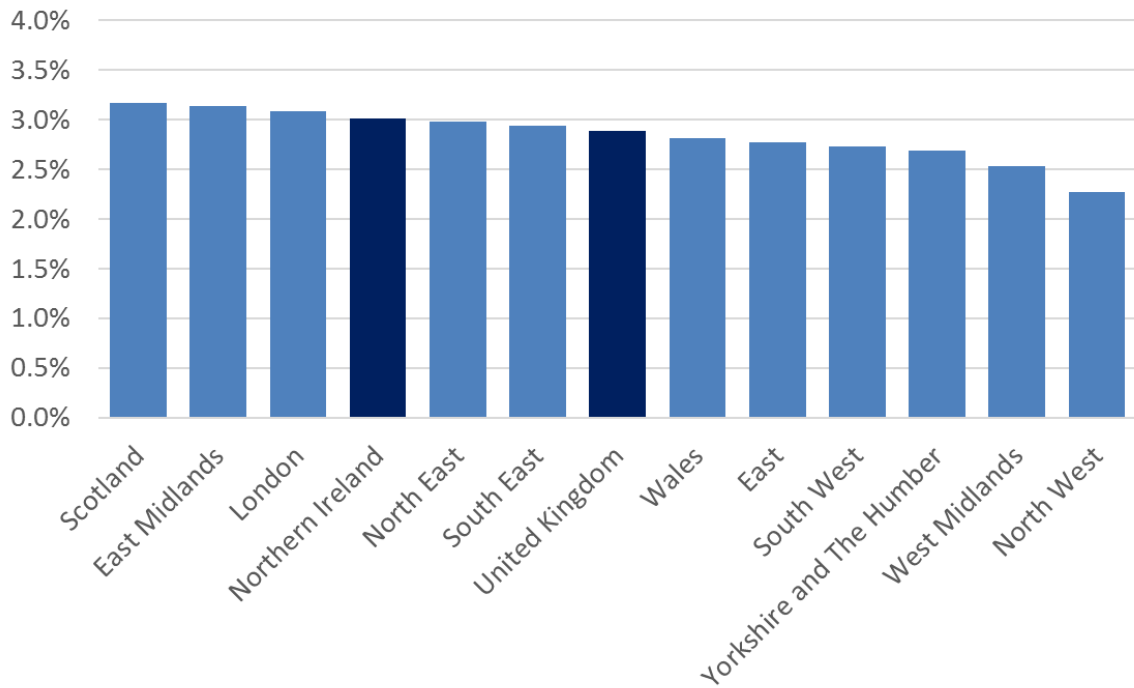
NI productivity grew at 3.0% per annum over the last decade, the fourth fastest rate of the UK regions (in terms of GVA per hour worked). Despite relatively rapid growth, it was from a low base and GVA per hour worked in NI remains the lowest of the twelve UK regions, lagging 19% behind the average. In terms of GVA per productive job, NI is now 15% lower than the UK average - widening from 10% in 1997.

Figures 4 and 5 illustrate the historical data for NI. Figure 5 includes both GVA per capita (relative income) as well as GVA per hour worked and GVA per productive job (both are measures of productivity), with the former providing a perspective on NI's relative economic performance overall and the latter illustrating the relative performance of those in employment.

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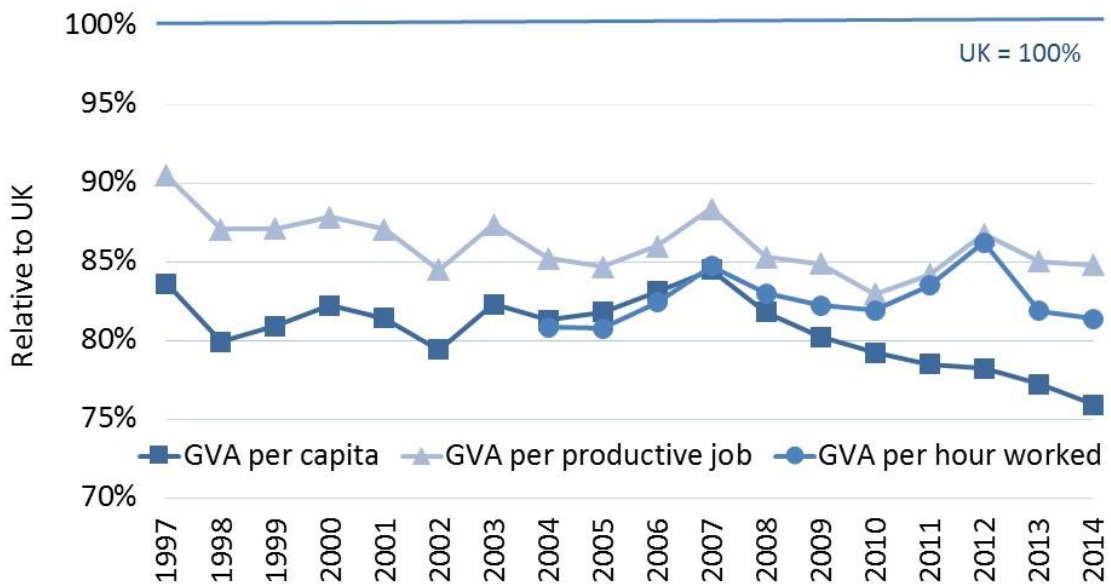
<sup>11</sup> ONS productivity handbook  
<http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/productivity-measures/productivity-handbook/introduction/index.html>

Figure 4 – Compound annual growth rate of GVA per hour worked, 2004 – 2014



Sources: ONS Regional Accounts, ONS Productive Jobs (Hours worked), UUEPC analysis

Figure 5 - NI GVA per capita, GVA per hour worked and GVA per worker relative to the UK average, 1997 – 2014



Sources: ONS Regional Accounts, Productivity jobs, productivity hours worked (unsmoothed series) & Annual Population Survey  
 Notes: UK includes extra region (mainly offshore energy) and statistical discrepancy  
 GVA per hour worked is not available from 1997 - 2003

Figures 4 and 5 show that relatively low and declining levels of income & productivity represent key economic policy challenges for NI.

In trying to understand the most effective way for policy to address the apparent gap, it is important to understand whether it is **what the region does (its sectoral mix) or how it does it (its productivity within sectors) or both** as the potential policy response differs depending on the cause(s). Does the region need to grow the sectors that are relatively more productive (suggesting policies that try to alter the sectoral pattern within NI – investment policy, sectoral targeting, public expenditure policy) or does it need its enterprises to perform better (suggesting policies that improve enterprise behaviour, perhaps leadership or training programmes, benchmarking of business practices and technology use)?

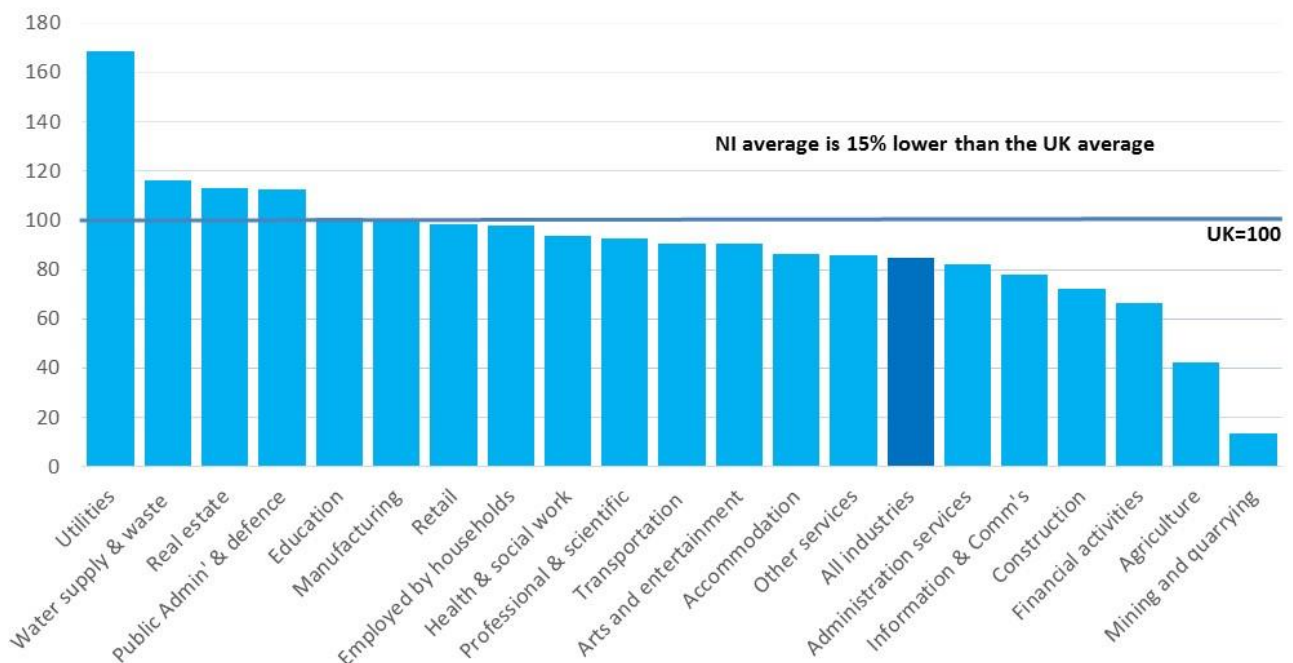
In the next section NI’s productivity is compared to the UK average, to identify differences across sectors. We look in greater detail at the manufacturing sector because of its important role in NI’s exports. We then look at the sectoral mix by examining where employment in NI is concentrated.

## 6.2. Sectoral productivity

This section of the paper uses productivity jobs data for NI and the UK. As productivity jobs by sector is not published for NI, the sectoral breakdown is estimated by applying the workforce jobs series sectoral composition to the productivity jobs total for NI, in line with NISRA advice.

Sectoral productivity in NI lags the UK average in 16 out of 20 sectors as illustrated by Figure 6. A similar pattern is found in the manufacturing subsectors, in which 8 of 13 subsectors are below the UK average.

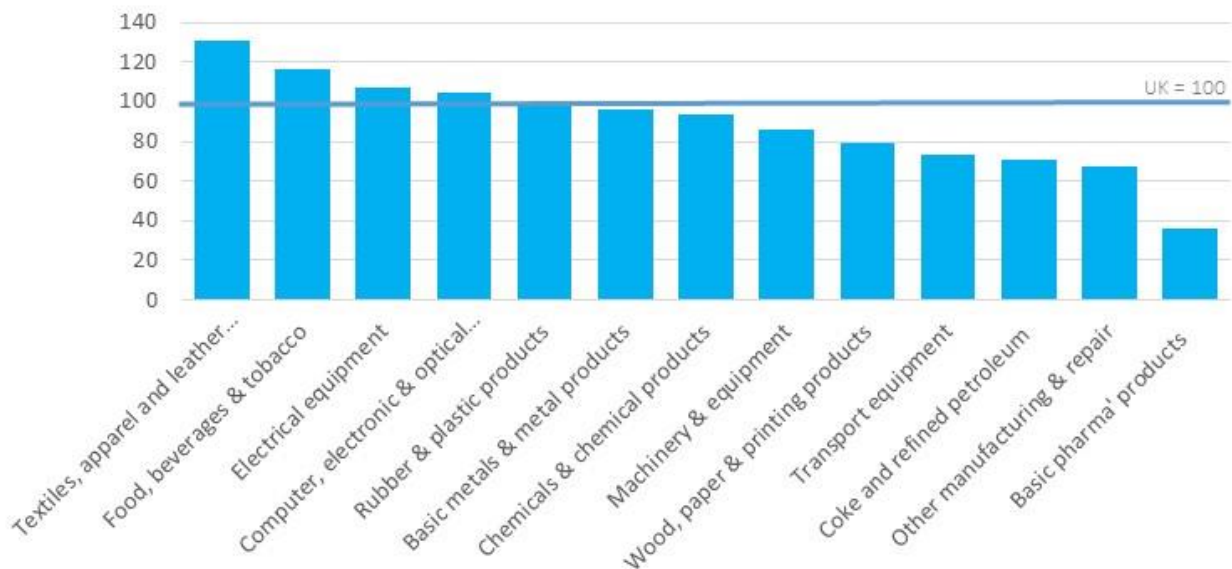
*Figure 6 - NI sectoral productivity relative to the UK average in nominal terms, 2014, UK =100*



Sources: ONS regional accounts, ONS productive jobs, workforce jobs, & UUEPC analysis

Note: Workforce jobs sectoral composition applied to productive jobs totals as per ONS consultation and guidance

Figure 7 - NI sub sectoral manufacturing productivity relative to the UK average in nominal terms, 2014, UK =100



Sources: ONS Regional Accounts, Workforce Jobs, & UUEPC analysis

An examination of the sectoral data suggests that further exploration of the data may be required to fully understand the potential reasons for some of the differentials. A number of the most striking issues are discussed below:

**Public administration:** The position of this sector as one of NI's four most relatively productive sectors and 13 percentage points above the UK average is, prima facie, surprising given that it is a non-profit making sector. Compensation of Employees (wages) account for 57% of the sectors GVA, with the remainder (43%) generated by Non-Market Capital Consumption (NMCC). Analysis carried out by Department of Finance Statisticians reveals that NMCC as a proportion of GVA in the public sector is higher in NI than any other UK country (and has been from the start of the data series in 1997). Therefore, higher relative productivity is likely to be driven by a large extent by NMCC and to some extent by NI having a large proportion of people working within the sector at higher grades than UK comparator regions, for example, a relatively large police force and relatively large number of Departments, Councils and other NDPB's. This issue merits further consideration as it would appear that productivity, excluding NMCC may represent a more meaningful comparison in economic development terms, or alternatively that the Government could boost productivity by engaging in additional non-market capital consumption.

**ICT:** The -22 percentage point differential appears surprising, given the type of activity undertaken within the sector.

**Agriculture:** The agriculture sector data warrants further investigation in order to understand the associated productivity, particularly as a unique case where the mean average wage exceeds productivity. It is likely that the relatively small size of NI farms contributes to this differential, although the scale is greater than might reasonably be expected. It is likely that the profits originating from agricultural production appear more commonly in the food production (manufacturing) sector or distribution and retailing. The measurement of workers is also very difficult in the farming sector and as a result, measurement problems may be more significant than in other sectors.

Furthermore, agriculture in NI receives a substantial proportion of its income from subsidies. High level of subsidies will reduce the actual GVA figure and as such will be supporting jobs in NI, ultimately

helping to reduce productivity. Nevertheless, a further investigation of the specific data within the agricultural sector would be helpful to understand the impact of subsidies in the sector and any potential impacts that may arise as a result of potential policy changes following Brexit.

**Finance & insurance and Mining:** Both of these sectors have a differential that is likely explained by the particular sub-sectoral composition of each industry. No oil is produced in NI and the type of Financial Services which are located in the City of London make comparisons to the UK average in these sectors rather ambiguous.

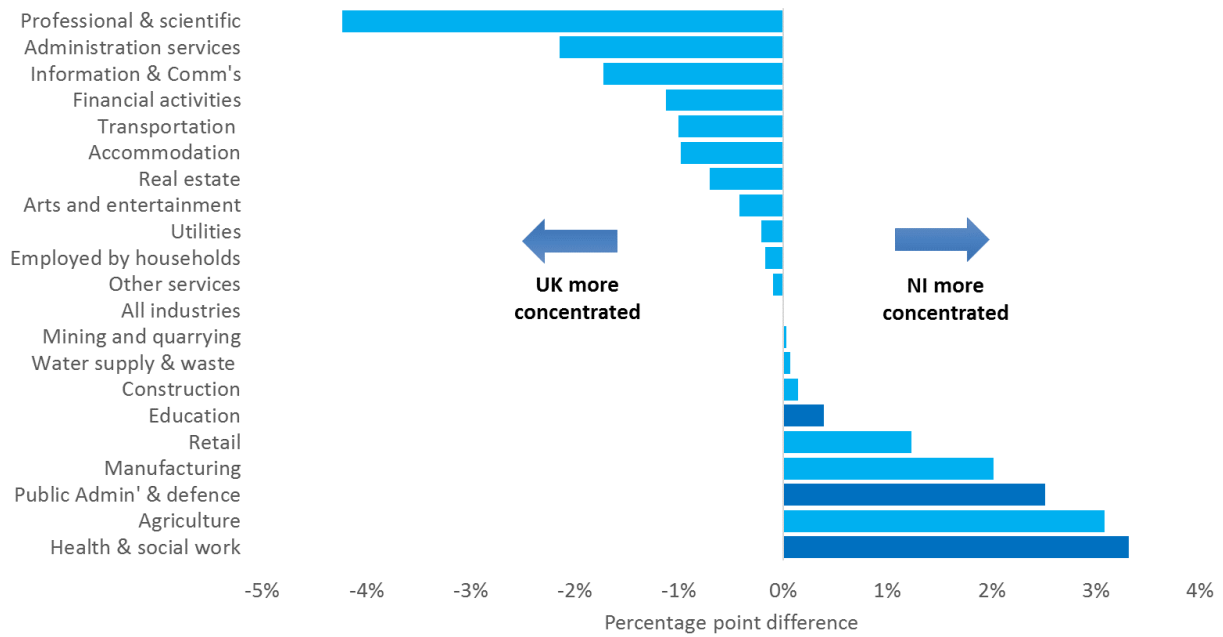
**Manufacturing:** It is encouraging to see how close to UK average productivity (-1pp) the sector is despite a sub-sectoral structure that would not lend itself to very high productivity. Figure 7 details NI's relative productivity within the manufacturing sub-sectors. Textiles, apparel and leather is more productive than the UK average and may be explained by the retention of the higher value added design and management function of enterprises that would have previously manufactured their products in NI. Food beverages and tobacco also looks relatively high, suggesting that profits from agriculture may be allocated to this sector, or that the figures are skewed upwards by tobacco manufacturing in Ballymena, which will cease in 2017 and could have a significant downward impact on the sectoral productivity data. Pharmaceuticals and transport equipment are surprising low given the high profile world leading enterprises within these sectors in NI but it may be a feature of measurement of GVA, and in particular the location (globally) of profits declared that influences this figure.

### 6.3. Sectoral employment composition

This section analyses “what NI does” by examining the current sectoral mix in NI relative to the UK average, using workforce jobs sectional composition. This is important, as illustrated earlier in the paper, matching the sectoral employment rate and productivity performance will not close NI's income gap with the UK average fully.

NI has a much larger concentration of employment in lower value adding sectors such as Agriculture, Retail & Health and Social work that the UK average. In contrast, employment in the UK is relatively more concentrated in higher value adding sectors such as professional services, ICT & financial services.

Figure 8 - Sectoral employment concentrations, NI vs. UK, 2014



Sources: ONS Regional Accounts, ONS workforce jobs & UUEPC analysis  
 Note: Based on sectoral employment share of Workforce jobs data in 2014. i.e. NI agriculture share of total employment =4.3% whilst UK=1.2% and hence a 3.1 percentage point difference.  
 Dark blue shading denotes predominately public sector industries.

### 6.4. Correlation between wages and productivity at the sectoral level

It is useful to map sectoral employment against productivity to illustrate which sectors have relatively high employment or vice versa in an NI context. Wages are also included in table 1, as an indicator that many can easily relate to and could potentially be useful as a proxy indicator for productivity, as the two should in general, be highly correlated unless profit share differ by sector. On average, productivity is slightly more than 50% above the average annual wage, with 14 of the 20 sectors within the range of 20% to 80% above.

The table illustrates that for example, productivity in sectors such as real estate and water supply is very high, although employment is relatively small share of the NI total with the result that these sectors make a relatively small contribution to income in NI. At the opposite end of the spectrum, retail and healthcare employ a large proportion of employees and productivity is below average. Due to the sheer size of these sectors, they have a proportionately larger impact on NI's income.

*Table 1 – Sectoral summary of employment, wages and productivity, NI, 2014*

Sector	Employment	Productivity	Wages
Agriculture	34,800	£11,700	£15,034
Mining and quarrying	1,900	£53,600	x
Manufacturing	79,200	£67,700	£26,399
Utilities	1,200	£362,400	£44,042
Water supply & waste	5,300	£104,500	£25,564
Construction	52,300	£35,400	£23,493
Retail	128,400	£35,900	£15,956
Transportation	28,600	£45,300	£22,162
Accommodation	44,200	£19,500	£10,441
Information & Comm's	18,700	£60,100	£32,018
Financial activities	18,200	£81,100	£32,505
Real estate	7,400	£406,000	£21,039
Professional & scientific	33,400	£41,200	£23,331
Administration services	49,700	£23,600	£18,644
Public Admin' & defence	57,400	£62,800	£31,642
Education	72,700	£35,900	£25,210
Health & social work	128,900	£24,800	£20,274
Arts and entertainment	19,400	£25,400	£16,317
Other services	20,200	£38,300	£16,214
Employed by households	700	£76,400	£0
<b>All industries</b>	<b>802,700</b>	<b>£42,800</b>	<b>£22,664</b>

Sources: ONS productive jobs, ONS Regional Accounts, Annual Survey of Hours and Earnings table 7 & UUEPC analysis

Note: Productivity in this context is GVA per productive worker. Wages are mean gross annual averages and are rounded to the nearest thousand.

Figure 9 is a complex but useful diagram in the context of understanding sectoral productivity, the relationship between productivity and wages and also in terms of identifying specific issues with the NI data.

### Relationship between productivity and wages

There is a positive relationship between productivity and wages, as illustrated by the dotted blue correlation line. What this means is that higher productivity sectors pay higher wages and vice versa. In general, high productivity sectors employ a greater proportion of individuals with high qualifications, invest in technology and capital and are more externally focussed than average. Enterprises enjoy higher profits and employees receive higher wages.

### Coloured Quadrants

The quadrants serve to illustrate which sectors are above or below average wages or productivity.

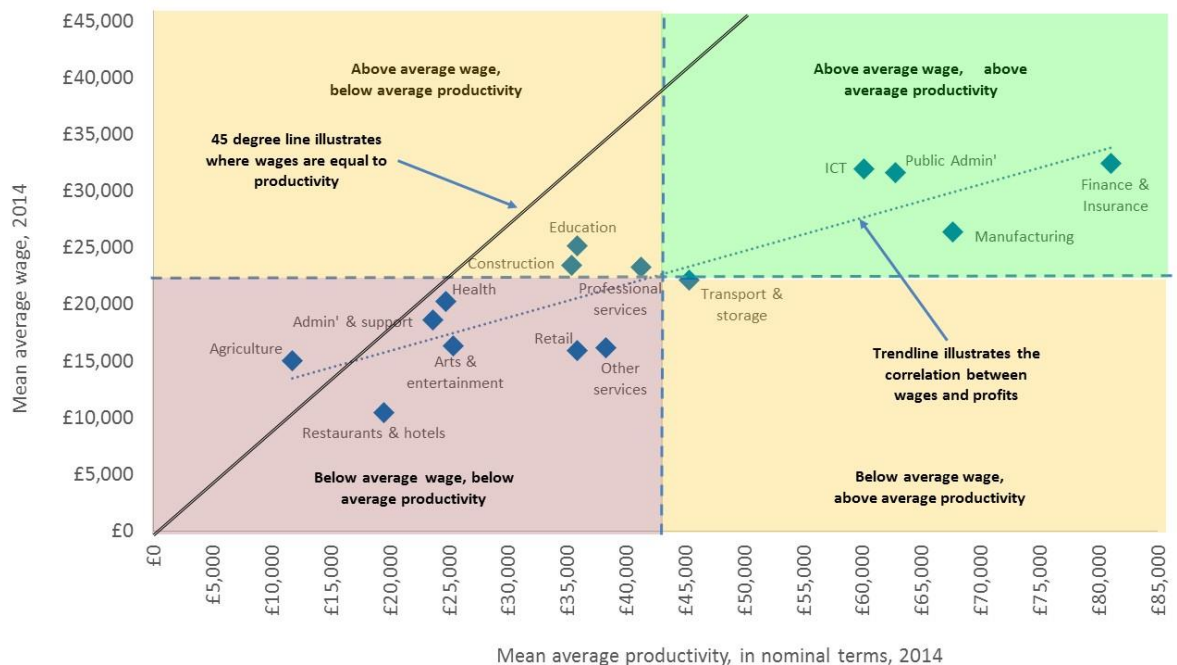
- The top right (green) quadrant is above average productivity and above average wage. As these sectors are above average in both productivity and wages, growth in these sectors will be very beneficial to the NI economy if they expand relatively. This quadrant accounts for 174,000 workers, 22% of the stock of total workers.
- The bottom right (amber) quadrant is below average wage and above average productivity and may reflect sectors in which more significant capital investments are required, such as manufacturing. This quadrant accounts for 29,000 workers, 4% of the stock of total workers.
- The top left (amber) quadrant is above average wage, but below average productivity. This quadrant accounts for 158,000 workers, 20% of the stock of total workers.

- The bottom left (red) quadrant is below average wage and average productivity. Additional employment growth in these sectors will reduce the NI average wage and productivity and as a result will widen the income gap. This quadrant accounts for 425,000 workers, 53% of the stock of total workers.

### 45-degree line

The solid black 45-degree line shows the point at which wages are equal to productivity (or there are no profits) which would be normal for pure public sector activities. Both Health and Education are close to this line as might be expected with some private sector activity recorded within the sectors. Public Administration is however, a significant outlier, although this is due to NMMC, as discussed earlier in the paper. A useful exercise would be to remove NMMC from public sector data for both NI and the UK in order to better assess core productivity.

Figure 9 - Comparison of sectoral productivity and wages, NI, 2014



Sources: Annual Survey of Hours and Earnings, Regional Accounts, ONS Productive jobs & UUEPC analysis

Note: Some sectors are excluded for a range of reasons. Mining and those Employed by Households are excluded as they are small sector and therefore mean wage data is not published. Utilities, Water Supply & Waste are not included as they are highly capital intensive sectors focused on infrastructure. Real estate is excluded as data is driven to a large extent by imputed rents in addition to wages and profits.

Using the sectoral patterns identified in Figure 9 and analysing sectoral employment data further shows that NI has a relatively large amount of employment (53%) within the bottom left quadrant – i.e. the low wage and low productivity sectors. In contrast, only 22% of NI’s employment is in the high wage, high productivity top right quadrant.

This analysis demonstrates that NI’s productivity has persistently lagged behind the UK average over almost two decades and that the gap has widened. The increasing productivity gap is the key driver of the increasing disparity in terms of NI’s average income levels relative the UK. NI’s sectoral composition is skewed towards lower value adding sectors and in general, lower productivity within those sectors. A useful mechanical modelling exercise is to change the sectoral productivity, employment composition and wage structure in order to illustrate the scale of change required within the NI economy in order to close the productivity gap



## 7. Closing the productivity gap (illustrative examples)

This section uses the current data to model a number of examples to illustrate the magnitude of change that would be required for NI to close to productivity gap to varying degrees with the UK average. This section illustrates the changes in overall average productivity, sectoral productivity, employment composition and wages to demonstrate the scale of the change that would be required to close the productivity gap with the UK average.

### **Example 1: NI matches UK's sectoral productivity (holding employment rate constant)**

If NI's sectoral productivity (GVA per productive job) matched the UK, the productivity gap would reduce from 15% to 8% (£3.1bn of additional GVA). This calculation illustrates the significance of lower productivity within sectors in NI compared with the UK.

### **Example 2: NI matches UK's sectoral wages (holding employment rate constant)**

If NI's sectoral wages matched the UK, the productivity gap would reduce from 15% to 9% (£2.3bn of additional GVA). This calculation illustrates the potential impact of paying UK wage rates in each sector in NI. As this is a simple example modelling exercise, it is assumed in that no reduction in employment occurs due to a reduction in competitiveness and that there is no impact on profits (either through reduced sales as a result of higher final prices, or through reallocation to wages from profits), all of which are likely to be impacted.

### **Example 3: Removing lower value adding jobs to match UK average productivity**

In this example, the productivity gap is closed completely by removing low value added employment from the NI economy. More than 240,000 low productivity jobs<sup>12</sup> would need to be removed from the NI economy to raise NI average productivity to the UK level. This would reduce GVA by almost 18% to £28Bn and total employment by 30% to just over 560,000.

This example illustrates the scale of change required if NI were to match UK average productivity levels. Whilst it is both implausible and unwise and demonstrating why productivity as a single target would be inappropriate for NI, it is nevertheless helpful to illustrate what reducing low value added employment might mean if the productivity gap is the single policy priority.

### **Example 4: Adding higher value adding jobs to match UK average productivity**

In this example, the productivity gap is closed completely by adding higher value adding jobs to the NI economy. Almost 125,000 high productivity jobs<sup>13</sup> would need to be added to the NI economy to bring productivity to the level that would match UK average productivity. This would increase GVA by almost one third to almost £47Bn and increase total employment by more than 15% to almost 930,000 (pushing the employment rate up to 64% of the 16+ population which would be much higher than the current UK average of 61%). This example illustrates the scale of change required without adding any additional population in the form of highly skilled economic migrants.

Each of these examples illustrates how stark the changes are that will be required in NI to match UK average levels of productivity. To pursue either of the extremes illustrated within the preceding text as a policy direction in NI would be both unachievable and likely to have other significant negative consequences.

The various illustrative examples highlight the complexity and the nuances of improving the relative productivity. By way of example, an aspirational target of reaching 90% of the UK average level of productivity could be a reasonable, but stretching policy ambition, perhaps a plausible figure might be

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<sup>12</sup> Productivity is assumed to be £25,000

<sup>13</sup> Productivity is assumed to be £100,000

to create 75,000 jobs at £75,000 productivity to get to 90% of the UK average – in essence - a “75 X 75 to get to 90%” strategy. This is just one possible future target that policy makers may consider relevant in the target setting framework.

## 8. Closing the income gap

The evidence has illustrated the impact of a range of factors on relative income per capita in NI, which leads to the question of “What is required to close the income gap?” There are a number of ways in which NI could close the income gap with the UK average that would demonstrate the complex nature of the problem and that each would require a very different policy response. These three examples indicate the scale of the change required that may be required within the NI economy.

### **Example 1: NI matches UK sectoral productivity<sup>14</sup> (holding current employment rate constant)**

If NI’s productivity within each sector matched the UK, the GVA per head gap would reduce from 25% to 18% (+£3.1bn of additional GVA).

### **Example 2: NI matches UK employment rate (at current sectoral productivity)**

If NI’s employment rate<sup>15</sup> matched the UK (increasing from 55.1% to 60.9%), the GVA per head gap would reduce from 25% to 17% (+£3.6bn of additional GVA).

### **Example 3: NI matches UK sectoral productivity and employment rate**

If NI’s sectoral productivity and employment rate matched the UK (keeping the sectoral mix the same), the GVA per head gap would reduce from 25% to 10% (+£7.0bn of additional GVA).

These examples serve to illustrate the scale of the challenge to achieve convergence with the UK average. Example 3 is the most ambitious, in which NI improves both its employment rate and sectoral productivity to match the UK averages. **Even in this example, NI would still lag the UK average level of income per capita by 10%.**

## 9. Drivers of productivity

It is clear that relatively low productivity, weak growth and NI’s sectoral composition all contribute to the relative income gap between NI and the UK average. The subsequent discussion naturally moves on to focus on the policies already in place to drive productivity and any policy changes, additions or reallocation of the amount of resources that are devoted to this issue. This paper seeks to examine the statistical evidence and whilst specific policy recommendations are beyond its scope, it is useful to consider the types of policies that can boost productivity and any future research could focus more specifically on these factors.

The UK Government published a productivity handbook<sup>16</sup> in 2008, which lists the five factors that are critical for determining productivity growth. They are:

- **Investment:** in physical capital, such as machinery, equipment and buildings.
- **Innovation:** the successful exploitation of new ideas, technologies, products or ways of working.
- **Skills:** the quantity and quality of labour available within an economy.
- **Enterprise:** taking new business opportunities (start-ups and existing enterprises).

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<sup>14</sup> It should be noted that GVA per employee is used in this calculation as hours worked are not available at sectoral level.

<sup>15</sup> Defined as 16+ population in employment as proportion of the total 16+ population. Note that additional employment is shared out in line with the current sectoral composition.

<sup>16</sup> <http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/productivity-measures/productivity-handbook/index.html>

- **Competition:** creates incentives to innovate and ensures that resources are allocated to the most efficient enterprises.

These drivers of productivity are used extensively in national and regional economic development strategies and Programmes for Government.

## 10. Key findings

This analysis finds that the relative *income gap* between NI and the UK has been ***persistent and widening*** over the last decade. The decomposition of the income gap demonstrates that the ***main contributory factor is relatively lower productivity***. NI's productivity is 15% lower than the UK average<sup>17</sup>, making it an important economic development issue. Worryingly, productivity growth has been insufficient to improve from NI's position as the lowest ranked UK region in terms of GVA per capita.

NI's sectoral composition is relatively heavily focussed on low wage, low productivity sectors. In essence, ***what NI does***, is relatively lower value added activity and this explains a large proportion of the productivity gap. The example analysis demonstrates that a very significant change in NI's sectoral structure would be required to close the gap and would also have significant implications for wider society in terms of skills that would be in high demand, skills that would no longer be required and also in terms of migration and population change.

Within sectors, ***how NI does it***, productivity is also, on average, lower. Sectors that trade internationally, such as manufacturing are close to the UK average as they could not survive if they did not, but many others are well below the UK average. Boosting within sector productivity through investment, greater use of technology or more efficient processes would have a large impact on the overall level of productivity and as a result, income in NI.

The analysis has also revealed that some elements of the ***data*** are worthy of further investigation to aid understanding of the data and potential implications for policy. Two sectors of note are Public Admin & Defence and Agriculture, with the former exhibiting higher productivity than may be expected and the latter the opposite. Policy makers in NI must ensure that the data employed to underpin policy decisions are as robust as possible. However, measurement risks can be somewhat mitigated by focussing targets on the numbers of jobs created and the wages associated with those jobs, as high productivity jobs are remunerated well as partly due to profits that these employees can deliver for the enterprises. The jurisdictional allocation of profits then becomes less important.

## 11. Policy considerations

In summary, low productivity, wages, employment rates and the sectoral composition present significant economic policy challenges for NI. Combining these factors should lead policy makers to focus more heavily on GVA per capita (or relative income) as an overarching policy objective, which encompasses a broad perspective of the impact of economic policy in NI. Monitoring productivity is desirable as a driver of overall competitiveness of the NI economy. However, considerations of subsequent or cascading targets should be used by Government to ensure that activity, inputs and policy innovations in the drivers of overall competitiveness are measured and reported upon, retaining and potentially increasing policy focus. Figure 10 illustrates this concept as investments are

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<sup>17</sup> On a per productive job basis

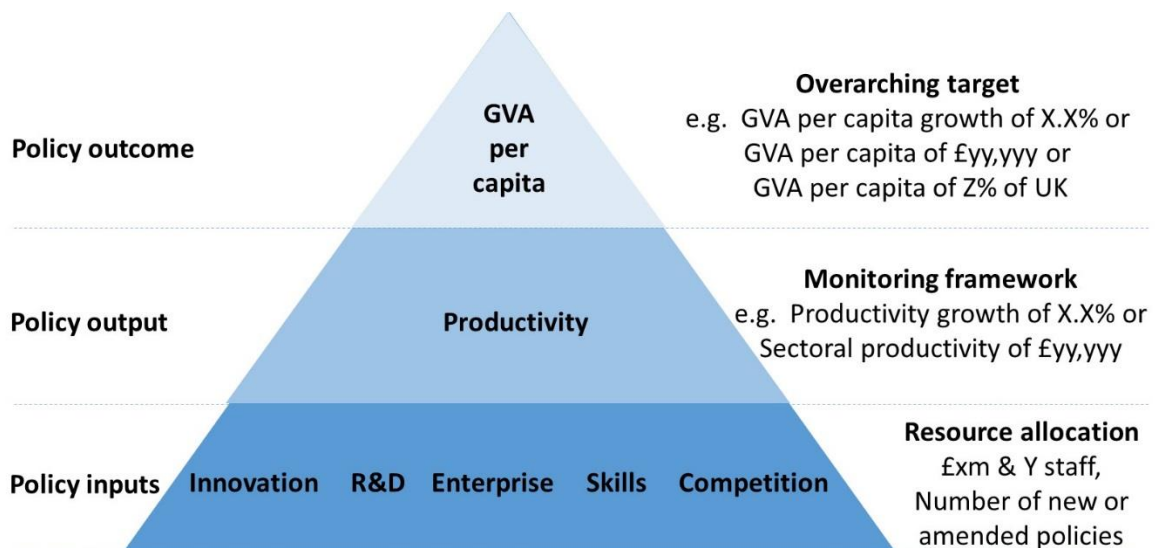
made at the policy input level, influencing productivity as an intermediate step and ultimately leading to improvements in GVA per capita.

It will be important to increase employment rates for all skill levels, support and encourage the development of new, higher value adding sectors and refocus those in low value added activities to boost productivity and as a result, the competitiveness of NI. Higher wages will help in terms of social cohesion in NI and also make a range of jobs more attractive. The key policy questions are;

- Is it a change in the sectoral balance, an improvement in sectoral performance, or both that is required?
- If productivity is to remain a policy goal (or wage levels are to be prioritised), what might a stretching but achievable target be? Might specific median basic wage targets at sectoral level be a more robust and specific way of targeting high productivity activity?

It may be useful for follow up research to map the policy inputs across Government Departments and agencies in order to establish the amount of resource that is allocated and the effectiveness and efficiency of the current policy framework in the context of competitiveness.

*Figure 10 – Illustration of the policy framework*



Source: UUEPC

## 12. Conclusion

Productivity is a key driver of prosperity, competitiveness and long term economic growth for both national and regional economies. It has featured prominently in a national and regional economic development strategies and with the recent vote for the UK to leave the EU; international competitiveness will be more important as the UK seeks to maintain and improve living standards for its citizens. Whilst NI and other devolved regions are a small element of the overall UK economy, they will be required to play their part and therefore, the launch of the Competitiveness Scorecard is very timely.

This paper has outlined the existing evidence and found that:

- Productivity is a key economic policy challenge for NI, as low levels and insufficient rates of growth to move the dial are the main contributory factors to relatively lower levels of income per capita. Despite productivity being the focus of a range of economic development policies it has lagged the rest of the UK regions for a number of years and is falling further behind:
- Low productivity is a factor of both what NI does (its sectoral structure) and how well it does it (productivity within sectors):
- Significant changes to NI's sectoral structure and productivity are required if NI is to match current UK levels of productivity:
- Whilst there are apparent issues with the data that are worthy of further investigation, focussing on closely related proxy indicators such as wages can be a useful alternative to productivity: and
- Productivity could be monitored as a measured as an intermediate measure of policy success. However, overall success could be measured using GVA per capita and inputs and activities at the level of the policy drivers (innovation, R&D, skills, enterprise, competition).

In summary, productivity is an important factor in determining and growing the standard of living in NI, as measured by income per capita. It is an area in which NI is relatively weak and improvements could be made. The drivers of productivity are well understood and investment in these factors by Government and the private sector will, in time, improve NI's productivity performance.

## Annex A – Data issues

### A.1. Data sources

Productivity data is calculated using GVA and employment. As with many sources of data that are based on survey evidence, they are subject to a degree of error. Indeed, when the four sources of employment data, the Labour Force Survey, workforce jobs series, LFS reconciled to workforce jobs and productivity jobs are examined for Northern Ireland there are discrepancies between the series, which are illustrated below. GVA can also be difficult to measure accurately at a regional level. For example, when dealing with large enterprises that involve a number of branch plants and headquarters located across a number of UK regions it is difficult to calculate accurately the amount of profits that should be assigned to each of the regions.

### A.2. Employment data

The Office for National Statistics (ONS) conducts numerous surveys measuring the employment in NI and the UK. The two most widely recognised measures of employment in the UK are the Labour Force Survey (LFS) and the Workforce Jobs (WFJ) series. There are also two additional series that are less commonly used - LFS reconciled to workforce jobs and productivity jobs

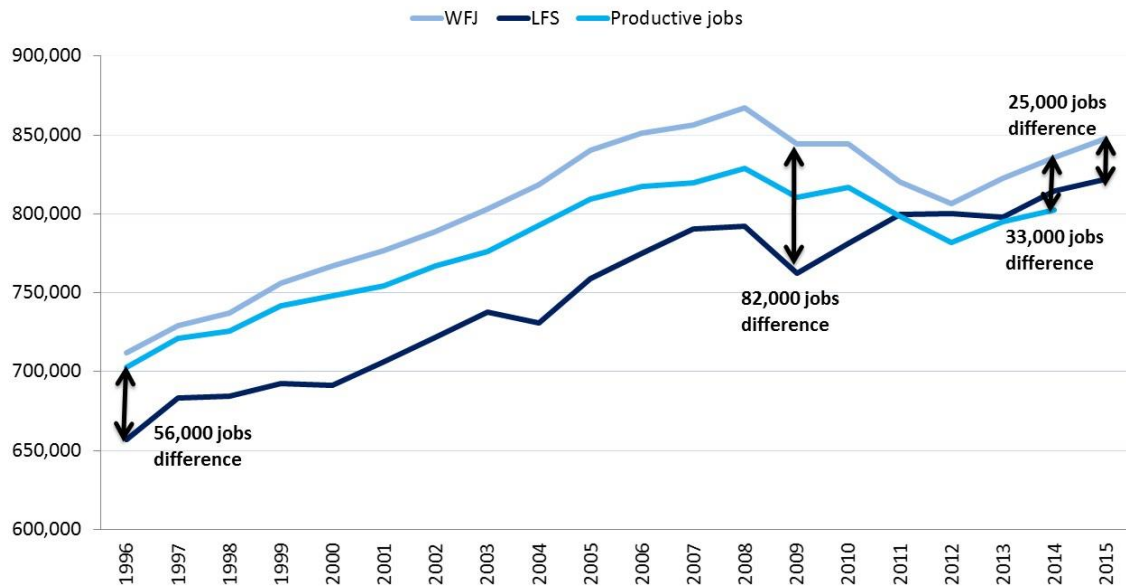
The LFS is a household survey which provides local data including employment estimates. Its completion is a requirement by EU legislation. The LFS is the primary source of labour market statistics throughout the EU and the recommended data source for total employment. The WFJ series is a business survey which estimates employment. It is the recommended data source for sectoral employment. Productivity jobs is the recommended data source for examining productivity issues, although no sectoral data is published for NI and the workforce jobs sectoral shares are applied to productivity jobs for NI to derive a sectoral estimate.

As published, the LFS series is measure of people and the WFJ a measure of jobs. If a person has two jobs they are counted in the LFS once and twice in WFJ. This means that on balance, the LFS measure should always be lower than the WFJ measure. It is possible to create an LFS jobs measure using the data on second jobs but this is not published and rarely used in any policy work. There are other definitional differences, although one would expect similar movements in the two series.

The productive jobs series comes from two principal sources within ONS: The Short Term Employment Survey (STES) data and the LFS. This “jobs” series is distinctly different from the number of workers where the data is collected directly from the LFS. Similarly, hours worked (known as productivity hours) are derived from estimates of average hours (derived in turn from LFS micro-dataset) and the productivity jobs.

These data series present a very different pattern of job creation, particularly during the 2009-2011 period as LFS relative employment rates converged with the UK whilst the WFJ series diverged – see figure A1. Productivity jobs broadly follows the patterns exhibited by the workforce jobs series.

Figure A1 – Comparison of employment in WFJ and LFS data series, 1996 - 2015



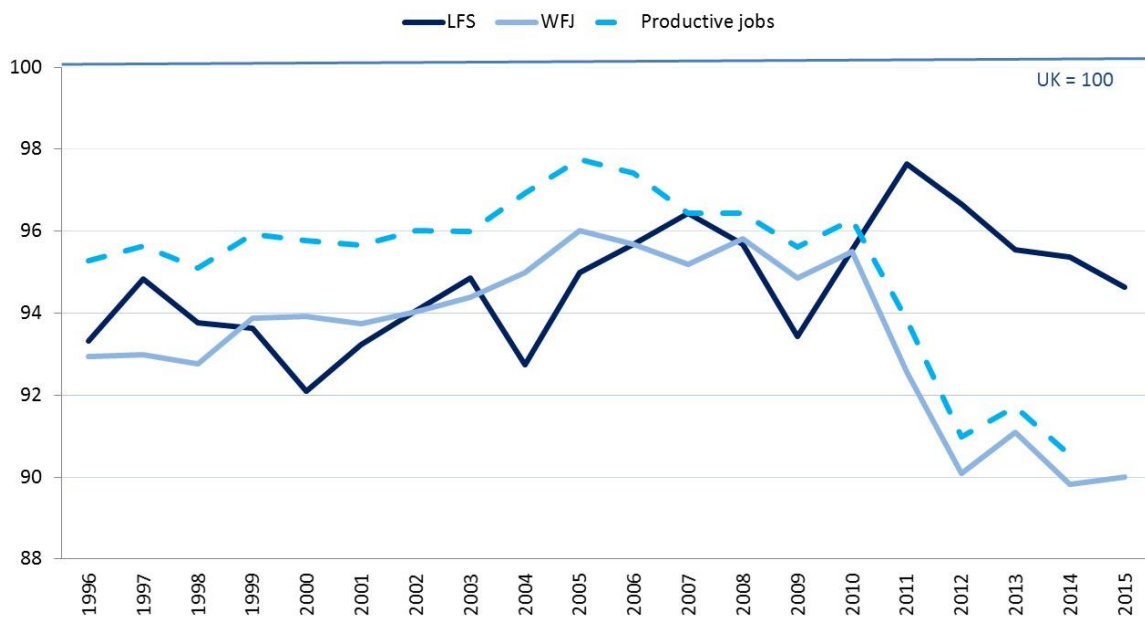
Source: ONS workforce jobs and Labour Force Survey

Note: Workforce jobs measures jobs and LFS measures people in employment (who can have more than one job). Therefore, WFJ will always be greater, although the overall trend should be similar.

The LFS series suggests that NI suffered only a minor recession in employment terms, recovering quickly and now employs more people than at any point over the last two decades. The workforce jobs and productivity jobs series both illustrate a more severe and prolonged recession and suggests that NI would need to generate c20,000 jobs in order to recover to its pre-recession peak.

All three series suggest that the NI employment rate gap relative to the UK is increasing, but to a more significant degree in the workforce jobs and productivity jobs series, as illustrated in figure A2.

Figure A2 – Relative employment rate, NI to UK (UK=100), 1996-2015



Source: ONS workforce jobs and Labour Force Survey

Note: Workforce jobs measures jobs and LFS measures people in employment (who can have more than one job). Therefore, WFJ will always be greater, although the overall trend should be similar. In technical terms the WFJ employment rate is not truly a rate but rather number of jobs / working age population but when presented as a relative this factor is not important to the conclusion from the chart, i.e. the inconsistency in relative performance.

The differential between the LFS and productive jobs and workforce jobs has narrowed in recent years it is measured in the tens of thousands and the differential in the employment rate is 2.3 percentage points in NI and 3.0 percentage points in the UK. Therefore, it is clear that the use of one or two others will result in different conclusions and policy responses.

### A.3. GVA data

As discussed earlier in the paper, some caution is required in the use of GVA data, particularly at sectoral level. As figure A3 and A4 illustrate, there are significant variations at sectoral and sub sectoral level between the ABI and Regional Accounts. Overall, the ABI reports 16% less GVA than the Regional Accounts for the sectors that are included. (£19.8bn in the ABI and £23.5bn in the Regional Accounts). It is clear that use of either dataset will lead to different outcomes for productivity and as a result, different policy conclusions.

There are reasons for the differences between Regional Accounts and ABI data, although on a sectoral basis some are significantly larger in the ABI and others are significantly smaller, suggesting that the adjustments have differential effects by sector or subsector. The main reasons for the differences are listed as<sup>18</sup>;

- removal of non-market activity included in the ABS coverage;
- adjustment to align with estimates of net taxes on production used in the National Accounts;
- adjustment to align with estimates of inventories (finished goods, stocks of materials, storage and fuels, and work in progress) used in the National Accounts;
- coverage adjustments;
- conceptual adjustments;
- addition of own-use and non-market output using data from other sources;
- coherence (balancing) adjustments.

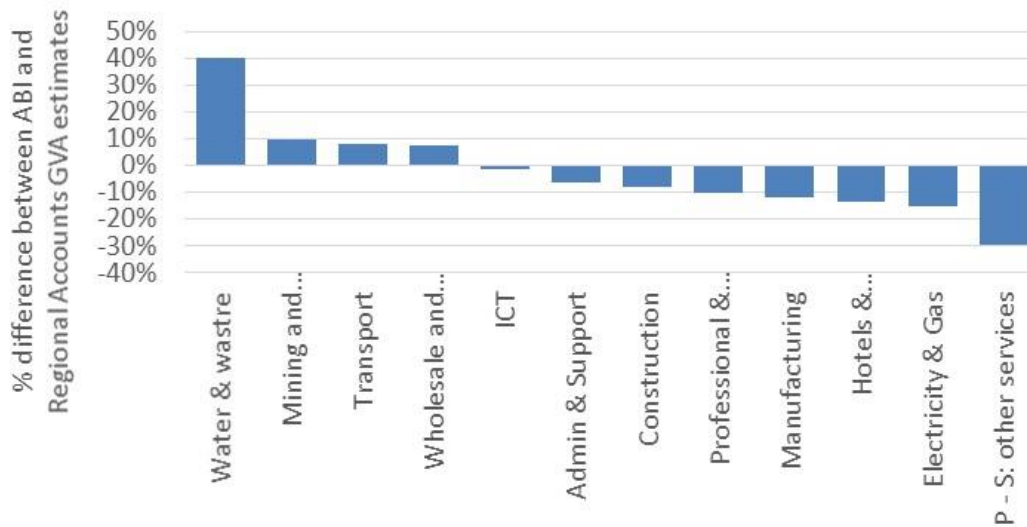
More careful examination and comparisons with the ABI are necessary before it could be used in any meaningful way to develop policy targets. Whilst precision of these data may be an issue, the broad messages and trends may be enough to inform the direction of policy development and target setting.

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<sup>18</sup> ONS, 2014, A Comparison between Annual Business Survey and National Accounts Measures of Value Added



Figure A3 – Differential between Regional Accounts GVA and Annual Business Inquiry GVA by broad sector, 2014



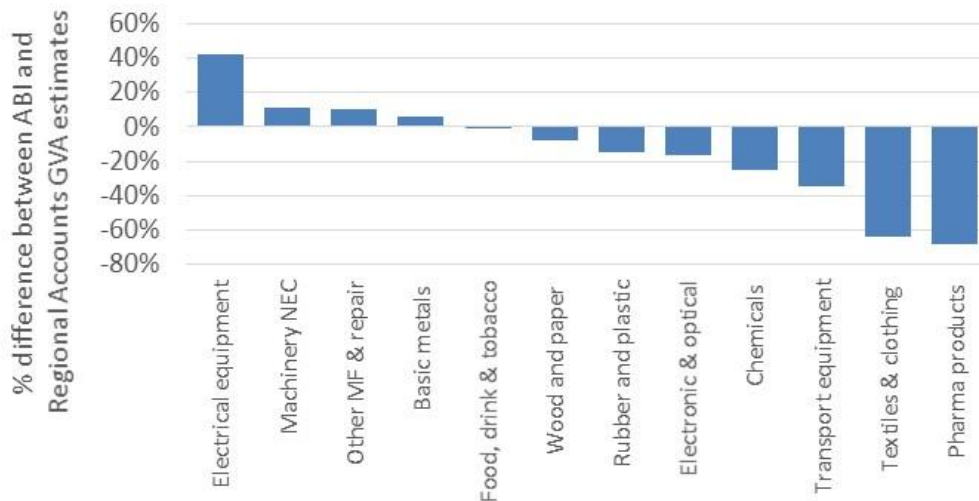
Sources: Regional Accounts and Annual Business Inquiry

Notes: Agriculture, Finance and Insurance Services, Public admin and defence, education & healthcare are excluded as they are not reported on within the ABI.

Arts, entertainment & recreation, Other service activities and the activities of households are grouped together as P-S: Other Services.

Real Estate is excluded as imputed rent data included within Regional Accounts makes the sectoral data incomparable to the ABI

Figure A4 – Differential between Regional Accounts GVA and Annual Business Inquiry GVA by manufacturing sub-sector, 2013



Sources: Regional Accounts and Annual Business Inquiry

Note: Coke and refined petroleum products is excluded as it is not reported on within the ABI.