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PRODUCTIVITY AND THE NORTHER IRELAND ECONOMY

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ABSTRACT

Productivity in many western economies has been stagnant in the years following the 2008 financial crash. The UK has been among the worst performing economies and within it, Northern Ireland has been a consistent laggard. Many have attributed Northern Ireland's comparatively weak productivity performance to differences in the industrial makeup of the region. However, headline sectoral figures do not bear this out. The productivity gap between Northern Ireland and the rest of the UK lies within industries and sectors. This paper seeks to highlight the sectors and industries where Northern Ireland falls behind and to consider why they fall behind.

Manufacturing and Public Services are sectors where Northern Ireland performs well while Agriculture and most of the Services Sector drag overall productivity down. In many cases Northern Ireland's firms lack the scale of their counterparts in Great Britain, but even adjusting for this many firms still fall behind. To compound the problem, in many cases activity is concentrated in areas where Northern Ireland has a productivity deficit and less concentrated in areas where it is more productive.

There are economy wide productivity issues relating to skills and physical capital investment where Northern Ireland has structural challenges to overcome. In addition to tackling sectoral issues, enterprise policy also need to focus on stimulating demand for skills among employers and employees while encouraging a culture of innovation among firms that lack the market incentive to do so.

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PRODUCTIVITY AND THE NORTHERN IRELAND ECONOMY

Paul Mac Flynn, Nevin Economic Research Institute

1. INTRODUCTION

It has been accepted wisdom for many years now that Northern Ireland's private sector has been underperforming when compared to the rest of the United Kingdom (Love et al (2010). The region has consistently produced output per head at a rate below that of the average in Great Britain (GB) and amongst the lowest of all UK regions. Employment levels in the private sector are well below other UK regions on a per head of population basis, while public sector employment is broadly comparable (Mac Flynn, 2015). A similar pattern emerges with wages in Northern Ireland (NI) compared to other UK regions.

NI as a regional economy has important structural differences with other regions of the UK. It is noticeably more concentrated in areas like agriculture and retail and less focussed in the professional and scientific sectors which generally produce proportionately more output. However, adjusting for these differences only explains part of the output gap between NI and the rest of the UK. Of course, there are individual and distinctive reasons for the underperformance of the private economy in NI. NI is the most geographically peripheral region of the United Kingdom and its recent history of civil strife is also perceived to have stunted its growth (Dorsett, 2013). However, while NI is peripheral to the rest of the UK, it shares a land border with one of the most dynamic European economies, the Republic of Ireland. Furthermore, whilst there will necessarily be legacy issues from the conflict, NI has failed to improve on many measures of economic performance since the signing of the Good Friday Agreement in 1998. Indeed, on any number of measures it is falling further behind the rest of the UK.

This paper seeks to examine NI's private sector in greater depth in order to identify possible structural causes of this under-performance and if these issues necessitate a change in industrial and enterprise policy in NI. How do we identify the scale of the productivity problem? How do industries in NI differ from the rest of the UK? Is it just about firm size or market share? Why are workers in NI less skilled? Are firms in NI less ambitious?

In order to answer these questions Section 2 looks at the structure of output in NI and the scale of the challenge facing policy makers. Section 3 will look at the industries in NI where the bulk of the productivity gap lies and attempt to identify sector specific productivity issues. Section 4 will look at both human and physical capital investment. It will examine the depth of NI's skills deficit and possible causes for it whilst also examining the limited data surrounding physical capital investment in the region and why there may be a lack of ambition among firms. Section 5 will conclude.

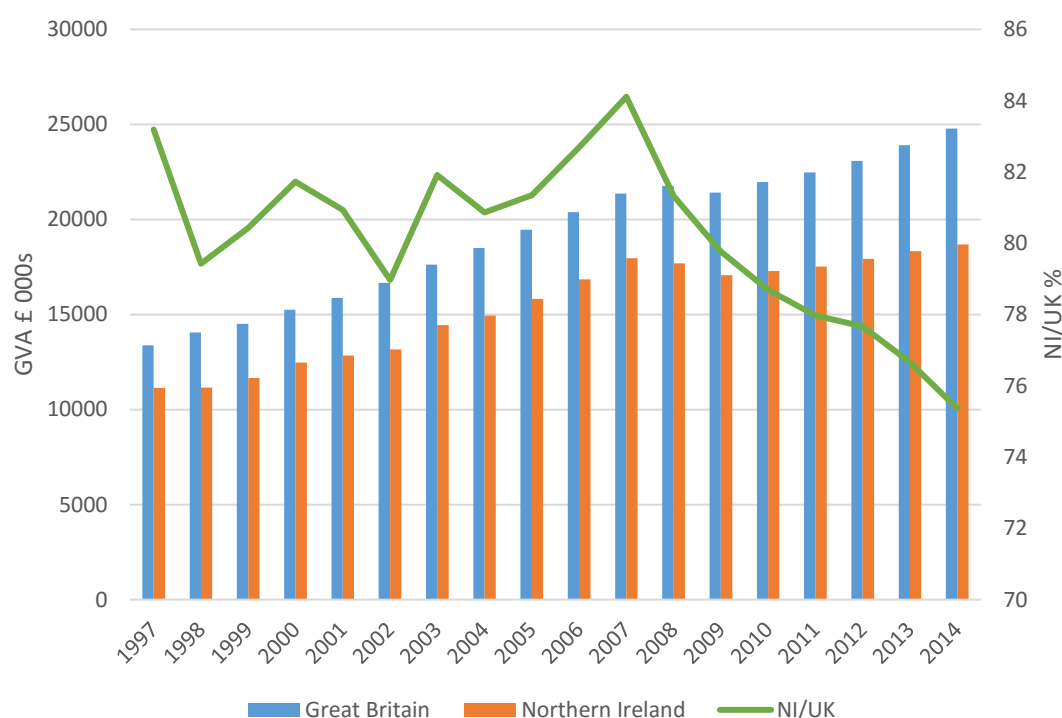
2. THE PROBLEM

Output or the sum of economic activity is an accepted if imperfect measure of how an economy is performing. There are other measures such as household income or indicators from the labour market that can create a fuller picture of economic health but economic output gives the most comprehensive measure of productive performance. Output is usually measured by Gross Domestic Product (GDP), but unfortunately that measure is not readily available for NI. Instead, output in NI is measured by Gross Value Added (GVA) which is equivalent to GDP with subsidies added in and less indirect taxes. Experimental figure for Northern Ireland in 2012 found that tax

and subsidies accounted for £4.9bn or 13 per cent of GDP in 2012 (NISRA, 2016). GVA is calculated using the income approach from National Accounts.

Adjusting total output for size of population allows for international and regional comparisons of productivity and living standards. As Chart 1 shows despite some progress in the mid-2000s, GVA per head in NI is only 75 per cent of the GB average. This means that there is a 25 per cent productivity gap between the GB and NI. As Chart 1 shows the productivity gap was not much better in 2007 than it was in 1997. Given the economic growth experienced over this period this is a significant result.

Chart 1: Gross Value Added per head of population Great Britain and Northern Ireland 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

As Chart 1 also shows, the gap has become substantially worse over the last six years. Productivity growth has fallen off in GB, but the decline in NI has been more severe. The impact of the Great Recession and the scale of the adjustment that followed it in NI particularly with regard to the construction and property sector may go some way to explaining this trend. However, the fact that at its smallest in 2007 the productivity gap between NI and GB was still 15 per cent suggests that the productivity problem will not be rectified by a broader business cycle recovery.

The Right Measure

While GVA per head is often the most utilised comparison of productivity it has many pitfalls. The most accurate measure of productivity in any economy is Total Factor Productivity. This measures the performance of the economy in supplying goods and services with the inputs of labour and capital. It measures the quality and quantities of these inputs and the efficiency with which they are combined (Bank of England, 2004). Data restrictions on investment in NI mean that any focus on the productivity of capital would be severely limited. It is possible to calculate

labour productivity measures for NI and these are presented in Table 1 along with GVA per head of population.

Table 1: Productivity Measures Great Britain & Northern Ireland 2014

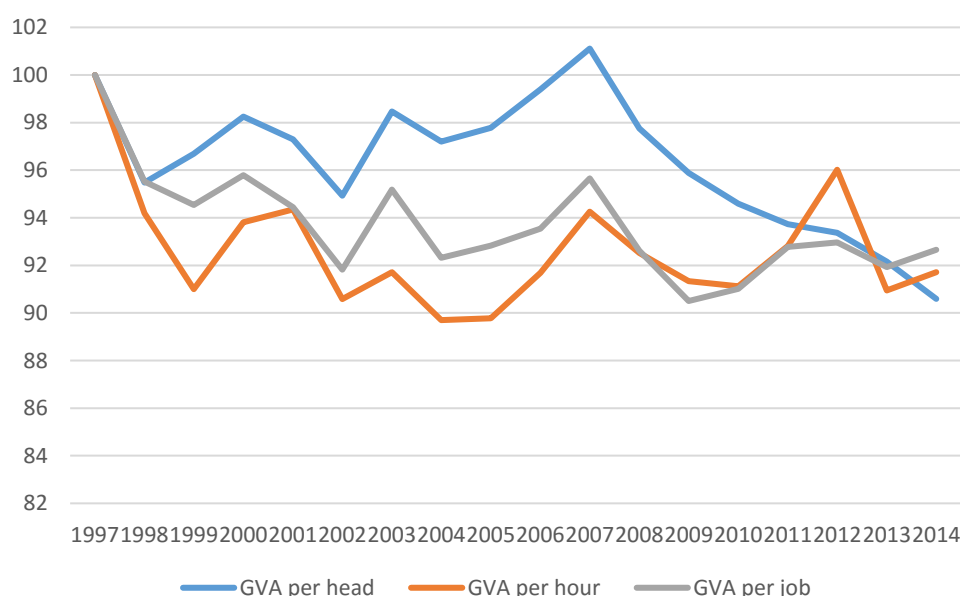
	GB	NI	Gap
Gross Value Added per head of population	24,790	18,682	24.6%
Gross Value Added per job	48,244	41,599	13.7%
Gross Value Added per hour worked	31.13	25.20	19.0%

Source: ONS Regional GVA (2015); ONS Regional Productivity (2016); ONS Workforce Jobs (2016)

Note: Figures are £s in 2014 prices

GVA per job identifies how much output is generated per worker and the productivity gap on this measure is only 14 per cent as opposed to 25 per cent on the per head of population measure. The scale of the difference here is due to the fact that NI has a significantly lower labour force participation rate than GB. Gross Value Added per hour worked provides a further measure of productivity that adjusts for different working patterns within jobs. The most recent figures (2014) indicate that the productivity gap on this measure is 19 per cent. Whilst the difference between these measures has fluctuated over the last number of years the decline experienced on all three measures from 1997 to 2014 has been quite similar. While GVA per hour probably provides the most accurate picture of overall productivity for the economy, GVA per job can be calculated at the sectoral level and so allows a more in-depth analysis of the gaps between industries.

Chart 2: Northern Ireland Productivity as Percentage of GB 1997-2014 (1997=100)



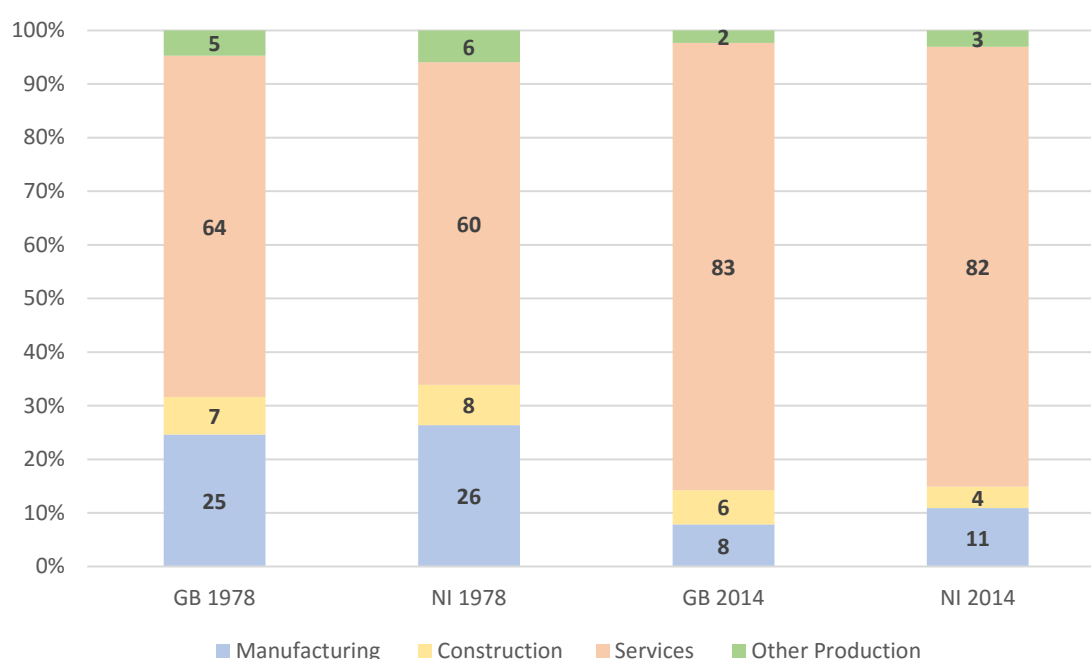
Source: ONS Regional GVA (2015); ONS Regional Productivity (2016); ONS Workforce Jobs (2016)

Mix of Employment

A sectoral or industrial analysis can address one of the most common explanations of declining productivity, namely the relative increase in *Services* sector employment. NI has been through the

process of de-industrialisation which has affected most western economies since the mid-1970s. Like many of these economies NI has become more orientated toward the service sector in terms of employment. Many attribute this shift away from production industries to services as one of the root causes of low productivity particularly in the US since the mid-1970s (Triplett & Bosworth, 2000). The growth in the Services Sector in the EU is considered to have made an above average contribution to employment growth and a below average contribution to productivity growth over the 1990s (Uppenburg & Strauss, 2010). Chart 3 shows the growth and contraction of employment by broad industrial sector in NI and the GB over this period of de-industrialisation.

Chart 3: Headline Industrial Sector Employment as percentage of Total Employment Great Britain & Northern Ireland 1978 & 2014



Source: ONS Workforce Jobs (2016)

The most interesting result is the while manufacturing employment contracted sharply over the period for both the GB and NI, that trend was less pronounced in NI. The rate of decline in manufacturing employment was steeper in NI in the late 1970s and early 1980s, but flattened out in subsequent years. Growth in the services sector NI has been slightly stronger in NI but this occurred in the context of a sharp fall in the construction sector which was not the experience at GB level. Chart 3 shows that NI has not been disproportionately affected by the generalised trend toward services sector employment compared to GB. Services sector employment growth was stronger in NI but this should have been aided by a less severe contraction in manufacturing. While growth in the services sector may have brought lower productivity growth, a relatively stronger manufacturing sector meant that this should actually have had less of an impact in NI than GB.

Headline Industrial sectors of employment are a very broad categorisation, and differences in the precise mix of employment between NI and GB do help to explain part of the productivity gap. There are significant differences for instance in employment at the Standard Industrial Classification (SIC) level. However, even differences at SIC level do not explain all of the gap and

this can be best demonstrated by calculating what GVA for NI would be if the sectoral mix of employment were exactly the same as GB.

Calculating a hypothetical GVA for NI can be achieved in two steps. Firstly, using GVA per job it is possible to calculate a GVA per job for each of the SIC sectors. Secondly, total employment in NI in 2014 can be reformulated as if it were distributed in the same proportions as it is in the GB. Multiplying the new employment level in each sector by the existing GVA per job in that sector gives a new level of output for each sector shown in the second column of Table 2.

Table 2: Northern Ireland Gross Value Added Adjusted for GB Employment 2014

Sector	NI Emp Mix	GB Emp Mix
Agriculture	408	124
Mining	103	91
Manufacturing	5,363	4,288
Electricity & gas	435	657
Water	552	446
Construction	1,852	1,909
Retail	4,610	4,311
Transportation	1,295	1,542
Accommodation & food	861	1,010
Info & Communication	1,126	2,000
Finance	1,479	2,189
Real estate	3,021	5,281
Professional & scientific	1,376	2,729
Administration	1,175	1,525
Public Administration	3,605	2,244
Education	2,611	2,424
Health	3,191	2,519
Arts	494	609
Other	772	789
Households	55	112
Total	34,384	36,799

Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

Note: Figures are £000s in 2014 prices

Adjusted for GB sectoral employment mix, NI's productivity gap measured by output per job is still 7 per cent. This portion of the productivity gap requires further investigation - Why are industries within NI less productive than their GB counterparts?

3. A SECTORAL PROBLEM

This section will seek to explore in further detail the productivity gaps between specific sectors in NI and GB. In deciding which industries to examine in more detail, three metrics are important; the scale of the productivity gap within that industry; that industry's importance to total employment; and that industry's share of total Gross Value Added. This is not to say that some sectors are not worthy of closer analysis. It is to say that the scale of the negative productivity gaps within the other sectors are more likely to shed some light on the recent decline in overall productivity in NI. These figures are presented in Table 3.

Table 3: NI – GB Productivity Gap, Share of NI GVA and Share of NI Employment by SIC 2014

Industry	% Productivity Gap	% of NI GVA	% of NI Jobs
Agriculture	-52.0	1.2	3.7
Mining	-86.2	0.3	0.2
Manufacturing	2.1	15.6	9.8
Electricity & gas	7.0	1.3	0.2
Water	7.3	1.6	0.7
Construction	-22.9	5.4	6.3
Retail	1.5	13.4	15.8
Transportation	-15	3.8	3.9
Accommodation & food	-13.2	2.5	5.7
Info & communication	-20	3.3	2.3
Finance	-34.2	4.3	2.3
Real estate	13.4	8.8	1.0
Professional & scientific	-8.7	4.0	4.3
Administration	-20.3	3.4	6.7
Public Administration	12.1	10.5	7.1
Education	-0.2	7.6	9.3
Health	-4.8	9.3	15.9
Arts	-3.7	1.4	2.3
Other	-14.6	2.2	2.7
Households	-32.2	0.2	0.1

Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

Note: Figures are £000s in 2014 prices

The largest negative productivity gap is in the mining sector. As output in this sector is largely driven by the geographic location of existing natural resources, further investigation of the productivity gap would likely yield little useful information. Additionally, as this sector accounts for a very small portion of overall employment and output, the impact on economy-wide productivity is likely to be marginal. The *Activities of Households* can also be set aside on the same basis of a very small contribution to both output and employment. Electricity & Gas and Water in NI both have a small but not insignificant positive productivity gap with the rest of the UK. However, these sectors account for less than 1 per cent of total employment meaning any further investigation is likely to be difficult and ultimately fruitless. There are some sectors where a large, positive productivity gap exists but where substantial measurement issues also exist. Calculating the contribution of *Real Estate* using the Income Approach of National Accounting can be difficult as it relies heavily on imputed rents (ONS, 2014) and there have been difficulties calculating the Real Estate sector in Gross Fixed Capital Formation (ONS, 2016) and an experimental Gross Domestic Product for the sector in NI (NISRA, 2015). Calculating the output of the Public Administration sector relies almost exclusively on employment levels within the sector (ONS, 2014b) and this makes it difficult to mount any serious investigation of labour productivity. The size of the gap in *Health*, *Education*, *Manufacturing* and *Retail* is too small to warrant further discussion in this paper.

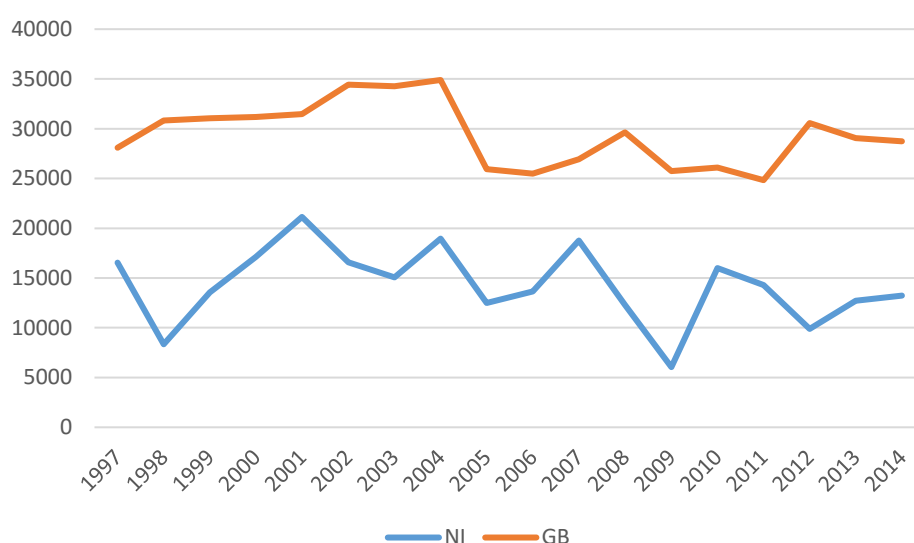
The *Finance* and *Agriculture* sectors have a large productivity gap and account for a sizable proportion of NI Output and jobs respectively. The *Information and Communication*, *Construction* and *Administration* sectors have productivity gaps of almost 20 per cent and between them account for 12 per cent of GVA and over 15 per cent of jobs in NI. *Accommodation and Food*, *Other*

Services and *Transportation* have productivity gaps just above or below the overall NI gap of 13 per cent and account for 8.5 per cent of GVA and just over 12 per cent of jobs. The *Professional and Scientific* sector accounts for just over 4 per cent of both jobs and GVA and has a productivity gap of 8 per cent. The following section will look at these industries in greater detail to discern what if anything existing economic data can reveal about their comparative regional weakness.

Agriculture

Chart 4 shows GVA per job for the *Agriculture* sector in NI and GB. Whilst Agriculture forms a much smaller part of the GB economy it is still significantly more productive than it is in NI. Compared to the other countries of the United Kingdom, NI's agriculture sector has improved its performance over the last number of years, however when measured by the size of turnover, the sector is notably smaller than UK counterparts. In England, over one quarter of farms have a farm business income in excess of £50,000, in NI the figure is 14%. The average farm income at UK level was £35,000 in 2014/15 while in NI it was just £25,000. NI has consistently been the worst performing UK region on many measures of farm income and productivity, but a significant fall in farm incomes in Scotland has changed that position somewhat in the last 2 years. The source of the NI agricultural productivity deficit appears to stem from the size of farms in NI. The average size of farms in England, Scotland and Wales were 88k, 107k and 48k hectares respectively, for NI it was 40. When very small farms are excluded the average farm size for England, Scotland and Wales was 132k, 273k and 97k hectares respectively. For NI it was just 60k hectares.

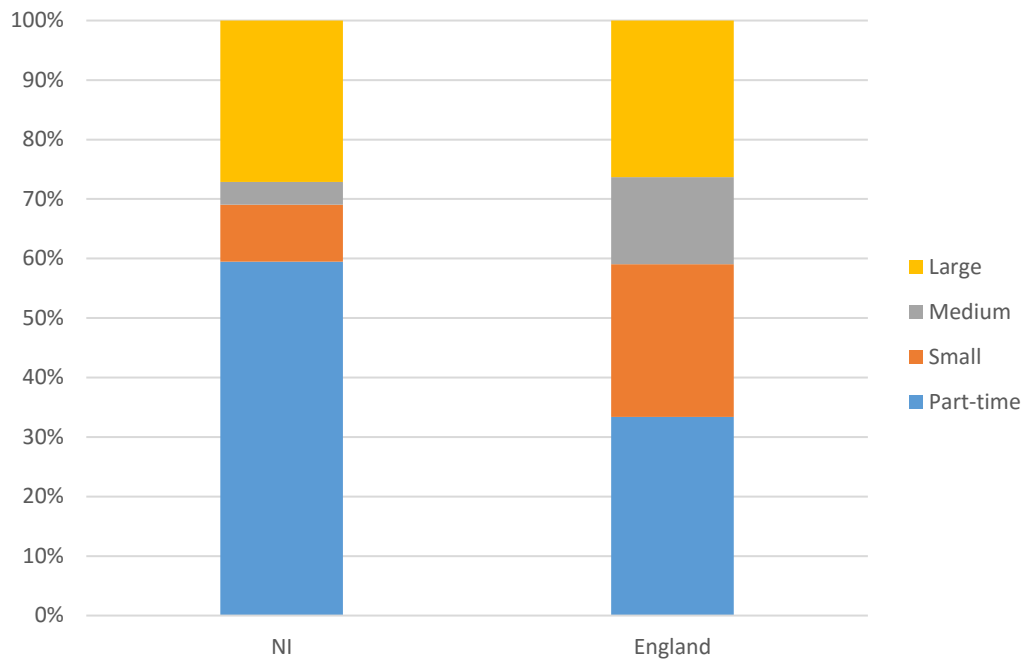
Chart 4: Output per Job in Agriculture Great Britain and Northern Ireland 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

That farms in NI are smaller by area or turnover than counterparts in the England Scotland or Wales is perhaps not that surprising. However, as chart 5 shows that the proportion of farms classified by labour input as 'large' in NI is actually equal to the proportion in England. It is among part-time and medium sized farms that NI has a significant differential. Nearly three quarters of NI farms are classified as 'very small' or part-time in this case as they require less than one full-time equivalent labour input. Just over 40 per cent of farms in England are either small or medium-sized compared to only 18 per cent in NI.

Chart 5: Farm Size in Northern Ireland and England 2013/14

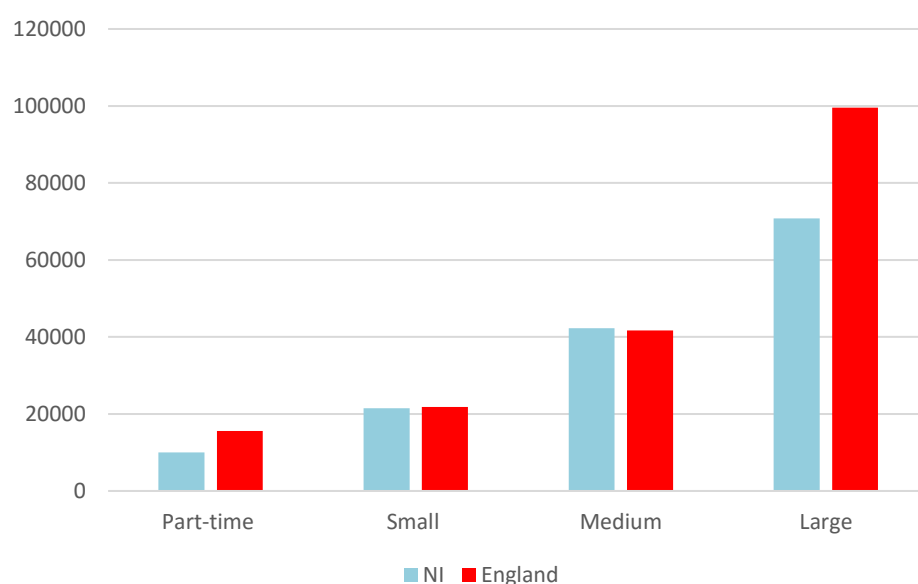


Source: DAERA Statistical Review of Northern Ireland Agriculture 2014 (2015); DEFRA Farm Business Survey 2013/14 (2015)

Adjusted for labour inputs Direct Farm Income in NI shows a significant problem at the upper and lower end of the scale. For Part-Time farms average income is two thirds of the England average. As this group accounts for three quarters of all farms this is where the largest productivity gap exists. As Chart 6 shows the average income for small and medium sized firms in NI is remarkably similar to their equivalents in England. There is a large gap for large farms which may be overstated as the upper definitional limit of large farms is open-ended.

What is clear from the available data is that farms in NI are smaller than their GB counterparts. However, the real problem is that farms in NI are more likely to be part-time or large and that is where NI is least productive. The problem is scale but not large scale.

Chart 6: Average Income by Farm Size in Northern Ireland and England 2013/14

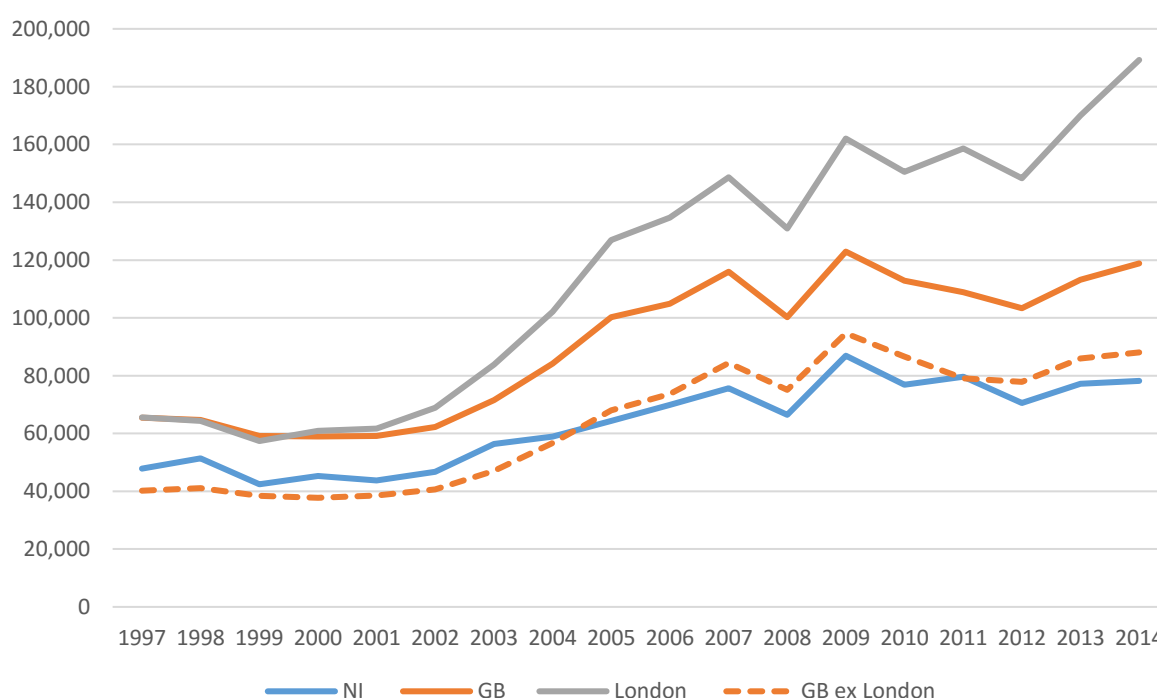


Source: DAERA Statistical Review of Northern Ireland Agriculture 2014 (2015); DEFRA Farm Business Survey 2013/14 (2015)

Finance

In the *Finance* sector, often the productivity gap between NI and GB is attributed to the distortion of the City of London. As Chart 7 shows, whilst the London region does lift the GB average, productivity in the NI finance sector still lags behind GB when this is accounted for.

Chart 7: Finance Sector Productivity Growth Great Britain, London & Northern Ireland (1997-2014)



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

As Chart 7 shows, NI actually started out above the GB ex-London average. NI fell behind in 2004 but has improved, equalling the ex-London average on two occasions in 2003 and in 2011. However as of 2014 an 8 per cent productivity gap exists between NI and the adjusted ex-London GB average. It is difficult to drill down further into the financial sector in NI as much of the firm level data is either too small to measure or disclosive. In particular, no information is provided for the turnover of firms in the finance sector adjusted for their relative size. Of the information that is available, Table 4 shows that, in terms of firms, NI looks more similar to the GB ex-London in terms of auxiliary financial services. However, NI is between London and the GB ex-London when it comes to insurance and pension activities and pure financial services.

Table 4: Financial Sector Firms Great Britain, London & Northern Ireland 2014

Sector	London		GB ex-London		NI	
	No. of firms	% of total	No. of firms	% of total	No. of firms	% of total
Financial services	4455	39%	6830	21%	290	29%
Insurance & Pension	525	5%	5340	16%	85	9%
Auxiliary activities	6490	57%	20285	61%	615	62%

Source: ONS Business Population Estimates (2015)

Whether the mix of firms within the finance sector explains the productivity gap is questionable. While a lesser role for insurance activities could explain the gap with GB ex-London, a more prominent role for financial services in NI should imply greater productivity as it does in London. Table 5 shows that NI has proportionately more high-turnover (greater than £5m) firms in *Insurance and Pension* activities than GB ex-London but has fewer high-turnover firms in the financial services sector. This may well be where the productivity gap exists.

Table 5: Financial Sector Firms' Turnover Great Britain, London & Northern Ireland 2014

Region	Subsector	Turnover £000s					
		50-99	10-249	250-499	500-999	1000-4999	5000+
London	Financial services	28%	28%	25%	26%	23%	34%
	Insurance & Pension	1%	2%	3%	3%	4%	6%
	Auxiliary activities	72%	70%	72%	70%	73%	59%
GB ex-London	Financial services	14%	16%	14%	18%	21%	36%
	Insurance & Pension	1%	2%	3%	5%	8%	13%
	Auxiliary activities	85%	82%	83%	77%	71%	51%
NI	Financial services	10%	19%	30%	42%	30%	33%
	Insurance & Pension	0%	2%	4%	0%	10%	17%
	Auxiliary activities	90%	79%	67%	58%	60%	50%

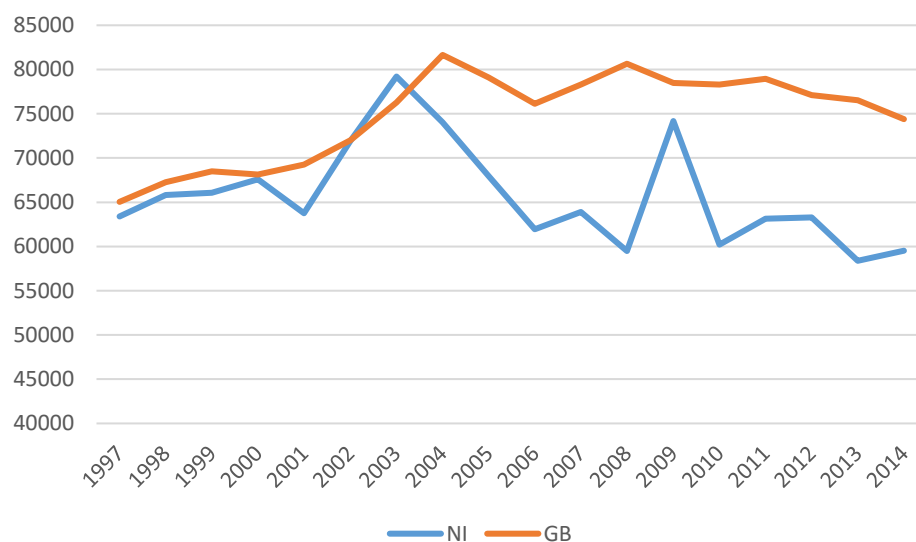
Source: ONS Business Population Estimates (2015)

If data were available to contrast firm turnover per employment levels, assessing the productivity of sub-sectors would be much easier. The available data does however suggest that the productivity gap may arise because firms in NI's largest finance sub-sector are comparatively smaller than those in the wider financial sector or comparable sub-sectors in other regions.

Information and Communications

Information and communication is a large sector ranging from publishing and broadcasting to telecommunications and computing. As Chart 8 shows NI's performance in this sector did quite well until the early 2000's. Interestingly, after a strong period of growth up to 2003, productivity in both GB and NI dropped off in subsequent years. This fall off in growth was not confined to the United Kingdom but was actually part of a wider global trend. The OECD have identified two periods of significant productivity growth in the *Information and Communications* sector in both the US and the EU from 1995-2000 and from 2000-2003. Both the EU and US saw significant growth over these periods but the US saw almost double the rate of the EU in the 1995-2000 period (Kretschmer, 2012). In an international context the post-2003 slowdown is to be expected. Why NI's slump was much deeper is less clear.

Chart: 8 Information and Communication Productivity Great Britain and Northern Ireland 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

Firm level analysis shows that while, once again, London is an outlier NI still falls significantly behind the rest of the UK in turnover per employment. As table 6 shows NI only manages to best Scotland amongst all 12 of the UK regions.

Table 6: Information and Communication Turnover per employment 2014

Region	Turnover/ Employment £000's
London	214.9
South East	189.0
South West	161.7
West Midlands	114.2
East of England	104.5
North West	100.0
Yorks & Humber	93.9
East Midlands	88.7
North East	81.5
Wales	80.6
Northern Ireland	74.2
Scotland	69.1

Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

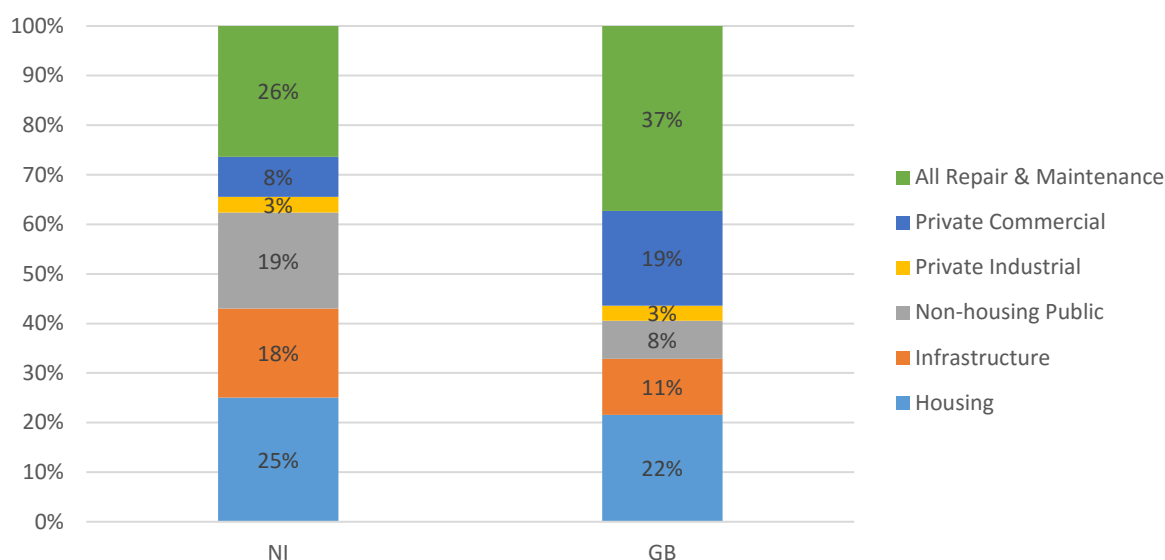
Note: Figures are £000s in 2014 prices

In respect of firms categorised by sub-sector, NI differs from the rest of the UK in two areas. Firms in NI are more concentrated in publishing and movie and television production, and are less concentrated in computer programming and consultancy. Computer programming is an important area of Information and Communications not just because it is a relatively newer technology than either publishing or broadcasting, but because of its impacts on the wider economy. The ICT sector, but computer programming in particular, has significant productivity spill-over effects for the wider economy (Biagai, 2013). The lack of output in computer programming may explain not only the productivity gap in ICT but may also explain a residual gap in productivity for the wider economy.

Construction

The *Construction* industry in NI has faced significant difficulties in the years following the financial crash of 2008. However even during its most buoyant period in the years leading up to the crash, productivity in the sector was well below the GB average, and had in fact been falling behind since 1997. Measuring output in the construction sector is notoriously difficult and most studies that have examined productivity in the sector highlight this (Abdel-Wahab & Vogl, 2014). Many studies have also charted falling construction sector productivity and attributed it to shifts toward lower productivity activities within the sector

Chart 9: Construction Sector Output Northern Ireland and Great Britain 2015



Source: NISRA Northern Ireland Construction Bulletin Q1 2016; ONS Output in the Construction Industry No. 17 (2016)

As Chart 9 shows that output in the construction sector in NI does look somewhat different to that of GB. In the first instance Repair and Maintenance accounts for a much larger share of overall output in GB, while Infrastructure and Housing are proportionately larger in NI. Interestingly the share of output for private commercial work and non-housing public work are exactly reversed between GB and NI, underlying the proportionately larger role of the public spending in the NI economy.

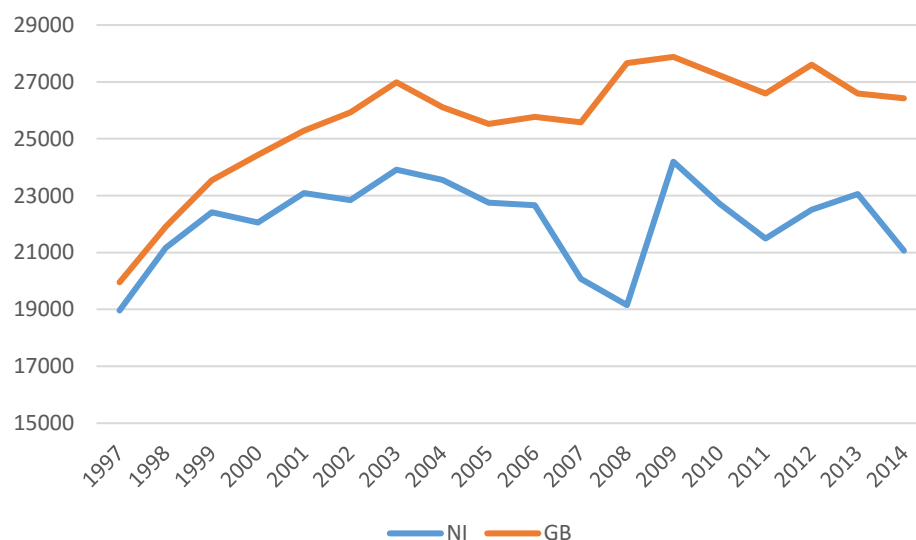
The larger share of output in housebuilding could be significant as Allen (1985) identifies a shift toward housebuilding as a key contributor to the productivity decline in the construction sector in the US. However, Mildemberger et al (2013) find that firm size and the shift from 'heavy construction' to contractors explains more of the decline. Once again, for NI the picture is mixed. Just under one third of construction businesses in NI have only one employee compared to 15 per cent in GB. However, NI and GB have the same proportion of firms with 10-49 employees at 10 and 10.3 per cent respectively.

Repair and Maintenance (R&M) is considered to be much more labour intensive than New Build, however Abdel-Wahab (2008) finds a significant difference in productivity between R&M and *New Build* in the housebuilding sector compared to the non-residential sector. *Non-Residential New Build* was found to be nearly three times as productive as *Residential New Build* whilst *Residential R&M* was found to be 1.3 times as productive as *Non-Residential R&M*. Housing makes up 34 per cent of NI's new build compared to only 29 per cent of the GB total. At GB level housing accounts for half of all R&M activity whilst in NI it was only 36 per cent. Further work is needed to fully assess sub-sectoral productivity within NI's construction sector and all output figures should be handled with caution. However, it does seem likely that a concentration of activity in lower value added sub-sectors may explain a significant portion of the productivity gap in this sector.

Administration

The *Administration* sector covers a wide area of economic activity stretching from travel agencies to employment services and private security. As Chart 10 shows it is another example of an area where NI began in 1997 at a level of output per job similar to that of the GB average but is now significantly below the average.

Chart 10: Administration Sector Output per job Northern Ireland and Great Britain 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

There is little established research looking at the role of administration services in driving overall productivity. Of the limited sub-sectoral data it would appear that NI has broadly followed GB trends. Looking at employment trends over the period, there has been a significant shift away from *Building and Landscape Services* and a shift toward *Office Administration*, in NI and *Employment Activities* such recruitment firms in GB. If anything, the data point to a convergence of sub-sectoral employment between GB and NI which stands in contrast to the productivity divergence.

Table 7 Employment in Administration Sector Northern Ireland and Great Britain 1997& 2014

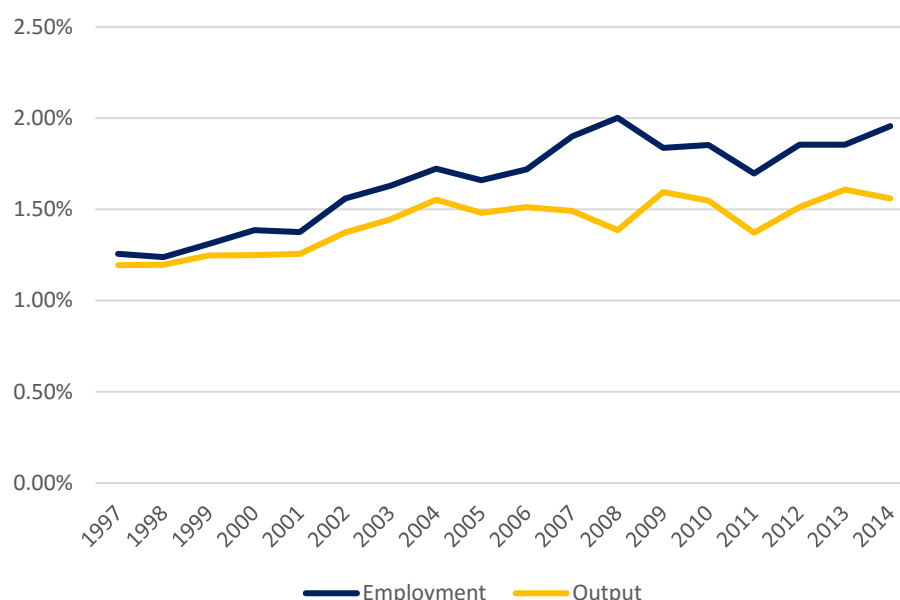
	NI 1997	NI 2014	GB 1997	GB 2014
Rental and leasing	9%	4%	8%	6%
Employment activities	34%	39%	27%	35%
Travel agency	7%	3%	6%	4%
Security	12%	11%	6%	8%
Buildings & Landscape Services	30%	23%	38%	28%
Office administration	8%	19%	16%	19%

Source: NISRA Quarterly Employment Survey (2016)

However, as Chart 11 shows, the productivity problem in administration in NI may be due to the very simple fact that over the time period employment grew faster than total output. In reality this likely reflects a lower capital intensity resulting in greater labour substitution in the sector,

which is common in low wage services sectors particularly those with lower levels of unionisation (Gordon, 1996). Data limitations prevent a further exposition of these issues within the Administration sector. It is likely that productivity in the administration sector in NI suffers from economy-wide productivity issues which are covered in greater detail in section 4.

Chart 11: Northern Ireland Administration Sector Output and Employment as a Percentage of Great Britain total 1997-2014

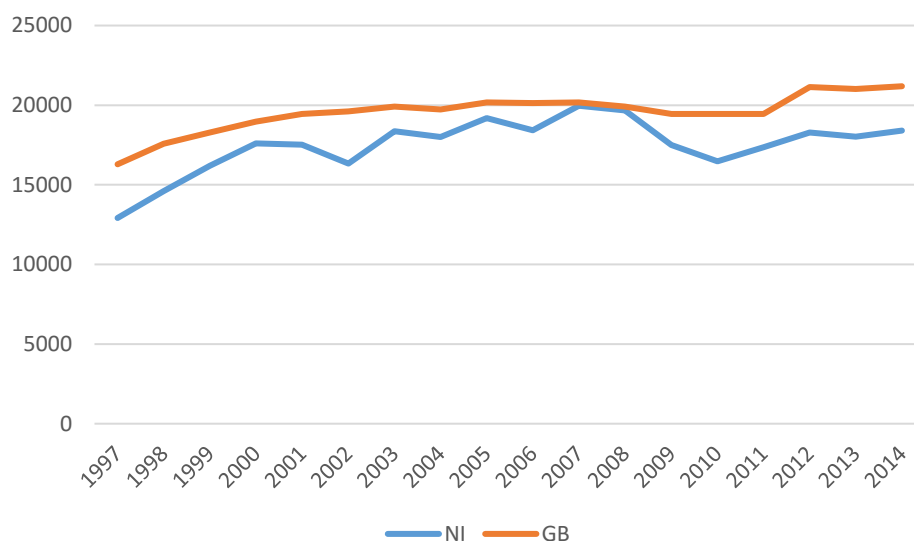


Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

Accommodation and Food

The *Accommodation and Food* sector is already of significant interest within NI as one of the lowest paid sectors in the economy (Mac Flynn, 2014). Whether low pay is driven by low productivity or vice versa is beyond the scope of this paper but the fact remains that after *Agriculture*, *Accommodation and Food* has the lowest output per job in NI. The productivity gap between NI and the GB average is distorted by the presence of London, but even when the GB average is adjusted for this, NI is still 8 per cent behind. As Chart 12 shows however, NI's performance had been quite good in the years before 2008. Following the crash, both output and employment fell significantly and have yet to recover.

Chart 12: Accommodation and Food Sector Output per job Northern Ireland and Great Britain 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

The *Food Service* sector accounts for almost 80 per cent of jobs in the sector and *Food and Drink* service providers account for the vast majority of firms in the sector. When firm size is measured by employment NI measures up quite well to the rest of the UK with firms that are actually slightly larger in both *Accommodation* and *Food Services*. However, when turnover is compared between firms, a different pattern emerges. In the food sector firms in NI have, if anything, a slightly larger turnover profile than the GB average, but in the accommodation sector NI firms are significantly smaller.

Table 8: Firms in Accommodation & Food Sector by Size of Turnover GB & NI 2014

Region		Turnover Size Band						
		0-49	50-99	100-249	250-499	500-999	1000-4999	5000+
NI	Accommodation	17%	13%	17%	14%	10%	24%	5%
	Food	4%	27%	41%	15%	8%	5%	0%
GB	Accommodation	9%	15%	29%	17%	14%	14%	3%
	Food	5%	25%	43%	17%	7%	3%	1%

Source: ONS Business Population Estimates (2015)

As table 8 shows 17 per cent of firms in NI's accommodation sector have a turnover of less than £50,000 almost double the proportion in GB. The food sector by comparison compares favourably, particularly in the £10,000 to £49,000 category. The disparity in turnover size in the accommodation sector would explain the productivity gap, but the root causes are still unclear. Unfortunately, the stock of accommodation does not break down serviced accommodation into sub-sectors and therefore it is not possible to be more prescriptive.

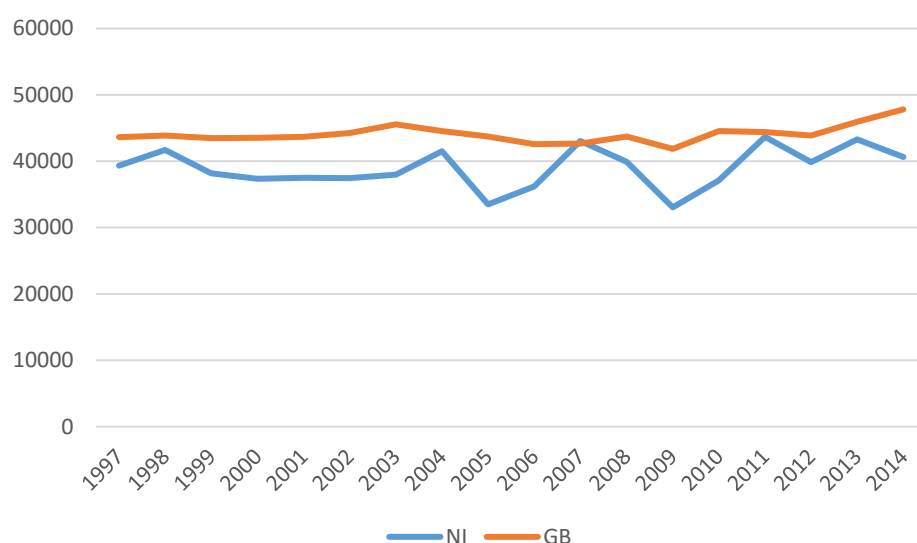
Other Service Activities

The *Other Activities* Sector naturally covers a curious mix of industries ranging from churches and Trade Unions to dry-cleaning and hair-dressing. Identifying a productivity gap is difficult in this area as the industries involved are so disparate. There is no indication that turnover levels within firms are any smaller and the average size of a firm by employment is roughly similar among all sub sectors. There are more firms in NI in the religious/political/membership organisation section and more firms at GB level involved in funeral services and personal well-being. While the Other Services Sector does account for just over 2 per cent of GVA and 3 per cent of total employment, it is too diverse to identify any trends or patterns beyond what is contained in standard labour market and business statistics. As with the administration sector, the cause of the productivity gap here will likely be contained in economy-wide productivity issues covered in detail in section 4.

Transportation and Storage

While there is a significant productivity gap between GB and NI in the *Transportation* sector, the experience of the last few years has been somewhat mixed. In 2007 and 2011 the transportation Sector productivity gap was negligible, but the most recent data suggests the gap is back to what it was throughout the early 2000s.

Chart 13: Transportation Sector Output per job Northern Ireland and Great Britain 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

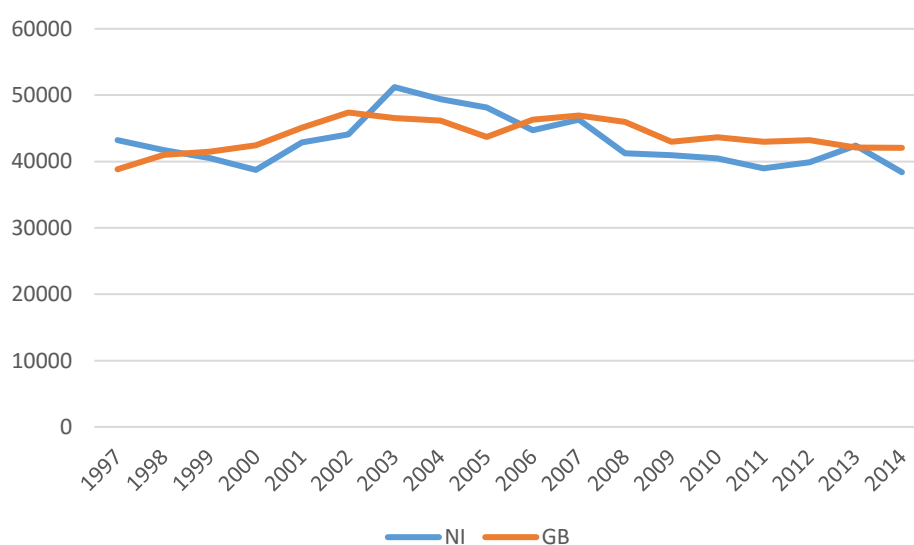
Transportation is another area where measuring productivity is quite difficult. The transportation sector experienced a comparatively higher level of deregulation, particularly in the airline industry and this should have been a positive productivity development according to conventional economic wisdom but internationally, transportation productivity has been in decline for decades (Duke & Torres, 2005). What many previous studies highlight is the role of infrastructure in the pace of productivity growth in the transportation sector. Among all the private sector service industries, transportation is probably the sector most sensitive to improvements or declines in a country's stock of infrastructure. Haulage industries rely on good road networks and airlines depend on increased runway capacity. The lack of significant

infrastructure investment in NI over the last number of decades has no doubt reduced productivity for the whole economy, but this deficit will be most keenly felt in transportation productivity. For example, NI has 0.04 miles of rail track per square mile compared to 0.12 in GB, and this does not take account of the High-Speed Rail infrastructure that is planned and already in place in England. NI is not alone in suffering an infrastructural deficit with other parts of the United Kingdom. Studies have highlighted the fact in the four years to 2020 the UK government will spend £1280 per person on transport in London compared to just £280 in the North of England (IPPR, 2016). NI's productivity gap in transport and for the economy as a whole is likely to remain subdued until such time as infrastructure spending is targeted towards areas of the United Kingdom with a deficit of investment.

Professional and Scientific

The *Professional and Scientific* Sector is unique in NI in the sense that it is the only sector that had a positive productivity gap in 1997 and a negative gap in 2014. As chart 14 shows NI began in 1997 significantly above the GB average output per job before falling behind in 1998. The early 2000s saw another period of positive productivity differentiation, while recently the negative gap has been sustained every year except 2013. What is clear is that NI has the capacity to not only meet GB productivity levels in this sector but even exceed them.

Chart 14: Professional and Scientific Sector Output per job Northern Ireland and Great Britain 1997-2014



Source: ONS Regional GVA (2015); ONS Workforce Jobs (2016)

Looking at the sub-sectors within the professional and scientific sector there is a clear divide between NI and GB. The sector is dominated by legal and accounting services in NI which account for one third of firms, compared to 19 per cent in the GB. In GB 36 per cent of firms in the sector are classed as *Activities of Head Offices and Management Consultancies*. Head office activities are more likely to be contained in London but Table 9 shows both Wales and Scotland have significantly more firms in this sub-sector than NI.

Table 9: Professional and Scientific firms 2014

Sector	% of firms in Sector			
	UK	Scotland	Wales	NI
Legal & Accountancy	18	12	20	34
Head Offices	37	29	30	20
Architecture	22	39	26	26
Scientific Research	1	1	1	1
Advertising	5	2	3	4
Other	16	15	17	12
Veterinary	1	1	2	2

Source: ONS Business Population Estimates (2015)

The difference in the proportion of firms classified as head offices in NI may not be significant on its own. However, the absence of head office functions may help to explain the lower productivity of other sub-sectors and legal and accountancy firms in particular. In recent years, many of the new jobs created in the legal and accountancy sector in NI have been subsidiaries of larger firms operating in London and the rest of the UK. Whilst the activity carried out here may be in the same category, it may not be of the same value and this is re-enforced by wage levels in the sector in NI. The wage gap in the professional and scientific sector would suggest that activity in the professional and scientific sector is of a lower value added profile. Wages in the sector in NI are 25 per cent lower than the UK compared to a gap of 14 per cent in the economy overall (NISRA, 2015) and a productivity gap of only 8.6 per cent in the sector.

4. BROADER PRODUCTIVITY ISSUES

Beyond the sector specific issues, there are productivity concerns that cut across all industries. One of the key drivers of labour productivity is the growth and development of human capital or skills. How and when skills are accumulated and how they are rewarded within an economy can go some way to explaining the development of labour productivity. As mentioned in the preceding section, due to a lack of data on investment a detailed examination of capital productivity is not possible. However, the role of investment and innovation in the development of overall productivity cannot be ignored and requires some contextualisation for NI. The following section will discuss these topics in greater detail.

Skills

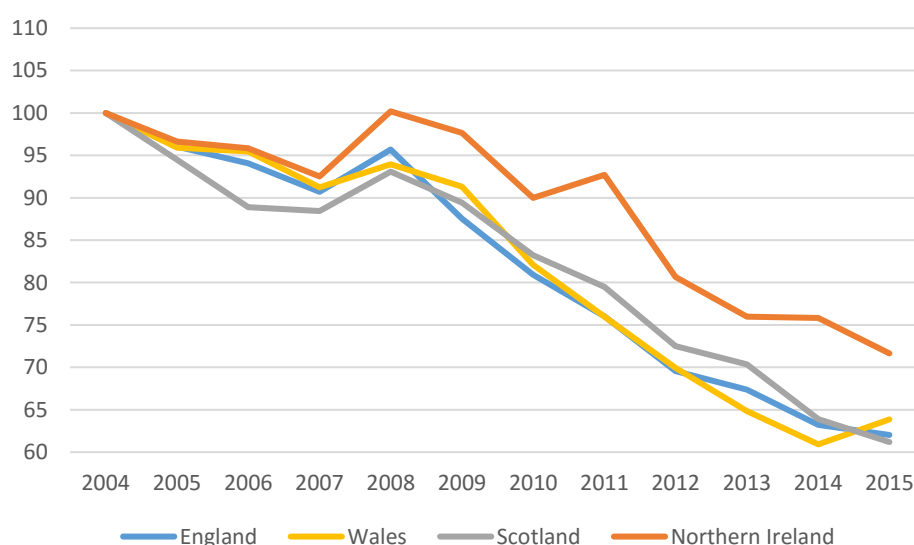
The skills deficit in NI is sizeable and enduring and the most worrying statistic is for those with no level 1 National Vocational Qualifications. NVQ stratifies a range of qualifications ranging from GCSEs to trade apprenticeships and University degrees. In 2015, 16 per cent of 16 to 64 year olds did not have a level 1 NVQ. To have less than a level 1 NVQ means less than 5 GCSEs at A-C grade. Table 10 puts NIs performance on this measure in a regional context and only the West Midlands come close at 13 per cent.

Table 10: Percentage of 16-64 with no NVQ level Qualifications by UK Region 2015

Region	Percentage with no NVQ
North East	10.4
North West	9.8
Yorkshire and The Humber	9.8
East Midlands	8
West Midlands	13
East	8
London	7.4
South East	6.3
South West	5.5
Wales	10.5
Scotland	9
Northern Ireland	16.3
United Kingdom	8.8

Source: ONS Annual Population Survey (2016)

It should be pointed out at this stage that the situation in NI has become markedly better over the last 10 years, but that a persistent gap remains. Chart 15 shows these trends in the context of the UK nations and while the reduction in NI has been impressive it has been less impressive than other regions of the UK over the same period.

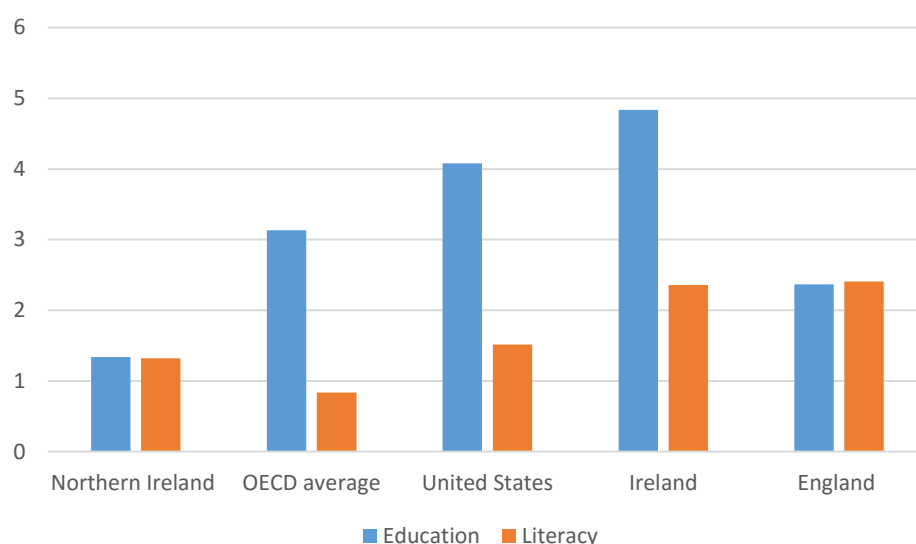
Chart 15: Number of 16-64 with no NVQ level Qualifications by UK Nation 2004-15 (2004=100)

Source:

There are many and disparate motivations for education and skills attainment ranging from the familial to the geographical, and within NI there are even more related to religious and community affiliation. Whilst many of these issues are beyond the scope of this paper there are some issues specific to the skills and the NI labour market which warrant a closer examination based on the issues raised in the preceding paragraphs.

The OECD Survey of Adults Skills is an international survey that forms part of the Programme for the International Assessment of Adult Competencies (PIAAC). The survey has a large sample size for NI and provides some much-needed insights into the attainment of skills and its interaction with the labour market.

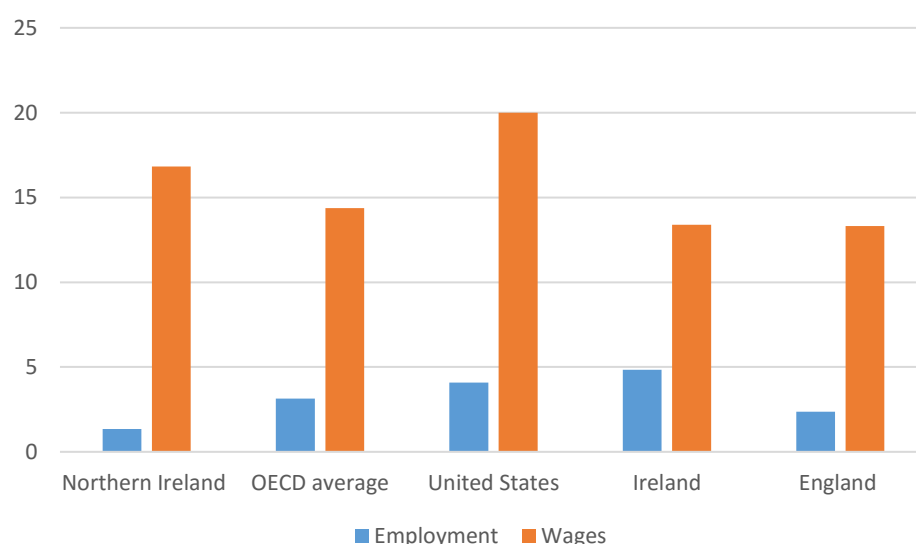
Chart 16: Effect of Literacy and Years of Education on likelihood of Employment



Source: OECD Survey of Adults Skills (2015)

The data cover the survey period 2008-2013 and no UK or GB comparable figure is available. What the data show is that years of education have almost exactly the same very small effect on the likelihood of being employed in NI. In the US and the Republic of Ireland, years of education and literacy have a far greater effect on employment possibilities. The figures for numeracy tell a similar story, although numeracy has a much lower effect on employment across the board.

Chart 17: Effect of Years of Education on likelihood of Employment and Wages



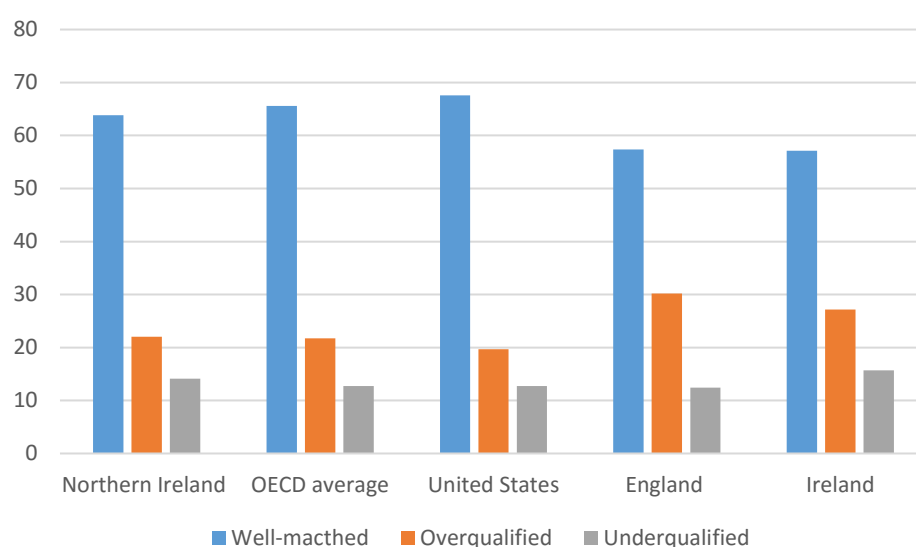
Source: OECD Survey of Adults Skills (2015)

The ‘brain drain’ from Northern Ireland may explain the differing effect of years of education on employment prospects. If those with more years of education are attracted to employment outside Northern Ireland this may mean that those left behind who do find employment have comparatively less education. However, when it comes to the effects of skills on wages NI tells a very different story. Years of Education have a very significant effect on average wages, above the OECD average and greater than either England or the Republic of Ireland. What Charts 16 and 17 show is that while gaining employment may not be that dependent on years of education, moving up the wages distribution very much is. This mismatch could explain why NI manages to maintain such a high level of workers with no qualifications and relatively low wages.

Most government programmes aimed at re-skilling or up-skilling focus on getting workers into employment, very few focus on using increased education to boost wages. Programmes in NI such as *Essential Skills* focus on literacy, numeracy and basic IT skills as a means to gaining employment. Based on the statistics in Chart 16 this focus is warranted because basic skills play as much of a role in gaining employment as formal education. However, this focus may have unintended effects on labour productivity. Higher wages are predominantly driven by higher labour productivity (Dearden, Reed & Van Reenen, 2006) and in NI higher wages are generally seem to be associated with years of education. It is not difficult to see a clear connection between greater educational attainment and higher labour productivity and ultimately a higher wage economy.

It would be misleading, however, to cast the problem of skills as merely one of supply. While years of education may be associated with higher wages, the data do not suggest that gaining years of education will ultimately lead to higher wages. With such a shortage of skills in the labour market. One would expect NI workers and jobs to be highly mismatched. However, the data suggests that workers in NI are neither more underqualified or overqualified than their comparators.

Chart 18: Qualification mismatch by Country/Region



Source: OECD Survey of Adults Skills (2015)

The problem of a lack of skills in NI may be due as much to lack of demand as it is to lack of supply. Government programmes that induce upskilling will ultimately be futile if firms in NI do not use or properly reward skills. The theory of a low-skill/low-wage equilibrium has been examined for

the UK economy (Wilson & Hogarth, 2003) and it would seem that NI falls into a category of UK regions where a high volume of low wage employment breeds a low level of skills acquisition. The interaction between employment prospects and skills acquisition in NI requires more study to make further policy recommendations in this area.

Capital

The other cross sectoral issue for productivity in NI is the combination of labour and capital inputs used in the production of goods and services. NI could have a workforce just as educated and skilled as the rest of the United Kingdom, but if firms in the rest of the UK match investment in human capital with investment in physical capital, productivity in NI would struggle to keep pace.

As mentioned earlier the absence of official data on investment means that there is no reliable figure for capital productivity in NI. There have been efforts to calculate Gross Fixed Capital Formation (GFCF), the main component of investment, for NI. However, these efforts have been the subject of intense discussion between NI Statistics and Research Agency and the Office for National Statistics. While the ONS estimates of GFCF for NI do come with a strong health warning they do provide the greatest detail on the industrial breakdown of capital investment. Table 11 shows estimates of GFCF by sector in NI.

Table 11 gives an indication of the regional breakdown of investment. However, it must be stressed that these are just estimates and constructing any measure of capital productivity from them would be misleading. To illustrate the scale of possible inaccuracy, the NI Statistics and Research Agency produced their own estimate of GFCF for NI in 2015 as a part of a project to develop national accounts for NI. The produced a figure of £4bn for 2012 which contrasts sharply with the £6.9bn figure produced by the ONS for the same year. The NISRA estimate uses a methodology similar to that used to calculate total UK GFCF. The ONS estimates of regional GFCF are apportioned out from total UK GFCF rather than being calculated from existing NI expenditure data. Further work will be carried out to reconcile these estimates, but for the moment they can only serve as a rough guide.

Table 11: Gross Fixed Capital Formation in Northern Ireland by Sector 2014

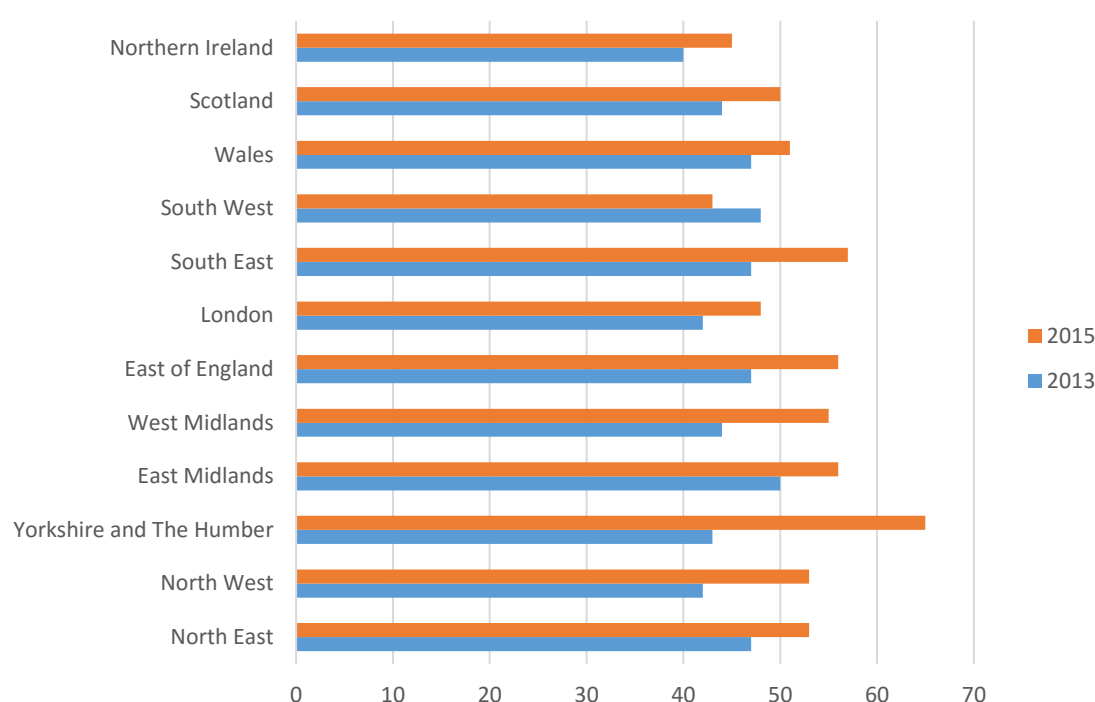
Sector	GFCF
Agriculture, forestry and fishing	711
Production	228
Of which Manufacturing	756
Construction	297
Distribution; transport; accommodation and food	556
Information and communication	201
Financial and insurance activities	137
Real estate activities	3103
Business service activities	170
Public administration; education; health	925
Other services and household activities	117
Total GFCF	7199

Source: ONS Regional Gross Fixed Capital Formation (2015)

Note: Figures presented are NOT national statistics

Despite methodological differences both the NISRA and ONS measures find NI to have the lowest per population investment levels in the UK. The low levels of physical capital investment in NI are possibly as much of a drag on productivity as low levels of human capital investment or skills. While there are more data to indicate why accumulation of human capital in NI is low by regional standards, there is little evidence of the same for physical capital investment. One possible source of information however is the UK wide Innovation Survey which measures the actions firms have taken to improve either their products or methods of production. It covers areas such as research and development and machinery acquisition but also covers areas such marketing investment and business organisation. It is not a perfect indicator of physical capital investment but does give some insight firm behaviour with regard to investment.

Chart 19: Percentage of Innovative Firms by Region 2013 & 2015



Source: ONS UK Innovation Survey (2015)

Chart 19 shows that NI had the least proportion of innovative firms in the UK in 2013 and owing to a substantial collapse in innovation in the South West of England, had only the second lowest proportion in 2015. In the production sector manufacturers of electrical and optical equipment were the most innovative (87 per cent) whilst in the Services sector financial intermediation firms (70 per cent) were the most innovative. More interestingly the firms who reported no innovation activity were asked to detail why this was so and of the firms who answered the most common response (19 per cent) was “No need due to market conditions”. This finding goes to the heart the investment issue in NI. There is no government policy that can reasonably be expected to induce firms to increase investment or innovation. If prevailing market conditions do not induce firm to invest or innovate then they will not.

Policies promoted by the Norther Ireland Executive to lower Corporation Tax are premised on the theory that if firms retained a larger share of their profits they would use this to further investment or innovation. Whilst the evidence from the Innovation Survey does not by any means

refute that hypothesis, it certainly does call it into question. Without more reliable data on investment it is not possible to be prescriptive about how policy should meet this challenge. The existing data does give some indication of the mindset of firms, and it would indicate that there is a cultural problem with investment and innovation among certain firms and this lies at the heart of the lack of investment in NI

5. CONCLUSION

The productivity gap between NI and the rest of the United Kingdom is a significant problem, but it is more complex than it first seems. While the mix of employment plays a role in that gap, the truth is that in several industries NI falls well short of its UK counterparts. As was shown in section 2, the problem is not that NI employment is more reliant on an industry like agriculture. It is that NI manages to produce less output per person within the agriculture sector. There are individual reasons within individual sectors as to why there is such a large productivity gap, but a residual productivity gap is likely to be explained by a lack of investment in capital, both human and physical.

The motivations surrounding the lack of investment are key to rectifying the situation. It is not enough to lament the lack of skilled workers in the economy without acknowledging that in many cases the labour market simply does not demand or reward such skills. A firm that does not feel the market compels them to innovate their products or processes will not suddenly feel the need to do so with larger retained profits. Bridging the productivity gap will require action within specific sectors.

The culture change will need to be one that encourages workers not to seek the bare minimum of qualifications necessary just to enter the workforce but enough to sustain career progression. It will also require an industrial policy that seeks to persuade firms, and smaller firms in particular not to be content with status quo but to engage in permanent investment in order to grow in the domestic market and beyond. Both these strategies would begin to move NI's economy in a new direction. If current policies are maintained it would seem highly unlikely that the present perilous productivity situation will change.

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