

Scottish Productivity - what does new data and research tell us?

Key points:

- The **latest data for Scottish productivity** (in terms of output per hour worked) shows a significant rise in 2018, up 3.8%. This is largely due to a decline in hours worked (-2.3%) as opposed to higher output (+1.4%). In comparison, UK productivity rose by only 0.5% in 2018.
- However, there is some **uncertainty over the Scottish hours worked figures** as other ONS estimates for Scotland in 2018 shows a small rise (+0.6%) over 2017 rather than a -2.3% fall.
- A **sectoral breakdown** of overall productivity shows some unusually high gains in some sectors in 2018, including **Manufacturing (+8%), Transport & Storage (+12%), Hotels & Catering (+13%), Administrative & Support Services (+9%) and Other services (+17%)**. Analysis of the latest productivity data at an industry sector level also shows:
 - At the **UK level**, productivity grew by less than 1% in 2018 for all but one of these very fast growing Scottish sectors;
 - In all of the fast growing sectors the majority of the productivity rise was due to a **fall in hours worked**, as opposed to an increase in output, and in some cases the discrepancy in contributions was extreme;
 - The Scottish data shows large and erratic year-on-year changes in many industry sectors, again usually due to large changes in hours worked rather than output;
 - The cause of such large shifts, if accurate, in hours worked is unclear.

Overall, the erratic nature of the annual shifts in sectoral productivity lead to significant doubts over the robustness of the, still experimental, disaggregated Scottish productivity data.

- The latest productivity figures highlight that, throughout time, the **results for Scotland are more noisy (i.e. erratic) than for the UK**, which is most likely mainly due to higher uncertainty (caused by smaller survey sample sizes) in the regional labour market data.

- In terms of **international rankings**, revised OECD estimates have reduced the gap between the UK (and Scotland) and leading nations by about a third (i.e. from a UK differential of 24% versus the USA to one of 16%). This is due to a relatively minor correction in methodology, and, as many more areas of potential inconsistency remain, this puts doubt over the accuracy of the differentials and of the rankings.
- The fact that countries like Denmark and Belgium have consistently seen productivity levels around 75% higher than those measured for Japan and New Zealand also brings into **question how useful productivity is as a measure for identifying successful economies**.
- **Scotland's international ranking** (using the revised OECD data) shows no change since 2007 (16th), which means the Scottish Government has failed to reach its target of improving this ranking by 2017. However, doubts over how relevant such international rankings are means that such a failure may be of little consequence.
- Scottish productivity figures are significantly affected by the inclusion or exclusion of **North Sea activity**. At present the onshore figures include offshore employment (but not output), thereby slightly reducing Scotland's recorded onshore productivity. However, if offshore output were to be included then it would obscure any onshore productivity problems, due to the extremely high productivity related to the oil and gas industry. Such data consistency issues mean that a comparison of Scottish, UK and international productivity figures is not straightforward.
- **Past government policies** to improve productivity have focussed on investment in skills and R&D, with mixed results, especially post 2007. Often political and/or economic difficulties exist when attempting to implement the 'best' policies, which can lead to inefficient initiatives being pursued.
- **Future government policies** might be better aimed at less explored areas. Learning from the **best performing companies** has considerable scope for spreading good productivity attributes more widely. In **post school education**, a greater focus could be put on encouraging greater creativity and straddling disciplinary boundaries. **Environmentally friendly infrastructure investment** might lead to productivity breakthroughs that could assist in dealing with climate change risks. **New data sources** might also prove fruitful in finding causal links that impact on policy.
- **In conclusion**, while Governments on-going obsession with improving productivity remains valid, the ways in which they currently go about setting targets and policies may not be optimal.

INTRODUCTION

This paper looks at productivity, as measured by output per hour, and what new insights have emerged as a result of the latest data and research undertaken with respect to both the Scottish and UK economies.

Section 1 looks at the latest Scottish and UK data, which now includes estimates for 2018 as a whole. This section also highlights: trends over the past 20 years; how such trends break down when looking at industrial sub sectors; some worrying data issues; and significant sectoral Scottish-UK differentials.

Section 2 looks at international comparisons of productivity. This includes: a review of UK data in light of recent OECD cross country research; analysis of how the Scottish Government has performed in relation to its productivity target and to the recent OECD research; and reasons that might legitimately explain cross country differentials in productivity.

Section 3 briefly considers why traditional routes to improving productivity have proved disappointing, especially of late, and how pursuing some new, more radical, initiatives might improve matters.

Why productivity?

Before looking at the data it is worth revisiting why productivity is so important and why we need to understand it better.

Essentially productivity is the output produced by a single unit of labour, which is usually measured in terms of per worker or per hour worked. This paper concentrates on ‘output per hour’ as it gives a truer measure of productivity over time by adjusting for part-time vs full-time, for annual leave, etc.

Given a fixed workforce, and adjusting for inflation, the economy grows by each worker (or working hour) producing more output, in other words by productivity rising. This also allows for wages to rise, as each worker is producing more and so can be rewarded more.

Why now?

Post the Financial Crisis of 2008 there has been a widespread slowdown in productivity growth. This ‘Productivity Puzzle’ is a worldwide issue but has been particularly strong in the UK and has led to a virtual standstill in real (inflation adjusted) wages and very slow growth in living standards.

What little improvement there have been in living standards (GDP per capita) has been largely down to the surprisingly good labour market performance post recession, with employment and unemployment rates being at record highs and lows respectively.

While the slowdown in productivity growth had initially been viewed as a temporary phenomenon, gradually returning to pre recession rates over time, it is now expected to be a more long lasting feature. The Office for Budget Responsibility (OBR), for example, expect productivity of just over 1% per year in the foreseeable future, rather than the historic 2+% rate. Even this lower rate is largely ‘built in’ by the modellers to the forecasts, as any such, partial, rebound has yet to emerge.

What to do?

The obvious issue then is - how do you boost productivity? Government’s have been struggling with this issue ever since the US ‘Productivity Paradox’ of the 1970’s with little success in understanding either the root cause of the slowdown(s) or how to rapidly return to growth. Since the Great Recession many studies have tried to explain the causes of the current slowdown in UK (and Scottish) productivity growth, as well as what policies are best followed to deal with it. However, the subject remains difficult to understand and to address.

After considering where Scotland currently sits in terms of recorded productivity levels and growth rates, this paper highlights some of the uncertainties around the data as well as looking at some new and possibly more radical ways to try and kick start productivity growth again.

Note: This paper largely avoids duplicating analysis published in previous Scottish Trends reports, in particular:

- ‘Scotland’s Economic Growth and Productivity Slowdown - Explanations, Implications and Potential Solutions’ of March 2018 (see <http://scottishtrends.co.uk/wp-content/uploads/2019/04/Scotlands-Economic-Slowdown-080318-pdfv.pdf> , which includes sections on: Scottish historical data; policy analysis by the OECD, Harris & Moffat and others).
- ‘Productivity Briefing Note’ of October 2015 (see <http://scottishtrends.co.uk/wp-content/uploads/2016/03/SCDI-Productivity-paper-III.pdf> , originally done for the SCDI and which includes sections on: growth accounting breakdown; Multi (or Total) Factor Productivity; and the post recession ‘productivity puzzle’).

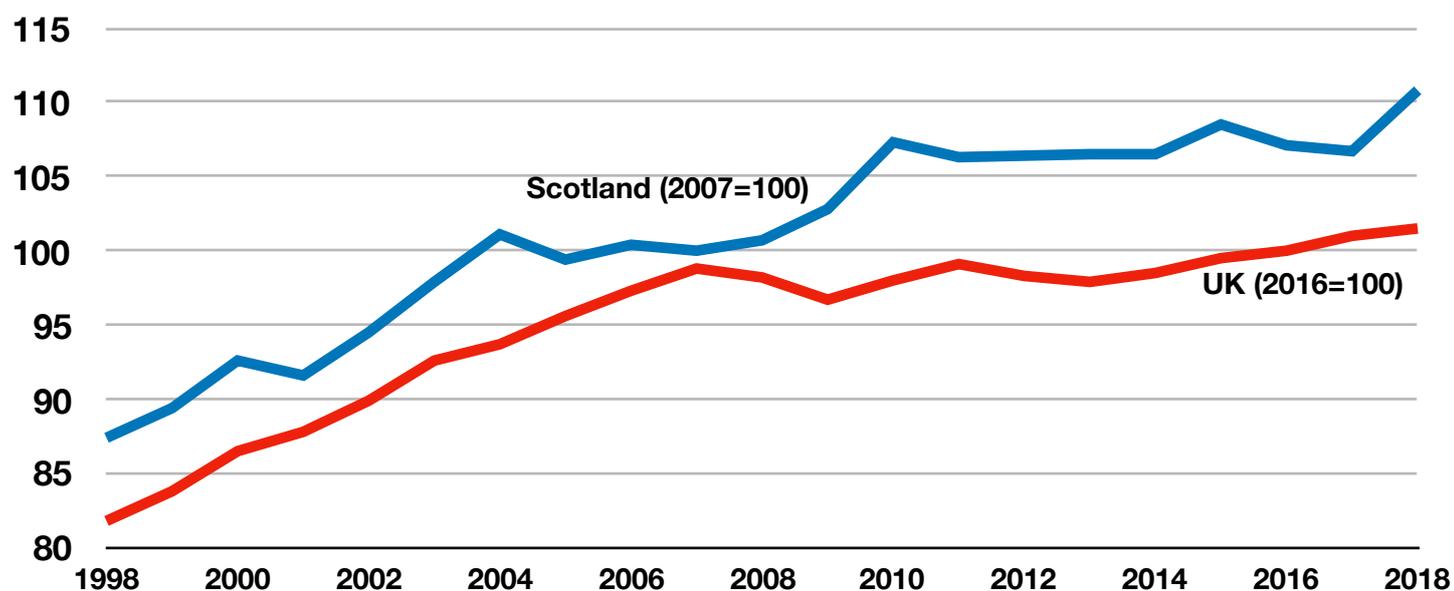
Other useful background papers include:

- Bank of England analysis ‘Productivity Puzzles’ by Andrew Haldane from March 2017 (see <https://www.bankofengland.co.uk/-/media/boe/files/speech/2017/productivity-puzzles.pdf?la=en&hash=708C7CFD5E8417000655BA4AA0E0E873D98A18DE>).
- Productivity Insights Network (PIN) overview ‘Productivity Perspectives Synthesis’ by Phillip McCann from November 2018 (see <https://productivityinsightsnetwork.co.uk/app/uploads/2018/11/Productivity-Perspectives-Synthesis-updated-21.11.18.pdf>).

SECTION 1: LATEST PRODUCTIVITY DATA FOR SCOTLAND AND THE UK

Recent Scottish Government and ONS publications have provided estimates for Scottish and UK productivity in 2018. This suggests yet another poor year for the UK, +0.5%, but an unexpected boost for Scotland, +3.8% (see Table 1). The rise in Scottish productivity is dominated by a fall in hours worked (-2.3%) alongside a small rise in output (+1.4%).

Figure 1: Labour Productivity (output per hour), Scotland and the UK, 1998 to 2018



Sources: ONS 'Labour Productivity, UK: October to December 2018', April 2019; Scottish Government, 'Labour Productivity Statistics 2018 Quarter 4', May 2019.

Note 1: The Scottish measure excludes the Continental Shelf (i.e. oil and gas related, and very high productivity, activity) in terms of output (GDP) but largely includes it in terms of employment while the UK measure includes Continental Shelf data for both output and employment;

Note 2: Alternative data (to 2017 and excluding the Continental Shelf) is also available from the ONS for all UK regions, including Scotland.

Points of interest:

- Data for '**hours worked**' are sourced from ONS productivity statistics but differ from those published in the ONS 'Regional labour market: Headline indicators for Scotland' publication (see Table 6 therein) which are based on the Annual Population Survey. For example, the APS data shows a rise in hours worked (+0.6%) in 2018, as opposed to a fall (-2.3%), which would result in a much smaller improvement in productivity. While these two figures are at odds with each other, given the size of the surveys they are based on, the difference may well be within combined sampling error margins;
- For Scotland, the **annual average productivity growth rate** from 1998 to 2007, the pre Great Recession period, was 1.5%. More recently (2013 to 2018) it has fallen to 0.8%;
- Similar analysis for UK productivity shows a slowdown from 2.1% a year (1998 to 2007) to 0.7% (2013 to 2018);
- While Scotland's productivity growth of late has been marginally above that seen for the UK, this advantage is wholly down to the improvement seen in 2018.

Analysis of productivity by industrial sub sector

Published data allows for a breakdown of the whole economy productivity figures by industrial sub sector. Table 1 highlights: the relative productivity strength of each sub sector; the degree to which this has changed between the 1998 to 2007 period and the post recession ‘slow growth’ period of 2013 to 2018; and growth in the latest year, 2018.

Table 1: Changes in industrial sub sectors (annualised) productivity growth rates

Sub sector	Scotland				UK			
	<i>Level (2016)</i>	1998-2007	2013-2018	2018	<i>Level (2016)</i>	1998-2007	2013-2018	2018
Whole economy	32	1.5	0.8	3.8	33	2.1	0.7	0.5
Manufacturing	40	4.4	2.0	8.3	37	4.7	0.9	0.3
- Food & drink	-				34	2.6	-0.3	-1.7
- Textiles	-				38	7.5	0.1	2.9
- Chemicals	-				101	7.0	1.2	3.3
- Computers etc	-				38	4.9	1.7	-1.6
- Transport equip	-				44	4.8	2.2	3.1
Construction	23	0.2	0.7	-1.1	25	0.7	1.9	-1.5
Services	32	1.3	0.7	3.6	33	1.9	0.8	0.8
- Wholesale & Retail	26	3.1	0.8	1.1	24	2.2	3.4	3.7
- Transport & Storage	27	2.7	1.4	12.1	27	2.6	0.1	0.6
- Hotels & Catering	17	-0.7	4.3	12.8	17	1.6	0.4	3.9
- Info & Comm's	33	1.7	1.0	3.1	44	6.2	1.2	0.7
- Finance	58	4.0	0.5	1.1	65	4.3	-0.7	-4.3
- Real Estate	291	-3.4	-3.0	-16.4	285	-3.2	-0.5	-1.0
- Professional	29	2.4	0.9	3.4	28	3.0	2.4	4.3
- Admin & Support	16	3.2	-0.4	8.9	19	2.2	1.6	1.0
- Public	28	-1.2	0.0	-0.2	27	0.0	0.0	-0.9
- Other	24	1.1	0.9	17.3	26	-0.7	-0.5	-0.5

Sources: ONS ‘Labour Productivity, UK: October to December 2018’, April 2019; Scottish Government, ‘Labour Productivity Statistics 2018 Quarter 4’, May 2019.

Notes: (1) ‘Level’ relates to the value (in cash terms) of output produced per hour. Hence, on average, Manufacturing activities have higher productivity than Service activities.

(2) Real Estate figures are highly distorted as output is imputed for all households while related employment applies to very few occupations.

(3) Data on UK ‘Other services’ is approximated from ONS data for ‘Arts & recreation’ and other ‘Other services’.

Points of interest in relation to analysis of sectoral productivity growth include:

- Scottish productivity growth in 2018 was unusually high in a number of sectors, including: **Manufacturing (+8%); Transport & Storage (+12%); Hotels & Catering (+13%); Administrative & Support Services (+9%); and Other services (+17%)**. Such big shifts in sectoral productivity are unexpected but not uncommon in Scotland (see below). In the past they have often either canceled each other out or have been spread across the years, whereas in 2018 a number of such big changes coincided and also went in the same direction, up.
- In all but one of these high growth sectors (**Hotels & Catering**) the **comparable productivity change at the UK level was much lower**, at 1% or less.
- In all of these sectors **the majority of the rise was due to fall in hours worked**, as opposed to an increase in output, and in some cases the discrepancy in contributions was extreme. For example, less than 1% of the 17% rise in **Other services** productivity was due to an increase in output.
- **Very large annual changes in sectoral productivity have been commonplace** since 1998 (as far back as the data goes), often reaching double figures and considerably more volatile than their UK counterparts. For example:
 - Annual **Manufacturing** productivity growth has exceeded 10% on three occasions in the last twenty years, whereas at the UK level it has never exceeded 6.3%;
 - **Construction** productivity grew by over 26% in 2015 then fell by 13% in 2016;
 - The annual rise or fall in **Hotels & Catering** productivity has exceeded 10% in five of the past twenty years and exceeded 5% in ten of the past twenty years. In comparison, at the UK level it has only exceeded 5% twice over the same period;
 - **Administrative & Support services** productivity rose by over 22% in 2009;
 - Within Government services, **Health & Social Work** saw a 13% increase in productivity in 2009;
 - Similar Scotland vs UK sectoral productivity growth variance contrasts can be seen for **Transport & Storage, Information & Communications, Financial services and Other services**.
 - In almost every instance of a large change to Scottish productivity the biggest source of the change has been a fall or rise in hours worked, rather than in output. For example, in 2009 **Administrative & Support (A&S) services** output rose by only 1% compared to the 22% increase seen in productivity.
- **Reasons why the ‘hours worked’ might change** include: more/fewer jobs; a shift to/from part-time vs full-time; and longer/shorter working hours per week. Workforce jobs data suggests that any change to the number of jobs in 2018 does not explain much of the productivity change. For example, the number of **A&S** jobs declined by less than 1% in 2018. Equally, in 2009, the number of A&S jobs fell by only 2%.

- The previous point suggests that changes in work patterns were the primary source of falling 'hours worked'. However, annual changes on the scale recorded seem unlikely and so **doubts must be harboured over the reliability of the disaggregated 'hours worked' data.**
- The **'Real Estate' sector** saw a very large fall in productivity in 2018. This sector is an oddity amongst industrial sectors in that it consists largely of imputed rent with regards to house owners. In other words, all housing is treated as if it was rented and this leads to a value that comprises around 12% of all economic activity (GDP). In practice of course very little is rented and the employment associated with this sector (estate agents, letting agencies, estate management companies etc) is tiny compared to 'output', hence the very high 'value level' of productivity seen for this sector in Table 1. However, the sectors impact on productivity is limited as the, very low, employment weight means that it has little influence on the overall productivity estimate.
- It is important to remember that these disaggregated industry productivity estimates are still **'experimental statistics'**. Rather than be put off by the doubts over the robustness of some the data, they are better viewed as being at an early stage in providing useful insights into productivity trends further down the line.

Overall, the published productivity figures suggest that, at both an aggregate and at a disaggregated level, the results for Scotland are much more noisy than for the UK, which is mainly due to higher uncertainty with regards to the regional labour market data. This heightened uncertainty may be connected to sample size levels.

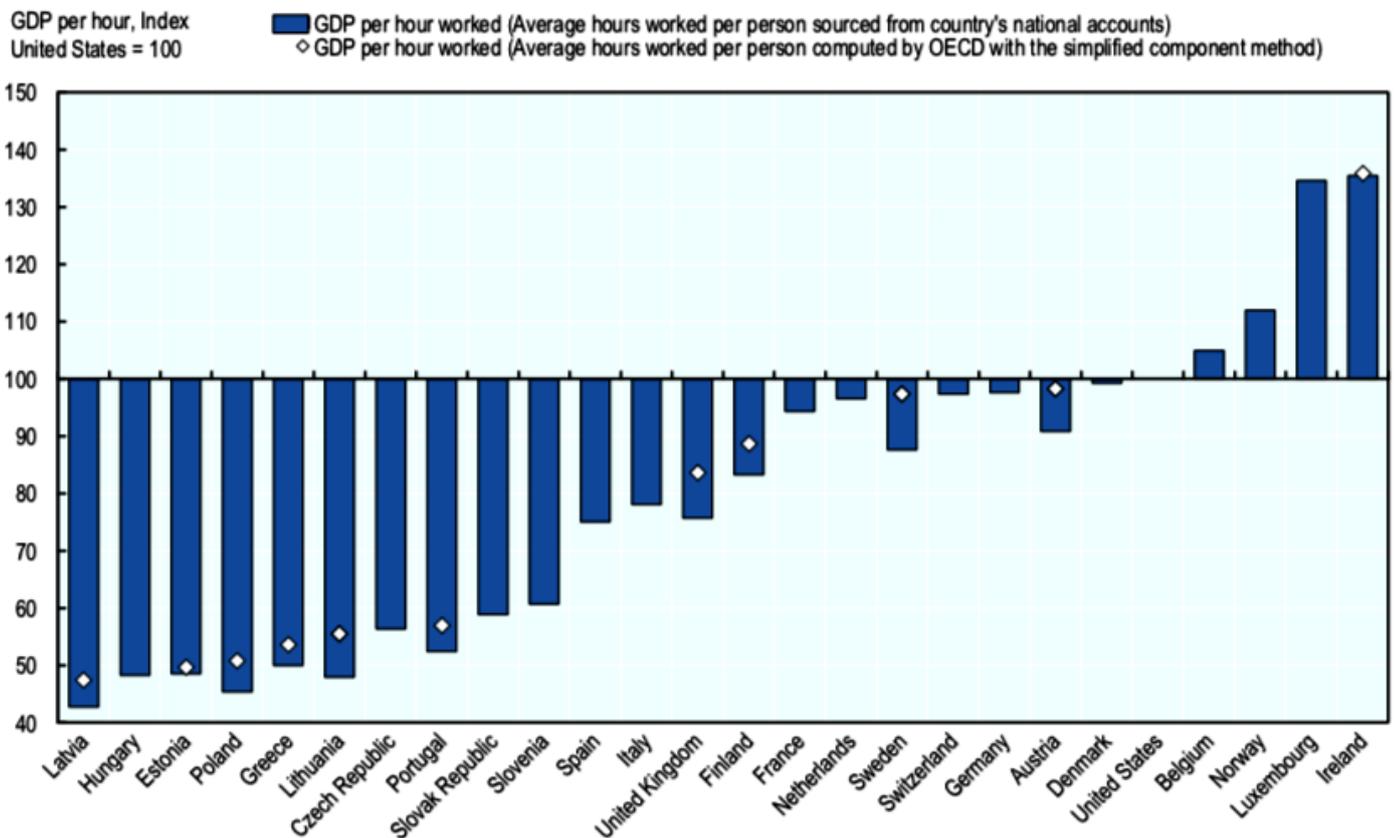
SECTION 2: INTERNATIONAL COMPARISONS OF PRODUCTIVITY

Recent OECD based revisions to UK productivity

It has long been recognised that the UK (and Scotland) has had a relatively poor level of productivity in comparison to many other developed economies. For example, in 2016 the UK gap with countries like the USA, Germany and France was estimated to have been around 25%. However, new research by the OECD (see [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=SDD/DOC\(2018\)12&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=SDD/DOC(2018)12&docLanguage=En)) suggests that this underperformance has been over estimated (see Figure 2).

Figure 2: Estimated labour productivity gaps, selected OECD countries, 2016

Gaps in GDP per hour worked as measured using average hours worked from official national accounts and from the OECD LFS based simplified component method, United States = 100



Note: The national accounts series is calculated from the OECD's Productivity Database using all national accounts data. The counterfactual series is calculated only for those countries using an unadjusted direct method and in exactly the same way as the national accounts series with the exception of average annual hours, which are based on the simplified component method previously discussed.

Source: National accounts estimates from OECD Productivity Statistics (database), April 2018. Unpublished OECD estimates based on European Labour Force Surveys results and Eurofound (2015) for statutory leave for European countries, and the Current Population Survey (CPS) microdata and an estimated 15 days of annual paid annual leave and public holidays (Rav et al., 2007) for the United States. Estimates first presented in OECD (2004).

Source: OECD, 'International Productivity Gaps: Are Labour Input Measures Comparable?', 2018

This new research takes into account different methodologies used to calculate output per hour, mainly with regards to estimating consistent 'hours worked' data, and finds that some countries perform notably better once this adjustment has been made, including the UK.

The UK differential, in comparison to the USA, shifts from a -24% differential to a -16% differential. In other words, one third of the productivity shortfall disappears. Similarly Scotland has been adjusted from a 27% shortfall to one of 18%. *(Note that this finding is only likely to affect the differential between countries, it is unlikely to have much bearing on the poor productivity performance of the UK and Scotland since 2008.)*

Other big winners have included Sweden, moving from a differential of -12% to being amongst the leading nations, and Iceland, moving from a differential of -33% to just -11%. *(Note that the leading nations of Norway, Luxembourg and Ireland are largely ignored in this analysis due to exceptional circumstances that benefit their productivity estimates. Specifically, these are: in the case of Norway, its reliance on very high productivity oil and gas output; in the case of Luxembourg, its high GDP on account of substantial cross border work commuting from France Belgium and Germany; and in the case of Ireland, its high GDP on account of substantial 'headquartering' of large international (but often US originated) companies like Apple, Google and major pharmaceutical manufacturers. In each case such a positive distortion means that the published figures do not reflect the average productivity of a typical worker or working hour in these countries.)*

In the UK's case, while 16% is still quite a big difference to the leading countries it is also a significant closing of the gap. This makes it potentially easier to explain the remaining difference through other known causes of such differentials. For example:

- the UK's lower share of Manufacturing may explain some of the differential, as Service industries typically have lower productivity levels than Manufacturing industries;
- the UK's high employment rate may explain some of the differential as the higher the rate the more low skilled workers tend to be added to the workforce, who typically exhibit lower productivity.

Furthermore, considerable doubt must exist over the accuracy, both in terms of actual estimates and consistency across countries, of productivity figures relating to: Financial Services, Public Services (including Health and Education), Real Estate and Construction, which for many economies (including Scotland) cumulatively account for 50% of economic output. In other words, great care needs to be applied when making judgments comparing national productivity levels.

Lessons to be learnt from a study of international productivity levels are discussed in more detail below. However, one point to note here is the degree of uncertainty that exists over national performance even when productivity gaps appear to be large. For example, revisions from just one, relatively minor, change to methodology have led to Iceland moving from being a clear productivity laggard to performing just below the level of the leading economies.

Analysis of Scotland's international productivity position and the Scottish Government's productivity target

In 2007 the Scottish Government set 'an improvement in Scottish productivity to rank in the top quartile of OECD countries by 2017' as one of its main economic targets. An SNP led Government has been in power since that time so that the impact of one parties economic policies on productivity performance can legitimately be judged without the potential for interference from a different political agenda. *(Note that the actions of the UK Government, which is obviously not SNP led and has changed over the period looked at, will also have affected Scottish productivity. However, such circumstances were clearly understood at the time that the Scottish Government set its target.)*

The latest figures show Scotland's ranking amongst OECD countries to be unchanged, at 16th, in all years since 2007. This is towards the bottom of the second quartile. *(Note the new position incorporates the upwards revisions to UK data by the OECD discussed earlier. Before the revision Scotland ranked consistently 19th, towards the top of the third quartile.)*

But how realistic was this target in the first place? Table 2 shows the (updated for OECD 2018 research) scores for all 37 comparator countries for a selection of years covering 2000 to 2017. It highlights a number of key points:

- **First**, the lack of comparative change (vs USA = 100) in many countries over time;
- **Second**, the exceptions to the first point are almost all related to countries with considerable scope for catch up, principally those in Eastern Europe and in less economically developed economies like Chile, Korea and Turkey;
- **Third**, the biggest movers were: i) Ireland (UP) due to exceptional circumstances relating to the notional relocation of international companies output. In particular, Irish productivity rose by 16% between 2009 and 2011 and again by a dizzying 29% in 2015 alone. Most, if not all, of this post 'Irish economic miracle' productivity rise can be put down to accounting practices rather than 'real' changes in output per hour worked by Irish employees; ii) Norway (DOWN in score terms) due to fluctuations in the oil price affecting GDP;
- **Fourth**, excluding those countries with exceptional circumstances (Ireland, Luxembourg and Norway), then the highest performers are Belgium and Denmark, not countries normally associated with outstanding economic strength;
- **Fifth**, Denmark and Belgium have consistently seen productivity levels around 75% higher than those measured for Japan and New Zealand, even though the latter are not countries renowned for their economic backwardness.

These findings beg the question - beyond the discovery of substantial raw material resources (Norway), distortionary tax incentives (Ireland and Luxembourg) or catch up (Eastern Europe and South East Asia) - how realistic is it for government's to attempt to target altering its 'headline' productivity ranking?

Table 2: Estimated Productivity Levels (output per hour) across OECD countries: 2000 to 2017 (Current prices and current PPP's, USA = 100)

Country, by 2017 ranking	2000	2007	2017	Change in score since 07	Change in ranking (exc. top 3) since 07
1 Ireland	86	92	138	46	-
2 Luxembourg	141	138	137	-1	-
3 Norway	121	130	115	-15	-
4 Belgium	108	102	107	5	up 1
5 Denmark	93	91	106	15	up 7
6 Austria	93	92	100	8	up 5
7 Germany	95	94	100	6	down 3
8 USA	100	100	100	0	down 1
9 Netherlands	104	103	99	-4	down 5
10 Switzerland	93	95	99	4	down 2
11 Sweden	100	101	99	-2	down 5
12 France	98	94	97	3	down 3
13 Finland	91	90	91	1	no change
14 Iceland	78	81	91	10	up 1
15 UK	90	88	85	-3	down 1
16 Scotland	81	79	82	3	no change
17 Australia	80	77	82	5	up 2
18 Italy	89	78	80	2	no change
19 Spain	74	73	77	4	up 1
20 Canada	83	78	74	-4	down 3
21 Japan	70	67	64	-3	no change
23 Turkey	40	48	61	13	up 6
25 Lithuania	32	46	60	14	up 5
26 New Zealand	63	59	60	1	down 2
29 Portugal	54	55	57	2	down 3
30 Greece	61	62	54	-8	down 7
31 Poland	37	41	54	13	up 3
37 Mexico	33	31	30	-1	no change

Source: Scottish Government, 'International Comparisons of Productivity - Economy Indicator 2017', xlsx tables on website, 2019.

Notes:

- 1) Table 2 shows top 20 performers then selected countries; less developed economies shown in **GREEN**
- 2) Top 3 countries (**SHOWN IN RED**) rankings are due to the exceptional circumstances that apply in each case, as discussed in the main text.

Bearing in mind these doubts over the validity of setting a productivity target, what lessons might actually be learnt from Table 2?

First, it is rarely simple to understand why a country has a particularly high ranking or why it has risen noticeably over a short period of time. To take Belgium and Denmark as examples:

- it is unclear why **Belgium** has consistently topped the productivity rankings (excluding the three exceptional, and distortionary, circumstance economies noted before). This may be to do with industrial make-up, with measurement issues, or with other Belgian specific issues. Certainly it is not the case that Belgium is widely held to be a classic case of economic success in the wider sense;
- it is unclear why **Denmark's** relative productivity score has risen post 2000. It is noticeable that the relative improvement has been quite recent, post 2009. The next biggest gainers, score wise, have been **Iceland and Austria** and again these gains have been relatively recent, mostly post 2014 for Iceland and post 2011 for Austria. It may be no coincidence that all these relative shifts occurred after the Financial Crisis. While we are aware of areas of the economy that have suffered and dragged down productivity since then, for example with respect to financial services and real estate, it is less clear which industries have provided greater scope for improving productivity levels over the past decade.

Second, it can also be difficult to understand why countries like **Japan and New Zealand** are so consistently low ranking. Clearly Japan has had long standing economic problems but its economy still has many strengths, including a strong (net) exports performance, which is usually (as in the case of Germany) the sign of a highly competitive and productive economy. While New Zealand has often ranked quite lowly in economic indices it is much more successful in more general terms e.g with respect to cross country Quality of Life indices.

Third, the clearest evidence for improving national productivity comes in relation to those countries that have the greatest scope for catch up. In Table 2 this is most obviously seen in the case of Eastern European countries that are still benefitting from the shift away from heavily state managed economies to more open and integrated (in particular with the EU) ones. However, while being in such a catch up position may offer considerable scope for productivity improvements, by simply copying the innovations already long in place elsewhere, it is not a guarantee of success, as can be seen in the stand still performances of countries like Mexico and even Portugal.

Fourth, while such a 'catch up' strategy may work in the extreme, it appears to be less relevant once a certain level of development has been reached. This is reflected in the inability of Japan and New Zealand to catch up on their considerable laggard status, never mind countries like the UK and Scotland where the gap is still clear but much smaller.

Scotland and the offshore economy

Inclusion of the Continental Shelf (i.e. the offshore economy) presents a number of problems when interpreting Scottish productivity, both in nominal and in relative terms.

First, figures for the level of overall (i.e. onshore plus offshore) Scottish productivity would undoubtedly be higher than those published for onshore productivity alone, as the oil and gas sector is highly productive, needing few employees to produce a large quantity of output. Indeed, at present, if the Scottish figures were to include activity in the Continental Shelf then they could improve the level of Scottish productivity by up to 10%.

Second, at present onshore Scottish productivity includes the labour element (jobs or hours worked) but excludes the output element. Hence, published figures currently underestimate onshore productivity, although probably not to a large extent. *(Note: this inconsistency is due to the GVA figures used to produce productivity excluding offshore output but the labour force figures associating all workers and hours with one of the twelve onshore economic regions of the UK and so no labour inputs are directly associated with offshore activities.)*

Third, while Scotland's productivity ranking and performance would undoubtedly improve in GDP per hour terms if the Continental Shelf were added in, it would also introduce a clear distortion. This is because doing so ignores the fact that such a raw materials based sector tends to be exceptional in its circumstances and its productivity advantages. As a result the new figures could disguise (onshore) productivity problems that Scotland might have. *(Note: this is also true in countries like Norway where its onshore productivity needs to be considered separately from its offshore productivity.)* Furthermore, overseas ownership is prevalent amongst companies operating in the North Sea and so the benefits to Scotland of this high productivity sector can be limited.

All of the above highlights that great care that needs to be taken in interpreting Scottish productivity statistics and in setting targets. It is likely that a number of different productivity related measures will need to be looked at in order to gain a full picture of what is going on within the Scottish economy.

SECTION 3: IMPROVING PRODUCTIVITY

Improving productivity is the preferred way to raise economic performance as it is more likely to result in a rising standard of living (GDP per capita). However, it remains a very difficult goal for governments to achieve.

For example, and as seen above, despite the Scottish Government having a productivity target over the past decade there has been no relative improvement in Scotland's international standing. Equally the UK government has targeted improving productivity to try and regain a higher GDP growth rate but again with little, if any, success. While Brexit has not helped, it is more of a side issue than part of the core problem.

What has caused this lack of success in the past and what might be done to improve the situation in the future?

Past productivity failings

The essential ingredients to improving productivity are fairly well understood, consisting of: a skilled and motivated workforce; good quality and widespread infrastructure; on-going investment in the latest technology; and an understanding and use of up-to-date processes and management techniques to combine these different elements.

Public sector policies to improve productivity have tended to concentrate on:

- improving skill levels;
- changing tax rates and incentives;
- improving the quantity and quality public sector investment;
- influencing the level of private sector investment and R&D spend.

Why then have such long understood and applied pro-productivity policies, increasingly, failed to produce results?

Problems with public investment

As the current debate over HS2 has again proven, strong concerns exist over the cost benefit of many major infrastructure projects. This has been the case for decades, with past examples including the Humber Bridge and the Channel Tunnel.

Much of this contention comes from the fact that such projects often have political roots. Given the lack of certainty pre project on costs and benefits this makes such projects amenable to ex-ante evaluations that support their case.

Other projects which might be viewed as highly attractive from a productivity point of view, like expanding flight capacity in the South East of England, are again mired in politics and in strong local opposition.

Major road expansions may be less controversial, in terms of usage, but can also be questionable in terms of their environmental impact and with regards to achieving the hoped for gains (e.g. the M25).

All of this makes the best strategy for allocating funding between various modes of transport (road, rail, bus, air, cycle, pedestrian) an extremely complex one.

Furthermore, using basic economic tools to help solve such problems, for example by introducing (even on a cost neutral basis) road charging, has proved too politically challenging for successive governments.

Problems with skills investment

While school attainment results continue to improve and higher education enrolment rates continue to rise, the impact of these changes on productivity is more difficult to identify.

Scotland's falling scores and rankings in relation to the OECD PISA exercise for 15 year old students may help explain this, measuring as it does their readiness to address real-life situations in the adult world, rather than their academic (exam) readiness.

Equally, past work by Dame Alison Wolf and by the Institute of Fiscal Studies (IFS) highlight the dubious economic benefits of some aspects of the existing UK Higher Education system.

In other words, while we appear to be being better educated, whether or not this is making us any more productive (in an economic sense) or innovative (in a more rounded sense) remains debatable.

Problems with changing taxes

In 2011 the final report from the Mirrlees Review, *Tax by Design*, was published by the IFS (see <https://www.ifs.org.uk/publications/5353>). However, little of its thoroughly researched recommendations have come to fruition.

In Scotland's case, this is despite the main author, Sir James Mirrlees, sitting on the Scottish Government's Council of Economic Advisers for many years.

Such inactivity suggests that the current generation of politicians and political parties find it difficult to put forward a persuasive argument to introduce or seriously amend:

- property tax (in terms of moving from council tax to land tax);
- road transport related taxation (in terms of moving from fixed costs to variable costs);
- earnings tax (in terms of streamlining and equalising employee vs employer taxation, including company tax vs income tax for self employed);

- VAT (in terms of equalising rates and abolishing exemptions);
- market distortion taxes (in terms of higher taxes for those companies and industries that have excessive market power and prices).

Beyond this list there can also be problems where policy targets conflict, as was seen recently with the Scottish Government's idea of reducing airport taxes. In that instance the economic target conflicted with an environmental one.

So what to do?

Productivity Reports

There are a bewildering number of reports assessing UK and Scottish productivity in recent times and discussing what might be done to improve things. (For example: the SNP's Growth Commission Report (see <https://static1.squarespace.com/static/5afc0bbbf79392ced8b73dbf/t/5b0a988c352f53c0a5132a23/1527421195436/SGC+Full+Report.pdf>); the David Hume Institute report (see <https://static1.squarespace.com/static/59b82ed532601e01a494df34/t/5b90c890c2241b85ea99ace7/1536215190323/Wealth%2Bof%2Bthe%2BNation%2B060918.pdf>); the LSE Growth Commission report (see <http://www.lse.ac.uk/researchAndExpertise/units/growthCommission/home.aspx>); various NIESR publications including their recent review (see <https://journals.sagepub.com/action/showTocPdf?volume=247&issue=1&journalCode=nera>); various Bank of England and ONS assessments; various IMF and OECD reports.)

There is some generic consistency amongst these reports in terms of what needs to be improved - quality and quantity of skills, infrastructure, innovation, investment - but such, well established, recommendations have failed to impact on the UK's long term relative position, or on its post Financial Crisis performance.

Similarly, learning from other countries, including catch up rather than innovation, is a commonly cited route for cutting corners to improve productivity. However, benefits here can be exaggerated as analysis is often only skin deep and may fail to identify the true causes for such a better performance. Cultural differences can also prove to be important barriers to copying change.

As a result of past failures it may be more fruitful to explore other avenues in order to raise productivity levels.

Drivers of productivity at the firm level - learning from the best performing companies

This is an increasingly fruitful area of analysis but also a complex one. Recent analysis by the ONS (see <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/understandingspatiallabourproductivityintheuk/2019-05-03>) suggests that differences in firm-level productivity within industries are a bigger determinant of the geographical differences in productivity than the differences in industry structures between areas.

Firm level productivity can be affected by both internal and external factors. Internal factors include whether a firm trades internationally, its management practices and its ownership, age and size. External factors associated with the location of a firm, such as differing local labour markets, existence of agglomeration benefits and levels of consumer spending, can also affect a firm's productivity performance.

While there is a long history of research into the impact of ownership, size and foreign direct investment (FDI) on productivity, other, less researched areas are coming more to the fore now. For example, the role and importance of management practices is better understood as is the relationship between firm-level trading and productivity, although problems remain with regards to establishing causation.

Despite these advances it remains difficult for governments to affect key business level decisions and practices on R&D, exporting, management practices etc. So while firm level based policies may be a potentially powerful source for future productivity gains, tapping into it is still a big challenge.

New ways of acting - frontier level innovation

In terms of **Skill level improvements** in the workforce it will be difficult to replicate the improvements seen in the decades leading up to the Great Recession, which saw the inclusion of a greater number of women in the workforce along with a much expanded higher education sector. In more recent times, higher rates of net inward migration may also have helped. The question is what new source of skills upgrading might emerge to provide further boosts?

Speaking at the Glasgow School of Art in 2018, Andy Haldane of the Bank of England highlights the role of universities in creating more innovative graduates than currently exists (see <https://www.bankofengland.co.uk/-/media/boe/files/speech/2019/the-creative-economy-speech-by-andy-haldane.pdf?la=en&hash=4A3B2C4C6F810E5F16BE72A6990C37C7C59CF4BA>). He cites worries that the education system stifles rather than encourages creativity by being heavily skewed towards developing cognitive skills which were more appropriate to earlier forms of industrial development.

In future, what may be more appropriate are 'multiversities' which expand disciplinary horizons and are less subject-singular. They may also need to straddle generations, as well as these disciplinary, divides. As well as a greater focus on creativity more emphasis on management issues could also be integrated into new courses.

This idea may only be the tip of the iceberg in terms of re-organising post school education in order to improve efficiency and productivity. At present the UK Higher Education (HE) model appears to be more geared to traditional disciplines and cash maximisation than to straddling disciplinary boundaries and to creativity. Pertinent questions exist over long standing traditions like: disciplines and course content; length of study; type of study (Higher Education vs Further Education vs Apprenticeship etc); and the apparent over-education of more than 30% of graduates. Perhaps greater government intervention is

needed to ensure such changes emerge and to help provide appropriately skilled graduates for the type of economy that exists now and in the future.

A shift to a more **environmentally friendly orientated public sector investment plan** could mean taking a lead in areas where change is inevitable in order to manage the impacts of climate change. Such investments will apply not only in areas like **Transport and Energy** but to some degree in almost every area of activity, whether it be in relation to households, businesses or government itself.

New measures of productivity, which take into greater account the negative externalities connected with environmental pollution, may also emerge and change the productivity landscape. This idea seems all the more likely now that Central Banks are actively engaging in the debate around climate change, surely a sign that a turning point has been reached. However, this is an area of great complexity and one where the need for, and ability to, change are only beginning to be understood and appropriate measures and policies developed.

New sources of data and analysis might shed further light on productivity issues. Philip Wales of the ONS highlights some of these in a recent article (see [National Institute Economic Review No 247, 'The Anatomy of UK Labour Productivity: Lessons from New and Existing Data Sources' by Philip Wales](#)). The Productivity Insights Network (PIN) is also carrying out a broad range of innovative work, including on why many large UK cities, including Glasgow, do not benefit from anticipated agglomeration effects. His work suggests that transport networks may be a large part of the explanation, a finding that could influence policy making decisions.

There are also areas where Scotland currently has a competitive advantage which are not being fully exploited, like **Tourism**, and where a particular focus may prove rewarding. Furthermore, there are very few Scottish industry sectors which have seen a (consistently) rising trend in productivity since 1998, essentially just **Manufacturing and Retail & Wholesale**. In particular, productivity gains in **Professional (Business) services**, and to a lesser extent with respect to **Administration & Support services**, are much clearer at the UK level than for Scotland.

This all goes to show that despite past failings and current misgivings over how to solve the 'Productivity Puzzle' there remains a wide range of potential interventions that might restart and sustain future productivity growth. The above discussion gives only a flavour of what might happen over a narrow range of, complicated, research areas.

The Scottish and UK Governments already have policies and plans in place to improve matters. For example, the Scottish Government has high hopes for the Scottish Investment Bank and its new Exports strategy. However, often these initiatives are variants on a long standing theme which has proved less than successful in the past. New forms of thinking will probably also be needed to improve the chances of success in the future.

CONCLUSIONS

While much of the analysis in this paper has thrown up doubts over the accuracy and robustness of current productivity measures and the appropriateness of setting productivity targets, improving productivity growth is still an important ambition.

In future, policy setters may need to focus their attention more on micro level than on macro level data and on new ideas rather than on repeating old ideas.

‘Raw’ national and sectoral productivity measures may not be a particularly good guide to the ‘real’ productivity performance and a wider range of measures may need to be considered, along with some new ones.

All productivity data will continue to need careful interpretation and this is particularly true of the Scottish data, where some is still under the ‘experimental statistics’ banner and where survey sizes may cause greater issues than at the UK level.

Despite these caveats moving forward with collecting and analysing productivity data is still likely to prove the most rewarding approach when trying to gain new insights into which interventions might best push productivity forward.

John McLaren

May 2019

Contact details:

m: 07429 508 596;

e: john.mclaren@btinternet.com

For information:

Latest Scottish Productivity data available at:

<https://www2.gov.scot/Topics/Statistics/Browse/Economy/Productivity>

Latest UK Productivity data available at:

<https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures>