



Scottish Policy Foundation

**The role of skills and education
in boosting productivity**

May 2018

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The challenge of solving the UK's weak performance, the so-called "productivity puzzle" dominates current debates on economic policy. Whilst weak productivity growth has been a feature of many advanced economies, the UK – and Scotland – have arguably been impacted more than most. Investing in human capital is accepted as an important way to improve productivity. But how can this be done, and is it all a good news story?

Introduction

The Scottish Government has a target for Scotland to be in the top quartile of OECD countries for productivity. For an advanced economy like Scotland, increasing productivity is generally considered to be the most sustainable way of improving living standards in the long term.

In recent years, Scottish productivity has been catching up with that in the UK. But even then, based upon the latest data, Scottish productivity remains over 20% below the top quartile of OECD countries.

So how can productivity be improved and what is the role of skills and education?

In this note, we discuss these issues and use the Scottish Policy Foundation's model to highlight some of the trade-offs that can arise when seeking to boost levels of productivity through investment in education and skills.

The Scottish Policy Foundation is keen to support proposals that come forward with new policy ideas to boost Scotland's skills base and contribute to faster productivity growth over the long-run.

If you are interested in putting forward a policy proposal and/or use the Scottish Policy Foundation's model to assess its possible impacts, please contact mail@scottishpolicyfoundation.org.

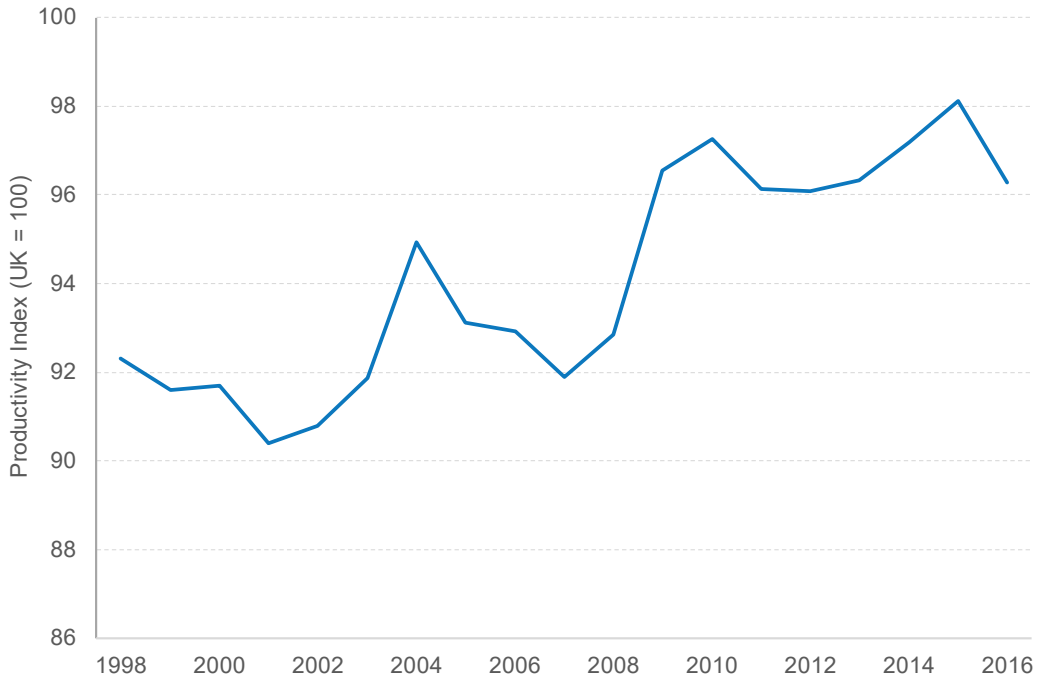
Recent trends in Scottish productivity

Over the long-term, productivity is key to sustainable growth. It is also crucial to increasing household incomes, as it is only by producing and selling more that firms become more profitable and can afford higher salaries.

As the chart highlights, over the longer-term, Scotland has been closing the productivity gap with the UK (albeit there has been a degree of slippage in recent years), i.e. trend output per hour in Scotland has been approaching that of the UK.

* All data correct as of May 2018. Data and analysis compiled by the Fraser of Allander Institute.

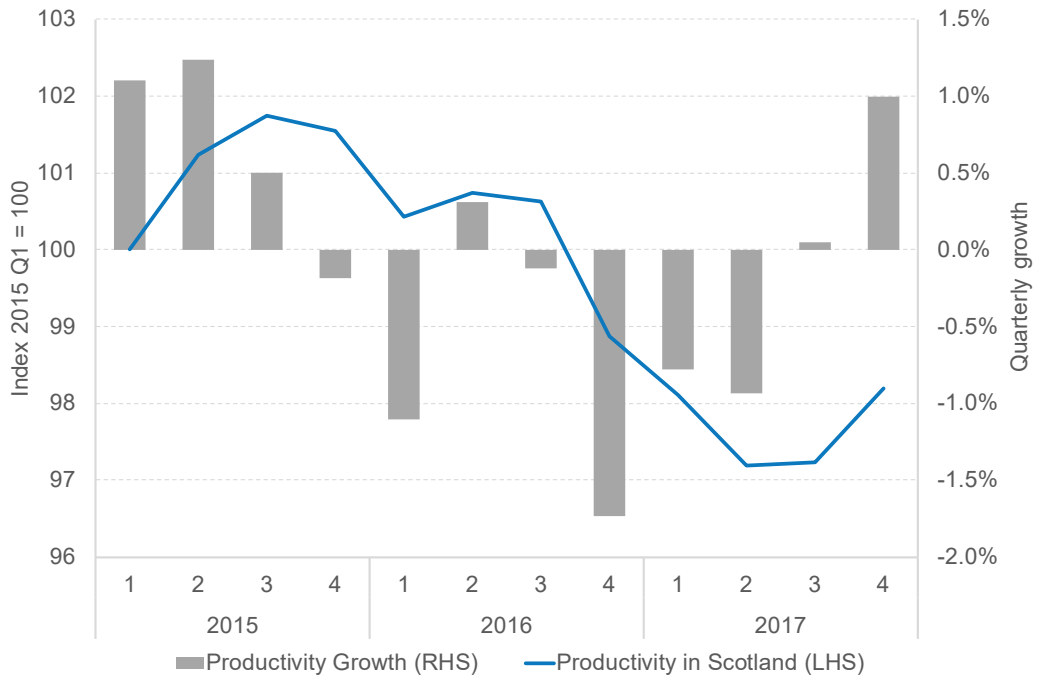
Chart 1: Scottish labour productivity – output per hour worked relative to UK



Source: Scottish Government

Unfortunately, much of this ‘catch-up’ reflects a weakness at the UK level rather than a structural change in Scotland’s own position. And in recent times, apart from the most recent quarter, productivity levels in Scotland had been falling.

Chart 2: Labour productivity in Scotland since 2015

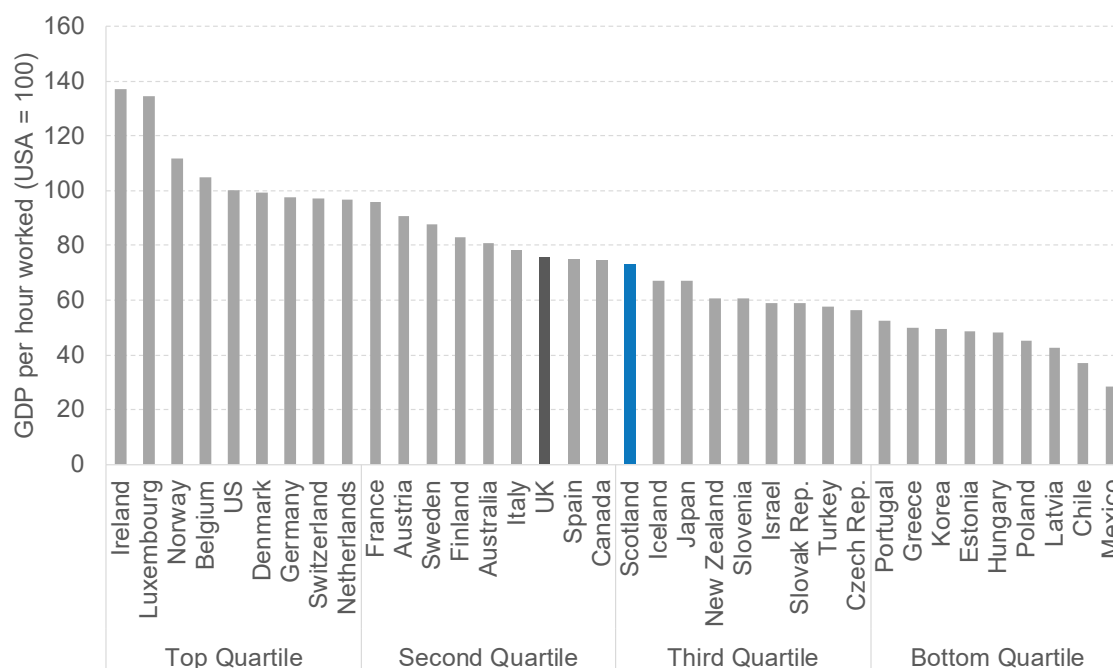


Source: Scottish Government

The reason for this fall has been that the number of hours people are working in the economy has been growing at a faster rate than the overall economy. As a result, the amount that each of us are producing per hour – in aggregate – has been decreasing. This reversed somewhat in the final quarter of 2017 and was why productivity bounced back.

Overall, Scotland is ranked in the third quartile of OECD economies in terms of productivity.

Chart 3: International productivity levels 2016 (USA = 100)



Source: OECD

Scotland’s ranking has been relatively consistent over a number of years. Indeed Scotland was ranked 18th in the OECD in terms of productivity in 2000. Today Scotland is ranked 19th.

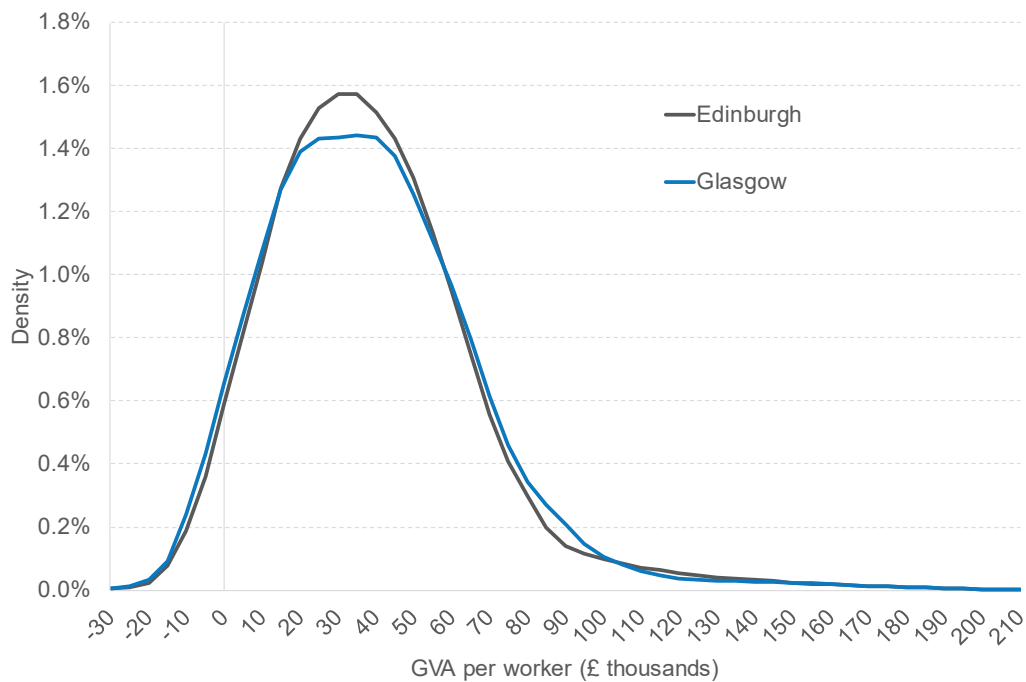
Policy discussions have tended to focus upon how best to generate high value productivity jobs and investment – i.e. in firms at the cutting edge of innovation and technology.

But increasingly, policymakers at both the UK and Scottish level are realising the importance of boosting productivity across the economy more generally.

As the chart below highlights, taking Glasgow and Edinburgh as an example, we see that vast majority of firms in the economy are in the middle to low end of the productivity spectrum. There are far fewer firms in the high-end of the spectrum.

Finding ways to shift the entire distribution up the value chain will be crucial. A focus on better management, skills across the workforce, process and workforce innovation, fair work and adoption of technology will be key.

Chart 4: Distribution of firm productivity in 2014



Source: ONS

The role of skills and education in boosting productivity

Most economists agree that there are a small number of factors that underlie long-term productivity performance:

- Investment in physical capital – such as machinery, equipment and buildings – helps people be more effective in their jobs, producing more, and better, quality output;
- Innovation and new ideas – such as in new technologies, products or ways of working – can help firms work faster and more efficiently;
- Enterprise is the seizing of new business opportunities by firms (both new and established businesses) – and this in itself can help unlock growth by leading to new products and processes; and,
- Competition can improve productivity by creating incentives to innovate and ensures that resources are allocated efficiently.

Skills are important for productivity for two reasons. Firstly, they are an important driver of productivity in their own right. A more skilled workforce can produce faster and higher quality output.

Secondly, underpinning all of these other productivity drivers listed above, is a need for a skilled workforce.

Skills complement physical capital by ensuring that people have the capacity to use new plant and machinery. A skilled workforce not only helps to support innovation but also enables people to take advantage of, and make best use of, new technologies and ideas once they are developed.

Skills help support enterprise and encourage new products and processes and can ensure that a country competes effectively in international markets.

At the same time, skills-mismatches can be an important barrier to productivity growth. Having people in the wrong job, or not being able to fill vacancies when they exist, are two key barriers to growth over the long-term.

A highly skilled and flexible workforce is likely to even more important in the long-run as our economy continues to go through significant technological change.

In recent years, we have seen a sharp rise in automation which has, in part, led to changes in our labour market. In particular, it has tended to impact on semi-skilled jobs leading to ‘job polarisation’¹. This trend is likely to continue.

Similarly, Scotland – like many advanced economies – is going through significant demographic change with an ageing workforce making life-long skills and learning crucial.

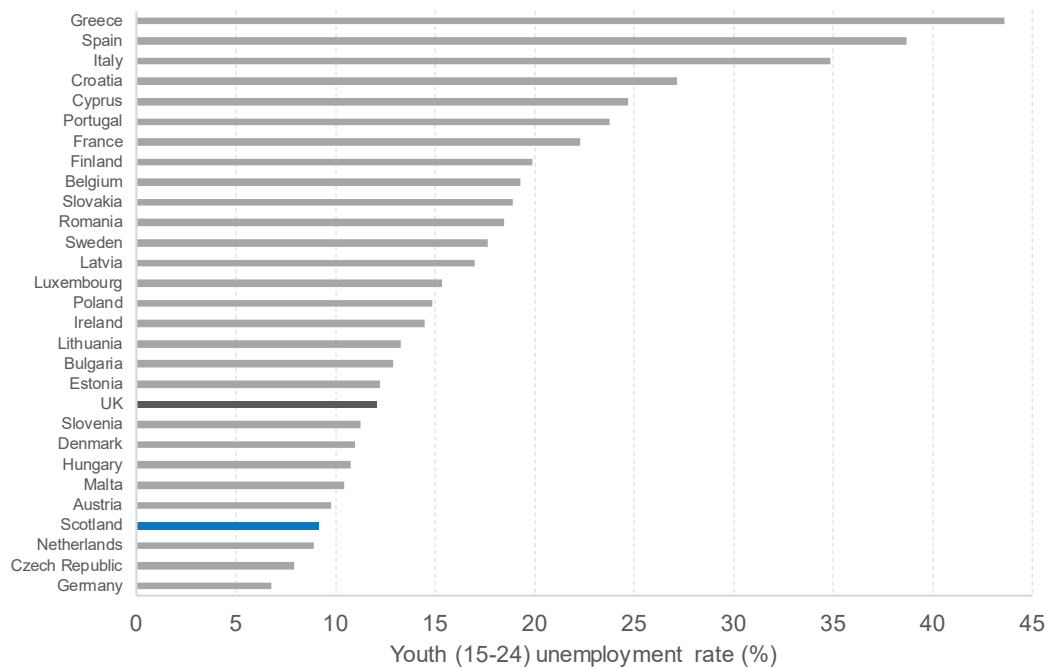
Of course, and on top of all of this, there is significant evidence to suggest that improved education and skills outcomes for individuals can lead to substantial additional – non-economic – benefits such as better health outcomes etc.

Skills policy in Scotland

Scotland has a highly skilled and productive workforce.

The country performs well in international comparisons of skills and qualification levels. Scotland’s youth unemployment rate is amongst the lowest in Europe.

Chart 5: Youth unemployment rates in EU 28 and Scotland, January – December 2017



Source: Eurostat

Scotland’s university sector is internationally recognised with five universities in the global top 200². And analysis by the Fraser of Allander Institute has found that [college graduates](#) provide a multi-billion boost to the Scottish economy each year.

But it is also recognised that there are challenges.

¹ Job polarisation refers to the situation where jobs requiring a medium degree of skill qualification become less in demand, relative to those at the top and bottom of the skills distribution.

² Source: Times Higher Education university rankings.

In recent years, the performance of Scotland's schools has slipped back on key performance indicators for maths, science and reading. The latest OECD [Programme for International Student Assessment](#) (Pisa) figures show that in all three, Scotland is ranked as 'average', whereas back in 2000 it was ranked as 'above average'.

Moreover, a significant attainment gap still exists between students from the most affluent backgrounds and those from poorer households.

Skills and education play a key role in the Scottish Government's [Economic Strategy](#) –

“Investment in education and training ensures that we have a strong and productive labour force, which has the skills to maximise our country's economic potential. It is also a key avenue for tackling a range of issues from poverty and income inequality to health and life expectancy.”

Scottish Government Economic Strategy, 2015

This support for skills and education takes a number of forms.

Firstly, there is a growing recognition that investment in early years learning is crucial to an individual's long-term development (social, health and economic). To support this, the Scottish Government is embarking on a major expansion of early learning and childcare by increasing the free entitlement from 600 hours to 1,140 hours per year by 2020 (for all three and four-year-olds and eligible two year-olds).

Secondly, there is school education. Boosting levels of attainment in schools is vital to delivering a more effective and productive workforce over the long-term. The Curriculum for Excellence (CfE) is the Scottish Government's centre-piece policy on school education and is designed to raise ambition and attainment amongst children and young people in Scotland.

Thirdly, despite high levels of investment over decades, there remains a stubbornly high attainment gap between the least and most disadvantaged children. It is widely accepted that this gap is not only undesirable in its own right, but itself acts as a barrier to long-term productivity growth as not every child has the opportunity to fulfil their economic potential. Initiatives such as the Scottish Government's Attainment Scotland Fund are designed to tackle this.

The fourth element is what is broadly known as post-16 education. This includes Further and Higher Education but also work-based learning. Scotland is recognised as having a leading Higher Education sector and the Scottish Government has made free-tuition a key part of its policy to support students attend University. Scotland's colleges have gone through significant reforms in recent years, including consolidation in the sector and a move to formal qualifications. Skills Development Scotland are also leading an expansion in work-based learning – crucially an increase in Modern and Graduate Apprenticeships – as part of Developing Scotland's Young Workforce.

Finally, there is a growing recognition that in a world of rapid technological change and greater automation, a number of existing jobs and tasks will be replaced. As a result, it is likely that people will undertake a variety of different roles over their working career. Therefore, there is a growing recognition of the importance of 'life-long learning' and the need for people to access constant learning throughout their careers.

The economic implications of boosting skills in Scotland

An obvious question in this discussion is what might be the economic benefits of policies that support skills and education levels in Scotland.

At the same time, it is also important to understand some of the unintended economic consequences that may arise and to develop potential policy responses to these.

Appearing to question whether or not we want greater skills in our economy or faster productivity growth may seem slightly odd, particularly given their importance to long-term economic prosperity.

But even a quick glance at other countries reveals some interesting back-stories.

In reality, there can often be a trade-off between productivity and labour market outcomes.

France for example, has higher levels of productivity than Scotland. One reason is that its firms invest more, but they do so partly at the expense of employing labour. As a result, people in work are well rewarded, but unemployment tends to be higher.

Of the countries ranked above Scotland for productivity, only a handful have lower unemployment rates.

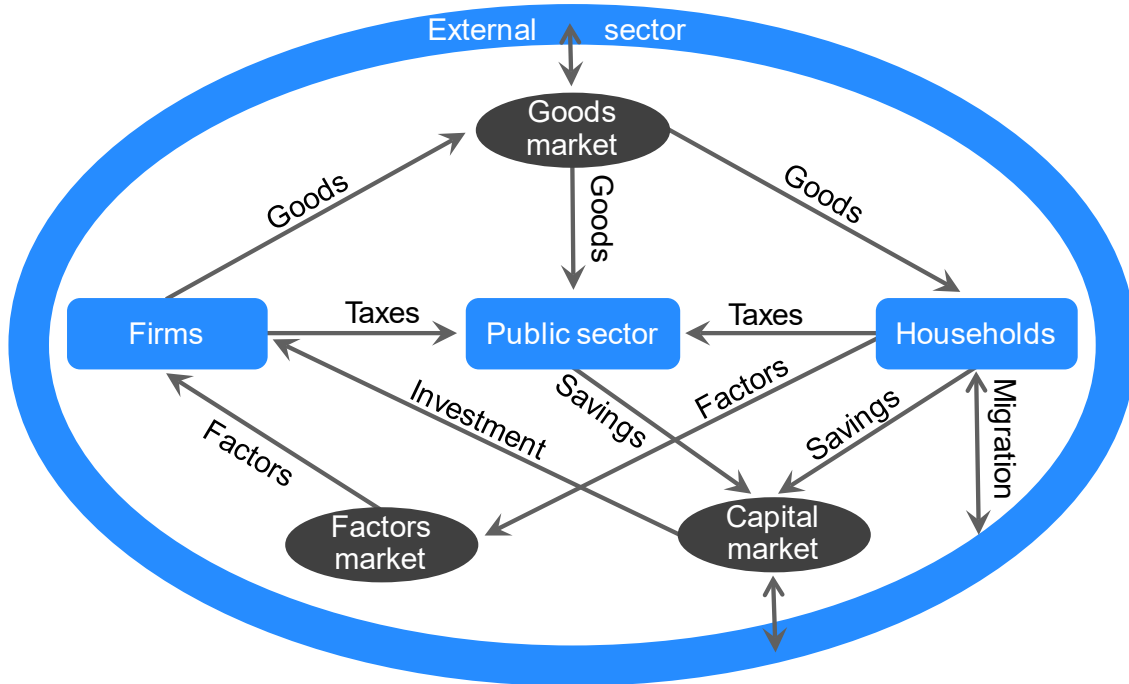
At the same time, higher skills for some but not others can increase inequalities.

To illustrate these effects, and the importance of developing well-designed policies that capture not only benefits appropriately but also mitigate against any risks or costs, it is possible to use the Scottish Policy Foundation’s new macroeconomic model of the Scottish economy.

The model is a detailed representation of the Scottish economy which captures the key interlinkages between firms, government, and households and their interactions in the goods, capital and labour markets, as well as the links with the outside world via trade, migration and foreign investment.

The model reflects the underlying structure of the Scottish economy, but also the behavioural responses of firms, households and government – see diagram below:

Diagram 1: Scottish Policy Foundation’s macroeconomic model of the Scottish economy



Source: Scottish Policy Foundation

In the model, developing the level of skills, training and education in the Scottish economy is captured through what economists call ‘human capital’.

One way to model changes to human capital is to draw upon evidence on the wage differentials/ premia associated with different skill levels.

The change in the wage associated with higher skills can be taken as indicative of the productivity-enhancing effects of human capital (and vice versa).

This increase in productivity can then be used – via the model – to quantify the economy-wide impacts of these changes³.

This approach uses relevant micro-econometric evidence of the returns to education to inform simulations in a dynamic macro model, calibrated on data for the Scottish economy.

In the analysis that follows, for ease we allocate the workforce into two groups – skilled and unskilled workers.

Table 1 details the short- and long-run economic effects of a 5% increase to i) skilled workers productivity and ii) unskilled workers productivity.

The increase in labour productivity is the only exogenous change introduced into the model. This means that the results should be interpreted as a deviation from what would have occurred if labour productivity had remained unchanged i.e. they indicate how much higher output is as a consequence of the higher level of human capital.

By the short-run, we mean the immediate period of the boost to productivity. The long-run is when all aspects of the economy have had time to adjust to the changes in productivity.

Table 1: Short and long-run effects of a 5% increase in skill differentiated labour productivity (% change).

	Short-run		Long-run	
	Boost to Skilled Workers	Boost to Unskilled Workers	Boost to Skilled Workers	Boost to Unskilled Workers
GDP	1.5	0.8	3.3	1.8
Unemployment rate (pp difference)	1.4	0.7	-0.4	-0.3
Skilled	0.5	0.5	-0.3	0.1
Unskilled	0.9	0.1	-0.1	-0.4
Employment	-0.7	-0.4	0.2	0.1
Skilled	-0.5	-0.6	0.4	-0.1
Unskilled	-0.9	-0.1	0.1	0.4
Real gross wage	-1.3	-0.6	0.4	0.3
Skilled	-1.0	-1.0	0.7	-0.1
Unskilled	-1.5	-0.2	0.1	0.7
Household consumption	-0.7	-0.4	0.7	0.4
Capital income	3.0	1.7	1.3	0.7
Labour income	-3.3	-1.9	-1.1	-0.7
Investment	3.4	1.9	3.1	1.7
Exports to RUK	1.4	0.8	3.1	1.7
Exports to ROW	1.7	1.0	3.3	1.8

Source: Scottish Policy Foundation

The analysis reveals a number of interesting results that have important policy implications.

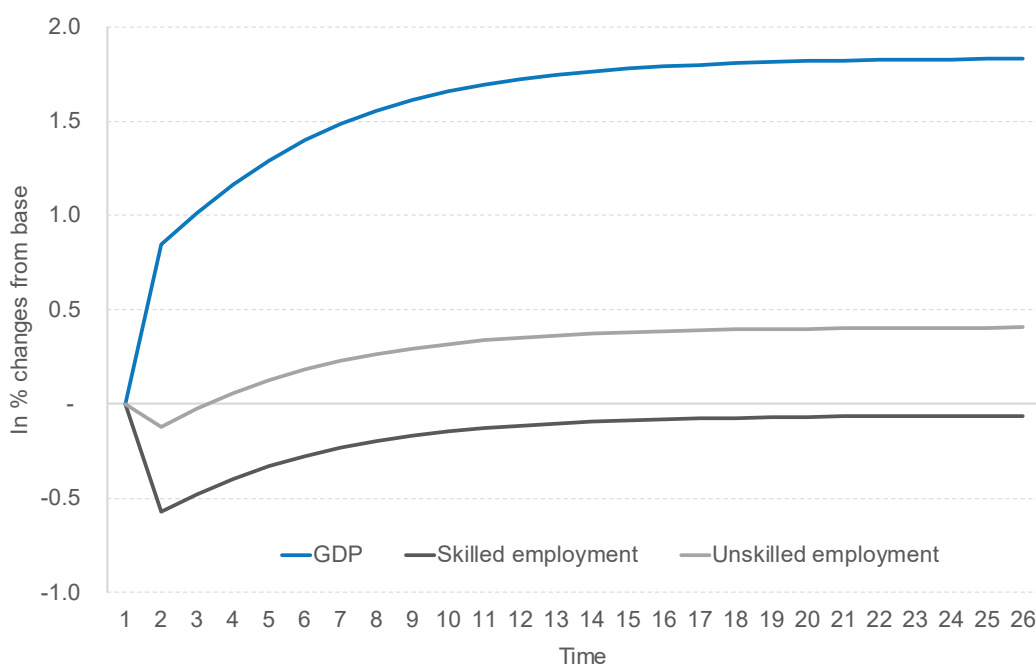
³ The specific approach adopted builds upon the method first developed by [Hermannsson et al. \(2017\)](#).

Firstly, as one would expect, an increase in productivity for either skilled or unskilled workers is good for economic output. Under both scenarios – and in the short and long-run – GDP is expected to be greater than it otherwise would have been. Unsurprisingly, the boost to the economy is larger for a rise in skilled productivity given that a 5% increase in productivity is a relatively large shift in overall effective productivity in the economy.

Secondly however, we see that in the short-run there is a rise in unemployment in the economy. As highlighted above, there can be a trade-off between higher levels of productivity and unemployment. By becoming more efficient at producing things, for a given level of demand in the economy, this means that fewer workers are required to produce the same amount of amount. Therefore, there can be tough choices – at least in the short-run – between policies that boost productivity and through which aim to support high levels of employment. Of course, this works both ways. Policies that support higher levels of employment – such as a wage subsidy – may lead to lower levels of productivity if it encourages firms to switch spending from investment in plant and machinery (or investing in the training of existing workers) to employing more staff.

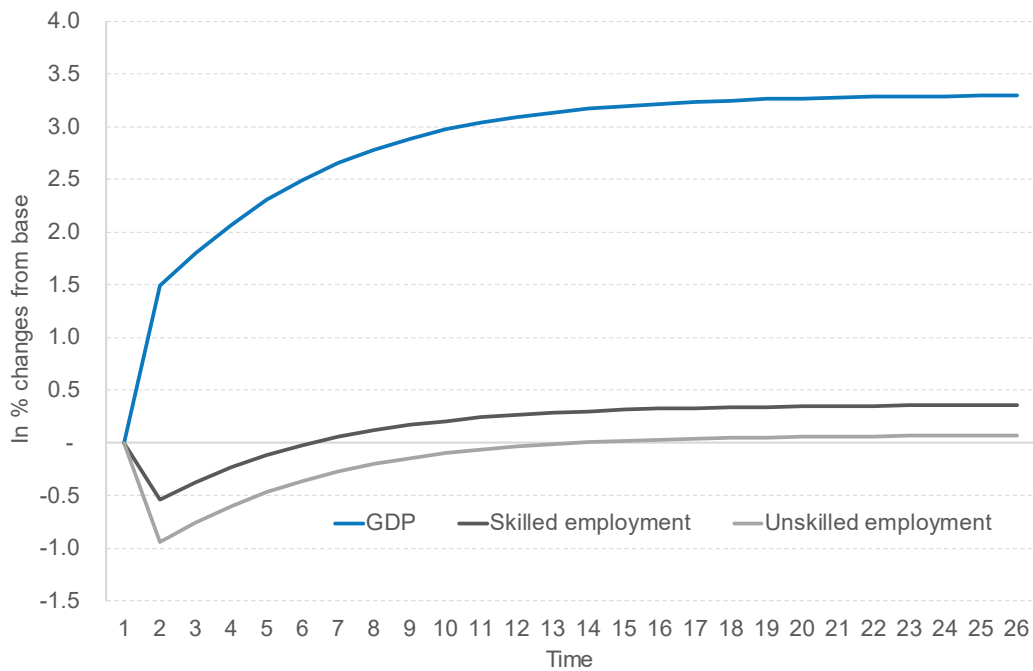
Thirdly, in the long-run as demand continues to grow due to improved competitiveness then these negative impacts on unemployment start to ease. In the case of a boost to skilled productivity, both employment amongst skilled and unskilled workers rises. However, in the case of a boost to unskilled productivity, then the effects are more marginal. The results suggest that there might even be a trade-off between increasing the productivity of the unskilled, and labour market outcomes of skilled workers. Here the impact on the skilled is actually negative (in terms of employment opportunities and their take home wage) in the long run.

Chart 6: Impact of 5% increase in unskilled productivity on Scottish economy – over short and long-run



Source: Scottish Policy Foundation

Chart 7: Impact of 5% increase in skilled productivity on Scottish economy – over short and long-run



Source: Scottish Policy Foundation

In summary, what policy recommendations can we take from these results? Two key points are perhaps worth highlighting. Firstly, boosting levels of human capital in the economy – through skills and education – is clearly beneficial to the long-term potential of the economy. Secondly, such policies do lead to wider implications that need to be borne in mind, whether that be in terms of employment (at least in the short-run) and spill-overs between the benefits for skilled and unskilled workers in the economy.

An informed debate on education

The Scottish Government has made improving Scotland’s education its top priority.

There will no doubt always be a debate over the level of investment required to meet the ambitious goals policymakers have set for education standards. But there are also important lessons from other countries in terms of the structure and delivery of education, skills and training irrespective of the level of investment.

Bold and innovative policy ideas are required to deliver improved outcomes.

Key areas of debate include –

- What governance arrangements are best for schools? Should local authorities continue to lead or should greater discretion be given to teachers and parents?
- Is the focus of the school curriculum right and/or how might it be improved?
- What is the best way to fund Scotland’s university and college sector to ensure that they remain internationally competitive?
- How might the skills and education systems evolve in response to increased automation and the need for people to develop skills over the course of their career?

These are just a selection of the types of questions that the Scottish Policy Foundation would be interested in hearing proposals on.

