

Just Transition Commission

Background Report

April 2019

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EXECUTIVE SUMMARY

1. This background report presents publicly available data and information for Scotland on what is known about current and projected:
 - Population
 - Labour market
 - Business and industry
 - Household income distribution
 - Skills and skills development
 - Greenhouse gas emissions

2. Information is presented for the current situation (most recently available) and projections up to 2050. Projections to 2030 are also included where available.

Population

3. The population of Scotland has increased since 2001 and it is now at its highest level at 5.42 million. Over the past decade population has increased by 5% with international migration being the largest contributor to this growth. Future population growth will rely on entirely net inward migration but this is forecast to fall.
4. Scotland's population is ageing. This is not a new phenomenon but it is set to accelerate from 2021 onwards and is happening at a faster rate than in the rest of the UK. The dependency ratio will increase from 0.55 in 2016 to 0.70 in 2041.
5. Migration patterns will impact differentially on cities and other areas, with the central belt and other cities benefitting from net migration while other mostly rural or places with fewer job opportunities suffer population declines.

Labour Market

6. The growth in employment for Scotland by 2028 is projected at around 85,000 jobs compared to 2018. However, as a result of people retiring, or leaving occupations or sectors for other reasons, *replacement demand* is projected to amount to 900,000 job opportunities over the course of the decade.
7. Comparing 2028 with 2018 in terms of projected employment by sector:
 - Significant growth is projected for jobs in private sector services and construction.
 - Manufacturing jobs are projected to decline by over 26,000, with 16,000 fewer in public administration and defence. Agriculture and mining are projected to continue their long-term decline in employment terms.
8. The forward look on the labour market is dominated by the potential impacts of *digitalisation* on the nature of work. This has been happening for some time, but there is no certainty on the time path for the emergence of more far-reaching impacts.

Business and Industry Landscape

9. Scotland's economy, worth £139.3 billion in 2017 when measured by Gross Value Added (GVA), has grown at a slower rate than the UK average over the past 20 years and continues to feel the effects of the economic downturn.
10. Scottish productivity growth has slowed but has far exceeded UK growth over the past decade: between 2007 and 2017 productivity in Scotland has grown at an average annual rate of 0.7% per year, which is higher than the UK average of 0.2% over that period.
11. Scottish Fiscal Commission's (SFC) December 2018 forecast is the most pessimistic, projecting subdued economic growth, averaging at just over 1% pa over the next five years. Other forecasts are more optimistic and indicate that growth will accelerate and peak at 2.1% in 2021 and then fall year-on-year to 1.5% per annum by 2026, while a third predicts a dip in growth in 2019 followed by an average of 1.5% per annum growth to 2023.
12. Productivity growth forecasts are more consistent and broadly flat: the SFC expects GDP per hour to gradually increase over the next five years but remain lower than historic rates. There are no published forecasts for the Scottish economy beyond 2027.

Household Income Distribution

13. The top ten percent of the population in Scotland had 24% more income in 2014-17 than the bottom forty percent combined. Comparing this to previous periods suggests an increasing trend of income inequality over this period.
14. Real wage growth in Scotland is relatively strong over the last decade. Scotland is currently only 1% from its pre-recession peak and is expected to match this in 2020 well before the rest of the UK. However, in-work poverty for working-age adults has increased continuously since 2011-14, and both, before and after housing costs measures were at an all-time high in 2014-17.
15. Forecasts show average earnings growth in Scotland increasing from 2.0% in 2018 to 3.1% in 2023. Real wage growth is forecast to pick up from -0.3% in 2018 to 1.1% in 2023. There are no Scottish forecasts for income inequality but UK projections suggest income inequality is likely to increase over the five years to 2022, assuming no change in UK government policy.

Skills and Skills Development

16. Around 1 million jobs will require to be filled over the decade 2017-2027 - some due to overall expansion of employment, but the vast majority as a consequence of replacement demand, where employees retire, or leave a sector or occupation for other reasons.
 17. There is a projected requirement for over 500,000 recruits with qualifications at HNC level or higher, while the requirement for employees without qualifications is projected at only around 80,000. Nonetheless, projections suggest that in 2028 around 25% of employees will be in jobs requiring lower level skills, little changed from the current position.
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18. Increasing digitalisation of the economy, a shrinking and ageing workforce is expected to require skills such as self-management, social intelligence and innovation. Others cite the importance of interpersonal skills, higher-order cognitive skills or system skills such as judgement or decision-making.
Greenhouse Gas Emissions
 19. Scotland is performing well on reducing greenhouse gas emissions compared to the rest of the UK, and met its annual legislated target for each of the past three years. Overall, Scottish emissions are now 49% below 1990 levels, and Scotland is on target for 2020. Scottish Parliament is considering a new Bill that will set the most stretching statutory targets of any country in the world
 20. Scotland has made strong progress in decarbonising its power sector which contributes the majority of the overall reduction in emissions to date. Other sectors fell slightly (Waste and Industry) or increased (transport). There were few reductions for the energy-end use sectors, even though the building sector is seen as having the greatest potential for reduction
 21. Scotland is on track to achieve the current 80% reduction target in 2050. The adoption of a 90% reduction target will require further policy efforts as this target is seen as at the limits of feasibility identified to date.
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1. INTRODUCTION

- 1.1. This report presents publicly available data and information for Scotland on what is known about current and projected:
- Population
 - Labour market
 - Business and industry
 - Household income distribution
 - Skills and skills development
 - Greenhouse gas emissions
- 1.2. In particular, information is presented for the current situation (most recently available) and projections up to 2050. Projections to 2030 are also included where available, as these chime with the timing of reporting on Sustainable Development Goals and Nationally Determined Contributions to reduction of greenhouse gas emissions under the United Nations Framework Convention on Climate Change (UNFCCC).
- 1.3. Each of the domains above are presented in turn, with:
- a brief outline of relevant policy objectives in Scotland,
 - analysis of the data pertaining to the most recent data available
 - available forecasts or projections for the short to medium term
 - long-term forecasts to 2030 and 2050 or as near as possible where available.
- 1.4. We have reviewed all the forecasts presented in all of the domains and can confirm that none explicitly consider the potential impact arising from policy action necessary to meet greenhouse gas targets in future. Nor do any of the forecasts explicitly model the potential impact of the UK leaving the European Union.

2. POPULATION

Summary of Evidence: Population

The population of Scotland has increased each year since 2001 and it is now at its **highest level ever at 5.42 million**.

Over the past decade Scotland's population has increased by 5%.

International migration has been the largest contributor to Scotland's population growth over the past ten years, and to a greater extent than in any other part of the UK.

From 2007-08 to 2013-14 there were more births than deaths in Scotland. However, **there have been more deaths than births since 2014-15 and is projected to be the case for every year going forward to 2041**. Future population growth will rely on net inward migration.

Although the gender balance is broadly even, **the growth in over 75 age group is predominately male** (an increase of 94% between 2016 and 2041 compared to 64% for females).

Although **three-quarters of Local Authority areas will increase their population, only six will grow at above the national average**.

Migration patterns will impact differentially on cities and other areas, with the central belt and other cities benefitting from net migration while other mostly rural or places with fewer job opportunities suffer population declines.

In 2015-16, **net migration to Scotland was positive at 31,700**, with 22,900 from overseas and 8,800 from the rest of the UK.

Net migration to Scotland from the rest of the UK is projected to remain at current levels but with both in and out migration increasing. However, **migration from overseas is projected to decrease substantially** from 40,400 in 2015-16 to 30,500 in 2040-41, while out-migration to overseas is projected to increase from 17,500 to 23,500 over the same period.

Scotland's population is ageing. This is not a new phenomenon but it is set to accelerate from 2021 onwards and is happening at a faster rate than in the rest of the UK. The dependency ratio will increase from 0.55 in 2016 to 0.70 in 2041.

The population of Scotland is projected to rise from 5.40 million in 2016 to 5.58 million in 2026, and to continue to rise to 5.69 million in 2041 – an increase of 5% over the 25-year period.

The working age population is projected to increase from 3.43 million in 2016 to a peak of 3.59 million in 2028 (an increase of 5%). **It is then projected to decline to 3.47 million by 2041**. Overall there is a 1% projected increase in people of working age over the 25-year period.

Most areas are projected to see an increase in their working age population, with 21 of 32 council areas in this category. However, parts of the west of Scotland and Scotland's island councils are projected to have smaller working age populations in 10 years' time.

The evidence base

Population growth

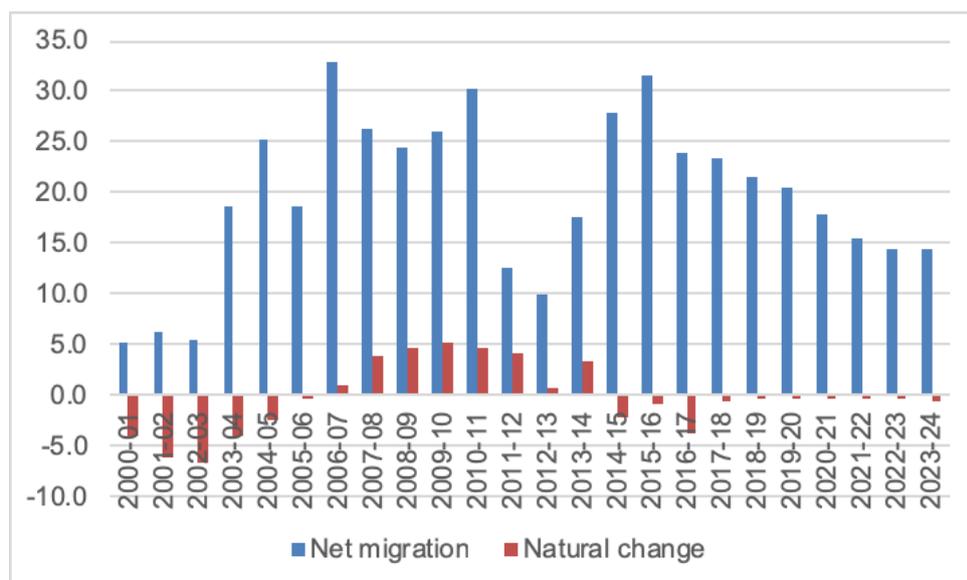
- 2.1. The population of Scotland has increased each year since 2001 and it is now at its highest level ever at 5.42 million. Over the past decade population has grown by 5% but more recently the rate has slowed due to lower migration levels, decrease in fertility and increase in mortality.
- 2.2. The Scottish Government has set a target to match average European (EU15) population growth over the period 2007 to 2017, supported by increased healthy life expectancy in Scotland over this period. For the latest year, population growth for Scotland has been higher than that of the EU 15 countries. It was outlined in the [Government Economic Strategy \(GES\)](#)¹ that population growth is a key contributor to, and consequence of, a growing and diversified economy.
- 2.3. The population of Scotland is projected to rise from 5.40 million in 2016 to 5.58 million in 2026, and to continue to rise to 5.69 million in 2041 – an increase of 5% over the 25-year period²
- 2.4. There are projected to be more deaths than births in every year going forward. Each year for the next twenty-five years all of Scotland's population growth is projected to come from migration³ (figure 2.2).

1 Scottish Government (2007) The Government Economic Strategy. Online at <https://www2.gov.scot/Publications/2007/11/12115041/0>

2 National Records of Scotland (2017) Population Projections for Scottish Areas (2016-based). Online at <https://www.nrscotland.gov.uk/files//statistics/population-projections/sub-national-pp-16/pop-proj-principal-2016-tab-publication.pdf>

3 Scottish Government (2018). Scotland's Population Needs and Migration Policy: Discussion Paper on Evidence, Policy and Powers for The Scottish Parliament, Online at <https://www2.gov.scot/Resource/0053/00531087.pdf>

Figure 2.1: Actual and projected natural change and net migration in Scotland (000s)⁴



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland

- 2.5. Scotland's population growth over the next ten years is projected to be predominantly in the central belt and urban areas, and mostly as a result of migration patterns.
- 2.6. Three quarters of local authority areas (24 councils) are expected to see growth. However, only six local authority areas will benefit from above average growth – Midlothian (13.3%); East Lothian (8.6%); City of Edinburgh (7.7%); East Renfrewshire (7.6%); Aberdeenshire (7.1%); and West Lothian (6.6%)⁵.
- 2.7. Areas facing depopulation comprise Na H-Eileanan Siar (-4.8%); Inverclyde (-3.8%); Argyll and Bute (-3.4%); North Ayrshire (-2.1%); Dumfries and Galloway (-1.5%); South Ayrshire (-0.9%); West Dunbartonshire (-0.7%); and East Ayrshire (-0.2%)¹⁰

Demographic change

- 2.8. Scotland's population is ageing. The Scottish Government's Fiscal Outlook states that while an ageing population is not new, it *“is set to accelerate from 2021 onwards and is happening at a faster rate than*

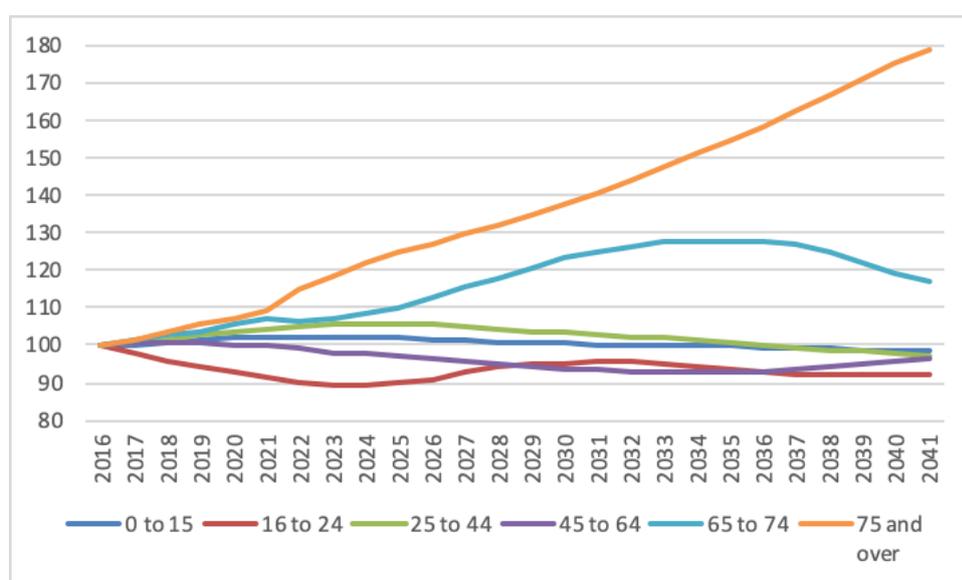
⁴ Ibid. figure 1.1, page 11.

⁵ National Records of Scotland (2017) Population Projections for Scottish Areas (2016-based). Online at <https://www.nrscotland.gov.uk/files/statistics/population-projections/sub-national-pp-16/pop-proj-principal-2016-tab-publication.pdf>

in the rest of the UK.” Figure 2.2 presents the projected changes in population by age group as an index which highlights the rate of change expected on the 2016 base year:

- There is a significant increase in the over 75 age group
- Those aged 65 to 74 are the only other group to increase in size
- Together, the over 65s account for 153% of the projected population increase
- All younger age groups are expected to decline in size
- Scotland’s dependency ratio⁶ increases from 0.55 in 2016 to 0.70 in 2041.

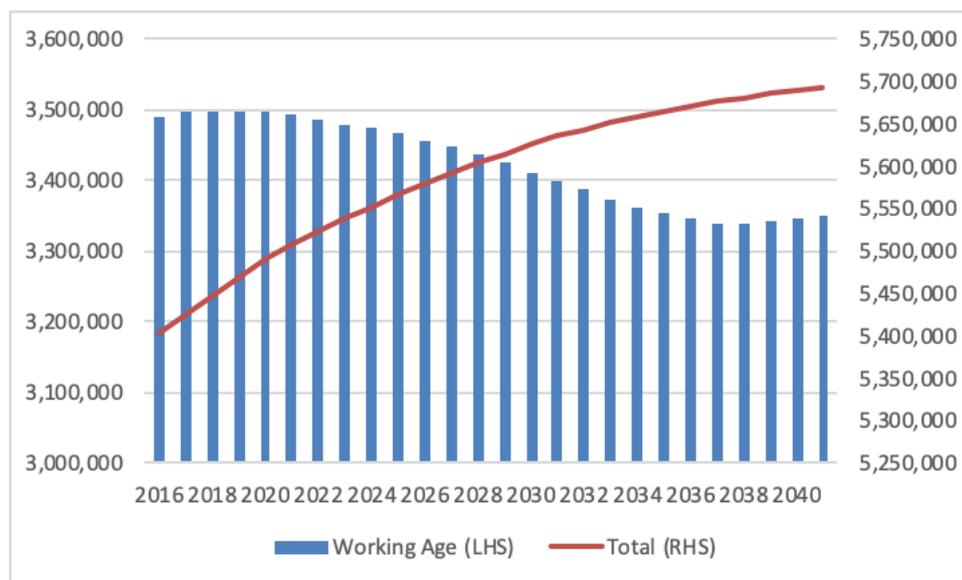
Figure 2.2: Population estimates by age expressed as an index (2016=100)



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland

- 2.9. Although the gender balance is broadly even, the growth in over 75 age group is predominately male (an increase of 94% between 2016 and 2041 compared to 64% for females). Improved health is a major factor here.

Figure 2.3: Forecast Scottish total population and population aged 16 to 64, thousands



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland

Migration

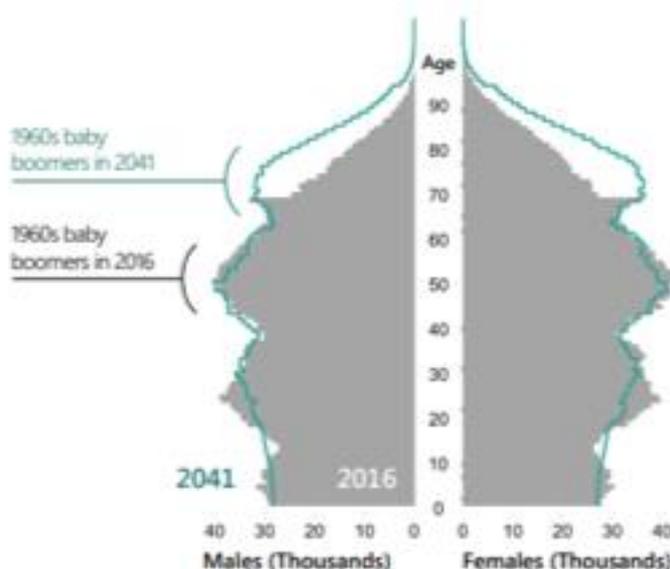
- 2.10. The Fiscal Outlook⁷ states that international migration “has been the largest contributor to Scotland’s population growth over the past ten years, and to a greater extent than in any other part of the UK” and the “most recent population projections from National Records of Scotland indicate that all of Scotland’s population growth over the next 25 years is expected to come from migration (from both overseas and the rest of the UK)
- 2.11. The Scottish Government recently published a paper on Scotland’s population needs and migration policy⁸. “Economic models show that a decrease in labour supply as a result of lower levels of migration has a substantial negative impact on both the Scottish and the UK economy”.
- 2.12. Between 2016 and 2041, the population of pensionable age is projected to rise from 1.05 million to 1.32 million, an increase of 25%,

⁷ Scottish Government. (2018, May). Scotland’s Fiscal Outlook The Scottish Government’s Five Year Financial Strategy, paragraph 4.17. Online at <https://www.gov.scot/publications/scotlands-fiscal-outlook-scottish-governments-five-year-financial-strategy/>

⁸ Scottish Government. (2018, February). Scotland’s Population Needs and Migration Policy: Discussion Paper on Evidence, Policy and Powers for The Scottish Parliament. Online at <https://www2.gov.scot/Resource/0053/00531087.pdf>

while the number of children is projected to decrease from 0.92 million to 0.90 million (reduction of 2%) over the same period. The number of people aged 75 and over is projected to increase by 27% over the next ten years and increase by 79% over the next 25 years to 2041⁹ (Figure 2.3).

Figure 2.4: Age profile of Scottish population in 2016 and 2041⁹



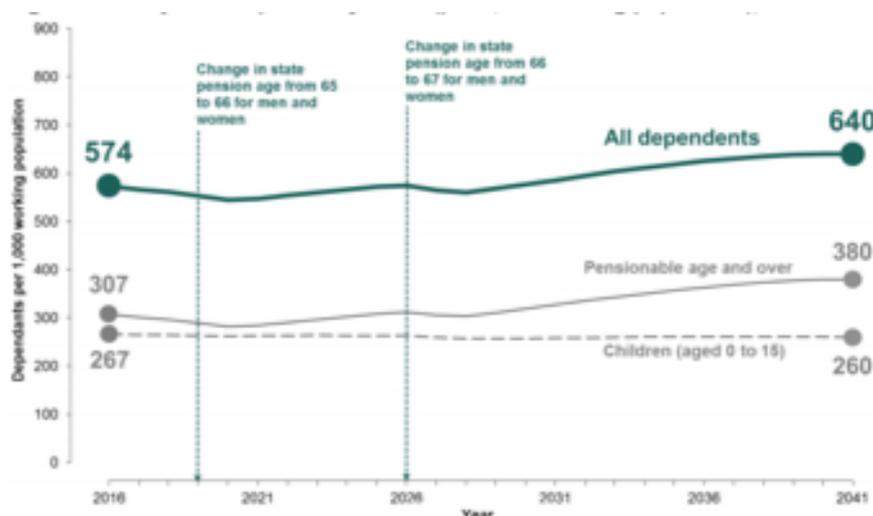
Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland, Office for National Statistics

- 2.13. Between 2016 and 2026, all council areas in Scotland are projected to experience an increase in their population aged 75 and over. Clackmannanshire (+48%) and West Lothian (+46%) are projected to experience the largest increases, while Dundee City (+9.6%) and Glasgow City (+2.9%) have the smallest increases.
- 2.14. The working age population is projected to increase from 3.43 million in 2016 to a peak of 3.59 million in 2028 (an increase of 5%). It is then projected to decline to 3.47 million by 2041. Overall there is a 1% projected increase in people of working age over the 25-year period.
- 2.15. Most areas are projected to see an increase in their working age population, with 21 of 32 council areas in this category. However,

parts of the west of Scotland and Scotland's island councils are projected to have smaller working age populations in 10 years' time.

- 2.16. Figure 2.4 shows the total number of dependents per 1,000 people of working age¹ is projected to increase from 574 in 2016 to 640 in 2041. The increase in the dependency ratio is due to the increase in the number of people of pensionable age per 1,000 working age population. The dependency ratio for children is projected to decline slightly from 267 per 1,000 working age population in 2016 to 260 in 2041. For people of pensionable age there is projected to be an increase in the dependency ratio from 307 pensioners per 1,000 working age population in 2016 to 380 in 2041.

Figure 2.5: Projected dependency ratios (per 1,000 working population), 2016-2041



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland, Office for National Statistics

Migration

- 2.17. In 2015-16, net migration to Scotland was positive at 31,700, with 22,900 from overseas and 8,800 from the rest of the UK¹⁰.
- Net migration from overseas is projected to decrease from the latest estimate of 22,900 in 2015-16 to 7,000 in 2040-41.
 - Net migration from the rest of the UK is also projected to fall, but by far less from 8,800 in 2015-16 to 7,600 in 2040-41.

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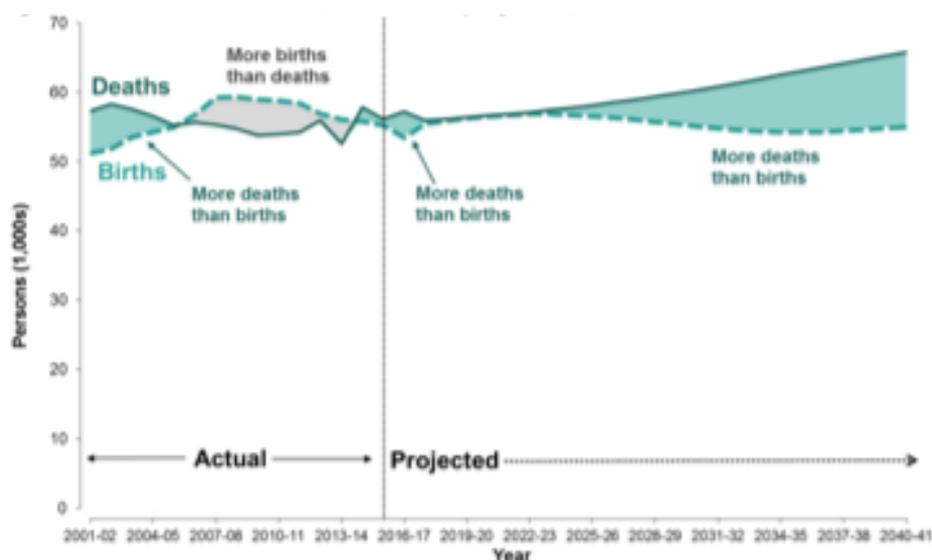
National Records of Scotland (2017) Population Projections for Scottish Areas (2016-based). Online at <https://www.nrscotland.gov.uk/files/statistics/population-projections/sub-national-pp-16/pop-proj-principal-2016-tab-publication.pdf>

- 2.18. In-migration to Scotland from the rest of the UK is projected to increase slightly from the latest estimate of 46,300 in 2015-16 to 47,100 in 2040-41, with out-migration from Scotland to the rest of the UK is also projected to increase from 37,500 to 39,500 in the same period.
- 2.19. In-migration to Scotland from overseas, however, is projected to decrease substantially from 40,400 in 2015-16 to 30,500 in 2040-41, while out-migration to overseas is projected to increase from 17,500 to 23,500 over the same period.

Births and deaths

- 2.20. The projected figures show that the number of deaths is projected to be higher than the number of births in every year from 2016-17 to 2040-41. From 2017-18 to 2023-24, the number of births and deaths are projected to be similar, with less than 1,000 more deaths than births each year during this period.
- 2.21. Beyond 2024, the number of deaths each year is projected to increase with births remaining at a broadly similar level. This means that by the year 2038-39 there are projected to be 10,000 more deaths than births each year in Scotland (figure 4).

Figure 2.6: Births and deaths, actual and projected, Scotland, 2001-02 to 2040-41



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland, Office for National Statistics

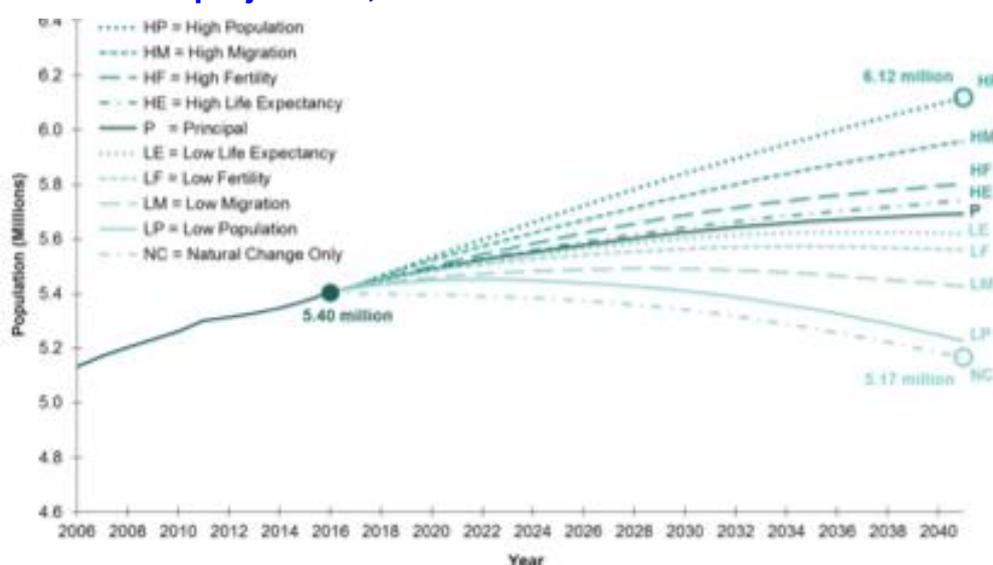
Life expectancy

- 2.22. Life expectancy for females is projected to increase to 84.5 years over the next 25 years from the most recent estimate of 81.2 years for those born around 2015 (an increase of 3.4 years). Males are projected to experience a larger increase in life expectancy of 4.6 years, from 77.1 years for those born around 2015 to 81.7 years in 2041¹¹.

Assumptions underlying different scenarios

- 2.23. Figure 2.6 shows the projected population under the different variant assumptions. The high population variant projects an increase in the population to 6.12 million in 2041 (13% increase) from the latest estimate of 5.40 million in 2016. The natural change only variant projects the lowest population in 2041 of 5.17 million, a 4% decrease.

Figure 2.7: Actual and projected total population of Scotland, under the 2016-based principal and selected variant projections, 2006-2041



Source: Mid-year population estimates and National Population Projections (2016-based), National Records of Scotland, Office for National Statistics

- 2.24. The assumptions for the principal and each of the variant projections are shown in Figure 2.7. The assumptions for the long-term total fertility rate vary from a low of 1.45 to a high of 1.75. For life

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National Records of Scotland (2017) Population Projections for Scottish Areas (2016-based). Online at <https://www.nrscotland.gov.uk/files/statistics/population-projections/sub-national-pp-16/pop-proj-principal-2016-tab-publication.pdf>

expectancy the differing mortality assumptions result in a range of 79.8 years to 82.9 years for male life expectancy in 2041 and 82.8 22 years to 85.6 years for females. The low and high assumptions for net migration from overseas range from -1,500 to 15,500 in 2041¹².

Figure 2.8: Assumptions for the 2016-based principal and variant projections for Scotland

Variant	Long-term fertility (Total Fertility rate - TFR)	Life expectancy males (2041)	Life expectancy females (2041)	Net migration from the Rest of the UK (2041) (rounded to the nearest 100)	Net migration from overseas (2041) (rounded to the nearest 100)	Total Net migration (2041) (rounded to the nearest 100)
Principal projection	1.65	81.7	84.5	7,600	7,000	14,600
High population	1.75	82.9	85.6	8,300	15,500	23,800
High Migration	1.65	81.7	84.5	8,000	15,500	23,500
High Fertility	1.75	81.7	84.5	7,900	7,000	14,900
High Life expectancy	1.65	82.9	85.6	7,600	7,000	14,600
Low Life expectancy	1.65	79.8	82.8	7,500	7,000	14,500
Low Fertility	1.45	81.7	84.5	7,200	7,000	14,200
Low Migration	1.65	81.7	84.5	7,200	-1,500	5,700
Low population	1.45	79.8	82.8	6,800	-1,500	5,300
Natural change only	1.65	81.7	84.5	0	0	0

Source: National Records of Scotland (2017) Population Projections for Scottish Areas (2016-based).

3. LABOUR MARKET

Summary of Evidence: Labour Market

Projections to 2030

The **growth in employment** for Scotland by 2028 is projected at around **85,000** jobs compared to 2018.

However, as a result of people retiring, or leaving occupations or sectors for other reasons, **replacement demand** is projected to amount to **900,000 job opportunities** over the course of the decade.

Comparing 2028 with 2018 in terms of projected employment by **sector**:

- Significant **growth** is projected for jobs in **private sector services** and **construction**.
- **Manufacturing** jobs are projected to **decline** by over 26,000, with 16,000 fewer in **public administration and defence**. Agriculture and mining are projected to continue their long-term decline in employment terms.

In terms of **occupations**:

- **Strong growth** is projected for: business and public service professionals; business and public service associate professionals; skilled construction and building trades; elementary clerical and service occupations.
- **Decline** is anticipated in relation to protective service occupations; administrative occupations; secretarial and related occupations; skilled metal and electrical trades; process, plant and machine operatives; and elementary occupations in trades, plant and store.

Labour supply is compromised in volume terms by the long term **decline in the working age (16-64) population**, although there may be some mitigation due to rising employment rates in the 65+ age group. Projections on net migration are largely conditional on the outcome of the BREXIT process, and governmental migration policy.

Scenarios Beyond 2030

The forward look on the labour market is dominated by the potential impacts of **digitalisation** on the nature of work. This has been happening for some time, but there is **no certainty on the time path** for the emergence of more far-reaching impacts.

Detailed research suggests that **jobs across the full spectrum** from currently very low skilled to very high skilled will be **impacted significantly**.

There is considerable uncertainty over the **impact on the total volume of employment**, although historically major technological advances transforming work have been consistent with growing employment.

Policy Context

- 3.1. The labour market is central to **economic development strategy** in Scotland as articulated in *Scotland's Economic Strategy* in 2015¹³. The labour market is at the heart of driving two high-level strategic goals:
- Increasing productivity and sustainable economic growth.
 - Increasing labour market participation and reducing inequalities, to make this growth as inclusive as possible.
- 3.2. *Scotland's Economic Strategy* places a great emphasis on **inclusive growth**, and the labour market is viewed as a critical domain linking growth and inclusivity.
- 3.3. The Scottish Government's 2016 *Labour Market Strategy*¹⁴ set out five **key labour market outcomes**.
- A skilled, productive and engaged workforce capable of meeting the needs of employers.
 - An economy that supports a sustainable working population, and that can retain and attract new talent to meet our wider economic and social ambitions.
 - High employment and low unemployment.
 - Equality of opportunity to access work and to progress, to ensure everyone is able to maximise their potential.
 - Fulfilling, secure and well-paid jobs where employees' contributions are encouraged, respected and valued
- 3.4. The last of these outcomes reflects a policy approach by the Scottish government which places great weight on **Fair Work**, defined as: '*Work that offers effective voice, opportunity, security, fulfilment and respect; that balances rights and responsibilities of employers and workers, and that can generate benefits for individuals, organisations, and society*'.
- 3.5. Another relevant key policy drive in more recent years is the focus on **tackling inequalities**. This has involved legislation, guidance to public bodies and a range of action plans. Two major current concerns, closely linked to the labour market, are:

¹³ Scottish Government (2015). *Scotland's Economic Strategy*.

¹⁴ Scottish Government (2016). *Scotland's Labour Market Strategy*.

- Halving the disability employment gap.
 - Closing the gender pay gap.
- 3.6. Actions Plans to address each of these goals have been produced by the Scottish Government.

Evidence Base: The Current Position

- 3.7. This section reviews the current labour market position based on trends over the most recently available 5-year period – to June 2018 unless footnoted otherwise. Over this period, the **total number employed** rose by 133,000 to 2,540,000 – of which 48% were female.

Employment, Unemployment and Economic Inactivity Rates

- The **employment rate** – measured as percentage of working age people in employment - rose from 74.4% to 78.5% for males, and from 66.6% to 70.7% of females. These are very high levels by historical standards, but there are big variations by region with the West of Scotland¹⁵ underperforming.
- Employment rates for **disabled** people rose¹⁶ from 42.4% to 48.4%, but the latest figure is well below the 81.5% employment rate for people without a disability.
- Employment rates for **minority ethnic groups** rose marginally from 57.8% to 57.9%, compared to the growth from 70.9% to 75.4% for the 'white' population.
- In terms of **age**, whereas the number of 35-49 year-olds in employment fell by 4.2%, there was a growth of 17.4% in both the number of 50-64 year-olds and 65+ in employment.
- **Unemployment rates** for males have fallen from 9.2% to 4.7%, and for females from 6.7% to 3.5%. Again the West of Scotland underperforms other Scottish regions.
- **Economic inactivity** rates show no improvement, with a fall from 23.4% to 22.2%. Economic inactivity rates are much higher in the West of Scotland, attributed to the higher incidences of disability and long-term health conditions.

Employment by Sector

- In 2018 the largest sectors of employment were Human Health and Social Work Activities, and Wholesale and Retail, each with in excess of 380,000 employees.
- Over the previous 5 years the strongest growth, 10% or more, was in Real Estate Activities, and Administrative and Support Service Activities.

¹⁵ Comprised of Glasgow City Council, East and West Dunbartonshire, East Renfrewshire, Inverclyde and Renfrewshire.

¹⁶ For 4-year period to 2017/18.

- There was a substantial decline (-43%) in Agriculture, Forestry and Fishing, but also in Manufacturing (-21%). The combined job loss in these two traditional sectors amounted to 35,000 over the five years. Agriculture, Forestry and Fishing now account for only 1.3% of all jobs, and Manufacturing 6.7%.

Employment by Occupation

- The most growth was displayed in caring leisure and other service occupations (12.7%); process, plant and machine operatives (11.4%); and professional occupations (10.7%). The numbers in professional occupations grew by over 10,000 per annum over the period.
- Relatively small percentage declines were experienced in administrative and secretarial occupations, and sales and customer service operations.
- Growth was particularly rapid in more specialist occupational areas, exceeding 20% for science, research, engineering and related professionals; and health and social care associate professionals.

Labour Supply

- 3.8. The figures for the number of EU migrants employed in Scotland for the last three years are shown below. Despite forecasts that numbers would decline following the referendum in June 2016, the evidence shows a different picture. The numbers grew very strongly during 2016/17 – and continued to rise during 2017/18. This growth is despite the reduced value of remittances to home economies due to the fall in sterling relative to the euro, allied with very strong growth and rising earnings in many of the Eastern European economies.

Figure 3.1: Employment of Non-UK EU Nationals

	EU Nationals Employed	% of Total Workforce
2015/16	110, 000	4.4%
2016/17	135, 000	5.4%
2017/18	143, 000	5.7%

Source: Annual Population Survey, ONS

- 3.9. Over 50% of EU migrants in employment in Scotland in 2017/18 were employed in Aberdeen City and Aberdeenshire, or Edinburgh city region. These are the two tightest labour markets in Scotland, so this finding is unsurprising.

- 3.10. In terms of sectoral and occupational reliance on non-UK EU labour, and focusing on situations where 10% or more workers are EU migrants:
- The Accommodation and Food Services sector employ nearly 15% of their workforce from EU migrants, but there are no others with a 10% exposure.
 - For occupations, there are five with a 10+% reliance on EU workers - textiles, printing and other skilled trades; process, plant and machine operatives; elementary trades and related occupations; elementary administration and services; and leisure, travel, related personal services.

Earnings, Skills Shortages and Deficits

- 3.11. Earnings and recruitment and skills issues tend to be related at some level.
- Average (median) weekly earnings¹⁷ increased by 10.5%. However, taking account of price inflation, average real earnings declined over this period.
 - Hard to fill vacancies as a percentage of all vacancies rose from 33% to 39%.
 - Skill shortage vacancies as a percentage of hard to fill vacancies declined from 74% to 60%.
 - The percentage of establishments with the skills gap - defined as staff with less than adequate competence levels for the job role – fell from 19% to 16%.
- 3.12. The evidence here is mixed on the indicators is derived from the UK Employer Skills Survey 2017. The narrative appears to be that vacancies are becoming hard to fill due to insufficient numbers of applicants, rather than the skill sets of those who do apply.

Projections to 2030

- 3.13. There are no projections available beyond 2028. The 2028 projections used here were commissioned by SDS from Oxford Economics to update the more comprehensive study published in November 2017¹⁸.

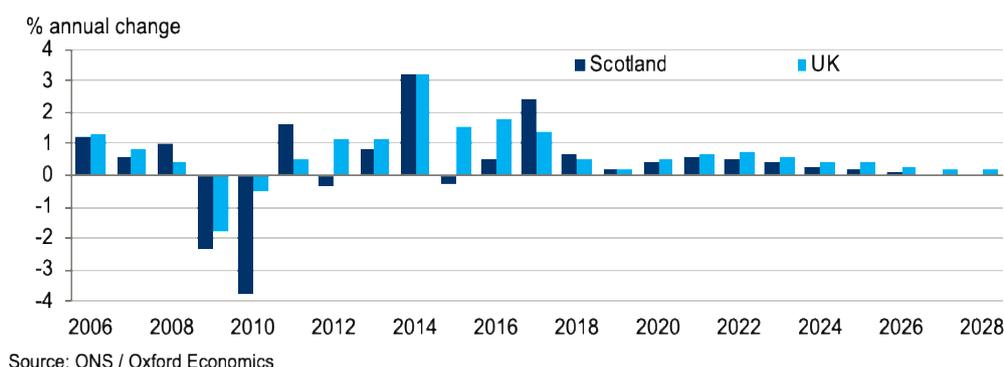
17 Annual Survey of Hours and Earnings, ONS

18 Skills Development Scotland (2017). *Jobs and Skills in Scotland. The Evidence.*

Employment

- 3.14. The headline employment projections for Scotland relative to the UK are captured in the chart below. This shows a much calmer pattern of annual change compared to the recession and post-recession years. As we move closer to 2028, projected annual employment growth is only marginally above zero. The net growth in employment for Scotland by 2028 is projected at around 85,000 compared to 2018.

Figure 3.2: Annual % Change in Employment – Scotland and UK

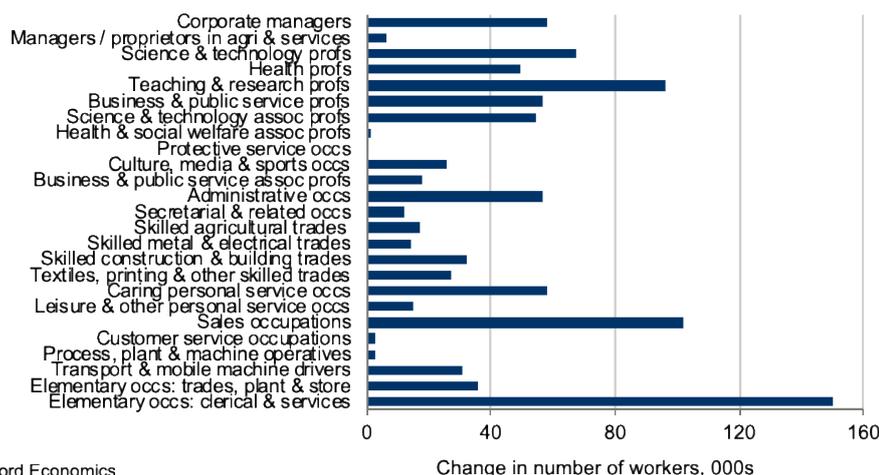


- 3.15. Although not charted above, the highest rate of jobs growth is projected in Edinburgh and Glasgow. The net job growth for the two cities combined is close to 68,000 jobs, over 80% of the jobs growth for Scotland as a whole. Employment is projected to decline modestly in North and South Ayrshire, Eilean Siar, Argyll & Bute, Moray, Dumfries & Galloway and Aberdeen City.

Total Employment Requirements

- 3.16. The expected net growth in jobs is, however, extremely modest compared to the number of job openings projected for the next 10 years as a result of people leaving Scotland, retiring from the labour market, leaving employment for other reasons or moving out specific occupations. This **replacement demand** is projected to amount to **900,000 job openings over the coming decade**.

Figure 3.3: Projections for Total Employment Requirements, 2018-28

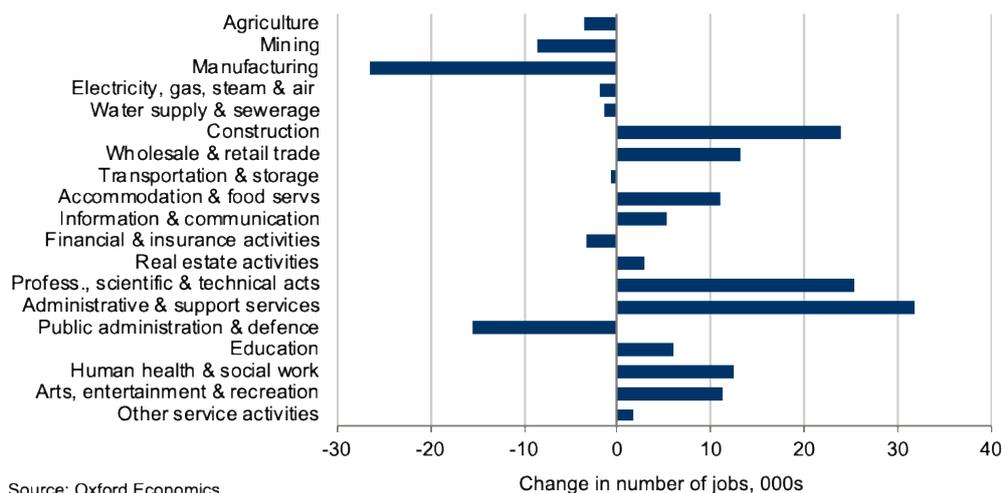


3.17. Within this overall total:

- The **largest demand** is projected for elementary clerical and service occupations, with 150,000 job openings. Sales occupations and teaching and research professional are both around the 100,000 mark.
- For many of occupations there will be a requirement to fill in excess of 40,000 jobs over the 10 years, including challenging recruitment and retention areas such as caring and personal service occupations.

Employment by Sector

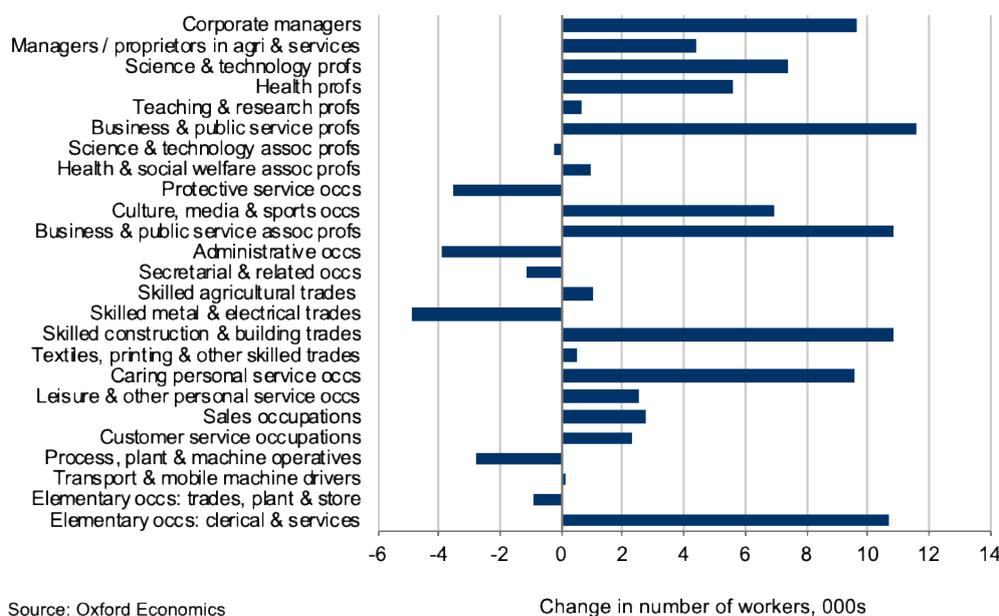
- Strong growth is projected for private sector services - Administrative and Support Services; Professional, Scientific and Technical Activities; - and Construction. All these sectors are anticipated to add well excess of 20,000 jobs – and over 30,000 jobs in the case of Administrative and Support Services.
- Growth of employment in excess of 10,000 is projected for Wholesale and Retail; Accommodation and Food Services; Human Health and Social Work; and Arts, Entertainment and Recreation.
- Manufacturing is projected to decline by over 26,000 jobs, with 16,000 fewer in Public Administration and Defence. Agriculture and mining are projected to continue their long-term decline as sources of employment.

Figure 3.4: Employment Projections by Sector 2018-28, Scotland

Employment by Occupation

- **Strong growth** – 10,000 additional jobs or more – is projected for business and public service professionals; business and public service associate professionals; skilled construction and building trades; elementary clerical and service occupations.
- **Growth** in excess of 5,000 additional jobs is projected for corporate managers; leisure and other personal service occupations; science and technology professionals; culture, media and sports occupations; and caring and personal service occupations.
- Occupational **decline** is anticipated in relation to protective service occupations; administrative occupations; secretarial and related occupations; skilled metal and electrical trades; process, plant and machine operatives; and elementary occupations in trades, plant and store.

Figure 3.5: Employment Projections by Occupation 2018-28, Scotland



Source: Oxford Economics

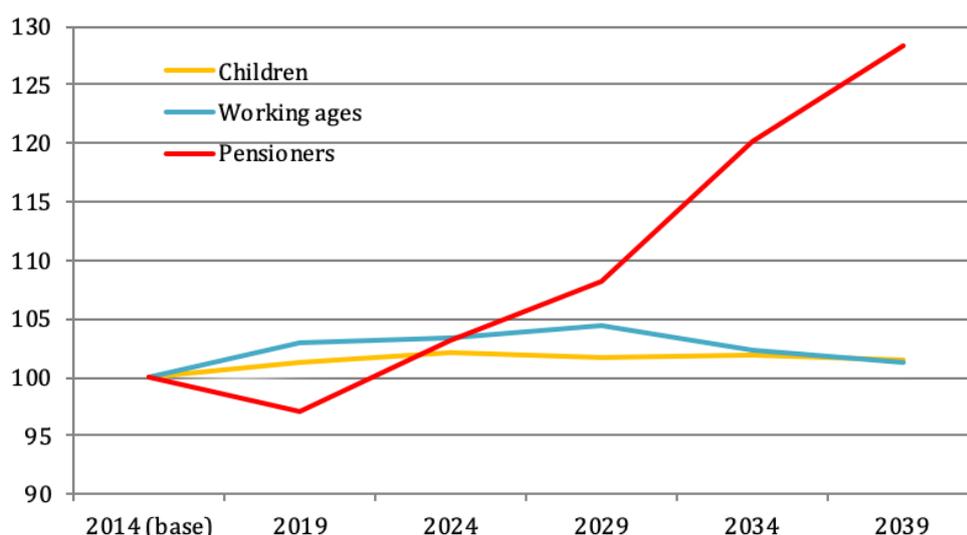
Change in number of workers, 000s

Labour Supply

- 3.18. A key factor in supplying the Scottish labour market has been the continued growth of EU migrants beyond the date of the EU referendum. At this point there is no certainty as to whether or not BREXIT will take place, and if it does take place there is no certainty as to the future relationship between the UK and the EU. In the circumstances, projections on the supply of EU labour are pure speculation. Additionally, although some direction has been indicated in relation to UK migration policy, no firm decisions have been made, and will not be made until BREXIT has been put to bed one way or the other.
- 3.19. Figure 3.6 provides a simple picture of projected population change which shows the working age population more or less flat lining from 2019, but then declining from 2029. What is clear is that Scotland's underlying demographic position, explored in depth in the Population Domain paper, is not supportive of a growing employment base using the 16-64 definition of the working age population.
- 3.20. However, the 16-64 definition of working age needs to be challenged. Average retirement ages are rising due to pension changes in the

state sector and pension defaults in the private sector, and this is already reflected in increasing employment rates in the 50-64, 65-74 and 75+ age bands. There are in excess of 600,000 in the 65-74 age band. The population projections suggest a shortfall of around 150,000 in terms of labour supply defining working age as 16-64. If 25% of the 65-74s were employed in 2040 the gap could be covered, and in fact nearly 90,000 of 65-74s are currently employed. It is likely, however, that these older workers would prefer to supply fewer hours per week than those of prime age.

Figure 3.6: Projected Scottish Population Change (Indexed) by Age Group, 2014-39



Source: NRS, 2016

- 3.21. Additionally, Scotland has currently around 100,000 unemployed and over 200,000 working age people classified as economically inactive due to disability and/or health issues. With more occupational tasks become digitally enhanced or enabled it may become easier for some of those further from the labour market to enter and sustain employment.

Issues with Projections

- 3.22. Statistical projections for employment are in common use throughout the UK. The limitations of these approaches are well known, and there are great dangers in using these at the disaggregated geographical scale, such as a local authority area, as in some instances this comes close to projecting the future of a small number of major employers

rather than the local economy. Projections are particularly fragile at times of great uncertainty in terms of the global economy, or major regional economies within this. Currently there are major issues with China's debt burden, a potential major trade war – and of course BREXIT. Additionally, the nature of employment is set to change radically – and perhaps rapidly, although this is less certain – due to the impact of digitalisation. This is discussed below.

Beyond 2030

- 3.23. **Digitalisation** is already changing face of the economy and labour market across the developed world. Digitalisation will have a significant impact on the nature of existing jobs, and this will also involve job losses – but at the same time digitalisation will create many new jobs. The issues and literature are reviewed in a recent Scottish Government publication¹⁹.
- 3.24. Overall, there is great potential to raise productivity and earnings. In the digital technologies industry, productivity is three times the Scottish average²⁰, but digitalisation has the **potential to raise productivity** across many other sectors. However, it can be hard to sustain this argument given the poor productivity performance of most of the major economies over the last decade.
- 3.25. Projections around the impacts of digitalisation, and the implications for skills are fraught with difficulty, however. Leading academics in this field estimated in a 2013 book²¹ that nearly 50% of US jobs were at risk from digital technologies within a 10-20 year time span. The OECD have argued that more weight needs to be given to the job creation potential of digitalisation, but nonetheless conclude the 9% of UK jobs are at risk by 2030²². A study by McKinsey²³ of a small number of leading economies, excluding the UK but involving the US

19 Scottish Government (2018). *Technological Change and the Scottish Labour Market*.
 20 Digital Scotland/Ekosgen(2017). *Scotland's Digital Technologies: Research and Analysis Report*.
 21 C. B .Frey and M.A. Osborne (2013). *The Future of Employment*.
 22 OECD (2016). *The Risk of Automation for Jobs in OECD Countries*.
 23 McKinsey & Co. (2017). *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation*.

and Germany, comes out with a projection roughly mid-way between the two quoted above.

3.26. The key drivers of digitalisation are the falling real cost of computing and the increased availability of ‘big data’. However, there remain ‘engineering bottlenecks’ which protect some tasks from computerisation. These relate to:

- Perception and manipulation tasks.
- Creative intelligence tasks.
- Social intelligence tasks.

3.27. Building on these concepts, Frey and Osborne applied their model²⁴ to 702 occupations which they ranked from low to high risk of ‘computerisation’. Just as an illustration, the 10 occupations most and least at risk from digitalisation are listed in the table below.

10 Occupations Least at Risk	10 Occupations Most at Risk
Recreational therapists	Telemarketers
First line supervisors of mechanics, etc.	Title examiners + searchers
Emergency managing directors	Hand sewers
Mental health social workers	Mathematical technicians
Audiologists	Insurance underwriters
Occupational therapists	Watch repairers
Orthotists + prosthetists	Cargo + freight agents
Healthcare social workers	Tax preparers
Oral surgeons	Photographic process workers
First line supervisors of firefighters.	New accounts clerks

3.28. The National Endowment for Science, Technology and Arts (NESTA) using different methods (based on a mix of expert consultations and machine learning analysis) also explored the future of specific occupations.²⁵ They classify occupations in terms of those most likely

²⁴ C.B. Frey and M.A. Osborne (2017). ‘The Future of Employment: How Susceptible are Jobs to Computerisation?’ *Technological Forecasting and Social Change*, 114.

²⁵ NESTA (2017). *The Future of Skills. Employment in 2030*.

to experience declines and increases in employment. Their findings are summarised below.

10 Occupations Projected to Expand	10 Occupations Projected to Decline
Food prep + hospitality trades	Mobile machine drivers + operatives
Teaching + education professionals	Elementary admin occupations
Sports + fitness occupations	Elementary sales occupations
Natural + social science professionals	Elementary storage occupations
Managers in hospitality + leisure	Customer service occupations
Health + social service managers	Customer service managers
Artistic, literary + media occupations	Assemblers + routine operatives
Public service + related professionals	Elementary agricultural organisations
Other elementary service occupations	Other admin occupations
Therapy professionals.	Printing trades

3.29. Similarities are clear between the occupations most and least at risk as digitalisation beds down – but there also differences with NESTA drawing a stronger association between the skill levels required and occupational redundancy compared to the work of Frey and Osborne.

3.30. More generally, there are some consistent themes emerging from the wider literature:

- Digital technologies will influence most forms of work and most workplaces, and more jobs, or tasks within jobs, will be done by machines.
- Digital technologies will increasingly find new ways of connecting and collaborating on the global business stage, opening up many new market opportunities.
- The information landscape will become increasingly complex over time, putting a premium on skills and systems that are able quickly to interpret and exploit what is out there.

- 3.31. As the role of machines grows, workers will become more focused on tasks such as working with and supporting others, and using creativity and drive to deal with complex issues.
- 3.32. More generally, there are **two big issues** for Scotland and other economies:
- **Will digitalisation will decrease or increase the aggregate demand for labour?** Potentially, Scotland's flat demographic profile could prove advantageous should the pessimistic scenario prevail. Historically, however, major technological changes have generally been associated with increased numbers of jobs and a rising demand for labour, but within this specific occupational groups and communities have often suffered great and long-lasting distress.
 - **What are the likely impacts on the mix of 'good' and 'bad' jobs, and the distribution of earnings between high and low in the labour market?** The more empirically based analysis to date suggests that digitalisation will impact across the occupational and earnings spectrum, but there is no certainty about this.
- 3.33. The challenges in the modern era may be the **pace of change** of associated with digitalisation and the **speed of transfer** as a result of economic globalisation, making it more difficult for our economy and society to respond positively and effectively to the new digital technology.
-

4. BUSINESS AND INDUSTRY LANDSCAPE

Summary of Evidence: Business & Industry

Scotland's onshore economy has **grown at a slower rate than the UK average over the past 20 years and continues to feel the effects of the economic downturn.**

Scottish productivity growth has slowed but has exceeded UK growth over the past decade: between 2007 and 2017 productivity in Scotland grew at an average annual rate of 0.7 per cent per year, which is higher than the UK average of 0.2 per cent over that period.

Private sector business services (Professional, Scientific & Technical Activities, Information & Communication, Administration & Support Services, and Real Estate Activities) have been **Scotland's fastest growing sectors.** However, many sectors have experienced a slowdown in economic growth since the recession, contributing to Scotland's weaker overall economic performance.

Scotland's business population is expanding but the rate of churn has increased among the business population, with an increase in the rates of both new businesses start-ups and business closures over the past five years.

Economic Outlook

Reflecting current uncertainty, **there are large variations in current forecasts** for Scotland. Scottish Fiscal Commission's (SFC) December 2018 forecast is the most pessimistic, projecting subdued economic growth, averaging at just over 1 per cent pa over the next five years.

Other forecasts are more optimistic: SDS 'Jobs and Skills in Scotland' November 2017 report indicate that growth will accelerate and peak at 2.1 per cent in 2021 and then fall year-on-year to 1.5 per cent per annum by 2026. ITEM's December 2018 forecast predicts a dip in growth in 2019 followed by an average of 1.5 per cent per annum growth to 2023.

Productivity growth forecasts are more consistent and broadly flat: the SFC expects GDP per hour to gradually increase over the next five years but remain lower than historic rates. SDS expects little improvement in productivity growth, with growth in GVA per worker increasing to 1.5 per cent in 2019, and then fluctuating between 1.3 per cent and 1.4 per cent up to 2027. This pattern is also Fraser of Allander Institute forecasts for sectors in the Scottish economy.

There are no published forecasts for the Scottish economy beyond 2027.

Policy Context

- 4.1. Scotland's economic strategy²⁶ is based on two key pillars:
- Increasing competitiveness, to boost long-term economic growth by supporting Scottish businesses to develop by supporting entrepreneurialism and access to finance, encouraging innovation and help businesses grow domestically and overseas.
 - Reducing inequality is not just a social objective but is interdependent with increasing sustainable economic growth over the long term by increasing the number of people who can contribute towards economic prosperity.
- 4.2. Scotland has the ambition to rank among the top quartile of OECD countries for productivity, equality and sustainability by creating a productive, inclusive and globally competitive economy with a high performing labour market.
- 4.3. The Council of Economic Advisers²⁷ highlighted the importance of improving access to patient capital²⁸ for Scotland's businesses to securing future growth. The Committee pointed to how a lack of access to patient capital impinges on a number of areas fundamental to long-term growth in Scotland:
- Upgrading infrastructure: infrastructure quality underpins long-term growth and has been widely recognised including the Green Paper as a significant impediment to growth in the UK. Investment in infrastructure in the UK is skewed towards and the south-east. For instance, expenditure on transport infrastructure in London is over five times greater per head of population than in Scotland.
 - Investing in science, research and innovation: while Scotland's higher education expenditure on research and development (R&D) as a proportion of GDP is amongst the highest in the Organisation for Economic Co-operation and Development (OECD), business expenditure on R&D (BERD) is amongst the lowest, and significantly below the UK rate (with the UK itself having a relatively low rate of BERD as a share of GDP internationally).
 - Supporting businesses to start and grow: Scotland's business birthrate is significantly below that for the UK. Scotland also

²⁶ Scotland's Economic Strategy, Scottish Government, March 2015.

²⁷ Submission by the Council of Economic Advisers to the First Minister of Scotland, regarding Institutions to Support Patient Capital and Economic Development, April 2017.

²⁸ Patient capital is the name given for long term capital, where investors are willing to forgo shorter term, immediate returns in anticipation of more substantial returns in later periods.

consistently lags behind UK overall in terms of high-growth enterprises as a share of the business base - in 2014, 7.2% of the UK business base was high growth firms, compared against 6.7% for Scotland.

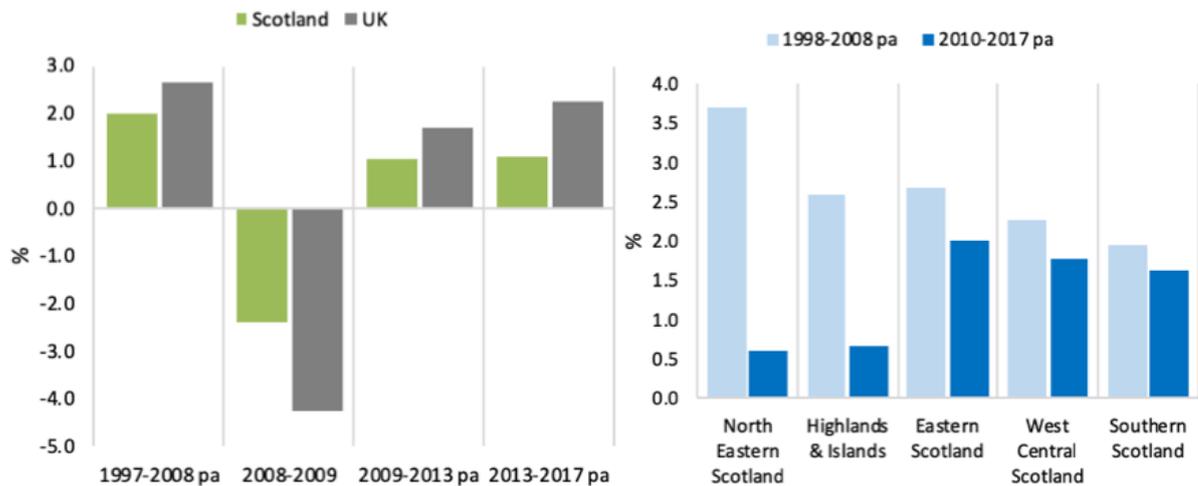
- 4.4. Business investment as a percentage of GDP has fallen over time for Scotland and has been between 7 and 8% of GDP, a consistently lower level than that for the UK, whose rate of business investment is itself low by international standards.

The Evidence Base: Economic Growth and Productivity

Economic growth in Scotland has lagged behind the UK average over the past 20 years and has struggled to recover to long-term rates since the recession

- 4.5. Scotland's economy has grown at a slower rate than the UK average over the past 20 years²⁹ and continues to feel the effects of the economic downturn.
- 4.6. Prior to the financial crisis, the Scottish economy grew by 2.0 per cent per annum in real terms (1997-2008), which was slower than UK average growth (2.6 per cent pa).
- 4.7. Scotland's economy was subsequently hit by recession, but less severely than the UK. In 2009, Scottish GDP fell by 2.4 per cent – which was much less steep than the UK-wide fall of 4.2 per cent – and took until 2013 to return to pre-recession levels.
- 4.8. Since entering the recovery period, economic growth across Scotland has lagged historical rates and has remained much weaker than across the UK. Between 2009 and 2013, GDP grew by 1.0 per cent per annum – below the UK average rate of 1.7 per cent. The Scottish economy has since struggled to strengthen with growth of 1.1 per cent per annum between 2013 and 2017 – half the rate of the UK-wide economy (2.2 per cent pa).

²⁹ Much of this may be explained by Scotland's lower population growth, compared to the UK as a whole, over the past 20 years.

Fig 4.1: Real GVA Growth

Source: Regional GVA (Balanced), ONS

All regions have experienced a dip in growth compared to their historic rates, particularly North Eastern Scotland and Highlands and Islands

- 4.9. Eastern Scotland and West Central Scotland are Scotland's biggest contributors to economic output, together accounting for two thirds of all Gross Value Added (GVA) in 2017.
- 4.10. Eastern Scotland has been Scotland's strongest performing region in recent years, with GVA growing by 2.0 per cent pa in real terms between 2010 and 2017. This was in line with the UK average. All other regions have experienced below-average growth, particularly North Eastern Scotland (0.6 per cent pa) and Highlands and Islands (0.7 per cent pa).
- 4.11. The economies of all regions have weakened since the 2008/09 financial crisis with recent growth rates lagging their historic rates. This is particularly the case in North Eastern Scotland with growth falling from 3.7 per cent pa during 1998-2008 – the strongest rate of all Scottish regions – to 0.6 per cent pa during 2010-2017. This is likely to be linked to the downturn in the oil and gas sector. Highlands and Islands has also experienced a steep drop in growth, from 2.6 per cent pa to 0.7 per cent pa over the same periods.

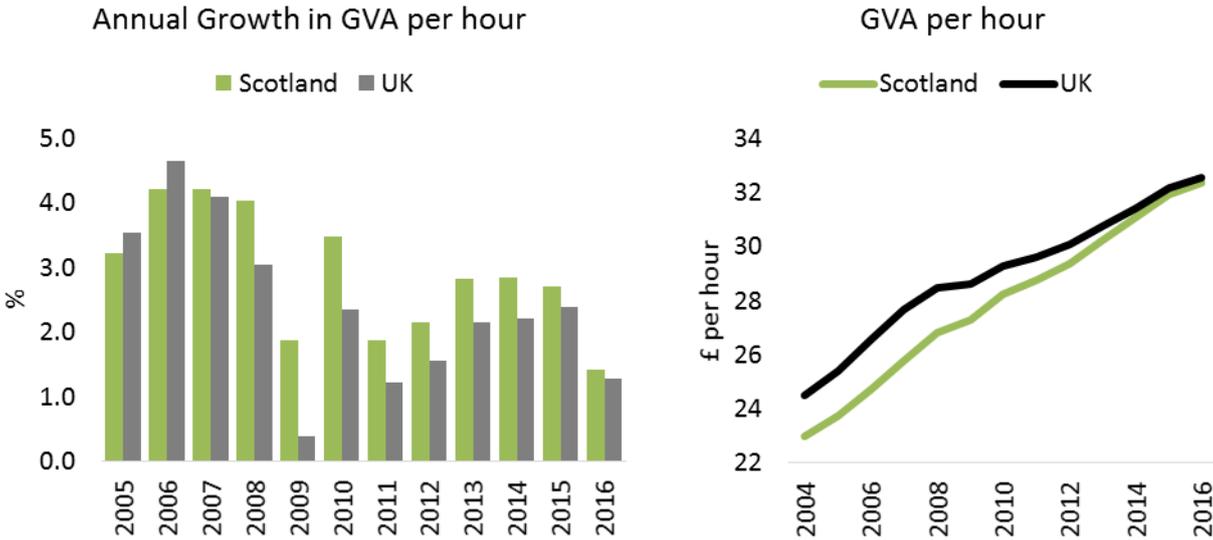
Productivity growth has slowed but has exceeded UK rates over the past decade

- 4.12. In line with the slowdown in economic growth since the recession, productivity growth has also slowed. Between 2013 and 2017, GVA

per hour in Scotland grew by an average of just 0.1 per cent pa in real terms, down from the pre-recession rate of 1.4 per cent pa (1998-2008).

- 4.13. However, Scottish productivity growth has exceeded UK-wide growth over the past decade. Between 2007 and 2017, productivity in Scotland grew at an average annual rate of 0.7 per cent per year, which was close to the EU and OECD averages of 0.8 per cent, and higher than the UK average of 0.2 per cent over that period.
- 4.14. Subregional productivity statistics show that there is wide variation in productivity rates between Scottish regions. In 2016, people working in Scotland produced an average of £32.38 of GVA per hour. This was slightly lower than the UK average productivity rate (£32.58 per hour), although some Scottish regions exhibited high productivity (North Eastern Scotland £36.3 per hour and Eastern Scotland £33.3 per hour).

Fig 4.2: GVA per hour, 2004-16



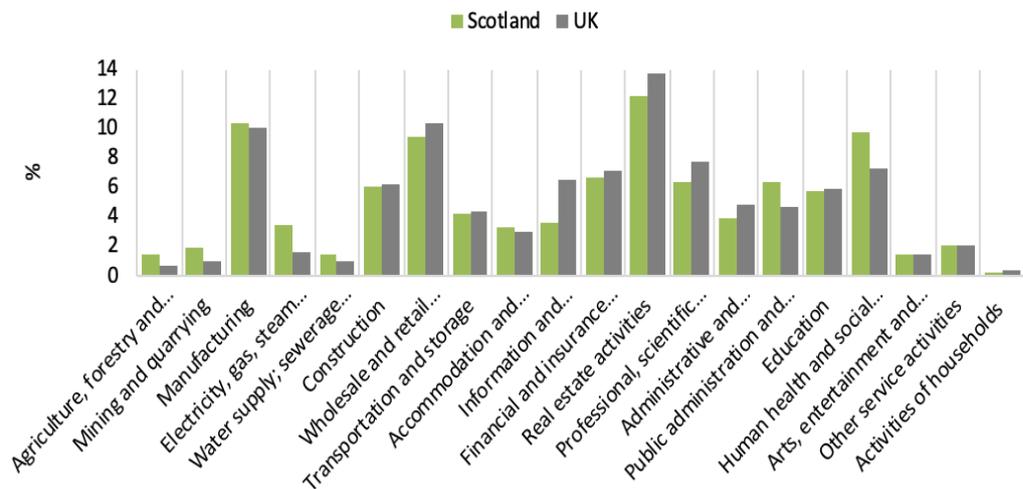
Source: Subregional Productivity, ONS

Real Estate, Renting & Business Activities is Scotland's biggest contributor to economic output

- 4.15. The Real Estate Activities sector is Scotland's biggest contributor to economic output. Producing £16.5 billion of

GVA in 2017³⁰ (in 2016 prices), it represented 12.1 per cent of all economic output. This was followed by Manufacturing (10.4 per cent), Health (9.7 per cent) and Wholesale & Retail (9.5 per cent). Compared to the UK picture, public sector services and the primary and production industries were more heavily represented in Scotland, while most private sector services accounted for smaller shares of output.

Fig 4.3: Share of GVA by sector, 2017



Source: Regional GVA (Balanced), ONS

Utilities, Accommodation & Food Services and Real Estate, Renting & Business Activities have been Scotland's fastest growing sectors since the economic downturn

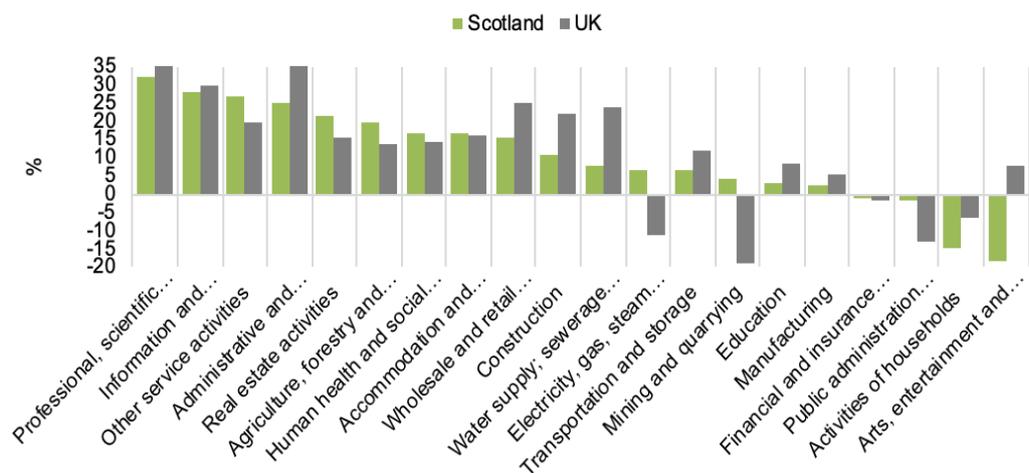
- 4.16. Since the economic downturn, the fastest growing sectors across Scotland have been private sector business services: Professional, Scientific & Technical Activities (a 32.2 per cent increased in GVA in real terms between 2010 and 2017), Information & Communication (27.8 per cent), Administration & Support Services (24.9 per cent) and Real Estate Activities (21.1 per cent). This is similar to the UK-wide picture.
- 4.17. Four sectors have experienced a decline in output since 2010: Arts, Entertainment & Recreation (-18.6 per cent), Activities of Households (-14.9 per cent), Public Administration & Defence (-2.0 per cent), and

³⁰ This includes an estimate for 'Imputed Rent', with a large proportion attributed to the imputed rental of owner occupiers

Financial & Insurance Activities (-1.2 per cent). These sectors also experienced a UK-wide decline, except Arts, Entertainment & Recreation.

- 4.18. Three sectors are notable in that their performance has been much stronger – or less weak – than across the UK since 2010: Mining & Quarrying (Scotland 4.3 per cent; UK -19.1 per cent), Electricity, Gas, Steam & Air Conditioning Supply (Scotland 6.7 per cent; UK -11.4 per cent) and Public Administration (Scotland -2.0 per cent; UK -12.9 per cent).
- 4.19. However, many sectors have experienced below-average growth, contributing to Scotland’s weaker overall economic performance. Sectors experiencing growth well below the UK average have been Arts, Entertainment & Recreation (Scotland -18.6 per cent; UK 7.5 per cent), Administrative & Support Services (Scotland 24.9 per cent; UK 48.0 per cent), Water Supply, Sewerage & Waste Management (Scotland 8.0 per cent; UK 24.0 per cent), and Construction (Scotland 10.7 per cent; UK 21.9 per cent).

Fig 4.4: GVA Growth by Sector, 2010-17



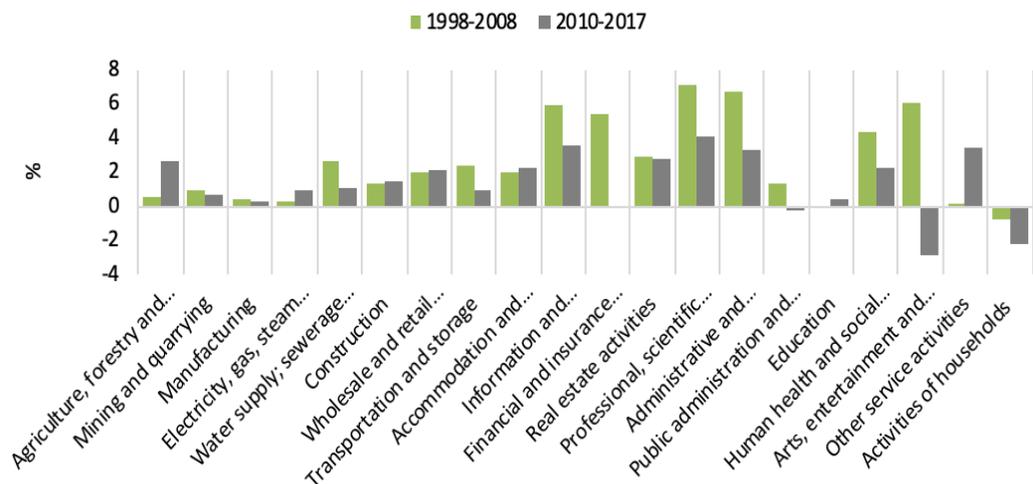
Source: Regional GVA (Balanced), ONS

All but four sectors have experienced a slowdown in economic growth since the recession, particularly Financial & Insurance

- 4.20. While some sectors have experienced slightly stronger growth since 2010 compared to historical rates – particularly Other Service Activities (3.4 per cent per annum 2010-2017, compared to 0.1 per

cent pa 1998-2008) and Agriculture, Forestry & Fishing (2.6 per cent pa 2010-2017, compared to 0.5 per cent pa 1998-2008) – many have experienced weaker growth. Arts, Entertainment & Recreation and Financial & Insurance have experienced the biggest deterioration, followed by Administrative & Support Services, Professional, Scientific & Technical Activities, Information & Communication, and Health & Social Work.

Fig 4.5: GVA growth per annum by sector, 1997-08 and 2010-17



Source: Regional GVA (Balanced), ONS

Scotland's Businesses

Scotland's business population is expanding

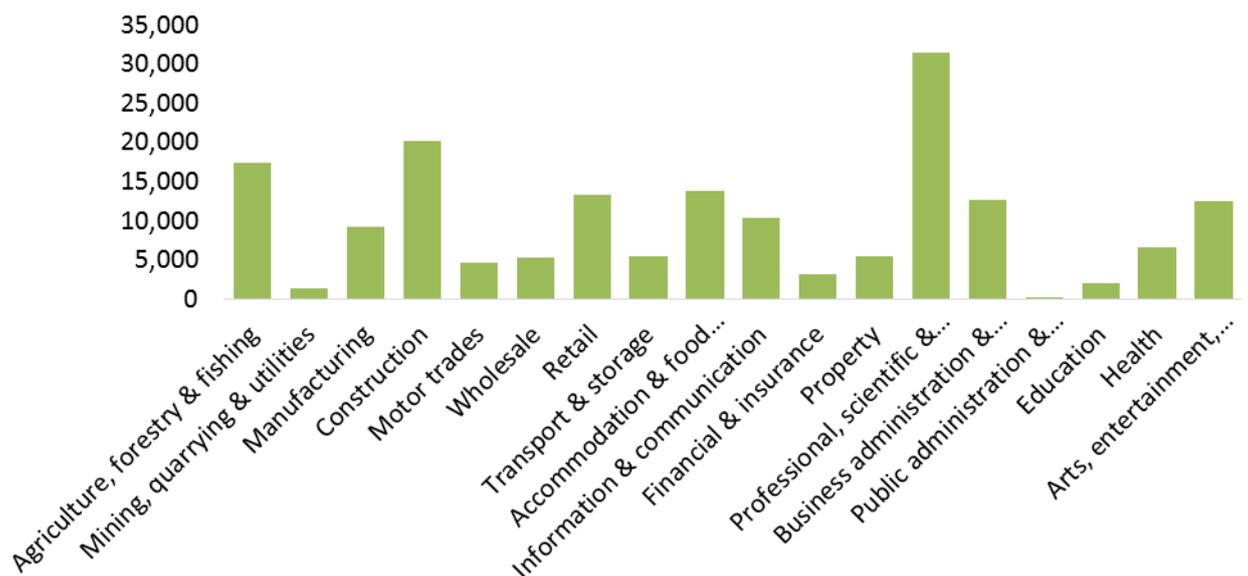
- 4.21. There were 331,365 businesses operating in Scotland in 2018, of which 181,600³¹ were VAT and/or PAYE registered. Around one quarter of VAT/PAYE registered businesses were based in the North East (26.1 per cent) and South East (25.1 per cent), around one fifth in the West (20.5 per cent) and South West (18.0 per cent), and one-tenth in the North (10.3 per cent).
- 4.22. Since 2012, the number of VAT/PAYE registered businesses have increased by 23,300, or 14.7 per cent. At regional level, growth ranged from 14-18 per cent in all regions apart from the North, which experienced growth of just 6.3 per cent. The business population across Scotland – and all regions – has increased faster than the

³¹ This is a count of the number of VAT and/or PAYE registered businesses active at any point in the year

resident population, with 335 businesses per 10,000 people in 2017, up from 298 in 2012.

- 4.23. Growth in the business population has been driven by an increase in the number of Business Administration & Support Services, Mining, Quarrying & Utilities, and Information & Communication businesses, and an increase in the number of micro businesses.
- 4.24. The largest sector (in terms of the business base) within Scotland is Professional, Scientific & Technical, accounting for 18.0 per cent of all VAT/PAYE registered businesses, followed by Construction (11.6 per cent) and Agriculture, Forestry & Fishing (9.9 per cent). At regional level, Professional, Scientific & Technical is the largest sector in North East (23.4 per cent), South East (19.2 per cent) and West (18.5 per cent) while Agriculture, Forestry & Fishing is the largest sector in the North (24.1 per cent) and Construction in the West (13.7 per cent).

Fig 4.6: Number of businesses by industry, 2018

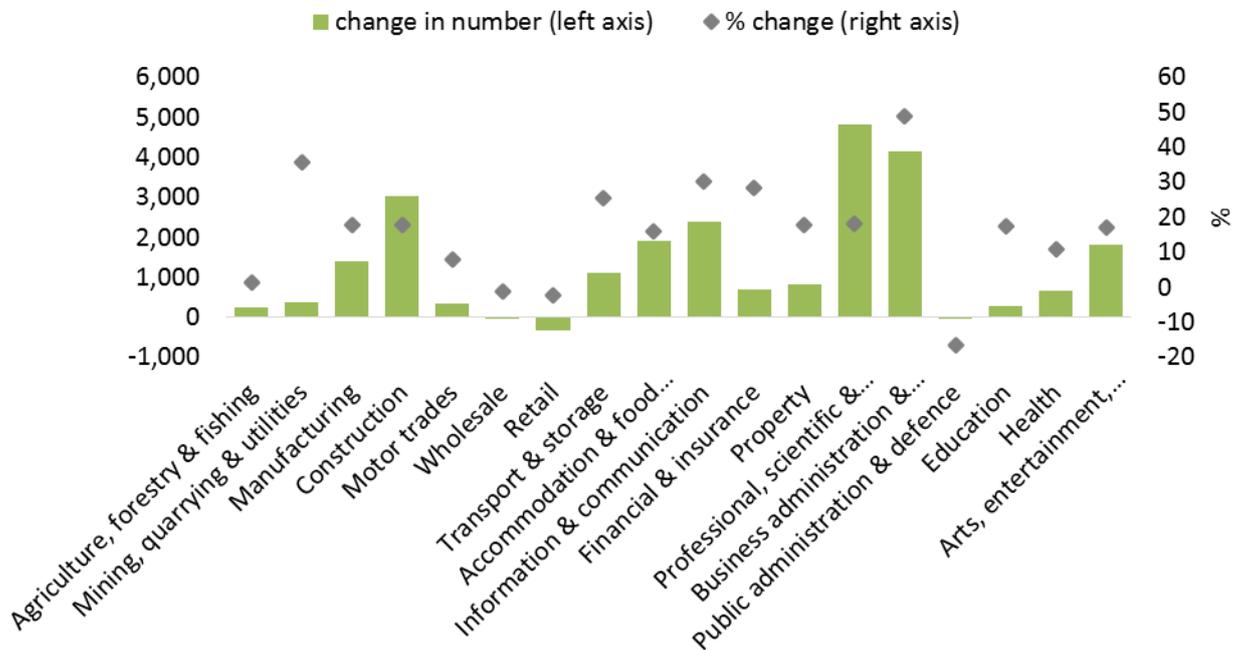


Source: UK Business Counts, ONS

- 4.25. Over the past five years, five sectors have seen their business base increase by more than 25 per cent. These include: Business Administration & Support Services (48.9 per cent), Mining, Quarrying & Utilities (35.8 per cent), Information & Communication (30.3 per cent), Financial & Insurance (28.3 per cent), and Transport & Storage (25.5 per cent) – although in absolute numbers, the biggest increase has been in the Professional, Scientific & Technical sector (+4,800).

During this time, three sectors have seen their business base shrink: Public Administration & Defence (-16.7 per cent), Retail (-2.4 per cent), and Wholesale (-1.1 per cent).

Fig 4.7: Total and percentage change in the number of businesses, 2013-2018



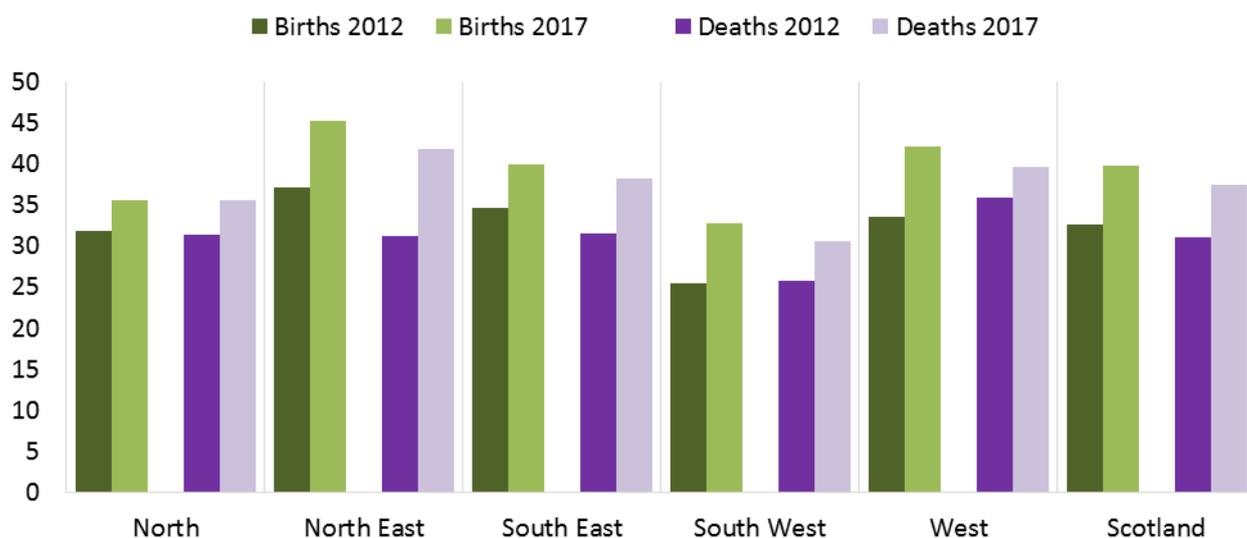
Source: UK Business Counts, ONS

- 4.26. The majority of businesses in Scotland are micro businesses, comprising 87.9 per cent of the business population in 2018. It is micro businesses that have accounted for the majority of growth in Scotland's business base over the past five years (93.1 per cent of all growth during 2013-18). This has been the case in all regions, particularly the North East (97.3 per cent of all growth).

The rate of churn has increased among the business population

- 4.27. The rate of churn has increased among the business population, with an increase in the rates of both new businesses start-ups and business closures over the past five years – nationwide and in all regions. In 2017, 21,600 new businesses started in Scotland, equivalent to 39.8 per 10,000 population – up from 32.7 in 2012. At the same time, there were 20,240 business deaths, equivalent to 37.5 per 10,000 population – up from 31.1 in 2012.

Fig 4.8: Rate of business births and deaths per 10,000 population, 2012 and 2017

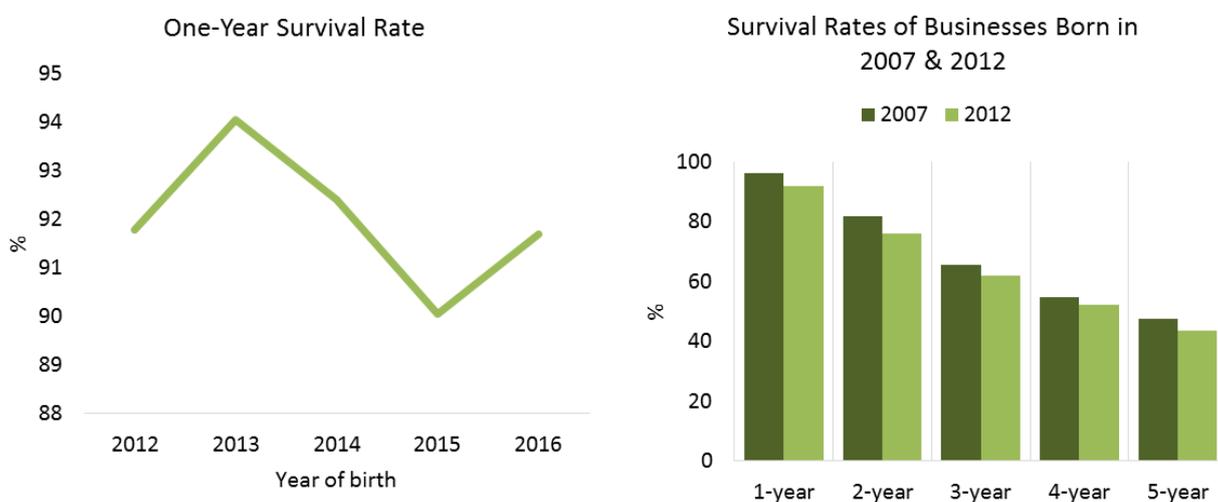


Source: Business Demography, ONS

The environment for new businesses has become more challenging

4.28. An increase in the business death rate highlights a more challenging environment for new businesses – with the rate of survival of new businesses falling over the past few years. Between 2013 and 2016, the percentage of businesses surviving their first year fell from 94.0 per cent to 91.7 per cent. And, looking at longer-term survival rates, businesses created in 2012 were less likely to survive for five years (43.7 per cent survival rate) than those born in 2007 (47.4 per cent).

Fig 4.9: Survival rates of new businesses



Source: Business Demography, ONS

Knowledge and Innovation

The number of knowledge economy jobs has increased

- 4.29. Knowledge-intensive activities have increasingly been recognised as important to supporting sustainable economic growth. Creating a greater reliance on intellectual capital rather than physical inputs provides access to long-term stable growth.
- 4.30. In 2017, there were 437,300 jobs in Knowledge Economy (KE) industries³², equivalent to 16.9 per cent of all jobs (lower than the Great Britain share of 20.1 per cent). There was wide variation in KE employment between regions, with the share of KE jobs ranging from 8.6 per cent in the North to above the Great Britain average in the West (20.3 per cent) and the South East (22.7 per cent).
- 4.31. Between 2015 and 2017, the number of KE jobs in Scotland increased by 17,400 – which, at 4.1 per cent, was in line with the Great Britain average, (4.2 per cent). The largest increase was in the North (+10.4 per cent) while KE jobs increased by just 0.5 per cent in the North East. Within KE sectors, the biggest increase in jobs was among Business support service activities n.e.c. (+6,000), Activities auxiliary to financial services, except insurance and pension funding (+3,000), Legal activities (+3,000), Activities of head offices (+3,000), Architectural and engineering activities and related technical consultancy (+3,000), and Motion picture, video and television programme activities (+2,000). In contrast, there was a sharp fall in Monetary intermediation jobs (-7,000).

The number of high and medium technology manufacturing jobs has fallen

- 4.32. In 2017, there were 58,900 high and medium technology manufacturing (HMTM)³³ jobs in Scotland, equivalent to 2.3 per cent of all jobs (lower than the Great Britain share of 3.0 per cent). At

³² SIC 2007 codes: 181, 182, 262, 263, 581, 582, 591, 601, 602, 611, 612, 613, 619, 620, 631, 639, 641, 642, 643, 649, 651, 652, 653, 661, 662, 663, 691, 692, 701, 702, 711, 712, 721, 722, 731, 732, 741, 742, 743, 749, 821, 822, 823, 829, 854, 910.

³³ SIC 2007 codes: 201, 202, 203, 204, 205, 206, 211, 212, 261, 262, 263, 264, 265, 266, 267, 268, 271, 272, 273, 274, 275, 279, 281, 282, 283, 284, 289, 291, 292, 293, 302, 303, 304, 309, 331, 332.

regional level, the share of HMTM jobs ranged from 1.1 per cent in the North to 3.0 per cent in the North East.

- 4.33. Between 2015 and 2017, the number of HMTM jobs in Scotland fell by 1,500, or 2.5 per cent, against a 3.4 per cent increase across Great Britain. This was driven by a fall in HMTM jobs in the North East (-3,500, or -15.7 per cent) and by a fall in jobs in the Manufacture of electronic components and boards (-1,000), Manufacture of general purpose machinery (-1,000), and Installation of industrial machinery and equipment (-1,000).

Fig 4.10: Share of all jobs in KE and HMTM sectors, 2017



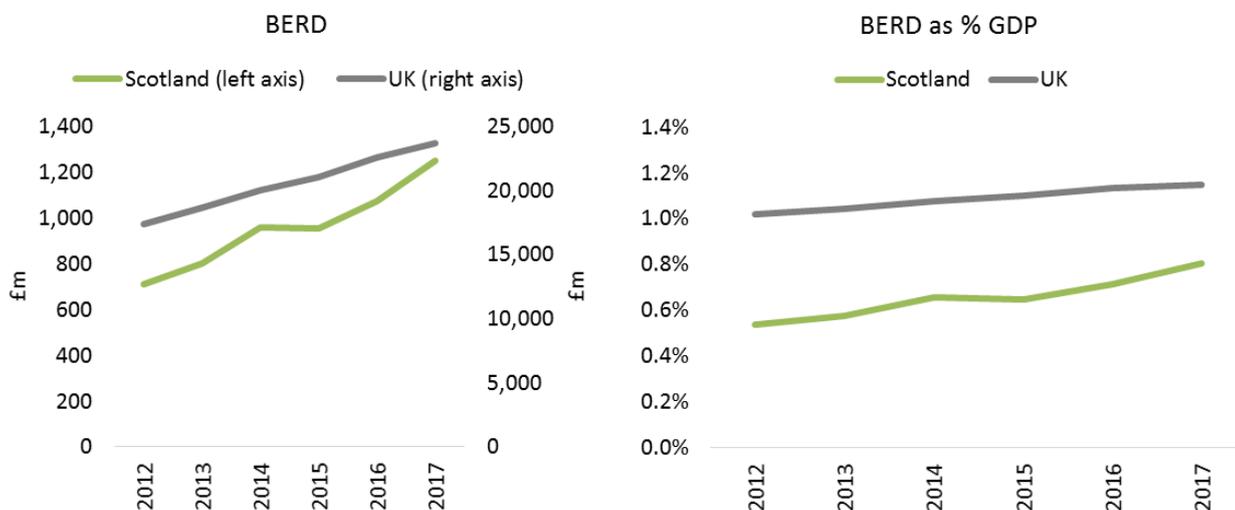
Source: Business Register and Employment Survey, ONS

Business expenditure on research and development and R&D employment have increased rapidly

- 4.34. Businesses in Scotland spent £1.2bn on R&D in 2017. Two-thirds of this expenditure was concentrated among four sectors: Miscellaneous Business Activities; Technical Testing & Analysis (£309m), Electrical Machinery (£215m), Chemicals (£179m), and Other Manufacturing (£122m).
- 4.35. Over the past five years, the value of business expenditure on research and development (BERD) in Scotland has increased by more than any other UK nation and region except London. Between 2012 and 2017, BERD increased by 76.0 per cent – well above the UK average increase (56.4 per cent) and just below London (78.0 per cent). As a result, BERD as a share of GDP increased to 0.80 per cent

from 0.54 per cent (although this remained below the UK average of 1.15 per cent). Employment on R&D performed within businesses in Scotland has also increased by 58.0 per cent over the past five years, from 8,300 in 2012 to 13,200 in 2017.

Fig 4.11: BERD, 2012-17



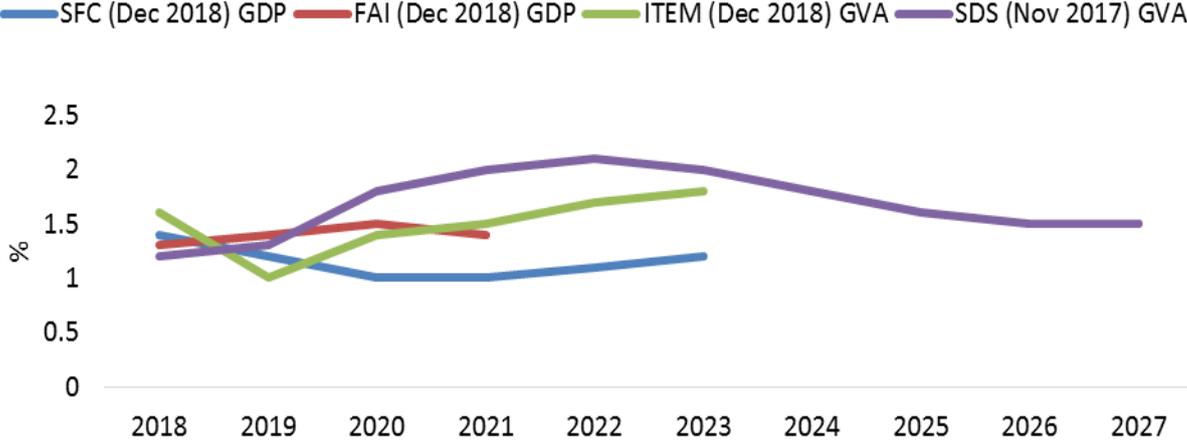
Source: Business Enterprise Research and Development Scotland 2017

Economic Outlook

There are large variations in recent economic growth forecasts published for Scotland, reflecting uncertainty about the economic outlook.

- 4.36. The Scottish Fiscal Commission's (SFC) December 2018 forecast is the most pessimistic, projecting subdued economic growth, averaging at just over 1 per cent pa over the next five years. This is primarily due to projected slow productivity growth as well as slow population growth, weak demand from the oil and gas industry due to volatile oil prices, the effect of Brexit on the economy, and weak growth in household incomes.
- 4.37. The EY Scottish ITEM Club and Skills Development Scotland (SDS) are the most optimistic. The forecasts contained within the SDS 'Jobs and Skills in Scotland' November 2017 report indicate that growth will accelerate and peak at 2.1 per cent in 2021 and then fall year-on-year to 1.5 per cent per annum by 2026. ITEM's December 2018 forecast predicts a dip in growth in 2019 followed by an average of 1.5 per cent per annum growth to 2023.

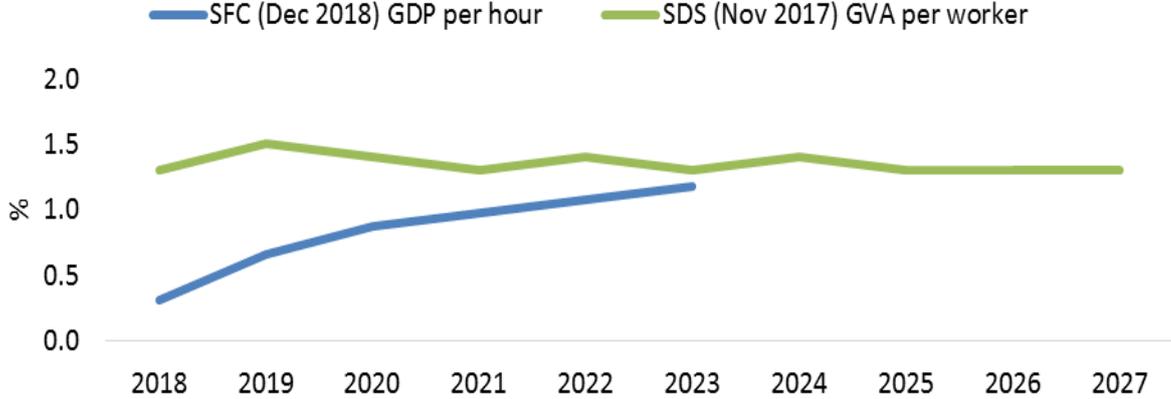
Fig 4.12: Output growth forecasts, constant prices, 2018-2027



Source: Scotland’s Economic and Fiscal Forecasts – December 2018, Scottish Fiscal Commission; Fraser of Allander Institute Economic Commentary – December 2018; EY Scottish ITEM Club 2019 Forecast – December 2018; Jobs and Skills in Scotland – November 2017, Skills Development Scotland

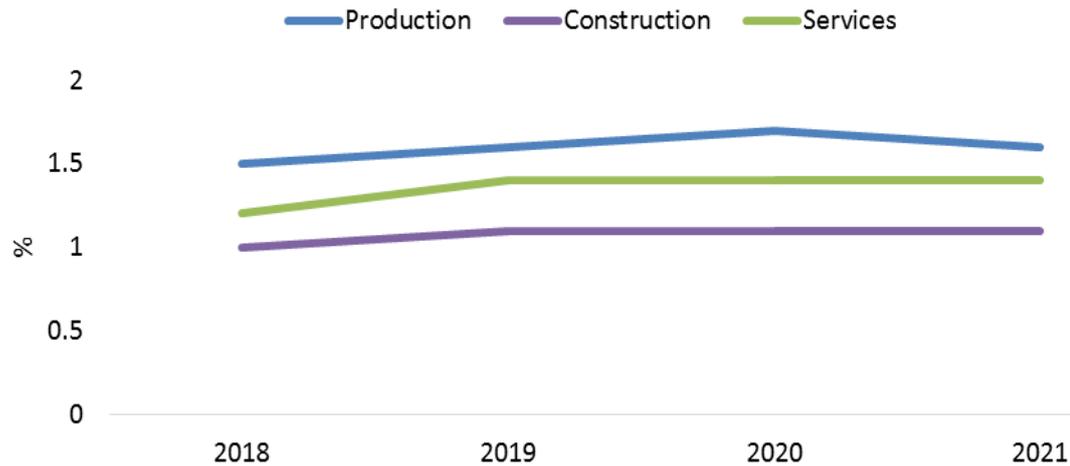
4.38. With regards to productivity, the SFC expects GDP per hour growth to gradually increase over the next five years but remain lower than historic rates. SDS expects little improvement in productivity growth, with growth in GVA per worker increasing to 1.5 per cent in 2019, and then fluctuating between 1.3 per cent and 1.4 per cent up to 2027.

Fig 4.13: Productivity growth forecasts, 2018-2027



Source: Scottish Fiscal Commission (Dec 2018) and Skills Development Scotland (Nov 2017)

4.39. At sector level, the Fraser of Allander Institute (FAI) expects little change in growth rates across the three broad sectors up to 2021, with Production experiencing the strongest growth of 1.6-1.7 per cent per annum.

Fig 4.14: Forecast GDP growth by sector, 2018-21

Source: Fraser of Allander Institute (Dec 2018)

- 4.40. ITEM expects private sector services to continue to drive the Scottish economy up to 2022, with strong growth among Professional, Scientific & Technical Activities, Information & Communication, Administrative & Support Services, and Real Estate, Renting & Business Activities. In contrast, ITEM projects a sharp slowdown in Manufacturing growth between 2019 and 2022, following strong growth in 2018.
- 4.41. Three sectors are expected to contract over the forecast period, particularly Public Administration & Defence, with year-on-year falls of between -0.6 and -1.0 per cent. Agriculture is also expected to contract between 2019 and 2021, while Mining & Quarrying is expected to shrink between 2020 and 2022.

Fig 4.15: Forecast GDP growth by sector, 2018-22

	2018	2019	2020	2021	2022
Agriculture, forestry & fishing	-1.7	-0.6	-0.3	-0.1	0.3
Mining & quarrying	0.6	1.1	-0.9	-1.0	-0.8
Manufacturing	4.0	0.3	0.6	0.8	1.0
Electricity & gas supply	2.3	-0.4	1.2	1.2	1.5
Water supply & waste management	2.4	1.3	1.0	1.2	1.5
Construction	-0.1	3.0	1.6	1.1	1.3
Retail & wholesale	2.3	1.6	1.1	1.0	1.3
Transportation & storage	3.6	0.3	0.7	0.9	1.1
Accommodation & food services	3.9	1.4	1.4	1.6	1.6
Information & communication	2.0	2.5	2.8	3.0	2.7
Financial & insurance	2.0	0.6	0.5	0.8	1.8
Real estate, renting & business activities	0.7	1.2	1.8	1.9	2.0
Professional, scientific & technical activities	0.4	2.7	2.9	2.9	2.9
Administrative & support services	4.0	1.6	2.6	2.4	2.7
Public administration & defence	-0.3	-1.0	-0.8	-0.7	-0.6
Education	-0.2	0.3	0.7	0.6	0.6
Human health & social work	1.0	0.7	1.1	1.4	1.6
Other service activities	1.2	0.1	0.2	0.6	0.9
Total GVA	1.6	1.0	1.4	1.5	1.7

Source: EY Scottish ITEM Club (Dec 2018)

Impact of Industry 4.0 on employment

- 4.42. Industrial Digital technologies (IDTs) are already transforming industry. The convergence of relatively cheap computing power, data storage, digital sensors, robotics and artificial intelligence will have profound impacts on business, employment and skills³⁴. Whereas previous waves of technological development have tended to automate

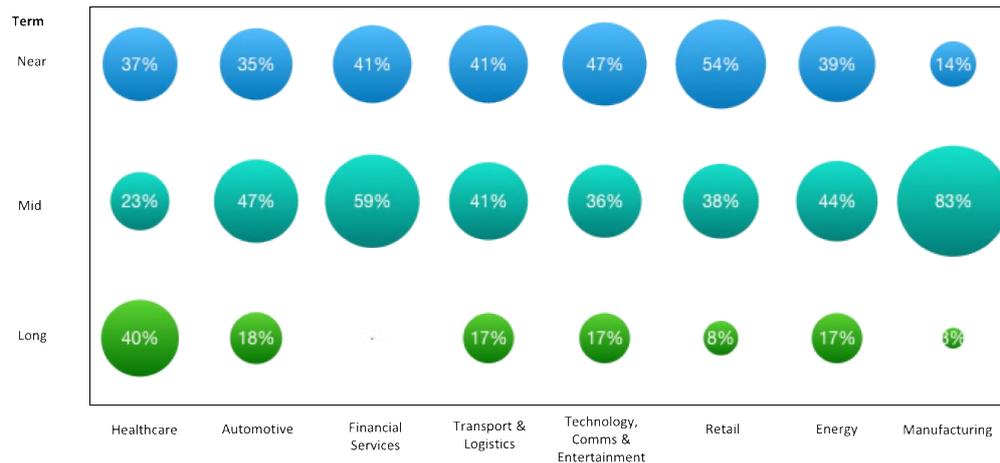
standard and routine tasks in the workplace, IDTs have the potential to impact on a much wider range of tasks – Artificial Intelligence processes have already been demonstrated to be faster and more accurate in collecting and processing data – accounting procedures, paralegal work, transaction process and some medical diagnoses.

- 4.43. Forecasting which occupations will be affected and the degree to which employees will be replaced by robots or machines is not straightforward. Estimates vary from 10-60% of jobs being at risk of automation from current and forthcoming technologies³⁵. Many studies also suggest that all occupations will need to evolve alongside increasingly capable machines.
- 4.44. Applying estimates for the UK of the proportion of workers at potential high risk of automation to Scotland's employment structure in 2017 suggested that just under 30% of total employment was vulnerable³⁶. These are very broad-brush estimates do not include the additional jobs created to serve the development of Industry 4.0 nor the wider economic benefit from induced growth. Modelling future scenarios for UK employment using an approach developed by Boston Consulting Group produced a number of scenarios where the improvement in sector performance will drive net employment growth. In the base case, a loss of almost 300,000 jobs will be offset by a gain of 100,000 new jobs and 370,000 jobs created through growth³⁷.
- 4.45. The speed at which these changes will occur is perhaps more difficult to judge. The adoption of IDTs has already started and is gathering pace but many studies expect full implementation to occur within 15-20 years.

35 Mckinsey Global Institute (2017) Jobs Lost, Jobs Gained: Workforce Transitions an a Time of Automation, December 2017. See also Frey and Osborne (2018) Automation and the future of work – understanding the numbers, Oxford Martin School, University of Oxford, 13 April 2018.

36 SCDI (2017) Automatic... For the people? How Scotland can harness the technologies of the Fourth Industrial Revolution to increase economic and social prosperity, SCDI, 2017

37 Made Smarter Review, pp-47-53.

Figure 4.16: Speed of impact of AI by sector

Source: PwC 2017. Near term 0-5 years, Mid 5-10 and Long 10+

4.46. Factors that affect the pace of automation will be:

- Technical feasibility
- Cost of developing and deploying solutions
- Labour market dynamics – skill shortage areas will automate more quickly as the costs of unfilled vacancies affect business performance
- Economic benefits – productivity and quality benefits
- Regulatory and social acceptance will affect pace of adoption³⁸

4.47. The research to date has focused more on the employment impacts of Industry 4.0. Business may find distinct advantages especially in those sectors where key skills are in short supply and automation provides a solution to such constraints on production.

38

Mckinsey Global Institute (2017) Jobs Lost, Jobs Gained: Workforce Transitions an a Time of Automation, December 2017. See also Frey and Osborne (2018) Automation and the future of work – understanding the numbers, Oxford Martin School, University of Oxford, 13 April 2018.

5. HOUSEHOLD INCOME DISTRIBUTION

Summary of Evidence: Household Income Distribution

The top ten percent of the population in Scotland had 24% more income in 2014-17 than the bottom forty percent combined. Comparing this to the two previous three-year periods suggests an increasing trend of income inequality over this period.

Real wage growth in Scotland is relatively strong over the last decade. While the UK will not return to its pre-recession peak (2008) until 2024, Scotland is currently only 1% from previous peak and is expected to match this in 2020.

Although median incomes are rising for all age groups (children, working-age adults and pensioners), for children and working-age adults they have only recently recovered to their pre-2008 recession levels

Poverty rates before housing costs in Scotland have been falling since the late nineties, but recent years' data suggest a slow increase co-inciding with the introduction of austerity after 2010. After housing costs, relative poverty rates have been rising since the all-time low in 2011-14.

In-work poverty for working-age adults has increased continuously since 2011-14, and both before and after housing costs measures were at an all-time high in 2014-17.

Forecasts of income distribution

Forecasts for the Scottish economy present a subdued outlook for the Scottish economy, driven by **slow growth in GDP, productivity and wages** over the last several years. This forecast is based on data which shows real wage growth has been weaker since 2010 than expected given growth in productivity and labour market conditions.

Continuing high demand for labour, an increasing proportion of older workers in the workforce and the National Living Wage alongside upward revisions to productivity are expected to feed through to real earnings growth.

The forecast shows average nominal annual earnings growth increasing from 2.0 per cent in 2018 to 3.1 per cent in 2023, broadly aligning with productivity growth. With inflation broadly flat at around two per cent, the forecast expects **real wage growth to pick up from -0.3 per cent in 2018 to 1.1 per cent in 2023.**

There are no forecasts for income inequality at the Scottish level. At the UK level, **projections suggest income inequality in the UK is likely to increase over the five years** to 2022, assuming no change in government policy.

This **increase in income inequality is due to real earnings growth mainly benefiting higher income households** and a reduction in the real value of working age benefits.

Including **housing costs has the effect of further depressing real income growth for the lowest-income households**. Housing costs are expected to increase for these households as a consequence of rising rents.

Turning to **income after housing costs, projections show a sharper increase in income inequality** up to 2021/22 reflecting contrasting trends in housing costs for different groups with the P90/P10 ratio will rise from 5.1 in 2015/16 to 5.9 by 2021/22. This would be the highest ratio since comparable records began in 1961.

Policy Context

5.1. Narrowing income inequalities is a key objective of the Scottish Government as set out in the 2015 Economic Strategy: *"creating a fairer society is not just a desirable goal in itself, but is essential to the sustained, long-term prosperity of the Scottish economy"*³⁹. The strategy identifies four actions to promote inclusive growth:

- **Fair Work:** Promote Fair Work and build a labour market that provides sustainable and well-paid jobs;
- **Business pledge:** Address long-standing barriers in the labour market so that everyone has the opportunity to fulfil their potential;
- **Promoting equality and tackling inequality:** Tackle cross-generational inequality through, for example, improved child care, boosting attainment and early years interventions that give every child a fair start in life; and
- **Place and regional cohesion:** Realise opportunities across Scotland's cities, towns and rural areas, capitalising upon local knowledge and resources to deliver more equal growth across the country.

5.2. Scotland's National Performance Framework (NPF) underpins delivery of the Scottish Government's priorities and monitors the delivery of the Scottish Government's purpose. This includes a Solidarity target⁴⁰:

- To increase the total income (adjusted for inflation) of all households in Scotland;

39 Scottish Government (2015) Scotland's Economic Strategy. Page 5. Online at <https://www.gov.scot/publications/scotlands-economic-strategy/>

40 Two data sources are used to measure the Solidarity target. For the income inequality part of the target the data source is the Family Resources Survey (Households Below Average Income dataset). The unit of measurement is the individual. For the "increasing total income" part of the target the data source is the Gross Disposable Household Income series, published by the Office for National Statistics.

- and to reduce income inequality by decreasing the ratio of income to the top 10% of households compared to the bottom 40% (i.e. the Palma ratio).

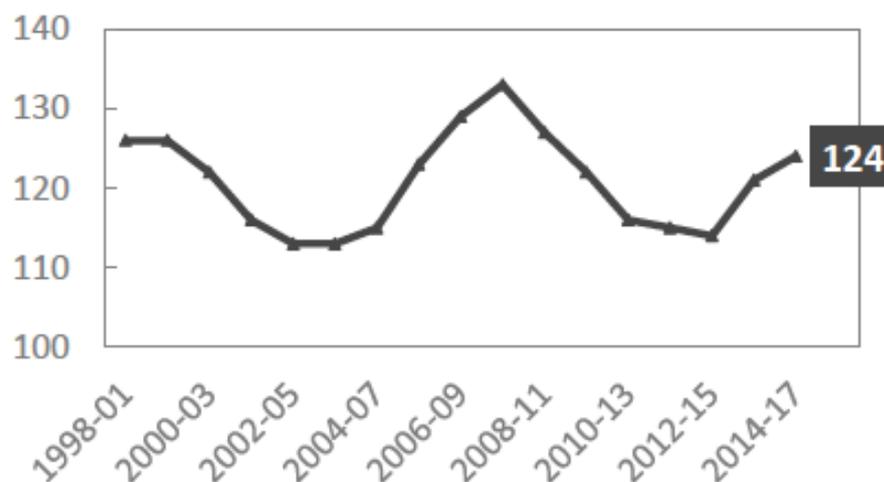
The Evidence Base: Current Position

5.3. *Poverty and income inequality in Scotland: 2014-2017*⁴¹ estimates the number and proportion of people living in poverty in Scotland in 2014 to 2017. This publication presents three-year averaged estimates of the percentage of people, children, working age adults and pensioners living in low income households in Scotland, and other statistics on household income and income inequality. The estimates are used to monitor progress in reducing poverty and income inequality.

Income inequality fell following the 2008 recession but has risen since

5.4. This measure of how equally income is distributed across the population is known as the “Palma ratio” or “S90/S40 ratio”⁴². Figure 5.1 shows the ratio of total income received by the top ten percent of the population divided by the total income of the bottom forty percent of the population (expressed as a percentage) over time.

Figure 5.1: Income inequality



Source: Poverty and income inequality in Scotland: 2014-2017

41 Scottish Government (2018) *Poverty and income inequality in Scotland: 2014-2017*. Online at <https://www.gov.scot/publications/poverty-income-inequality-scotland-2014-17/>

42 The ratio between the top 10 per cent to the bottom 40 per cent of the income distribution was designed by Gabriel Palma. This particular ratio was adopted because the ‘middle 50 per cent’ (ie from 40 per cent up to 90 per cent) have a relatively stable share of national income both across countries and over time.

- 5.5. The Palma ratio is used internationally to estimate the extent of inequality between those at the top of the income distribution and those at the bottom and is currently used in Scotland to monitor progress towards the Scottish Government's Solidarity Purpose Target. The top ten percent of the population had 24% more income in 2014-17 than the bottom forty percent combined. Comparing this to the two previous three-year periods suggests an increasing trend of income inequality over this period.

Overall household income is rising but unevenly across demographic groups

- 5.6. In 2014-17, median household income before housing costs was £485 per week, compared to £475 in 2013-16. Median income has increased steadily since the last recession and has reached its highest level since reporting began. Median income after housing costs has followed the same trend to median income before household costs. Median income after housing costs was £432 per week in 2014-17, at its highest level since reporting began.

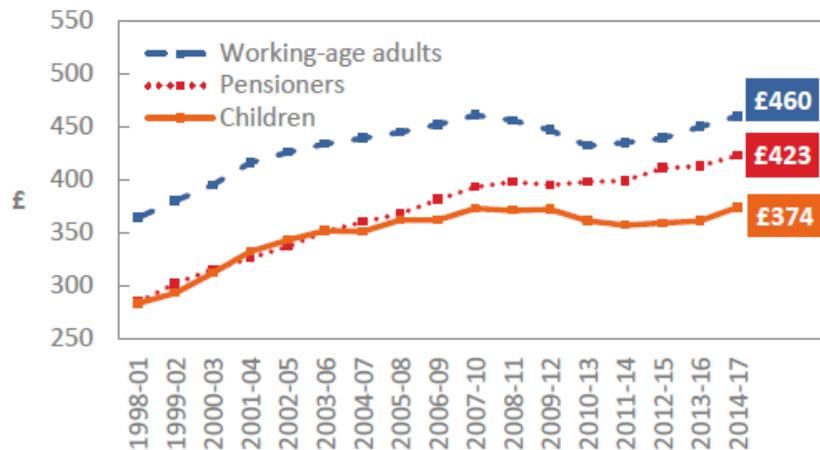
Figure 5.2: Median household income, 2016/17 prices



Source: Poverty and income inequality in Scotland: 2014-2017

- 5.7. Although median incomes are rising for all age groups (children, working-age adults and pensioners), for children and working-age adults they have only recently recovered to their pre-2018 recession levels (figure 5.3).

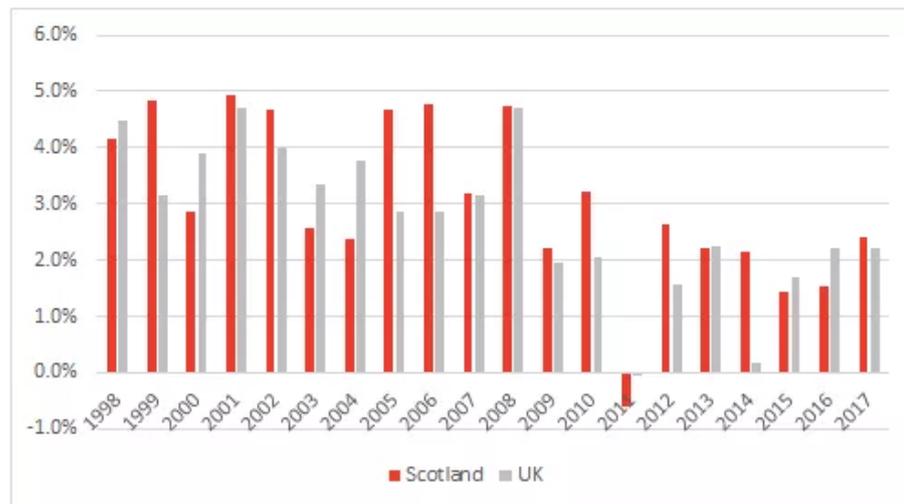
Figure 5.3: Median household income after housing costs by demographic group, 2016/17 prices



Source: Poverty and income inequality in Scotland: 2014-2017

- 5.8. Analysis of real wage growth over the last decade suggests that compared to elsewhere in the UK, Scotland has done relatively well (Figure 5.4). While the UK will not return to its pre-recession peak (2008) until 2024, Scotland is currently only 1% from previous peak and is expected to match this in 2020.

Figure 5.4: Percentage growth in median weekly earnings, 1998-2017



Source: Fraser of Allander Institute (2017) How are Scottish earnings performing relative to the UK⁴³

Relative poverty rates fell until the 2008 recession but have risen since

- 5.9. Relative poverty is a measure of whether the income of the poorest households are keeping pace with middle income households across the UK. It is estimated that 16% of Scotland's population, or 860,000 people each year, were living in relative poverty before housing costs in 2014-17. This compares to 15% in the previous period. After housing costs, 19% of Scotland's population, or 1 million people each year, were living in poverty in 2014-17, the same as in 2013-16 (Figure 5.5).
- 5.10. Poverty rates before housing costs in Scotland have been falling since the late nineties, but recent years' data suggest a slow increase co-inciding with the introduction of austerity public sector budgets after 2010. After housing costs, relative poverty rates have been rising since the all-time low in 2011-14.

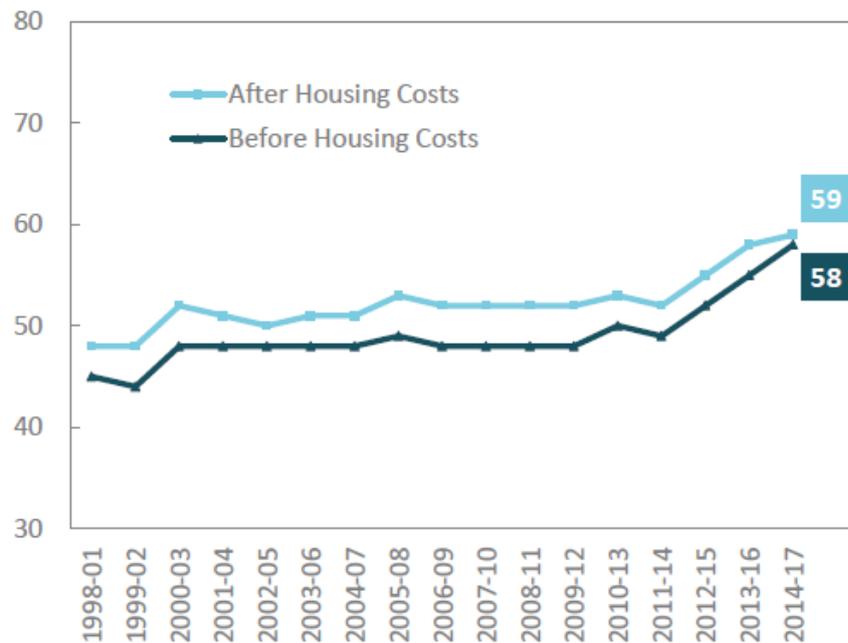
Figure 5.5: % of people living in relative poverty



Source: Poverty and income inequality in Scotland: 2014-2017

In-work poverty has increased significantly since the 2008 recession

- 5.11. In 2014-17, 58% of working-age adults in relative poverty before housing costs were living in working households (Figure 5.6). After housing costs, this was 59% of working-age adults. In-work poverty for working-age adults has increased continuously since 2011-14, and both, before and after housing costs measures were at an all-time high in 2014-17.

Figure 5.6: Percentage of working age adults in in-work poverty⁴⁴

Forecast Projections

Low nominal and real forecasts for wage growth from 2018 to 2023

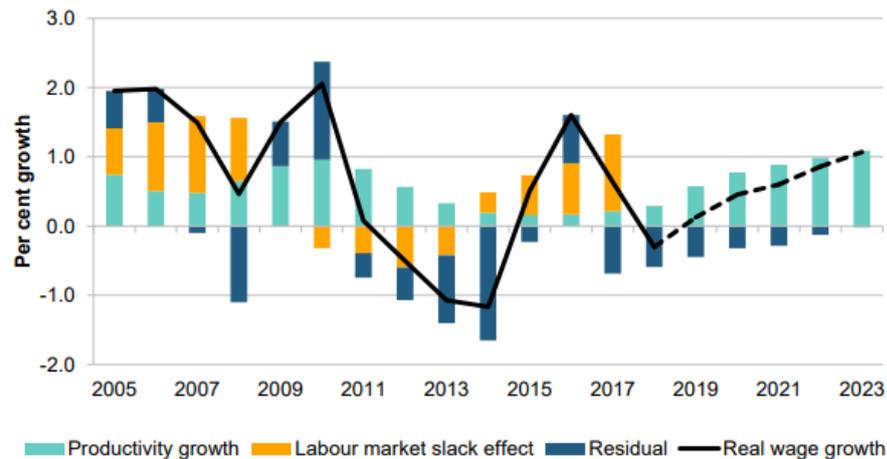
5.12. The Scottish Fiscal Commission⁴⁵ presents a subdued outlook for the Scottish economy, driven by slow growth in GDP, productivity and wages over the last several years. The forecast is based on data which shows real wage growth has been weaker since 2010 than expected given growth in productivity and labour market conditions. The residual category captures a number of factors that could have been acting as a drag on wage growth, which include:

- Ongoing uncertainty and low confidence in the economy
- Rising non-wage labour costs and limited business profitability
- Changes in the oil & gas industry following the fall in oil prices from 2014 onwards and declining UKCS expenditure
- Downward pressure on wages from the increasing trend towards automation and artificial intelligence technologies in business processes
- A rise in low-paid 'gig-economy' work

44 In-work poverty refers to people living in households where at least one member of the household is in either full or part-time paid work, but where the household income is below the relative poverty threshold.

45 <http://www.fiscalcommission.scot/media/1435/scotlands-economic-and-fiscal-forecasts-december-2018-full-report.pdf>

Figure 5.7: Contributions to real wage growth, outturn and forecast (per cent)



Source: www.fiscalcommission.scot/media/1435/scotlands-economic-and-fiscal-forecasts-december-2018-full-report.pdf

5.13. Looking ahead, the SFC expects the overall drag on wage growth relative to productivity to lessen, by the shrinking of the residual category from 2018 onwards, allowing wage growth to increase. This more positive outlook for wage growth relative to the last eight years is driven by:

- Ongoing tightness in the labour market starting to feed through to higher wage growth.
- Higher public sector pay in Scotland having a direct effect on the pay of those in scope in the public sector, as well as indirect spillover effects on the pay of those in the private sector.
- The National Living Wage is set to increase by 4.4 per cent in 2018, increasing wages for some of those in employment on lower incomes.
- Demographic change means that the labour market will see a shift from younger workers to older workers. Forecasts suggest that between 2010 and 2025, there will be 120,000 fewer individuals aged 16-24, and 280,000 more individuals aged over 55 in the labour market. On average, those in their 50s earn around 40 per cent more than those in their 20s. This shift in the labour market is expected to increase average earnings over the next five years.
- Increases in productivity are expected to feed through to real earnings growth.

5.14. The forecast shows average nominal annual earnings growth increasing from 2.0 per cent in 2018 to 3.1 per cent in 2023, broadly aligning with productivity growth. With inflation broadly flat at around

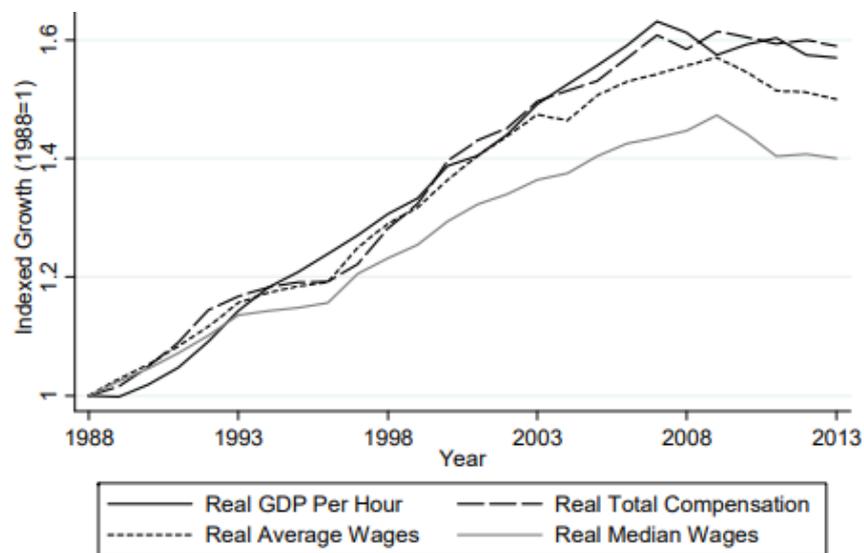
two per cent, the forecast expects real wage growth to pick up from - 0.3 per cent in 2018 to 1.1 per cent in 2023.

Decoupling of productivity and wage growth

5.15. At the UK level, wages have been increasingly decoupled from productivity (Figure 5.8)⁴⁶. This has implications for the interpretations of wage forecasts that are based on continued improvements in productivity. There are two dimensions to this:

- The gap between average wages and total compensation per hour suggests that non-wage labour costs, mostly pensions, have taken a growing share of the productivity growth that has been achieved.
- The opening of the gap between mean and median wages is because of rising wage inequality. As top earners had faster wage growth that pulled the average (mean) wages up at a faster rate than the median wages (of the middle or typical worker).

Figure 5.8: Decoupling of wages from productivity, UK



Source: Machin, S (2015) Real Wage Trends. Understanding the Great Recession: From Micro to Macro Conference, Bank of England, September 23 and 24 2015

Forecasts for income inequality show an increase in inequality due to real earnings growth mainly benefiting higher income households and a reduction in the real value of working age benefits

- 5.16. There are no forecasts for income inequality at the Scottish level. At the UK level, projections by the Institute for Fiscal Studies (IFS)⁴⁷ and the Resolution Foundation⁴⁸ suggest income inequality in the UK is likely to increase over the five years to 2022, assuming no change in government policy⁴⁹.
- 5.17. Looking first at income before housing costs, growth in inequality between 2015/16 and 2021/22 is expect to reverse the fall in inequality observed after the economic downturn in 2008. The IFS projects that the P90/P10 or Gini ratio will rise from 3.9 in 2015/16 to 4.4 in 2021/22, similar to its level at the start of the 1990s⁵⁰.
- 5.18. Turning to income after housing costs, the projections show a sharper increase in income inequality up to 2021/22 reflecting contrasting trends in housing costs for different groups. The IFS projects that the P90/P10 ratio will rise from 5.1 in 2015/16 to 5.9 by 2021/22. This would be the highest ratio since comparable records began in 1961, the ratio previously having peaked at 5.4 in 2008/09 and 2009/10.
- 5.19. The Resolution Foundation has also produced projections for the Gini coefficient. This is expected to increase from just under 35% in 2015/16 to around 36% by 2022/23 based on incomes before housing costs. On an after housing costs basis, it is expected to increase from 39% in 2015/16 to around 40% by 2022/23. However, the Gini coefficient is more sensitive to changes in income at the very top and bottom of the income distribution than the Palma ratio and so make the projections less robust.

47 Andrew Hood and Tom Waters (2017) Living Standards, Poverty and Inequality in the UK: 2016-17 to 2021-22, IFS Report R127. Online at <https://www.ifs.org.uk/publications/8171>

48 Adam Corlett and Stephen Clarke, Living Standards 2017: The past, present and possible future of UK incomes, Resolution Foundation. Online at <https://www.resolutionfoundation.org/publications/living-standards-2017-the-past-present-and-possible-future-of-uk-incomes/>

49 Please see Annex B for notes on the robustness of these estimates.

50 The Gini coefficient compares household income at the 90th percentile of the distribution to household income at the 10th percentile.

- 5.20. The projected increase in inequality in incomes before housing costs is attributable to two main factors:
- Firstly, forecast growth in real earnings is expected to mostly benefit higher-income households, since earnings make up a larger share of total income for these household.
 - Secondly, cuts in the real value of working-age benefits are expected to reduce the real incomes of poorer households.
- 5.21. Including housing costs has the effect of further depressing real income growth for the lowest-income households. Housing costs are expected to increase for these households as a consequence of rising rents. The IFS observes that rising rents can be expected to have a greater impact on these households than has previously been the case because of the cash terms freeze in local housing allowances until 2020. The freeze means that for more low-income households in the private rented sector, housing benefit awards will not full cover the cost of their rent. Combining these effects with planned benefit cuts, the IFS estimates that the income of a household at the 10th percentile of the distribution will decrease by 7% between 2015/16 and 2021/22, after adjusting for inflation.
- 5.22. Mortgage interest payments are also expected to increase above inflation over this period, albeit from a low base. This will lead to an increase in housing costs for some households further up the income scale, although income growth after housing costs is still projected to be weakest for households at the bottom.
- 5.23. The Resolution Foundation estimates that real incomes will fall for the lowest-income households in each year between 2016/17 and 2019/20. However, while stronger growth is projected for households near the top of the income distribution, their projected rate of income growth of around 2% per year by the early 2020s is still “mediocre by historical standards. No part of the distribution is forecast to have growth higher than its 1994-95 to 2007-08 average”. This makes the outlook for the coming years highly unusual, in that rising inequality occurs alongside weak growth in real incomes. By contrast, the rise in inequality during the 1980s occurred alongside very strong income growth for households in the top half of the income distribution and moderate income growth for households in the bottom half.
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6. SKILLS AND SKILLS DEVELOPMENT LANDSCAPE

Summary of Evidence

Around 1 million jobs will require to be filled over the decade 2017-2027 - some due to overall expansion of employment, but the vast majority as a consequence of **replacement demand**, where employees retire, or leave a sector or occupation for other reasons.

There is a projected requirement for over 500,000 recruits with qualifications at **Higher National Certificate (HNC)/Advanced Higher level or higher**.

The requirement for employees **without qualifications** is projected at only around 80,000.

Nonetheless, projections suggest that in 2028 around 25% of employees will be in jobs requiring **lower level skills**, little changed from the current position.

Long-term scenarios beyond 2030

Skills Development Scotland suggest a growing need for **meta-skills** due to accelerating digitalisation of the economy, with additional drivers including the ageing and declining workforce, and increased demands for caring professions. They define three main broad types of meta-skills: **self-management, social intelligence** and **innovation**.

National Endowment for Science, Technology and Arts (NESTA) argue that there will be an increasing demand for:

- **Interpersonal skills:** social perceptiveness and coordination, and negotiation skills
- **Higher-order cognitive skills:** originality, fluency of ideas and active learning.
- **Systems skills:** judgement and decision-making, systems analysis and evaluation.

Policy Context

6.1. *Scotland's Economic Strategy* in 2015⁵¹ envisages skills development helping to drive two high-level strategic objectives:

- Increasing productivity and sustainable economic growth.
- Increasing labour market participation and reducing inequalities, to make this growth as inclusive as possible.

6.2. With rapidly rising **youth unemployment from 2008**, the Scottish Government committed in *Developing the Young Workforce*:

51 Scottish Government (2015). *Scotland's Economic Strategy*.

Scotland's *Youth Employment Strategy*⁵² to a raft of skills measures to deal with the problem.

- 6.3. The Scottish Government's 2016 *Labour Market Strategy*⁵³ set out five key labour market outcomes. Skills development has a key role in 3 - promoting a skilled and productive workforce, high employment and low unemployment, and Fair Work.
- 6.4. The Scottish Government has a strong policy emphasis on **higher education**, supported by a no fees policy for Scottish and EU students. Scotland has the highest proportion of working age tertiary graduates across the OECD.
- 6.5. Scotland has distinctive **college system** where students can be studying for either further or higher education qualifications, and where well-established pathways exist for college students to articulate with higher education in university⁵⁴. Additionally, a major programme of college mergers was instituted in 2013 to create a system capable of meeting more effectively both the aspirations of and outcomes for learners, and the needs of employers and the economy more generally.
- 6.6. There is a strong commitment to increased investment in **apprenticeships**. The core offering is **Modern Apprenticeships (MAs)**, but **Foundation** and **Graduate Apprenticeships** have also been introduced. All MAs involve paid jobs with employers, with additional off the job training provided by colleges, training providers and others. This part of the skills system is more directly demand-led.
- 6.7. Scotland has now launched Fair Start Scotland (FSS) a 3-year **employability** programme targeted at people further from the labour market. Unlike previous UK government approaches, FSS is a voluntary programme.

52 Scottish Government (2014). *Developing the Young Workforce: Scotland's Youth Employment Strategy*.

53 Scottish Government (2016). *Scotland's Labour Market Strategy*.

54 SFC data shows that 30% of college FTEs are studying higher education qualifications.

Current Position: Skills Development Landscape

Funding

- 6.8. Focusing on post-school skills, excluding capital investment, and research and innovation funding going to universities, the Scottish Government funds around £1.42 billion investment in skills development per annum in universities and colleges, and work-based learning through the apprenticeship family – Modern Apprenticeships, Graduate Apprenticeships and Foundation Apprenticeships (although this last group is delivered through schools and colleges, and does not technically fall into the post-school skills system). The funding for 2018/19⁵⁵ is divided up as follows across the broad categories:
- £737 million on higher education.
 - £594 million on college education.
 - £80 million on apprenticeships.
- 6.9. More modest levels of funding are available to support employer investment in their existing workforces, through the £10 million per annum Workforce Development Fund.
- 6.10. For 2017/18, the numbers for funded FTEs⁵⁶ were as follows:
- 127,400 university students.
 - 119,200 college students.
 - 28,700 apprentices.
- 6.11. Compared to 2013/14, college FTEs were flat, publicly funded university FTEs rose by 2% and apprenticeships by 13%.
- 6.12. A central tension in the college and university sectors is how best to balance the curriculum to meet both the needs of employers and the economy, as well as the subject demands of individual learners. As apprenticeships are jobs, this tension is not in play.

⁵⁵ A. McGregor (2018). *Scotland's Future Skills Needs*. Scottish Government. Figures supplied by SFC and SDS. Steering group for study chaired by SFC.

⁵⁶ A. McGregor (2018). *Scotland's Future Skills Needs*. Scottish Government. Figures supplied by SFC and SDS. Steering group for study chaired by SFC.

Skills Agencies

- 6.13. The two key skill's agencies are the **Scottish Funding Council (SFC)** and **Skills Development Scotland (SDS)**.
- 6.14. **SFC** is the body through with Scottish Government funding flows to Scotland's colleges and universities. **Outcome Agreements** are established with each college and university, which align the contributions of these institutions with key Scottish policy imperatives, National Outcomes and SFC's Strategic Plan. SFC then monitors the performance of the institutions in relation to the Outcome Agreements. SFC also has a significant role in funding research and innovation across the skill system.
- 6.15. **SDS** has a mix of commissioning, technical support and service functions:
- It is responsible for the management of the **apprenticeship programme**, which is delivered by a range of public, private and third sector contactors appointed and monitored by SDS.
 - It is the principal agency involved in **careers** education, information, advice and guidance.
 - It has developed capability in the area of **skills investment planning** which is now being deployed for key sectors of the Scottish economy as well regions across Scotland.
 - It is the operational lead for Scotland's **redundancy response** service - Promoting Action for Continuing Employment (PACE).
- 6.16. Each year the agencies have received detailed guidance through a ministerial letter covering what is expected of them for the year ahead by the Scottish Government. However, following the 2016 *Enterprise and Skills Review*, the Scottish Government introduced in 2018 a new **Enterprise and Skills Strategic Board** with a remit to '*through collective responsibility, ensure hard alignment between agencies to drive improvement in Scottish productivity and better support business and users of the skills system*'⁵⁷. Specifically in relation to skills, the Board's Strategic Plan⁵⁸ sets out to:
- Use funding to provide more agile support for employees and employers to upskill and reskill.

57 Scottish Government website, *Enterprise and Skills Strategic Board*.

58 Enterprise & Skills Strategic Board (2018). *Strategic Plan*.

- Integrate and expand existing upskilling and reskilling interventions.
- Create a flexible and sustainable funding model to meet the future expansion of demand for work-based and work-integrated learning.
- Accelerate the implementation of the Learner Journey Review recommendations, particularly around duplication and speeding up of articulation routes through school, college and university - and with apprenticeships.

6.17. A key mechanism for achieving much greater alignment is through much more structured and focused joint working between SDS and SFC.

The Evidence Base: Current Position

6.18. This section reviews the current skills position, based on trends over the period 2012 to 2017.

- The percentage of Scotland's working age population with **no qualifications** declined from 11% to 9%, and those with qualifications at the Scottish Vocational Qualification (SVQ) **Level 1 (National 1) only** falling from 10% to 9%⁵⁹.
- However, Glasgow city region⁶⁰, with 34% of Scotland's working age population, has 44% of those with no qualifications.
- The percentages of working age people with **qualifications at SVQ Level 4 (ordinary degree or graduate diploma) or above** increased from 38% to 44%⁶¹.
- The percentage of **school leavers moving into positive follow-up destinations** rose from 90% to 93%⁶².
- The percentage of school leavers with qualifications at Scottish Credit and Qualifications Framework (**SCQF Level 6 (Higher or equivalent) or better**) rose from 56% to 61%, and with **SCQF Level 7 (Advanced Higher) or better** from 18% to 19%⁶³.
- The percentage of employers with vacancies reporting that some of these are due to **skill shortages** was essentially unchanged between 2015 and 2017, rising only slightly from 31% to 32%⁶⁴.

59 Annual Population Survey, ONS.

60 Defined as Glasgow City Council, plus councils for East Dunbartonshire, East Renfrewshire, Inverclyde, North Lanarkshire, Renfrewshire, South Lanarkshire and West Dunbartonshire.

61 Annual Population Survey, ONS.

62 Scottish Government, Attainment, Leaver Destinations and Healthy Living.

63 Scottish Government, Attainment, Leaver Destinations and Healthy Living

64 UK Employer Skills Survey, Scottish Result Tables, 2015 and 2017

- 6.19. On the demand for skills, broken down by broad skills levels, it is estimated⁶⁵ that:
- In 2017, 43% were employed in jobs requiring higher level skills, 31% in jobs requiring intermediate skills and 26% jobs requiring lower skills.
 - The corresponding percentages in 2012 were 41%, 32% and 27%.
- 6.20. This indicates a modest shift towards higher skills over the period, a continuation of long-term trends. The figures are at odds with the so-called hollowing out of the labour market, but it is still the case that the UK, Germany and the USA have the highest percentage of low skilled jobs in the developed world⁶⁶.
- 6.21. A persistent feature of the school, college, and university and apprenticeship systems is the highly gendered nature of study for subjects relevant to digital skills specifically and STEM subjects more generally. Currently only around 20% of jobs requiring digital skills are held by females⁶⁷. Unless this situation changes, substantial and persistent digital skills shortages are likely to develop.
- 6.22. Another key issue for the employment and skills system is the persistently high level of under-utilisation of graduate skills. The 2016 figure for graduate skills under-utilisation ranges from 40.8 of graduates (5 or more years after graduating) working in non-graduate roles based on the Annual Population Survey, compared to 28% of first degree leavers entering 'non-professional' roles based on Higher Education Statistics Agency surveys⁶⁸.

Projections to 2027

- 6.23. Projections for the decade to 2027⁶⁹ suggest the following in terms of the required qualification levels for the jobs becoming available.

65 Skills Development Scotland (2017). *Jobs and Skills in Scotland: The Evidence*

66 A. McGregor (2017). *Implications of BREXIT for Fulfilling Work in UK*. Carnegie UK Trust.

67 Digital Scotland/Ekosgen (2017). *Scotland's Digital Technologies: Research and Analysis Report*.

68 Scottish Government (2018). *Scotland's Future Skill Needs*. Evidence review for Enterprise and Skills Strategic Board's Skills Mission.

69 Skills Development Scotland (2017). *Jobs and Skills in Scotland: The Evidence*.

- Around 1 million jobs will require to be filled within the Scottish labour market - some due to overall expansion of employment, but the vast majority as a consequence of replacement demand, where employees retire or leave work altogether due to health or reasons, move from employment to self-employment, migrate to other regions or otherwise are no longer in scope to a specific occupation or sector.
- There is a projected total requirement for over 520,000 recruits with qualifications at HNC level or higher.
- The number of jobs requiring filled by employees without qualifications is projected at only around 80,000

Figure 6.1: Expansion and Replacement Demand ('000s) by Qualification, 2017-27

	Expansion Demand	Replacement Demand	Total Requirement
Doctoral or Postgrad	12.5	50.2	62.7
HNC to Honours Degree	46.2	418.4	464.6
Higher Level + SVQ 3	-5.9	137.0	131.1
National 5 + SVQ 2	8.6	214.9	223.6
National 1-4 + SVQ 1	-8.1	47.8	39.7
No Qualification	2.6	75.2	77.8
Total	56.0	943.6	999.6

Source: Skills Development Scotland (2017). Jobs and Skills Scotland: The Evidence

- 6.24. Nonetheless, projections to 2028⁷⁰ indicate that around a quarter of employees will be in jobs requiring lower level skills, with little change over the decade. This is based around the numbers of employees in sales and customer service; process, plant and machine operations; and elementary occupations.
- 6.25. These projections have strengths and weaknesses.
- A strength is that the big finding that replacement demand is likely to be much more important than demand from expanding employment levels reflects the age structure of the workforce which is known in some detail. However, what is less certain is whether

retirement ages will remain relatively constant over time due to big changes in employer and state pension schemes.

- Weaknesses include the inability to take account of the potential impact on the labour market of BREXIT, and the uncertainties around the pace and precise impact on the demand for skills associated with the digitalisation of employment.

Scenarios Beyond 2030

- 6.26. There are no projections around skills beyond 2027. However, a number of attempts have been made, largely by consulting with experts and testing scenarios, to speculate on the skills that will be increasingly valued in the future.

Skills Development Scotland

- 6.27. SDS work⁷¹ – *Skills 4.0* – involved an extensive literature review, consultations with leading experts on the future of work and skills and an assessment of the existing literature on how to measure emerging skills. The study predicts the growth in importance of **meta-skills**. These are essentially the **soft skills** identified in many previous studies, but the work by SDS has concentrated on defining the skills more precisely, and indicating why they will be of increasing importance over time.
- 6.28. A key driver behind the growing need for meta-skills is expected to be the accelerating digitalisation of the economy, with additional drivers including the ageing of and reduction in the size of the workforce, and increased demands for caring professions. The three main broad types of meta-skills likely to be increasingly in high demand are:
- **Self-management**: ‘Manage the now’.
 - **Social intelligence**: ‘Connect with the world’.
 - **Innovation**: ‘Create our own change’.
- 6.29. The table below sets out the main elements in these broad skill sets.

71

Skills Development Scotland (2018). *Skills 4.0. A Skills Model to Drive Scotland's Future*.

Figure 6.2: The Elements of Meta-Skills

Self-Management	Social Intelligence	innovation
Focussing	Communicating	Curiosity
Integrity	Feeling	Creativity
Adapting	Collaborating	Sense Making
Initiative	Leading	Critical Thinking

- 6.30. What is less well articulated is the mechanism by which these skills can be generated in an effective manner – and who should do this. The report recognises that this poses major challenges for the skills system, and suggests that the blending of academic and work-based learning is likely to be the key way forward.
- 6.31. Additionally, SDS argues that there will remain a strong requirement for ‘universal’ skills, more commonly referred to as ‘**core**’ **skills** – literacy, numeracy and digital intelligence.

National Endowment for Science, Technology and Arts (NESTA)

- 6.32. NESTA is well respected independent organisation whose central focus is on innovation. Their analysis⁷² generate some conclusions on changes in the nature of demand in terms of sectors and occupations. They also devised techniques for surfacing ‘hypothetical occupations’.
- 6.33. Their contribution is in relation to skillsets which will become much more important in the future. They argue that the demand for skills will change, with a stronger emphasis on:
- **Interpersonal skills**, such as social perceptiveness and coordination, and negotiation skills.
 - **Higher-order cognitive skills**, such as originality, fluency of ideas and active learning.
 - **Systems skills**, such as judgement and decision-making, systems analysis and evaluation.
- 6.34. As with the work on meta-skills by SDS, the significant challenge is how to create these skills. SDS argue for blended training involving employers and educational institutions, while NESTA argue it is likely that these skills will need to be developed in the earlier years of a

72

NESTA (2017). *The Future of Skills. Employment in 2030.*

person's life, and will require significant investment in re-designing approaches to learning at the pre-school and school stages.

- 6.35. Clearly work to create these skillsets likely to be in greater demand will need to be carried out all levels, not least because digitalisation will create redundancies as well as opportunities. Skills and other packages will be needed to redeploy people into the emerging occupational areas. Compared to many of our international competitors, investment by UK employers in skilling and re-skilling their workforces, and by the UK at governmental level in active labour market programmes, is pitifully low and has been declining⁷³. However, it will be difficult and expensive for the post-school education and skills system – and employers - to carry out the necessary remedial work in the absence of a major skills investment in the early years to the develop the behaviours and skills that will become increasingly important over time.

But Digital Skills and Capabilities Will Also Become More Important

- 6.36. There is a danger that Scotland fails to capture the employment and productivity benefits of digitalisation due to the lack of digital skills⁷⁴. There are already concerns that the output of university and college graduates, apprentices, and others in digitally relevant courses and training is not keeping pace with the growth in demand⁷⁵. SDS has identified key skill challenges across sectors, stemming from the fact that growth in demand for digital skills is effectively a given, which include:
- Recruiting and people with the right skills who are STEM proficient.
 - Keeping up with the pace of change in technical competences, including software, content development and coding.
- 6.37. However, Scotland needs to resolve a key issue if it is to ensure the supply of digitally skilled labour to the quality and in the volume likely to be required. Currently, digitally skilled employment as **heavily gendered**, with only around 20% of females involved. Some statistics

73 McKinsey & Co. (2017). *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation*.

74 Scottish Enterprise (2018). *Technology Talent Pipeline*

75 ScotlandIS (2018). *Technical Industry Survey*.

from the school system show the challenge⁷⁶. In terms of schools, the latest statistical evidence is set out below using Computing as an example⁷⁷:

- In 2018, only 20% of entries for computing qualifications for the National 5 examinations were girls – and this had fallen from 24% in 2014.
- At the Higher level, only 16% of entries were girls – down from 20% in 2014.
- At the Advanced Higher level, only 14% of entries were girls, a figure which has remained static over time.

76 Digital Scotland/Ekosgen (2017). *Scotland's Digital Technologies: Research & Analysis Report*.

77 SQA Statistics 2018, <https://www.sqa.org.uk/sqa/64717.html>

7. GREENHOUSE GAS EMISSIONS ACROSS SECTORS

Summary of Evidence

Climate Change (Scotland) Act 2009, set a 2050 target of reducing greenhouse gas territorial emissions by 80%⁷⁸ and an interim target of 42% by 2020. Scotland also has annual targets for emissions reductions.

The Scottish Parliament is considering the Climate Change (Emissions Reduction Targets) (Scotland) Bill that proposes a 90% reduction target for 2050.

Scotland is performing well and met its annual legislated target for each of the past three years. Overall, Scottish emissions are now 49% below 1990 levels at 38.6 MtCO₂e in 2016 (on an unadjusted basis).

The reduction has been achieved through declines in emissions from most sectors but the Energy sector decarbonisation has contributed most to this performance.

Transport (including Scotland's share of international shipping and aviation) is the largest emitting sector in 2016 accounting for some 37% of total net emissions. Agriculture is the next largest representing 26%. Scotland's forestry acts as a carbon sink contributing a 33% reduction to overall emissions, more than compensating for Agriculture. Business and Industrial processes account for just over a fifth, Energy Supply just under a fifth and Residential 16%.

Long-term Scenarios to 2050

Climate Change Committee's (CCC) 2018 assessment of Scotland's long-term ambitions considered the 80% emission reduction target achievable with the 90% reduction target also feasible but requiring further policy effort.

Policy Context

- 7.1. The Climate Change (Scotland) Act 2009, set a 2050 target of reducing greenhouse gas emissions by 80% and an interim target of 42% by 2020. The Scottish Parliament is considering the Climate Change (Emissions Reduction Targets) (Scotland) Bill which was introduced on 23 May 2018:

“The Scottish Government introduced the Climate Change (Emissions Reduction Targets) (Scotland) Bill to the Scottish Parliament in May 2018 following advice from the Committee on the definition and levels of the new targets. As introduced, the Bill would increase Scotland's ambition for emissions reduction by 2050

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Scotland's target does not include emissions produced as a result of imported goods and services.

from 80% to 90% against 1990 levels, and adjust the way emissions are accounted for within the targets.”
[Reducing emissions in Scotland, 2018 Progress Report to Parliament, September 2018, page 6]

- 7.2. The targets in the Bill for 2020, 2030 and 2040, for reductions in emissions of 56%, 66% and 78%, are the most stretching statutory targets of any country in the world. Setting a 2050 target for a 90% reduction of all greenhouse gases means net-zero emissions of carbon dioxide. Scotland will be carbon neutral by 2050.
- 7.3. The Scottish Government has also said that it wants to go further and achieve net-zero for all greenhouse gases as soon as possible and that it will set a target date for this as soon as this can be done credibly and responsibly.
- 7.4. In light of the IPCC Special Report on limiting global warming to 1.5 degrees, the Scottish Government has joined the UK and Welsh Governments in asking the Committee on Climate Change for updated independent advice on targets. The Committee’s advice is expected in Spring 2019.

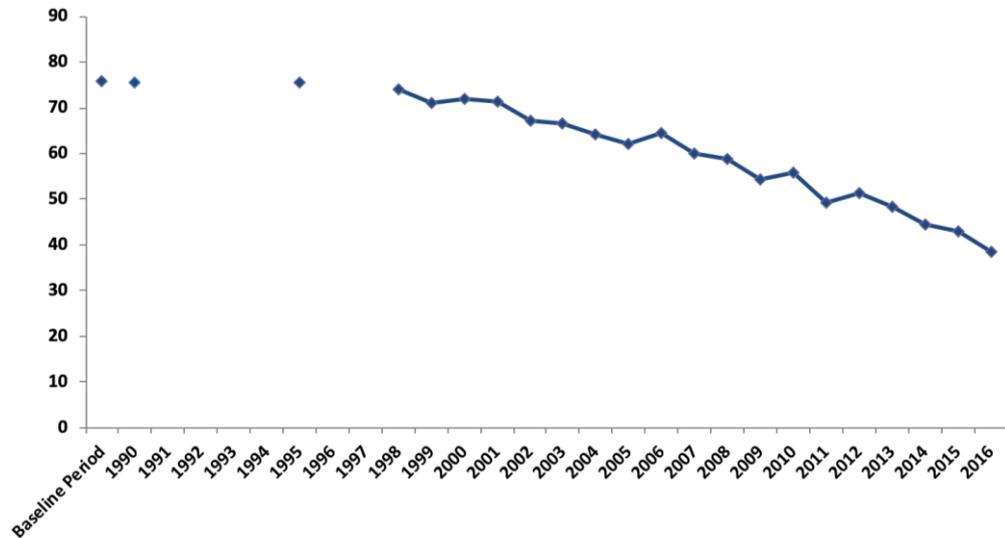
The Evidence Base: Recent Trends

- 7.5. Scotland is performing well on reducing greenhouse gas emissions compared to the rest of the UK, and met its annual legislated target for each of the past three years. Overall, Scottish emissions are now 49% below 1990 levels (declining from 75.6 MtCO₂e in 1990 to 38.6 MtCO₂e in 2016)⁷⁹, and Scotland is on course to outperform the current interim target for 2020⁸⁰.

79 Greenhouse Gas Emissions, Scotland 2016 Key Findings, Scottish Government, 12 June 2018.

80 Committee on Climate Change, Reducing emissions in Scotland, 2018 Progress Report to Parliament, September 2018.

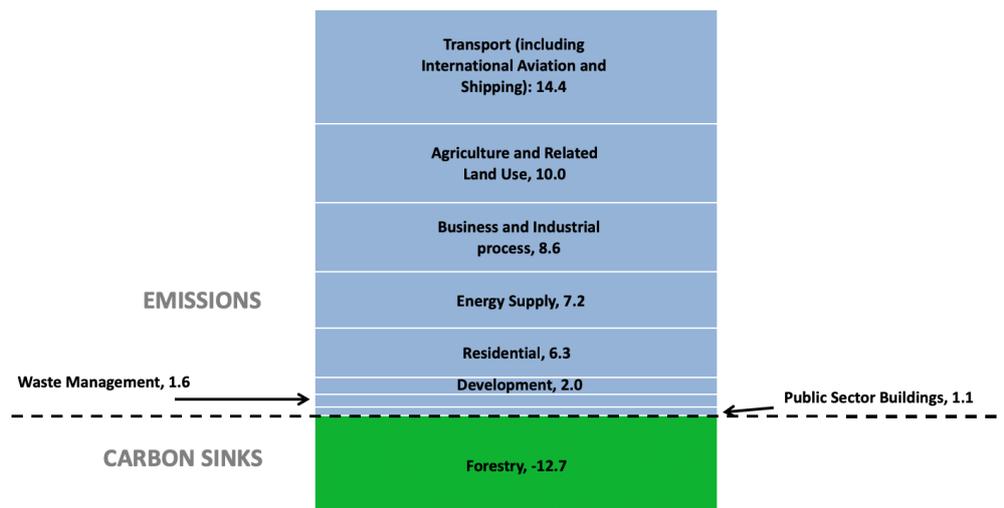
Figure 7.1: Scottish Greenhouse Gas Emissions, 1990 to 2016 (MtCO₂e)



Source: Scottish Greenhouse Gas Emissions- Scotland 2016

- 7.6. Transport (including Scotland's share of international shipping and aviation) is the largest emitting sector in 2016 accounting for some 37% of total net emissions (14.4 MtCO₂e). Agriculture and related land use is the next largest representing 26% of total net emissions (10.0 MtCO₂e), although Scotland's forestry acts as a carbon sink contributing a reduction to overall emissions (-12.7 MtCO₂e). Business and Industrial processes account for just over a fifth (22% or 8.6 MtCO₂e), Energy Supply just under a fifth (19% or 7.2 MtCO₂e) and Residential 16% (6.3 MtCO₂e). Other sources Development, Waste Management and Public sector buildings together contribute a total of 12% of net emissions.

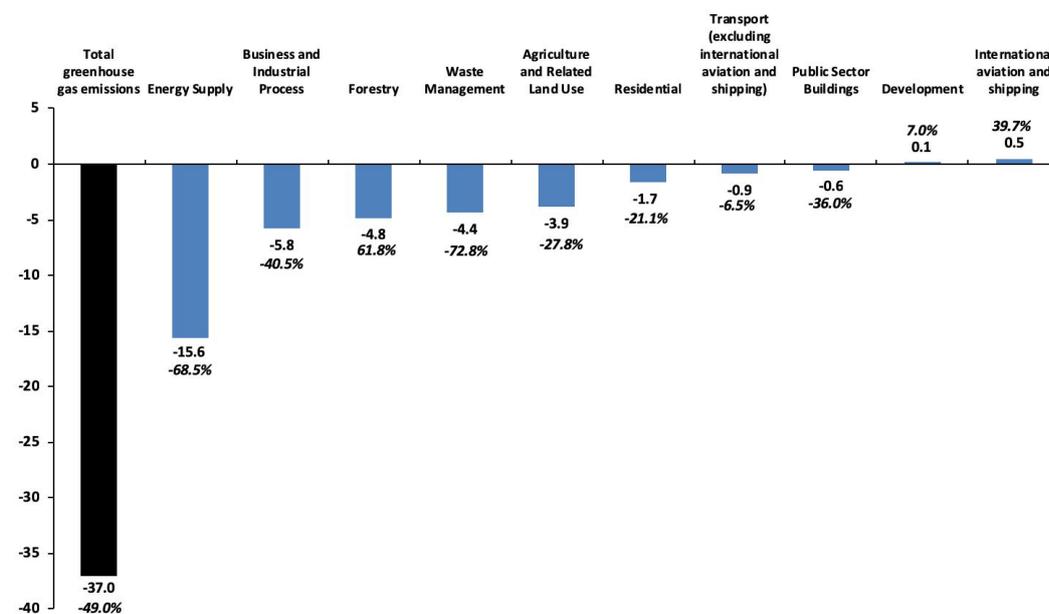
Figure 7.2: Sources of Scottish Greenhouse Gas Emissions, 2016 (MtCO₂e)



Source: Scottish Greenhouse Gas Emissions- Scotland 2016

7.7. Since 1990, greenhouse gas emissions from all domestic sources have declined but the Energy sector has declined most and now contributes less than a third of its 1990 emissions. This has been due to the closure of a number of coal-fired power stations. The decline in Business and Industrial Process emissions (a reduction of 40.5%) is primarily due to a reduction in iron and steel emissions.

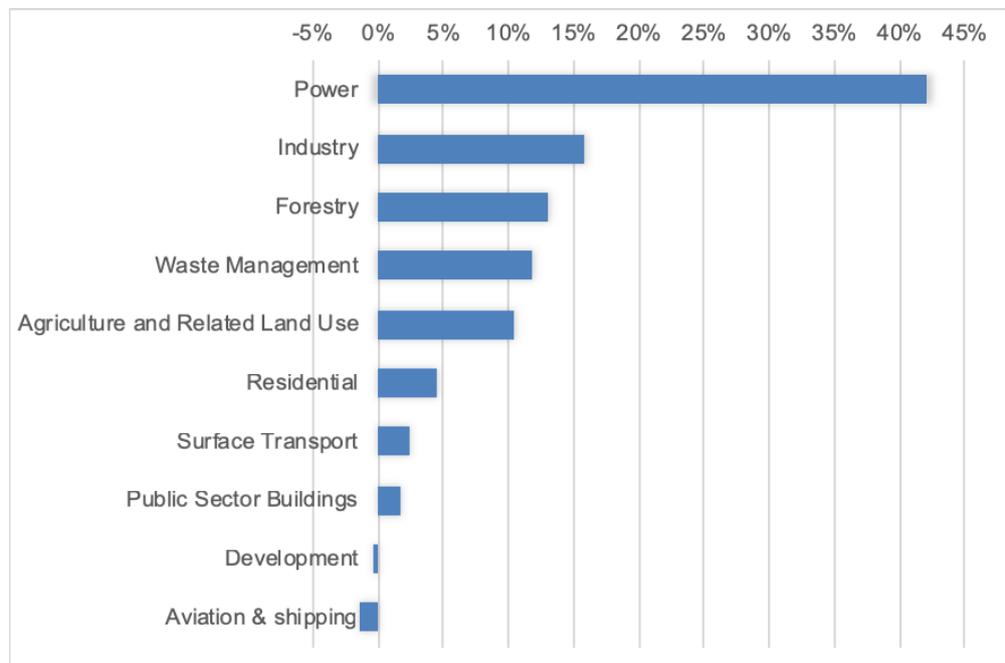
Figure 7.3: Change in Net Emissions by Scottish Government sector 1990 to 2016 - in MtCO₂e and percentage changes



Source: Scottish Greenhouse Gas Emissions- Scotland 2016

- 7.8. Improvements in landfill management have contributed most to a significant proportionate decrease in Waste Management emissions (-72.8%) but this represents a net reduction of 4.4 MtCO_{2e}. Domestic Transport has fallen but by only 6.5% and an increase in international aviation and shipping has meant that the sector as a whole fell by 0.4 MtCO_{2e}.
- 7.9. The fall in Energy sector emissions between 1990 and 2016 accounts for 42% of the total decline in net emissions – more than twice the contribution than any other sector. Falls in the emissions of Business and Industrial Process, Forestry, Waste Management and Agriculture accounted for 51% of the decline in total net emissions.

Figure 7.4: Sector contributions to decline in Greenhouse gas emissions as a percentage of total net decline 1990-2016



Source: CPC calculations based on Scottish Greenhouse Gas Emissions- Scotland 2016 data expressed as a proportion of the total reductions achieved 1990-2016

- 7.10. Declines in the two other large emission sector – Transport and Residential were modest (a combined 6%). Effort is required across all sectors to meet future emissions reduction targets.

The Population Projections for Scottish Areas are based on the latest mid-2016 population estimates and provide an indication of the future population size and age structure of Scottish areas based on a set of assumptions about future fertility, mortality and migration:

- Fertility is taken to mean the total number of children a woman would have, on average at the end of her child bearing years. The long-term fertility rate for Scotland is assumed to be 1.65. Past trends in the number of births in each area is compared with the national trends. This is used to calculate a differential rate that is then applied to the Scotland level fertility rates to calculate the future number of births in each area.
- At Scotland level, future improvements in mortality rates are based on the trend observed in the period 1961 to 2015. Based on these rates, the expectations of life at birth for Scotland are projected to increase from 77.1 years for those born around 2015 to 79.4 years in 2026 for males, and from 81.2 years for those born around 2015 to 82.7 years in 2026 for females. The number of deaths in each area is compared with the national trends. For deaths this is done separately by sex for three age groups; 0-59, 60-79 and 80 and over. This is used to calculate a differential rate that is then applied to the Scotland level mortality rates to calculate the future number of deaths in each area.
- Three types of migration are modelled separately by the projections; within Scotland migration, migration between Scottish areas and the rest of the UK and migration between Scottish areas and overseas.
 - For within Scotland migration and rest of UK migration, trends in migration over the previous five years is used to create a rate that is then applied to the projected population for each area to calculate the number of in and out migrants.
 - Overseas migration is projected separately It includes migration by asylum seekers and refugees, both of which are modelled separately from other international migrants. It is assumed in the national population projections (NPP) that international migration will move from levels seen in the base year to a long-term trend several years later. The time taken to reach the long-term trend is known as the run-in period. In the 2016-based population projections, the run-in period was seven years, with the long-term trend beginning in 2023.
- For each area, the projected population for each year is calculated by removing any special populations (such as prisoners and armed forces) from the previous year's population and then ageing on the remaining population. Local fertility and mortality rates are then applied to calculate the number of projected births and deaths. Rates to calculate migration within Scotland and with the rest of the UK are also applied, before migrants to and from

overseas are added and subtracted from the population. Finally, any special populations are added back in to find the final projected population. This is then repeated for each year of the projection.

- The assumptions are based on past trends and do not take account of any future changes that may occur as a result of policy initiatives but may reflect the past impact of policy and economic changes.
 - Variant projections using alternative plausible assumptions are also produced. The seven variants included are: high fertility, low fertility, high life expectancy, low life expectancy, high migration, zero outwith Scotland migration.
-

ANNEX B NOTES ON FORECASTING INCOME DISTRIBUTIONS

The IFS and Resolution Foundation projections are highly uncertain. They build on macroeconomic forecasts produced by the Office for Budget Responsibility (OBR) and demographic projections from the Office for National Statistics (ONS), which are themselves subject to much uncertainty.

Both sets of projections were produced before the publication of official statistics on the income distribution for 2016/17, in DWP's Households below average income release. The projections do not take account of more recent economic or demographic forecasts (including those made by the OBR at the time of the March 2018 Spring Statement) or subsequent policy announcements.

Instead, the projections offer an estimate of the future path for inequality in a scenario where policy remains unchanged. They do not account of possible behavioural responses to forthcoming tax and benefit changes, which could alter the shape of the income distribution.

The projections also assume a single UK wide policy in relation to taxation. In reality continuing devolution of powers means that tax policy differs in Scotland:

- The higher rate threshold will increase only in line with inflation. In 2017-18 this will mean a threshold of £43,430 while in the rest of the UK it will be raised faster than inflation to £45,000. National Insurance contributions are unaffected meaning that the income at which NI rates change and the income at which income tax rates change will become decoupled in Scotland.
- The structure of council tax will be changed slightly from April 2017 such that those in the most expensive properties (bands E-H) will pay more.
- Accompanying this, the Council Tax Reduction system will be made more generous for eligible families with children. It has also been previously protected from cuts made in most of England.



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