University of Strathclyde Business School

Fraser of Allander Institute

Scottish Cities Outlook: an Update

September 2021

UNIVERSITY of STRATHCLYDE
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The Fraser of Allander Institute

Disclaimer

The analysis in this report has been conducted by the Fraser of Allander Institute (FAI) at the University of Strathclyde. The FAI is a leading academic research centre focused on the Scottish economy.

The report was commissioned in December 2020 by The Scottish Cities Alliance.

The analysis and writing-up of the results was undertaken independently by the FAI. The FAI is committed to informing and encouraging public debate through the provision of the highest quality analytical advice and analysis. We are therefore happy to respond to requests for technical advice and analysis. Any technical errors or omissions are those of the FAI.

1. Introduction

In 2019, The Fraser of Allander Institute was commissioned by the Scottish Cities Alliance to outline the economic outlook for the seven cities of Scotland – Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling.

The report identified several strengths shared by the cities, such as skilled workforces, international reputation and economic potential. However, a number of marked differences were also observed in terms of scale, relative performance, industrial structure and resilience.

Scotland's cities are the engines of growth in the economy and at the time of the last report, the outlook for the Scottish economy was improving.

The report highlighted that Scotland's cities, alongside Scotland overall and economies globally, face a number of longer-term Grand Challenges. Those which dominated discussions included: economic growth and productivity; technological change; the transition to a net zero carbon economy; tackling inequalities; and an ageing population.

In 2020, The Scottish Government, Scottish Cities Alliance and national agencies developed an action plan in response to the transition to net zero. The plan outlined how they will work collaboratively to ensure that Scottish cities play their part in meeting the 2045 carbon reduction targets, whilst maximising economic and well-being outcomes across Scotland.

However, fast forward to present day and the picture for the Scottish economy is very different.

Covid-19 has presented one of the greatest challenges in a generation – not only a global health crisis, but also a significant social and economic challenge, causing huge technological, social and cultural disruption.

The Scottish economy now faces unprecedented challenges presented by the Covid-19 crisis, in addition to those highlighted in our 2019 report.

The remit of this report was to:

1. Analyse the economic impact of Covid-19 on Scotland's seven cities;

2. Discuss how the transition to net zero might interact with the other four challenges, and, where relevant, give examples of where policy has been successful in tackling these challenges;

3. Highlight examples of policies that have worked in other places in the UK and internationally to address the grand challenges. To support this analysis, the FAI and SCA hosted a roundtable discussion with experienced professional in government, policy and academia; and,

4. Highlight how a differing policy approach might work in tackling the grand challenges.

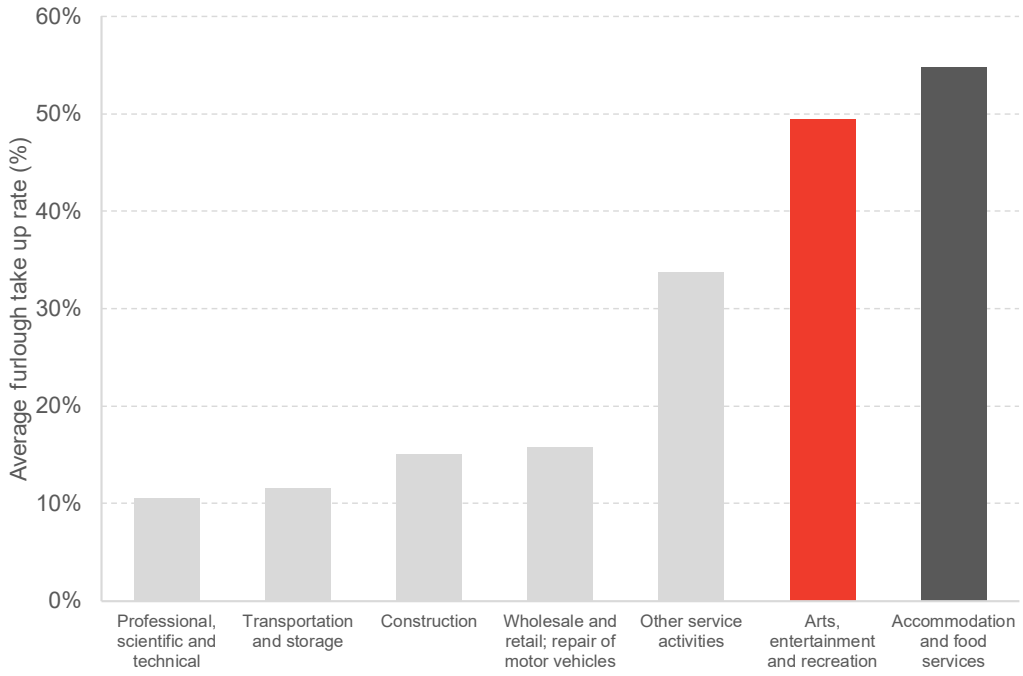
2. The impact of Covid-19 on Scotland's cities

The nature of the current crisis is unique given its differing effects on sectors in the UK.

National lockdowns forced the temporary closure of many businesses. As a result, employees have either had to transition to work-from-home practices or have been supported through the government's furlough scheme. Both have led to disproportionate effects on sectors of the economy.

In particular, we know that given the inability to work from home, sectors such as accommodation and food services, and the arts, entertainment and recreation sectors have had lower proportions of staff working from home, Chart 1.

Chart 1: Proportion of workforce furloughed by Sector, Scotland, December 2020



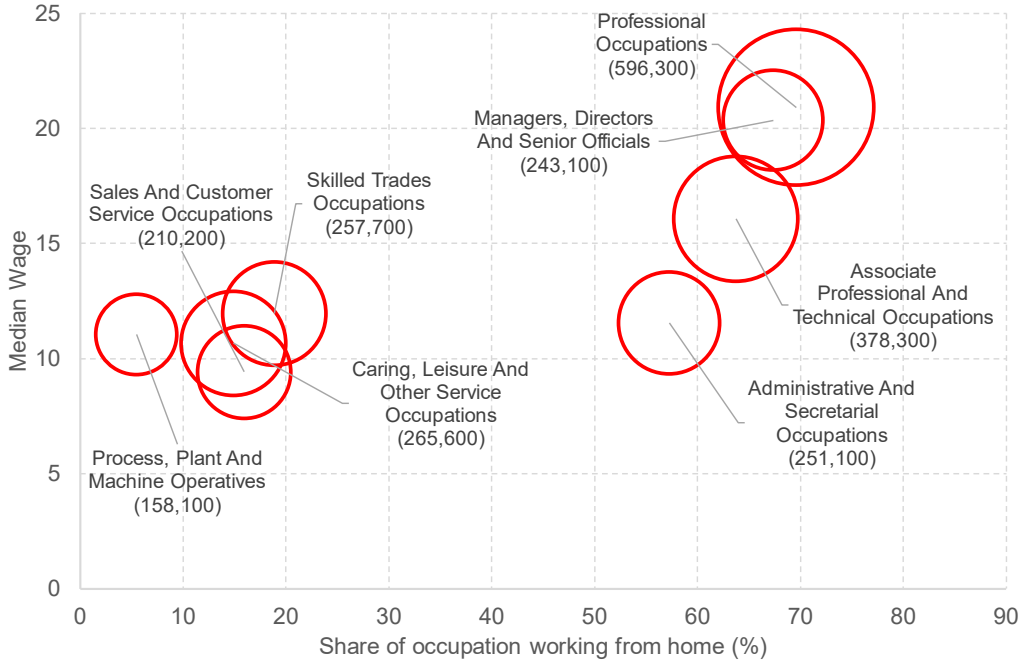
Source: *HMRC CJRS*

Chart 2 shows that the proportion of occupations working from home is highly concentrated among those occupations that tend to earn more, on average.

'Shutdown' sectors which have been most affected are predominantly made up of low-income occupations. Consequently, those who cannot work remotely – disproportionately low earners – have been far harder hit by the pandemic in job and income losses, while those on the top-end of the income scale have continued to work and earn.

Such evidence suggests that Covid-19 is exacerbating many pre-existing inequalities.

Chart 2: Proportion working from home by occupation, Scotland, 2020



Source: *ONS; NOMIS; BRES*

Sectoral make up of cities

But what does this mean for the cities in Scotland?

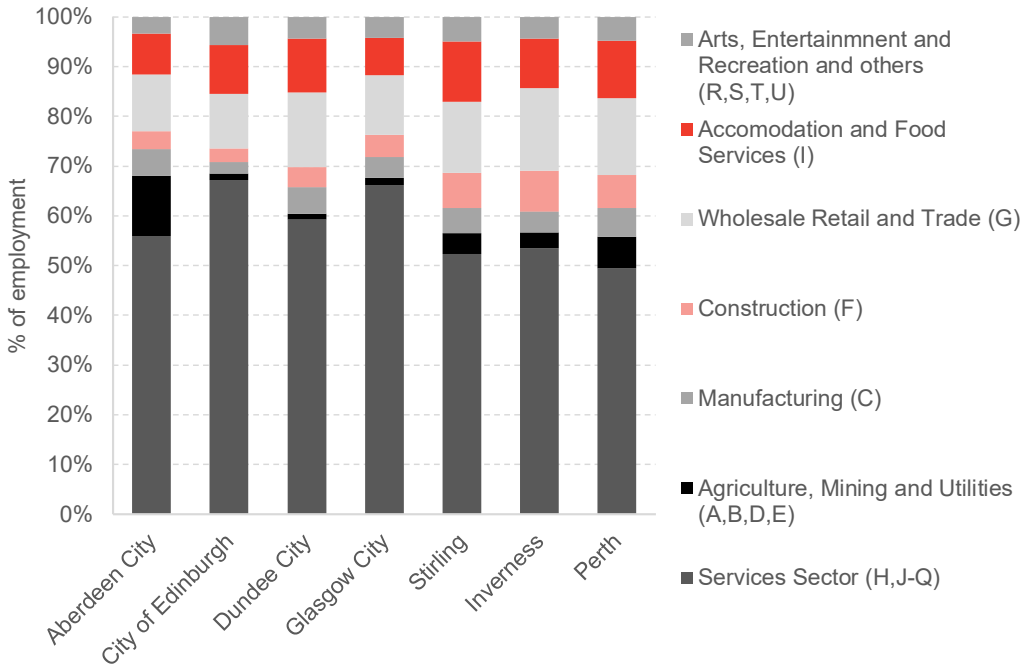
We know that several sectors and occupations have adapted well to homeworking, however, some have not, given the in person nature of many jobs. Many hotels, restaurants and cinemas had no choice but to close their doors and support employees through the government furlough scheme.

Differences in the sectoral make up of cities across Scotland has resulted in a varied impact in the extent to which cities have been affected.

For example, Professional and Associate Professional Occupations account for the largest share of jobs in the Information technology, Education, and Professional and Scientific sectors. In Aberdeen, Dundee, Edinburgh, Glasgow and Stirling, these sectors make up between 20 and 25% of employment, compared to only 15% in Perth and Inverness.

Chart 3 highlights that the Accommodation and Food services, wholesale and retail and the arts, entertainment and recreation sector make up similar proportions of each cities economy. However, these sectors are more prominent in Dundee (28%), Stirling (29%) and Perth (29%).

Chart 3: Sector make up by employment share, 7 cities, 2019

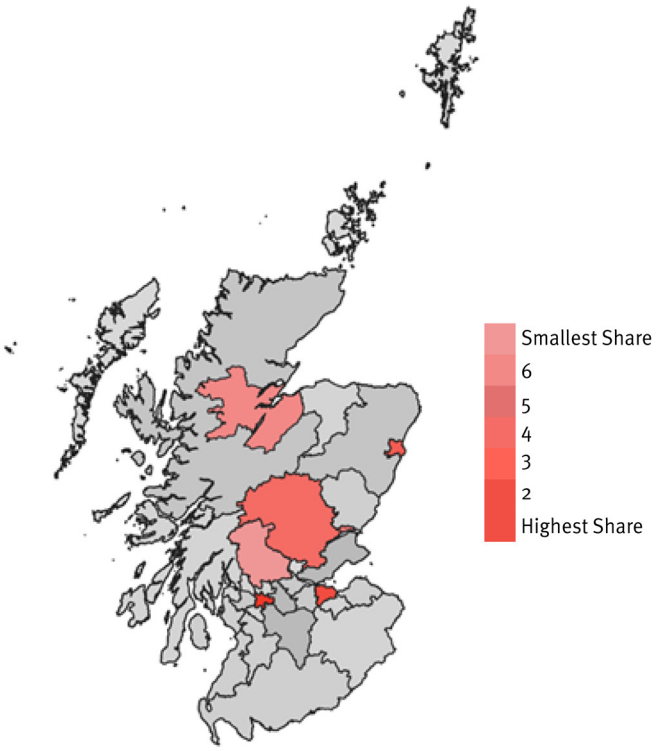


Source: *BRES*

Figure 1 shows that it is the bigger cities that account for the largest share of furloughed workers; this is not overly surprising given the populations of big cities like Glasgow and Edinburgh.

12% of people furloughed in Scotland were employed in Glasgow, with a further 10% employed in Edinburgh.

Diagram 1: % of total Scotland cumulative furlough by City, March 2021[1]



Source: *HMRC CJRS*

1 CJRS statistics are provided at the local authority level, meaning Inverness is captured within Highland – therefore, we have taken employment in Inverness as a proportion of total Highland employment and applied this to total furloughed in Highland to attain Inverness estimate.

3. Grand Challenges

In the short-term, the negative economic implications of Covid-19 for cities will dominate any policy discussion.

Yet the longer-term challenges and opportunities, highlighted in our 2019 report still remain, and how the pandemic may have changed the nature of them remains to be seen.

The five key areas of challenge and opportunity highlighted were:

- The growth challenge – and the importance of boosting productivity across Scotland's cities;
- The opportunities from technological change – and the growth of the knowledge-based economy;
- The transition to a net zero carbon economy – and the importance of supporting new 'green' industries of the future and improving the environment of our cities;
- The changing nature of our population – and the opportunities to make our cities attractive places to live and work; and,
- The importance of tackling inequalities – and crucially, providing opportunities for everyone in our cities to fulfil their economic potential and creating opportunities to improving wellbeing.

The infographics overleaf provide a recap of the 5 grand challenges, giving insight into how the pandemic may have impacted them, as well as highlighting key policy questions and areas of focus to both overcome the challenge but also utilise any opportunities.

1 The Growth Challenge

- The cities are what drives growth in the Scottish economy. However, given the effects of the pandemic, we know certain cities have been more negatively impacted given their sectoral make-up.
- With many businesses expecting to reduce some of their office footfall permanently and high street retail shifting more towards online, cities must look to how they remain attractive destinations in order to continue to drive growth.
- Any focus on growth will vary in each city, but focussing on key sectors and increasing investment will be crucial.

More than

1/2

of Scotland's economic activity takes place in Scotland's cities or surrounding areas.

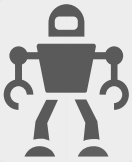
30,000

more people employed in Scotland's cities in 2019 than in 2015.

2 Technological Change

- For the past few years, the challenge of technological change has centred on the risks of automation facing the labour market
- Technology has played a large part in many businesses survival in 2020, with the shift to working from home and digital learning.
- For most firms, the pandemic accelerated many long term digital plans from a few years to a couple of months - with many businesses now looking to invest in new technologies.

The **Logan Review** identified key areas of focus for Scotland to boost the technology sector.



Focus: How can universities help cities boost the technology sector and enhance the knowledge economy in Scotland?

36% of firms reported that homeworking had led to increased investment in technology and software that has improved productivity in 2020.

3 Transition to Net Zero

- The relationship between the economy and the environment has been at the forefront of policy discussion for the past few years.
- The shutdowns experienced during the pandemic has eased many of the environmental pressures facing the globe pre-pandemic, with policymakers now looking at green economic recovery measures that prioritises the environment.
- As the economy transitions away from fossil fuels such as oil and gas, reskilling and supporting jobs in transitioning to new jobs in renewables is key.

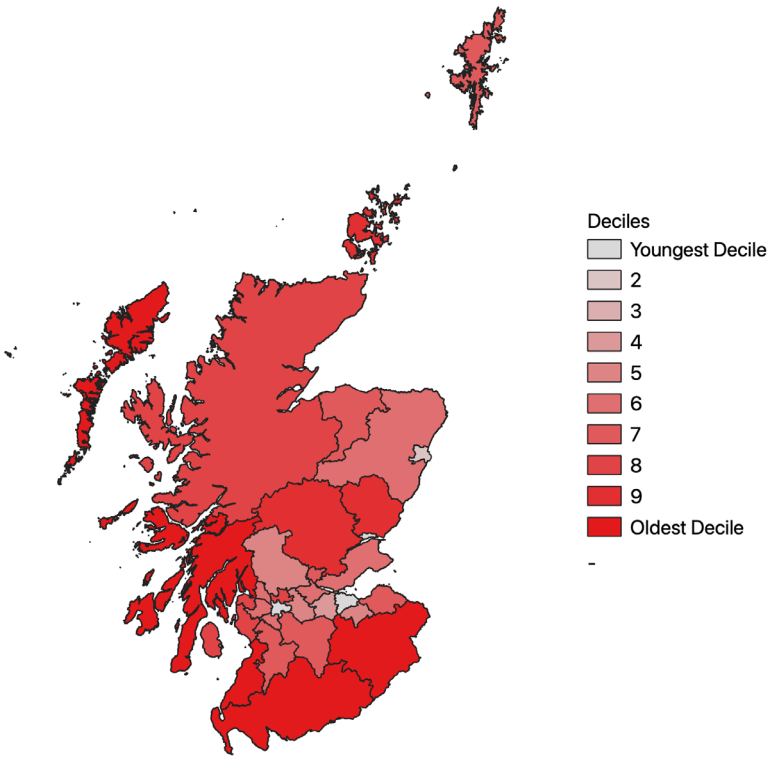
Challenge: Reskilling jobs as Scotland transitions to carbon neutral energy sources from oil and gas to ensure nobody is left behind.

Scotland is a country at the forefront of the net zero agenda, with the **Just Transition** ensuring provisions for green jobs and infrastructure

4 Demography

- Since the recession, the gap between Edinburgh with the wider Scottish economy has grown, with a sharp increase in the number of people living and working in the local areas.
- Edinburgh is the fastest growing city in Scotland and one of the fastest-growing areas of the UK, outpacing even London in terms of growth.
- Scotland's population is also ageing - Inverness and Perth have a median age around 10 years older than Edinburgh, Glasgow, Dundee and Aberdeen.
- Edinburgh has a median age of 36.5, compared to 47 in Perth – with the Scottish average at 42.
- Projected population growth for Dundee, Aberdeen and Inverness is negative, and whilst the Scottish average population growth is only 0.2%, Perth, Glasgow, Stirling and Edinburgh's populations are projected to grow.

Chart 4: Median Age by Local Authority, 2019

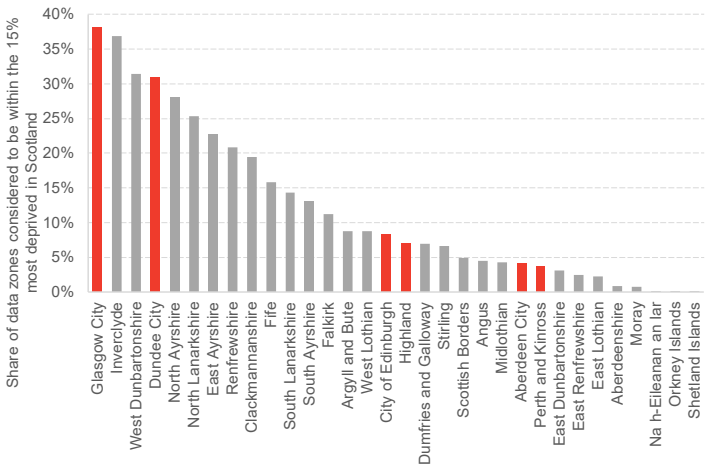


Source: NRS

5 Tackling Inequality

- Glasgow and Dundee are two of the most deprived local authorities in Scotland. Around 30% of the top 15% most deprived data zones in Scotland are in Glasgow, with around 6% of these in Dundee.
- These cities also have the highest child poverty rates. However, of the 7 cities, the lowest child poverty rate is around 20%, showing that whilst inequality and poverty are more prevalent in certain cities, inequality is something that all cities are currently tackling
- Median hourly earnings in Edinburgh are 20% higher than in Dundee.
- Top weekly earners in Edinburgh and Glasgow earn roughly twice as much as the lowest earners.
- Median weekly earnings have increased, on average, by 25% across Scotland's cities between 2010 and 2020.

Chart 5: Share of top 15% most deprived datazones by local authority, 2020



Source: NRS

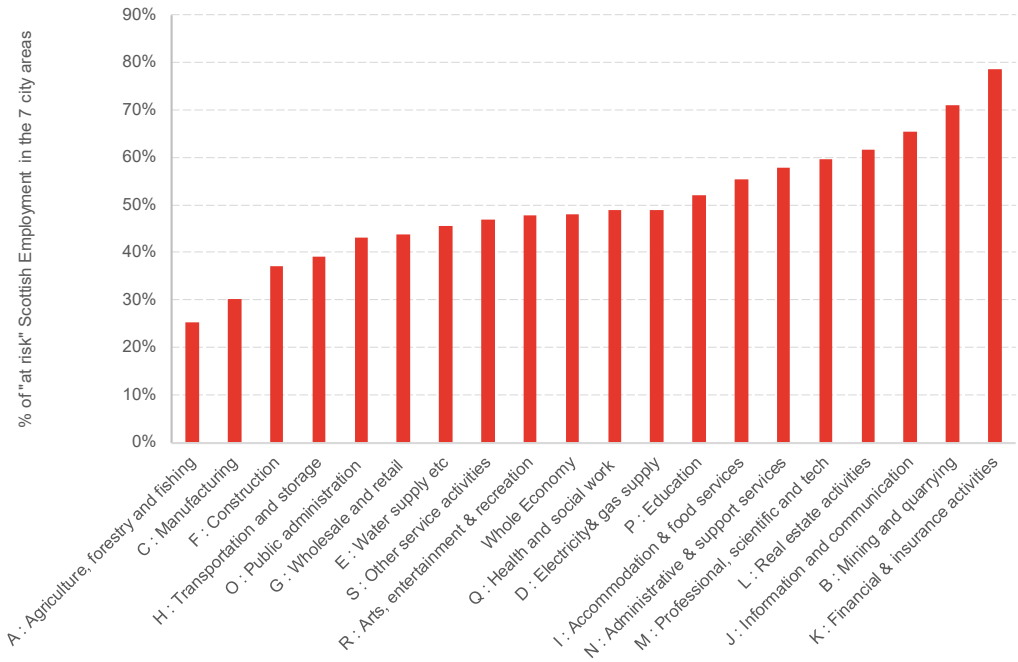
Technological Change

Previous research by the Fraser of Allander Institute found that 3 in 10 Scottish jobs contain tasks which have the potential to be automated -

- Almost half (48%) of these jobs are contained within the 7 city local authority areas.
- This varies hugely by sector: of the employment in finance and insurance services that is at risk of automation, almost 4/5 is located in the Scotland's cities.

Chart 6 shows the sectoral variation: with more detail on the main sectors affected in each city shown in Table 3 overleaf.

Chart 6: Percentage of "at risk" Scottish employment in the city areas, 2019



Source: *SCDI "Automatic for the People" (2018), BRES, FAI calculations*

Demography and growth challenge

The demographic outlook for certain areas of Scotland could limit economic growth potential in Scotland.

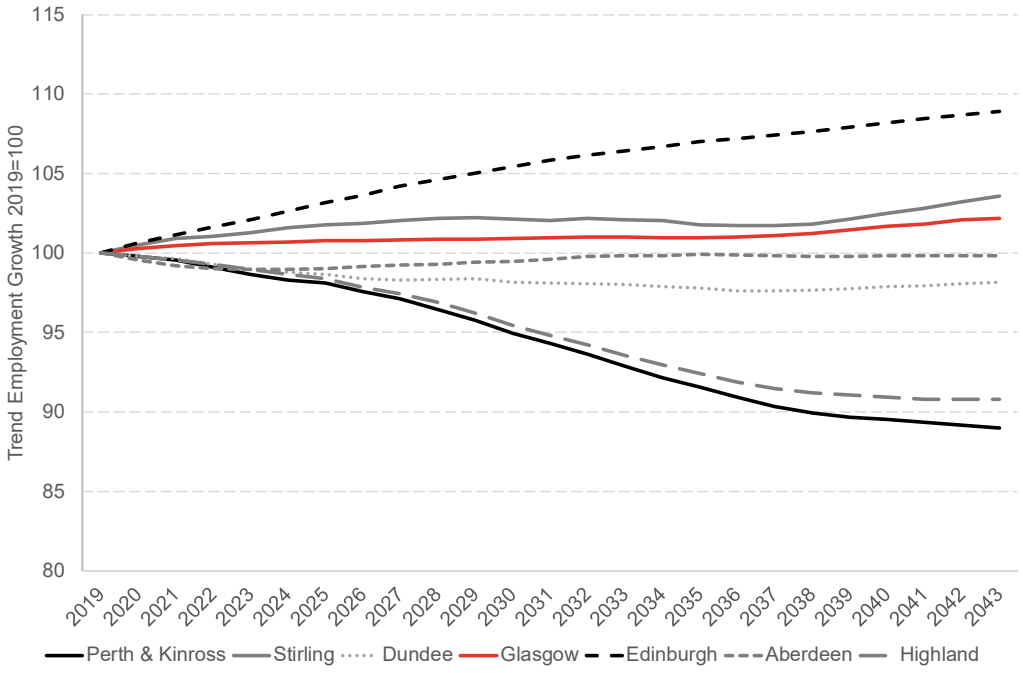
The continued outflow of young people to the 'big' cities from more rural areas, as well as an ageing population and shrinking workforce are critical issues facing the Scottish economy. And given that productivity and economic success are increasingly tied to these demographic changes, the longer term implications for the Scottish economy are evident.

Furthermore, the Covid-19 pandemic may have accelerated these issues, only worsening the outlook for the Scottish economy if this challenge is not tackled.

Chart 7 illustrates the employment outlook for the local authority areas of the core cities – using a pre-Covid baseline – while Chart 8 shows productivity rates of each area compared to the Scottish average.

Aberdeen City			City of Edinburgh			Dundee City			Glasgow City			Highland			Perth and Kinross			Stirling			Scotland		
Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk		Top 10 sectors	% & cumulative % of jobs at risk	
Wholesale & retail	16%	16%	Wholesale & retail	16%	16%	Wholesale & retail	23%	23%	Wholesale & retail	18%	18%	Wholesale & retail	21%	21%	Wholesale & retail	21%	21%	Wholesale & retail	22%	22%	Wholesale & retail	20%	20%
Professional, scientific & tech	14%	30%	Administrative & support services	11%	27%	Health & social work	14%	37%	Administrative & support services	16%	34%	Accommodation & food services	12%	33%	Accommodation & food services	11%	32%	Administrative & support services	13%	35%	Manufacturing	10%	30%
Administrative & support services	11%	42%	Financial & insurance	11%	38%	Accommodation & food services	10%	48%	Health and social work	9%	43%	Health & social work	11%	44%	Manufacturing	10%	41%	Accommodation & food services	9%	44%	Administrative & support services	10%	40%
Health & social work	10%	51%	Health & social work	9%	47%	Manufacturing	9%	56%	Professional, scientific & tech	7%	50%	Transportation & storage	8%	52%	Administrative & support services	9%	50%	Manufacturing	8%	52%	Health and social work	9%	49%
Mining & quarrying	9%	60%	Accommodation & food services	9%	56%	Public administration	8%	64%	Accommodation & food services	7%	57%	Manufacturing	8%	60%	Health & social work	7%	57%	Health & social work	6%	59%	Transportation & storage	8%	57%
Manufacturing	8%	69%	Professional, scientific & tech	8%	64%	Administrative & support services	6%	70%	Financial & insurance	7%	64%	Administrative & support services	7%	67%	Public administration	6%	63%	Professional, scientific & tech	6%	64%	Accommodation & food services	7%	65%
Transportation & storage	8%	77%	Transportation & storage	7%	71%	Transportation & storage	5%	75%	Manufacturing	6%	70%	Public administration	6%	73%	Transportation & storage	5%	68%	Construction	5%	69%	Public administration	7%	71%
Accommodation & food services	7%	84%	Public administration	6%	77%	Information & comms	5%	80%	Public administration	6%	76%	Construction	5%	78%	Construction	5%	74%	Financial & insurance	5%	74%	Professional, scientific & tech	6%	78%
Public administration	5%	88%	Information & comms	6%	83%	Professional, scientific & tech	4%	84%	Transportation and storage	6%	82%	Professional, scientific & tech	5%	82%	Professional, scientific & tech	5%	78%	Public administration	5%	79%	Construction	4%	82%
Construction	3%	91%	Manufacturing	4%	87%	Education	4%	88%	Information & comms	5%	87%	Water supply etc	4%	86%	Agriculture	4%	82%	Transportation & storage	5%	84%	Financial & insurance	4%	86%
Total jobs at risk	49,230		97,056			20,632			121,564			33,338			18,992			14,061			739,550		
% of Scottish jobs at risk	7%		13%			3%			16%			5%			3%			2%					
% of jobs in area	29%		28%			28%			29%			29%			29%			29%			30%		

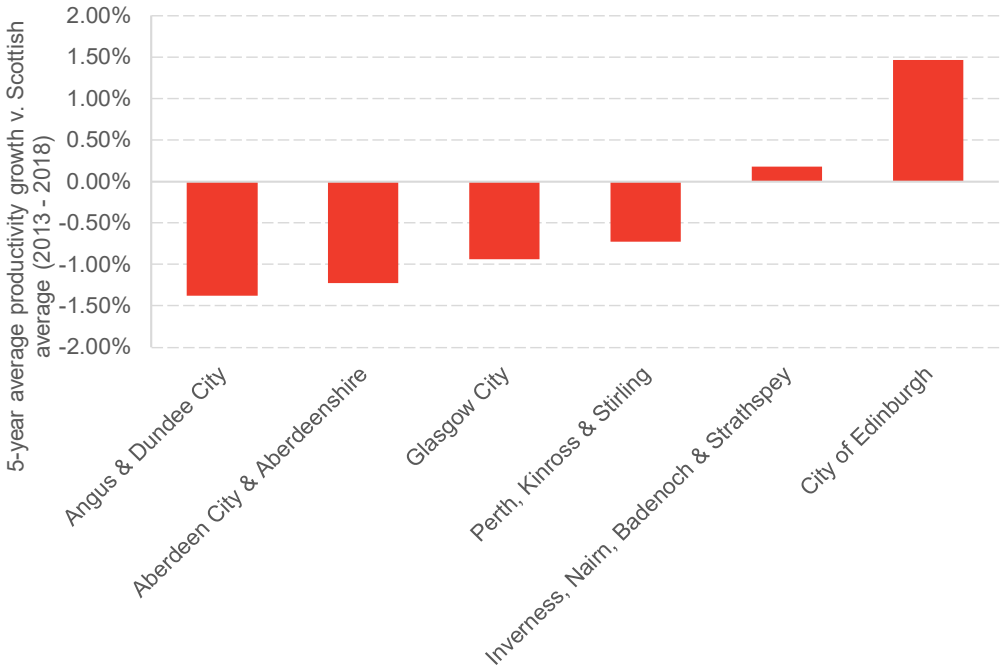
Chart 7: Outlook for Employment in City Local Authorities



Source: *NRS, FAI calculations*

The projections above use the outlook for overall population as well as working age population in each area to determine the change in the overall employment base. Charts 7 and 8 highlight the challenges facing Highland and Perth and Kinross areas, with Aberdeen and Dundee City also deviating downwards from the baseline.

Chart 8: 5 year average productivity growth vs Scottish average, City NUTS 3 areas



Source: *ONS, FAI calculations*

How to tackle the grand challenges?

Devising policy to tackle these grand challenges is difficult and will vary city by city given the differing nature of the challenges faced. However there have been some examples, both domestic and international, of policy approaches that have successfully tackled some of the challenges.

Successful domestic examples of policies used to tackle the grand challenges include:

- In attempt to tackle regional inequalities, £1billion of funding was allocated to the improvement of infrastructure to attract new businesses away from London in the UK, leading to the relocation of numerous businesses. One key example is the move of major parts of the BBC to Salford, Greater Manchester, creating local job opportunities across a number of sectors.
- The North Sea Transition Deal is the first of its kind by any G7 nation, agreeing to support the transition of the offshore oil and gas industry to clean, green energy. In a commitment to people and skills, the deal will support up to 40,000 high-quality direct and indirect supply chain jobs to ensure that everyone employed in the sector can progress in fulfilling their potential. The transition also aims to attract new green energy firms to the UK in an attempt to support local economies by securing 50% of offshore decommissioning and new energy technology. The landmark deal has potential to transform the sector in preparation for a net zero future and catalyse growth throughout the UK economy.

- Glasgow has committed £115million to the 'Avenues' programme which seeks to make the area more attractive, people-friendly and safe for small businesses. The £1billion Glasgow City Region Deal – one of the largest in the UK – has funded the project, with grants from government – both UK and Scottish – to promote economic growth and infrastructure.

Two international examples are discussed below.

The Atlantic Canada Immigration Pilot

- Launched in 2017, the pilot is a creative approach to address labour market challenges, helping businesses in the Atlantic provinces of Canada to fill vacancies that could not be filled locally.
- Three programmes were identified for hiring foreign nationals: the International Graduate Programme, the High-Skilled Programme, and the Intermediate skilled programme.
- The pilot aims to help employers hire foreign skilled workers who want to immigrate to Atlantic Canada and international graduates who want to remain in Canada post-graduation.
- Due to the success of the pilot, the Canadian government has committed to making it a permanent programme.

The Spanish Catalogue Hard-to-fill occupations

- A first of its kind programme which aimed to identify occupations that were significantly difficult to fill with Spanish professionals.
- The catalogue provides a list of occupations across a number of sectors, with the aim of incentivising recruitment firms in Spain to find foreign professionals to immigrate and fill occupations in the country.
- This method has been adopted by many countries across the world and was recently adopted in Scotland in response to the UK Migration Advisory Committee's call for occupation shortages in 2020.
- Given the success of the method in Spain, there has now been work done to regionalise the catalogue, identifying the specific shortages in regions of Spain, making the catalogue more specialised to the localities of the country and tackling specific skills shortages.

4. Net Zero Ambitions in Scotland's cities

Using the analysis in the 2019 report, the Scottish Cities Alliance partners worked collectively to co-design their net zero action plan. In it, they highlight a number of areas of collective focus, which include:

- Switch-over to zero emission vehicles (ZEVs) in city fleets and public transport;
- Scale up circular economy initiative in cities;
- Extending district heating (and cooling) systems to all buildings based on the standardised approach to low carbon heat planning policy across the cities; and,
- Improve energy efficiency of buildings owned by cities followed by addition of low carbon power generation.

The plan does well to align with the net zero aims of the Scottish Government, addressing the need for: identifying and closing skills gaps, substantial investment in energy efficient infrastructure, the implementation of low emission zones in cities, and, increased access to low emission vehicles.

Can the grand challenges hinder or support the net zero action plan?

So far, the report has focussed on how the 5 grand challenges present both obstacles and opportunities for each city's economy.

However, whilst certain challenges may be more prevalent in certain cities, they may also have implications for one another. It is therefore important to assess where some crossover may exist, particularly in relation to the objectives within the net zero action plan.

For example, a key aim of the Alliance action plan centres on the uptake of zero emission vehicles in Scotland's cities. In order to achieve this, however, it will require behavioural change from consumers, as well as technology to mass produce zero emission vehicles (ZEVs). Such technology is expensive and likely to result in higher prices for consumers; the average cost of an electric car in the UK is estimated to be around £40,000[1].

Particularly, in the case of Glasgow and Dundee, two cities that have high rates of poverty and inequality, this means there will be a large gap between those who can afford ZEVs and those who cannot, something that may worsen given the effects of the pandemic on the inequality gap.

Therefore, green policies aiming to increase the uptake of low-emission vehicles will need to account for the high cost of these types of vehicles and ensure accessibility for everyone in the economy.

Furthermore, another aim within the action plan focusses on creating sustainable economic growth by supporting the growth of supply chains and innovation in areas where Scotland has growth potential.

1 See NimbleFins.

Over the past few years, economic growth and the metrics used to determine success have also been a key policy issue, with many arguing that the measures should be changed to fit more inclusive growth. In our 2019 report, we discussed how the cities faired in their ability to accommodate inclusive growth and a wellbeing economy.

This means that any objective that aims to boost growth in cities must account for the inclusive growth agenda, where growth should not only be sustainable but the benefits accessible to everyone in society.

5. The role of technology and the knowledge economy?

The role of technology in achieving net zero

One of the most important crossovers is the role that technology and the enhancement of Scotland's knowledge economy has to play in achieving the aims in the Alliance action plan.

Electrification, and the transition to renewable energy sources will be a crucial determinant in transitioning to net zero. However, this transition, given the equipment and infrastructure needed, will only be possible with technological progress and the knowledge economy behind this to facilitate the technological change.

Scotland's cities are primed to seize emerging ideas and technology as they arise, considering the market make-up, skills base, and overall city ecosystem that will sustain their success in the technological age.

In recent years, Scotland has been a key player in the renewable energy sector, with some examples including:

- Highland and Islands Airports heading a £3.7 million consortium de-carbonization initiative at Kirkwall Airport which plans to make all its airports carbon-neutral, allowing Scotland to establish the world's first net zero-emission aviation zone by 2040.
- In Orkney, the European Marine Energy Centre became the first successful body to produce hydrogen gas using electricity generated from tidal energy in 2017. The hydrogen gas generated is carbon neutral and has already been used to power local ships and island ferries.
- Aberdeen is the sole UK participant and new president of the World Energy Cities Partnership, which offers an international network for the United Kingdom to cooperate with cities such as Stavanger, Norway; Perth, Australia; Houston, USA; and Halifax, Canada.

Scotland's cities are key drivers of growth, but they also drive technological change given the prevalence of institutions such as universities and colleges, and their ability to act as incubators for the relevant technology firms.

In 2020, the Scottish Government commissioned a review on Scotland's technology sector dubbed 'The Logan Review' (LR). In it, Mark Logan, former Skyscanner executive and professor of computing science at the University of Glasgow, set out a number of recommendations, based on his findings, on how to improve the technology 'ecosystem' in Scotland. Broadly, these included:

- Creating a Tech-Scaler National Backbone;
- Forming a foundational talent pipeline;
- Improving social infrastructure and international market space;
- Better aligning public grant funding to support the needs of the technology sector; and,
- Better inflow of investment funding to tech companies.

The Logan Review provides Scotland with a set of technological objectives and sets out areas of investment and importance in the sector. Therefore, given the role technology has to play in helping Scotland's cities achieve their net zero ambitions, aligning the objectives of an action plan for cities with the recommendations in the review makes sense to ensure attention is directed in the right place.

Table 3: The Alliance Action Plan and links to the Logan Review

Logan Review Recommendation	Alliance Aims and Objectives	Crossover
Foundational Talent Pipeline	Just Transition and growth of new skills whilst minimising avoidable disruption.	The recommendation in the LR relates to the reorganisation of taught curriculum at schools and universities to expand the talent pool within the technology sector in Scotland. The Alliance want to support a just transition and grow new skills in cities with reference to plugging skills gaps. This creates an opportunity to expand the role of both school and universities in cities. Supporting young people to learn new skills and attain relevant qualifications can help to fill relevant skills gaps in the technology sector. However, making it sustainable can create a continuous talent pool of skilled individuals over a number of years. The Climate Emergency Skills Action Plan (CESAP) sets out a plan for the reorientation of Scotland's skills system, highlighting the role of business, communities and individuals in achieving skills objectives. CESAP has been developed through engagement with expert groups, including the Scottish Cities Alliance.

Integrated Ecosystem Grant Funding	Support the growth of supply chains and innovation that capitalise on Scotland's strengths and support sustainable economic growth. Support strategically coordinated investment in the charging network that enables wider energy and transport system benefits and efficiencies.	If Scotland is going to prosper as an incubator for start-ups, both technology-based and in general, then having more available grant funding and investment is key. Whilst the LR recommendations are more general for the sector as a whole, the Alliance has potential to align their specific aims of growing supply chains and investment in transport systems by incentivising grant and investment funding for businesses and start ups that can help facilitate this. This includes providing the necessary support and incentives to encourage cities to promote entrepreneurship and support start-ups.
Investment Funding		

The role of universities and forming a knowledge economy

The 'civic university'

Goddard et al. (2016) discuss the role of the civic university in society.

In the civic university, knowledge exchange activities are integrated into teaching, research and other academic activities. This integration of external engagement has a number of benefits –

- **Student recruitment:** universities can employ staff from a wider, 'non-traditional', cohort (worker-learners and mature students), enhancing diversity in the workplace.
- **Applied analysis in teaching:** combining theory with applied analysis. Students achieve an education that is applied and relevant to the current state of the world around them.
- **Bridging the gap between academia and the wider world:** collaboration with non-academic institutions allows researchers to better understand the research demands of the 'wider world'. Academic research alone is not sufficient to identify such gaps in the literature, and so the relationship between academia and knowledge exchange is crucial to foster impactful research.

In the civic university, the university creates and nurtures relationships with non-academic partners to deliver outputs that have an impact on society, changing over time with the needs of society.

The role of Scottish universities

Whilst the objectives in the Alliance action plan are more specific in comparison to the recommendations in the Logan Review, there is one clear parallel that can be drawn. Universities not only serve a purpose in attracting people to cities post-pandemic but have potential to help cities move towards a digital economy suited to the recommendations in the Logan Review, and in turn, the objectives of the Alliance.

From discussions with relevant stakeholders, in order to create a national backbone of technology start-ups, creating incubator institutions that can help boost technological entrepreneurship and

grow the number of start-ups in the sector will be key to achieving these aims. At present, there is a small number of these institutions in Scotland and increasing the number of them in all cities is what will continue to grow the technology agenda.

Universities in Scotland have a large role to play in advancing the technological agenda in Scotland. As well as this, they also have the potential to keep cities attractive destinations as they are seen as the hub of technology and innovation.

Scotland's universities are estimated to support over 72,900 jobs and add £4.6 billion to the Scottish economy[2]. However, it is not just the contributions to growth and employment that put universities at the forefront of technological change and the net zero ambitions.

Some existing examples of how universities have supported technological advancement in relation to a Just Transition include:

- Three university-led programmes have been awarded funds from Scottish Enterprise's Low Carbon Challenge Fund, which will help SMEs in a variety of sectors, including transportation and electricity.
- Leading experts from the University of Strathclyde and the University of Edinburgh will collaborate with nine business partners to investigate 30 industrial sites that account for about 80% of Scotland's industrial greenhouse gas emissions.
- The University of Glasgow highlights a number of projects[3] that are currently being undertaken to address the net zero challenge. These projects include formulating building materials to boost sustainability in the construction sector; retrofitting tenement buildings in the city to meet carbon reduction targets; and analysing differing types of clean fuel sources such as bioenergy and hydrogen.

Scotland has one of the most educated workforces in Europe, with nearly 50% of people obtaining a tertiary qualification or higher, and also has a higher proportion of the workforce with degrees or higher in science and engineering subjects than the UK. This has put the country in a prime position to continually grow its knowledge economy, and in particular, boost innovation.

A knowledge economy

How are relationships between universities and their local area fostered in a way that allows for knowledge to spill-over? The European Commission's guide to connecting universities to regional growth highlights the following recommendations -

- Universities must avoid serving solely on 'transactional mechanisms', such as commissioned research for local companies, and instead must focus upon the longer-term growth that local areas can achieve through 'transformational' mechanisms. That is, contributing to human capital development through teaching and training, and carry out research that aims to support business growth in key regional 'businesses clusters'.
- Partnerships with businesses and industries is fundamental to ensuring that transactional research becomes transformational.

A strong knowledge economy boosts collaboration and partnership between industry and academia

2 See UCU (2020)
3 See SDI

The recent development of the Advanced Manufacturing Innovation District Scotland (AMIDS) is a prime example of what can be achieved through utilisation of the relationship between academia and industry. The scheme is leading the way in collaborative innovation by utilising the expertise of the University of Strathclyde, but also accommodating major industry players such as Rolls Royce and Boeing.

There are many relevant examples of collaboration in Scotland across the economy, which includes collaboration amongst universities. Some examples include:

- The Life Sciences sector is a key growth area for Scotland and has been identified as a growth sector for many years. The Scottish Universities Life Sciences Alliance (SULSA) was established in 2007 as a research collaboration between the Universities of Aberdeen, Dundee, Edinburgh, Glasgow, St Andrews, and Strathclyde, and is sponsored by the Scottish Funding Council (SFC). SULSA aims to sustain and advance Scotland's global position in Life Sciences through supporting world class research facilities and hiring the best talent.
- The Scottish Government is investing £124 million in a network of Innovation Centres over a six-year period. Innovation Centres (ICs), established in collaboration with Scottish Enterprise and Highlands and Islands Enterprise, are partnerships between universities and the private sector to improve innovation in Scotland. These centres enhance long-term economic development in Scotland by improving university partnerships.
- The city of Perth has a new business leadership approached outlined in their Perth City Plan, Perth 2040. Part of this strategy includes collaboration with Perth Creative Exchange – a £4.5m creative industry partnership project between Wasps (Workshop & Artists Studio Provision Scotland) and Perth and Kinross Council -, University of the Highlands and Islands (UHI) and other Scottish Universities to support the launch of creative/tech or science-based start-up businesses.
- Business Gateway is a publicly funded national business advice service. Business Gateway offers advice, professional resources and support to help those starting a business, and those already running one. This free support ranges from a start-up toolkit, advice on a business plan and 1:1 business advice with an experienced adviser; advice that ranges from start-up queries to questions around how to launch a new product or move premises. In 2019/20, Business Gateway helped over 40,000 customers, handling over 33,500 enquiries; including support for almost 9,000 start-ups and over 23,500 established businesses
- Over the past decade, the Scottish Government has invested £156 million in research pools, attracting another £360 million from universities and their business partners. This collaborative approach has received widespread recognition, drawing leading international scholars and postgraduate students to Scotland and laying the groundwork for more major advances in study and interactions with business and industry.

There are also relevant examples outside of Scotland:

- The West Midlands Regional Economic Development Institute (WM REDI) will be established at the University of Birmingham to support inclusive growth in the Brimingham city-region and across other UK regions.

And internationally:

- Mecklenburg-Vorpommern, a state in North Germany, is a knowledge economy. Research by Busetti et al. (2018) highlighted that the German region devised a strategy to improve the academic and research infrastructure of the health sector in the local area and attract businesses in this sector to region - a strategy that involved the government starting up a business whose purpose was to bridge the gap between stakeholders in the health sector. The health sector has seen consistent growth since this strategy was set out.

6. Cities Policy in Scotland: A differential approach

The challenges and opportunities faced by the cities of Scotland differ greatly, as highlighted in this report. Inevitably, a blanket approach to policies designed to tackle the grand challenges is unlikely to effectively or efficiently address issues in certain cities.

For example, a policy designed to reduce the inequality gap by providing employment opportunities is likely to get more people out of poverty in Edinburgh – a city with fewer areas of deprivation – than in Glasgow or Dundee. To tackle the growing problem in cities where inequality is considerably higher, far more will need to be done.

Developing policies that specifically address problems within cities, but also that has scope for collaboration, will likely support cities as a whole tackle the 5 grand challenges.

Opportunity and Challenge Clusters

In the medium to long-term, there are structural changes which will significantly impact the Scottish economy, and these national and global long-term shifts have consequences that outweigh the political climate or any short-term developments or policies.

Typically, there is little that local areas can do to resist such changes, or to alter the scale or nature of these global or national changes.

This section discusses some challenge areas where cities may struggle to influence Scotland's grand challenges. We call these areas 'challenge clusters'.

However, within reason, Scotland's cities can prepare for these challenges and turn them into opportunities for new investment and growth.

In this section we highlight areas of opportunity for the cities to collaborate and address the grand challenges collectively, given the current policy environment. We call these areas 'opportunity clusters'.

There are two opportunity clusters, and one challenge cluster identified. These are:

- The technological change opportunity cluster;
- The levelling up opportunity cluster; and,
- The demography and growth challenge cluster.

Opportunity Cluster: Technological change

While there are evident challenges ahead as we move towards a tech-driven Scottish economy, specific opportunities can be clearly seen in the Logan Review Recommendations and the commitments of the Scottish Government to implementing its recommendations.

The Logan Review recommended that the initial 'Tech Scalers' should be situated in Aberdeen, Dundee, Edinburgh, Glasgow, Inverness and Stirling, with a strong link to the knowledge economy in each of these areas. In addition, there will be a desire to link up with other sites, particularly to reach out into more rural areas.

However, the role of cities in providing the international market space is also key. The Alliance had an opportunity to work with the Advisory Board, established to accelerate Scotland's tech-led recovery, recently[4] to discuss how the network of cities in Scotland can collaborate to provide the facilities and ecosystem for the international market.

Opportunity Cluster: The importance of tackling inequalities

As discussed, Scotland's cities are home to some of the most deprived areas across the country.

As Scotland recovers from the current economic and health crisis there will be a focus on ensuring that economic growth is distributed fairly across the Scottish economy.

The recent focus of the UK government on "Levelling Up" provides tangible opportunities for collaboration in tackling inequalities in the coming months.

Recent funding opportunities such as the Community Renewal Fund and the Levelling Up fund build upon processes like the city deals, providing an opportunity for local authorities in Scotland to apply directly for funding in devolved areas.

We have already discussed that the cities may have quite different challenges when it comes to inequality: with Glasgow and Dundee City having a larger proportion of the deprived areas in Scotland. These differences are reflected in the priority areas identified by the Levelling Up Fund, see Table 4 below.

Table 4: Levelling Up Fund Priority Areas

Level 1	Level 2	Level 3
Glasgow City	Stirling	Highland
Dundee City	Aberdeen City	Perth & Kinross
		City of Edinburgh

Source: *HMT*

In addition, Glasgow City has been identified as one of the priority areas in the Community Renewal Fund.

Challenge Cluster: Demography & the growth challenge

Taking both the demographic and growth outlooks together, there are clear opportunities for all cities to collaborate on addressing these challenges. Of course, successive governments have had an ambition to increase productivity in Scotland, but it remains a difficult metric to move.

It may be a first step for the Alliance to consider the drivers of productivity for each of the areas more explicitly.

4 Accelerating Scotland's tech-led recovery.

As in the CBI's Productivity Index[5], these drivers can be grouped under:

- Business Practice – exporting, investment, R&D, innovation & entrepreneurship rates
- Skills and Training – qualification levels, job-related training, skills utilisation
- Health and Wellbeing – sickness absence, rates of inactivity due to ill health
- Infrastructure & Connectivity – Broadband & 4G coverage, Commuting times

Whilst not all indicators may be available at local authority level, many of these indicators can be examined to identify the drivers of productivity (i) where collaboration may be possible and (ii) where actions in other areas, including on net zero, technological change and addressing inequalities, may help address some of these issues.

It is worth noting that when examining productivity measures, like those listed above, it is important to modify the basket of indicators as economic conditions change.

For example, if homeworking or hybrid working becomes the norm post-pandemic, then commuting times may become less relevant.

5 See Productivity Index.

7. Conclusions

There is no doubt that Scotland's cities make a significant contribution to Scotland's economy. However, the pandemic will have undoubtedly changed their role, and as we highlighted in our previous report, this will change again in the future.

Whilst the full effects of the pandemic remain to be seen, it is clear that certain cities, given their sectoral make-up, may be more negatively impacted than others. This means that ensuring every city is supported to recover to their pre Covid-19 levels is key in helping the Scottish economy to continue to recover.

Our research has highlighted that the longer-term challenges facing the Scottish economy also continue to affect the seven cities, and so any economic recovery in each city may also be hindered or supported by the challenges referred to throughout this report.

What has become clear though is that in order for the Scottish Cities Alliance to effectively deliver their net zero action plan, they must consider the opportunities provided by technological change, and in particular, the role that Scotland's universities and knowledge economy provide.

In addressing the other challenges, there are also clear opportunities for collaboration. However, it is clear that in certain cities, inequality and the growth challenge are bigger issues, and will inevitably provide obstacles to certain aims and objectives.

In order to effectively deliver on the aims within any action plan, the Alliance must consider not only how to overcome individual challenges facing the seven cities, but also how other challenges might provide opportunities and threats to what they aim to deliver.

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