

Enterprise and Skills Strategic Board Annual Analysis 2019

Supporting Annex

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Annex B: Assessing the strength of the existing evidence base

Logic Chains

The Analytical Unit and Agencies (with Scottish Enterprise leading) have worked together to develop several logic chains that describe the relationship between the activities agencies deliver and the expected short-term and long-term outcomes that impact on the Strategic Boards priorities of productivity, equality, well-being and sustainability.

Once the principal logic model was agreed by the Board in March this process of refinement and prioritisation (taking account of the agencies new strategic and operating plans) enabled agencies to identify a set of ten shared “activity bundles” and simplified logic chains linking inputs across the agencies to the shared outcomes in the Board’s full logic model. The broad process followed with the agencies is illustrated below:



The ten activity bundles are:

- Infrastructure & Capital Investment
- Inward Investment
- Entrepreneurship
- Research & Innovation
- Workplace Development
- Learning & Skills System
- Access & Diversity
- Business Support
- Sector Development
- Community & Place

An example activity bundle is shown in **Figure n** below.

Strength of the evidence

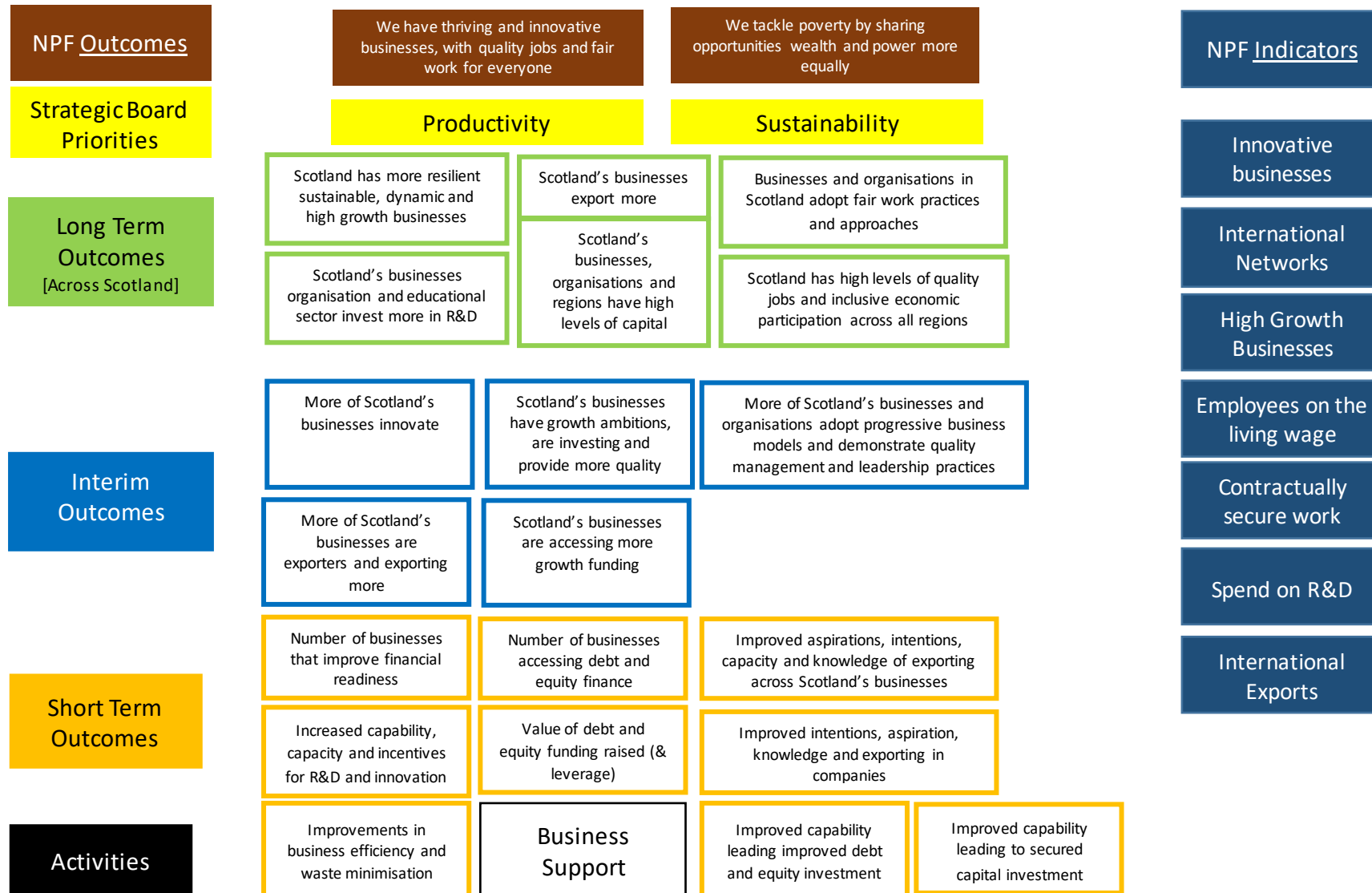
Scottish Enterprise and the Analytical Unit have designed an Assessment Framework based on a pragmatic assessment of best practice and to include such fields as: use of findings, type of methods applied, coverage, timeliness and quality. Scottish Enterprise and the Analytical Unit piloted the Framework for the “business support” bundle and a workshop with all agencies is planned for early February to roll the approach out to the other bundles.

The output of this process will enable us to assess whether the evidence demonstrates sufficiently a causal relationship between activities and shared (long-term) outcomes. In doing so, we will be able to identify evidence gaps and emerging priorities.

Outputs

- Logic chains for each activity bundles.
- Assessment Framework for research & evaluation evidence.
- Identified evidence gaps and understand emerging priorities.

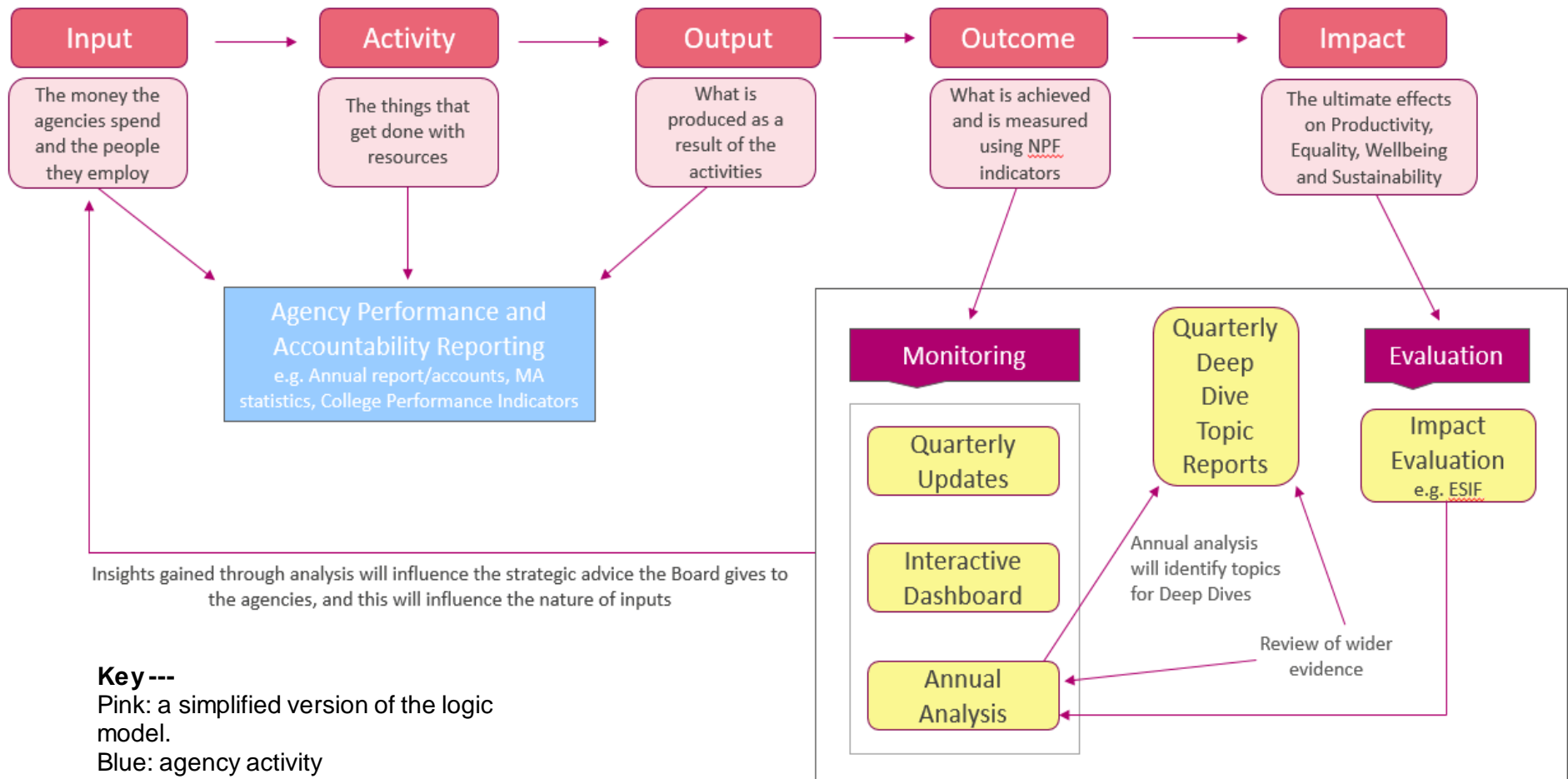
Figure 1: Logic chain for Business Support activity bundle



Annex C(1): Illustration of the six elements of the Performance Framework

Figure 2: Strategic Board Performance Framework

Strategic Board Performance Framework

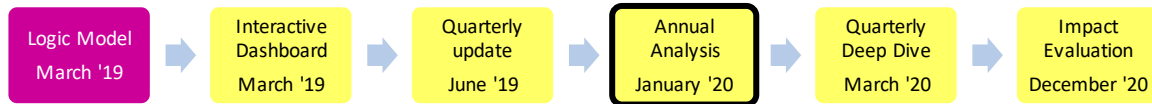


Key ---
 Pink: a simplified version of the logic model.
 Blue: agency activity
 Yellow: Analytical Unit activity

Annex C(2): Explanation of the six elements of the Performance Framework.

1. The Performance Framework was developed by the Analytical Unit in collaboration with the Board and Agencies. The Framework has six elements that together monitor Scotland's progress across productivity, equality, wellbeing, and sustainability (PEWS). Progress has been made across all six components of the Framework, with the following deliverables taken place or expected.

Figure 3: Progress of Performance Framework



2. Across 2019, the Board have been presented with the **logic model** and it is currently with the agencies to add more detail on activities and outputs. Logic models form the backbone of the performance framework. The dark pink boxes illustrate a simplified version of the logic model. The evidence of activity at the first three stages of the logic model comes from the agency performance reporting (i.e. the Annual Reports and Accounts of the agencies, as well as publications such as the College Performance Indicators). These publications provide information about the resources invested by the agencies, the activities they carry out, and the outputs of these activities.
3. Outputs produced by the Analytical Unit are highlighted by yellow boxes; these provide evidence at each stage of the logic model. In terms of measuring outcomes, an **interactive dashboard** was developed and is being tested for usability. This was demonstrated to the Board in March. The dashboard has been produced to give the Board access to data about Scotland's performance. Where possible, it provides information for Scotland, OECD countries and regions of Scotland, and is disaggregated by protected equality characteristics
4. The Board receive **Quarterly Updates** showing a summary of performance and highlight where there have been changes since the last update. Going forward, these will also be used to highlight new evidence on enterprise and skills.
5. The **Annual Analysis** (this report) is the main output. This will provide a fuller analysis of Scotland's performance against the relevant NPF indicators, including consideration of the contributions of the agencies to these outcomes. **Quarterly Deep Dives** will stem from this report and the discussion at the Board's Strategy Day. These will be in depth discussions on key topics facilitated through informal presentations by experts to the Board or analytical papers.
6. To measure impact, we have ensured **evaluation** is fully integrated into the Performance Framework. The evaluation element is the most long term component. A substantial evaluation project has begun to better understand the impact of the agencies' investment in human capital through apprenticeships, and teaching and learning in colleges and universities. The first main output is expected in Autumn 2020. Similar activity is in development for investment in innovation and exports.

Annex D: Variation between National Performance Framework indicator and International or UK comparison indicators used in the Annual Analysis

Figure 4: Productivity Indicators – further detail.

Indicator	Same as NPF?	Details
Productivity	✓	
Economic Growth	✗	The NPF reports the difference (percentage points) between GDP growth rate in Scotland and the previous three year average. The international measure is the GDP growth rates of the OECD countries.
International Exporting	✗	The NPF reports the value, in GBP millions, of Scottish exports (excluding oil and gas). The international measure is exports as a % of GDP in the OECD countries.
R&D Spend	✓	
High Growth Businesses	✓	
Number of Businesses	✗	The NPF measure is the total number of private sector enterprises (registered for Value Added Tax and/or Pay As You Earn) in Scotland per 10,000 adults. The international measure uses EU data for registered businesses in the Business Economy (excluding agriculture, forestry and fishing, and public sector and non-market activities), and Scotland and UK rates for all businesses (registered and unregistered) per 10,000 adults in the population.
Scotland's reputation	✗	The NPF measure is the Anholt GfK-Roper Nation Brands Index: average scores of the six dimensions of national competence, given as a value out of 100. The international comparison is rank out of the 50 countries evaluated.
Skills shortage vacancies	✓	
Young people's participation	✗	The NPF reports the percentage of young adults (16-19 year olds) participating in education, training or employment. The international data is the proportion of 15-19 year olds in OECD countries not in employment, education or training (NEET). For Scotland, the proportion of 16-19 year

		olds (slightly different age category) who are NEET is used as a comparison.
Economic Participation	x	The NPF measure is the gap (percentage points) between Scotland and the highest performing UK country in terms of employment (16-64 year olds). The international measure is the 15-64 employment rates in OECD countries.
Educational Attainment	x	The NPF captures the proportion of school leavers attaining 1 or more award at SCQF Level 6 or above. The international measure reports the percentage of students at PISA Level 5 or better in Reading, Mathematics and Science, across OECD countries
Access to Broadband	✓	
Entrepreneurialism	✓	
Work place learning	✓	
Innovation active businesses	x	The NPF data is sourced from the UK Innovation Survey. The UK Innovation Survey (UKIS) is part of the wider Community Innovation Survey (CIS) covering European countries, which makes it possible to compare the rates of business innovation across the EU. The CIS focuses on a smaller range of industries and sectors.
Skills under-utilisation	✓	The NPF indicator is based on SCQF level 4 and below, whereas the international data is based on ISCED11 level 0-2 (i.e. % of people who have lower secondary school education or less). This does not exactly correspond.

Figure 5: Equality, Wellbeing and Sustainability indicators – further details

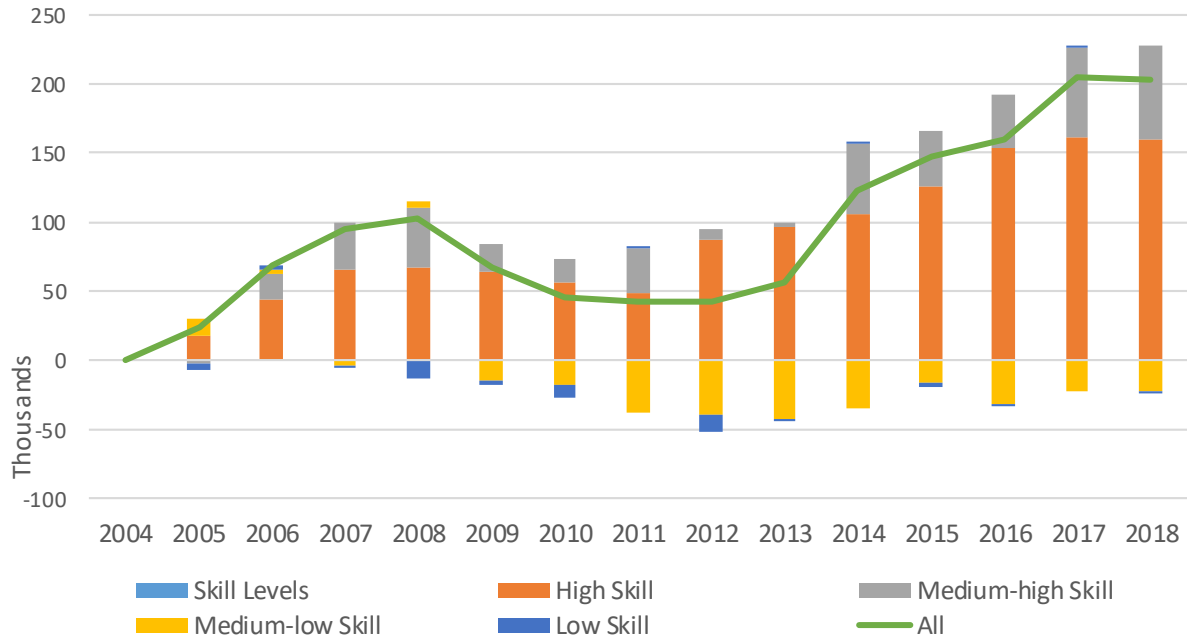
Indicator	Same as NPF?	Details
Gender differences in employment rate	✓	
Gender Pay Gap	x	The NPF measure of gender pay gap is based on median hourly earnings excluding overtime. The international data is for median gross weekly earnings in the OECD countries.
Income inequality	-	This NPF indicator uses the Palma ratio for Scotland to measure income inequality. The Palma ratio divides the richest 10% of the

		population's share of net household income by that of the poorest 40%. The international data compares the UK as a whole to the other OECD countries. The Palma ratio for Scotland cannot be compared with the Palma ratios in the OECD ranking as it is based on a different income dataset, and the Palma ratio is sensitive to the choice of the underlying data. Scotland has consistently scored slightly better than the UK as a whole on income inequality measures; however, the differences are unlikely to be statistically significant
Earning less than the Living Wage	✓	
Mental Wellbeing	✗	The NPF measure is average score on Warwick-Edinburgh Mental Wellbeing Scale. The international comparison uses the "Life Satisfaction" measure from the OECD's Better Life Index.
Employee Voice	✗	The NPF indicator measures the proportion of employees whose pay and conditions are affected by agreements between trade unions and their employer. The international measure is the percentage of employees with the right to engage in collective bargaining across the OECD countries.
Social Capital	✗	The NPF indicator captures the resource of social networks, community cohesion, social participation, trust and empowerment that individuals report. The international comparison uses the "Community" measure from the OECD's Better Life Index, i.e. the proportion of people who have friends or relatives to rely on in case of need.
Natural Capital Index	-	Scotland is the first country in the world to publish such a detailed attempt to monitor annual changes in its natural capital. Internationally comparable data is not yet available.
Renewable Sources	✗	The NPF measure is the percentage of energy consumption which comes from renewable energy sources. The UK comparison is the percentage that renewables makes up of all electricity generated.
Carbon Footprint	-	Scotland is a world leader in terms of calculating its carbon footprint; internationally comparable data is not yet available.

Greenhouse Gases	✓	
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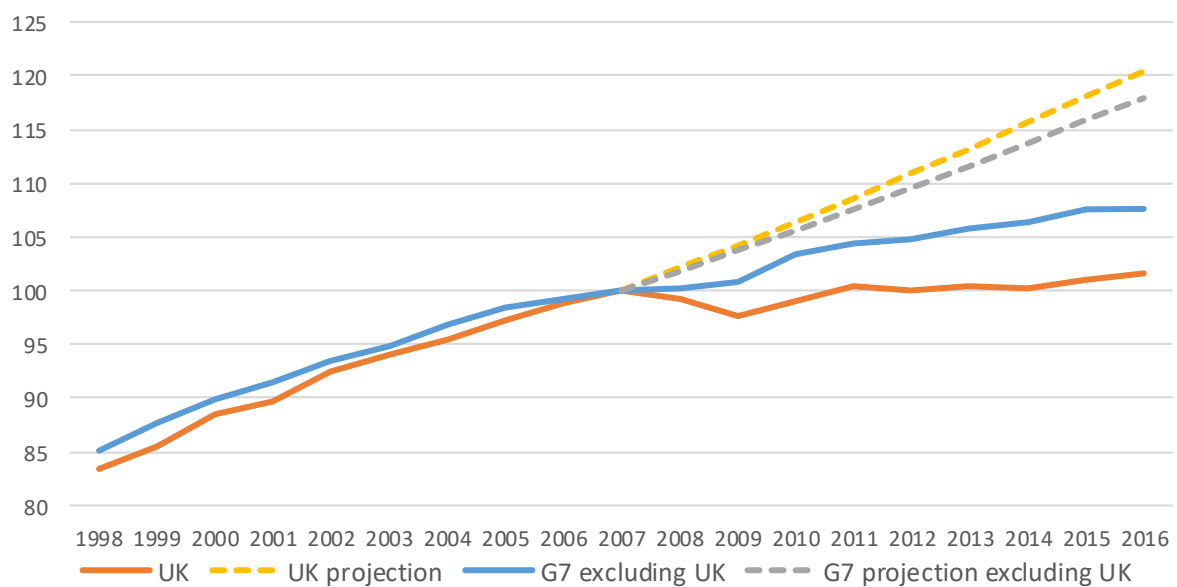
Annex E: Supporting information for ‘Theme 1: Productivity’

Figure 6: Labour stock: Cumulative increase in occupation skills level of employment (16+), 2004 to 2018, Scotland



Source: Scottish Government (2019), *Regional Employment Patterns*, May 2019.

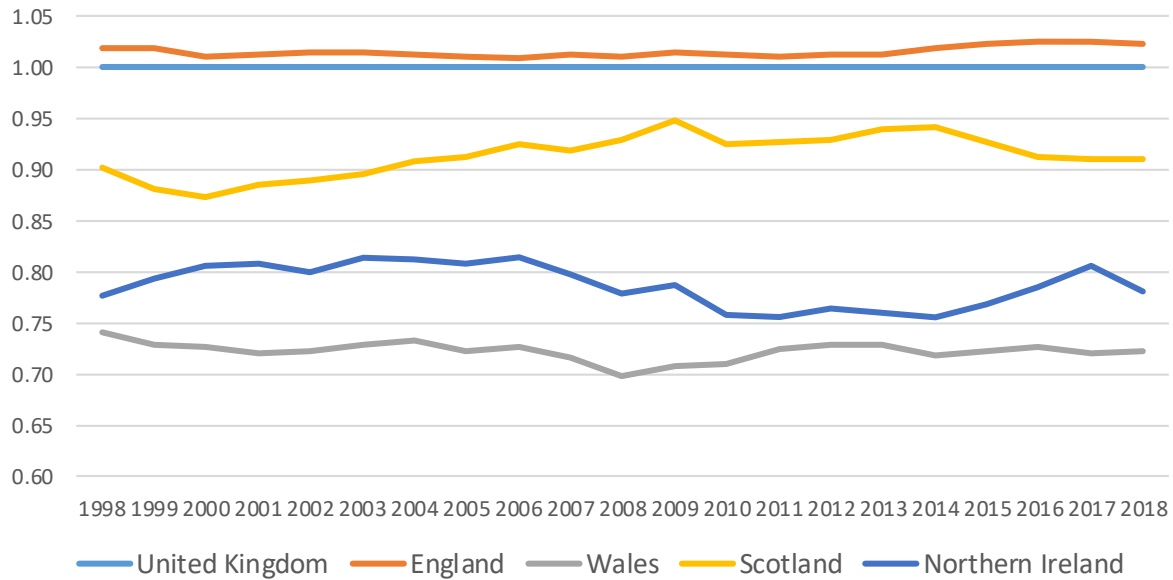
Figure 7: Constant Price GDP per hour worked – actual and projection UK and other G7 countries 1998-2016



Source: OECD.

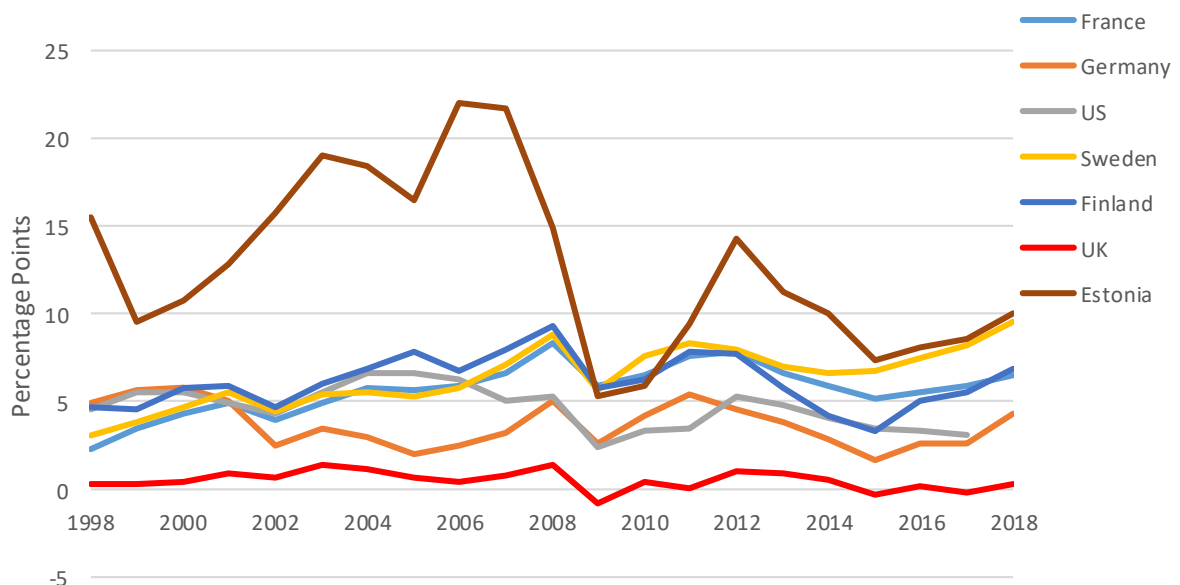
Figure 8: Comparison between Scotland and other UK nations using Gross Value Added (Income Approach) per head of population (current basic prices)

England, Scotland Wales and N Ireland, relative to UK GVA (UK GVA=1)



Source: ONS.

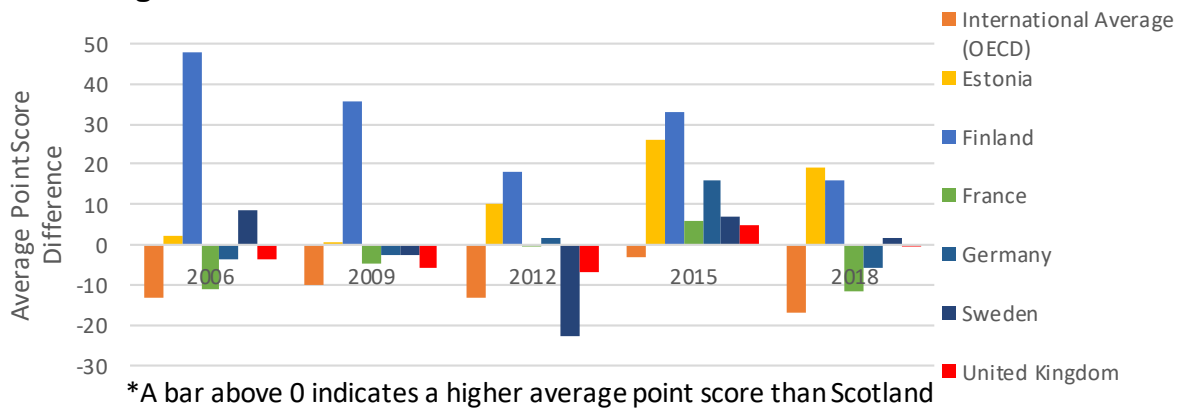
Figure 9: Percentage Point difference in Gross Capital Formation as a share of GDP/GVA, Scotland and selected other countries 1998-2018*



* Where the line above the 0 axis indicates a greater share of GDP going to capital investment than the share of Scotland's GDP.

Source: OECD, 2019. World Development Indicators.

Figure 10: PISA Average Score Gap between Scotland and Selected Countries – Reading*



Source (Figure 10-12): OECD, 2019. Program for International Student Assessment (PISA), 2000, 2003, 2006, 2009, 2012, 2015, and 2018 Reading, Mathematics and Science Assessments.

Figure 11: PISA Average Score Gap between Scotland and Selected Countries – Maths*

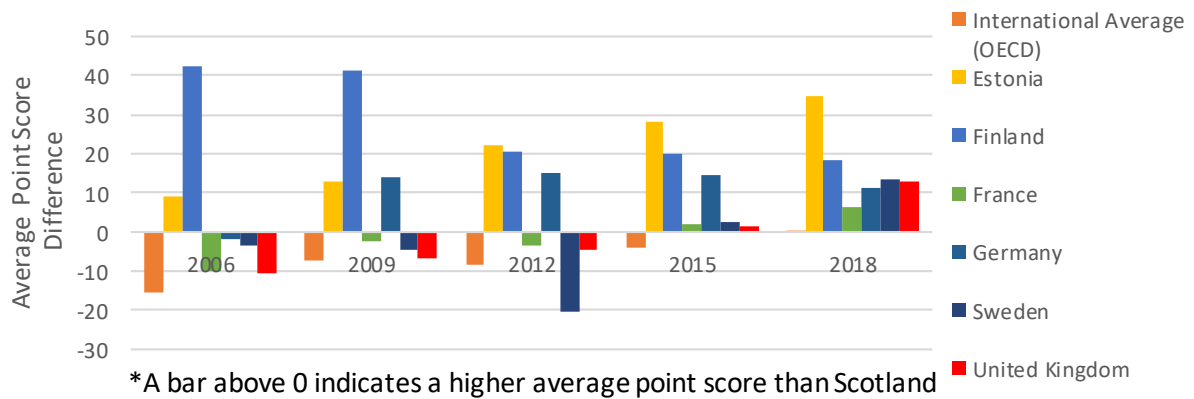
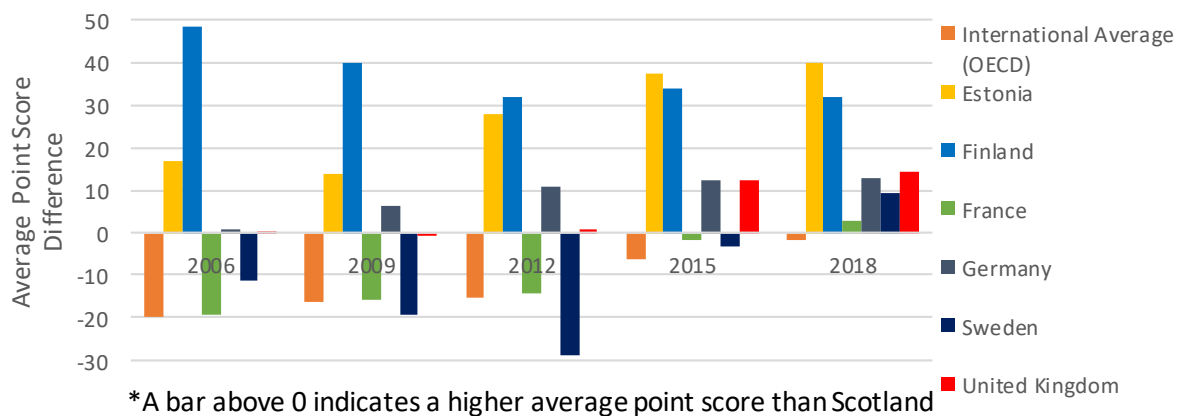


Figure 12: PISA Average Score Gap between Scotland and Selected Countries – Science*



**Figure 13: Share of 15-39 age cohort with tertiary level education 2009 - 2018
(Ranked by 2018 share)**

Source:

GEO/TIME	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cyprus	45%	45%	47%	50%	50%	52%	53%	55%	54%	54%
Lithuania	44%	48%	48%	48%	49%	50%	53%	54%	54%	54%
Ireland	46%	49%	50%	52%	53%	53%	53%	51%	52%	51%
Luxembourg	40%	40%	43%	45%	46%	51%	45%	45%	41%	49%
Belgium	43%	44%	43%	44%	44%	46%	46%	46%	48%	48%
Spain	41%	43%	44%	46%	47%	47%	47%	46%	46%	46%
France	40%	41%	41%	42%	44%	45%	45%	46%	46%	46%
United Kingdom	38%	40%	41%	43%	44%	44%	45%	45%	45%	46%
Greece	31%	32%	34%	37%	40%	40%	42%	43%	43%	44%
Sweden	35%	36%	36%	38%	40%	41%	41%	42%	43%	43%
Poland	34%	36%	38%	39%	41%	42%	43%	43%	43%	43%
Norway	36%	37%	37%	37%	38%	42%	43%	43%	43%	43%
Latvia	30%	33%	35%	37%	38%	38%	38%	42%	40%	42%
Estonia	35%	36%	34%	35%	36%	37%	38%	38%	39%	39%
European Union - 15 countries (1995-2004)	31%	32%	33%	35%	36%	36%	37%	37%	38%	38%
European Union - 28 countries	31%	32%	33%	34%	35%	36%	37%	37%	38%	38%
Finland	35%	36%	35%	36%	37%	37%	38%	38%	38%	38%
Slovenia	28%	29%	32%	34%	36%	37%	39%	39%	39%	38%
Malta	23%	25%	27%	30%	31%	32%	32%	33%	34%	37%
Netherlands	29%	31%	31%	32%	33%	35%	35%	36%	36%	37%
Euro area (19 countries)	30%	31%	31%	33%	34%	34%	35%	35%	36%	37%
Austria	16%	16%	16%	18%	19%	33%	34%	36%	37%	36%
Iceland	29%	29%	30%	29%	29%	29%	29%	32%	35%	36%
Denmark	28%	28%	29%	30%	30%	32%	33%	32%	34%	35%
Bulgaria	26%	28%	29%	30%	32%	34%	35%	35%	35%	34%
Portugal	21%	23%	25%	26%	27%	30%	32%	33%	33%	33%
Croatia	21%	24%	24%	24%	28%	32%	31%	30%	31%	32%
Romania	24%	26%	28%	29%	31%	31%	32%	32%	32%	32%
Slovakia	19%	23%	24%	25%	26%	27%	28%	28%	30%	31%
Czechia	17%	19%	21%	23%	24%	25%	27%	28%	29%	29%
Hungary	25%	25%	27%	29%	29%	29%	30%	28%	28%	29%
Germany (until 1990 former territory of the FRG)	22%	22%	23%	25%	25%	24%	25%	26%	27%	28%
Italy	17%	17%	18%	19%	20%	21%	22%	23%	24%	25%
EU 15										

Figure 14: Literacy skill level 2012 – OECD PIAAC survey

Country	Age 55-65		Country	Age 16-24	
	Percentage	Low Levels (1 and 2)		Percentage	Low Levels (1 and 2)
New Zealand	19	48	Japan	14	23
Japan	24	49	Finland	17	26
Australia	19	49	Republic of Korea	17	27
United States	19	52	Netherlands	17	29
England	19	53	Estonia	18	36
England and N Ireland	19	53	Sweden	19	37
Slovak Republic	20	54	Australia	19	39
Canada	21	54	Poland	18	40
Netherlands	21	56	Czech Republic	16	41
Sweden	22	56	Germany	16	42
Czech Republic	22	58	Austria	16	42
Estonia	20	58	New Zealand	19	43
Norway	20	58	Slovak Republic	18	43
Finland	25	59	Canada	17	44
Ireland	16	61	Denmark	17	44
Israel	16	61	Norway	18	45
N Ireland	18	62	France	17	45
Poland	21	63	Slovenia	14	47
Germany	20	64	N Ireland	20	51
Denmark	22	64	Ireland	17	51
France	22	65	United States	18	52
Greece	20	65	England and N Ireland	18	52
Spain	20	69	England	18	52
Slovenia	22	70	Israel	23	54
Republic of Korea	17	71	Spain	12	56
Austria	19	71	Italy	14	57
Italy	21	74	Greece	14	58

Figure 15: Business births as a percentage of all businesses (all sizes)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Germany		9.3	8.3	8.7	8.7	8.0	7.4	7.2	7.1	6.7	
France		9.7	13.0	12.8	11.0	10.1	9.5	9.9	9.4	9.8	
Netherlands	15.5	13.1	12.0	10.4	11.2	10.3	10.1	10.1	9.7	9.6	9.5
Finland		10.2	9.0	9.9	9.8	8.9	7.2	7.8	6.7	6.9	
Sweden		7.1	7.1	7.5	8.2	6.8	7.1	7.2	7.2	7.0	
UK		13.0	10.1	10.5	11.6	11.8	14.7	14.3	14.8	15.1	
Norway		9.6	8.7	7.7	8.2	8.7	9.2	8.3	9.1	8.2	

Figure 16: The cost of the gender pay gap to women's hourly pay 2013/14¹

	2004	2013/14
Bonus earnings	£0.27	£0.82
Size of company	£0.55	£1.51
Occupational segregation	£1.50	£1.51
The gender residual	£1.63	£3.15

Source: *Close the Gap, 2018. The Gender Penalty.*

Note: Based on men's mean average pay in 2004 (£13.62) and men's mean average pay in 2014, source: British Household Panel Survey 2005 and UK Household Longitudinal Survey 2013/14

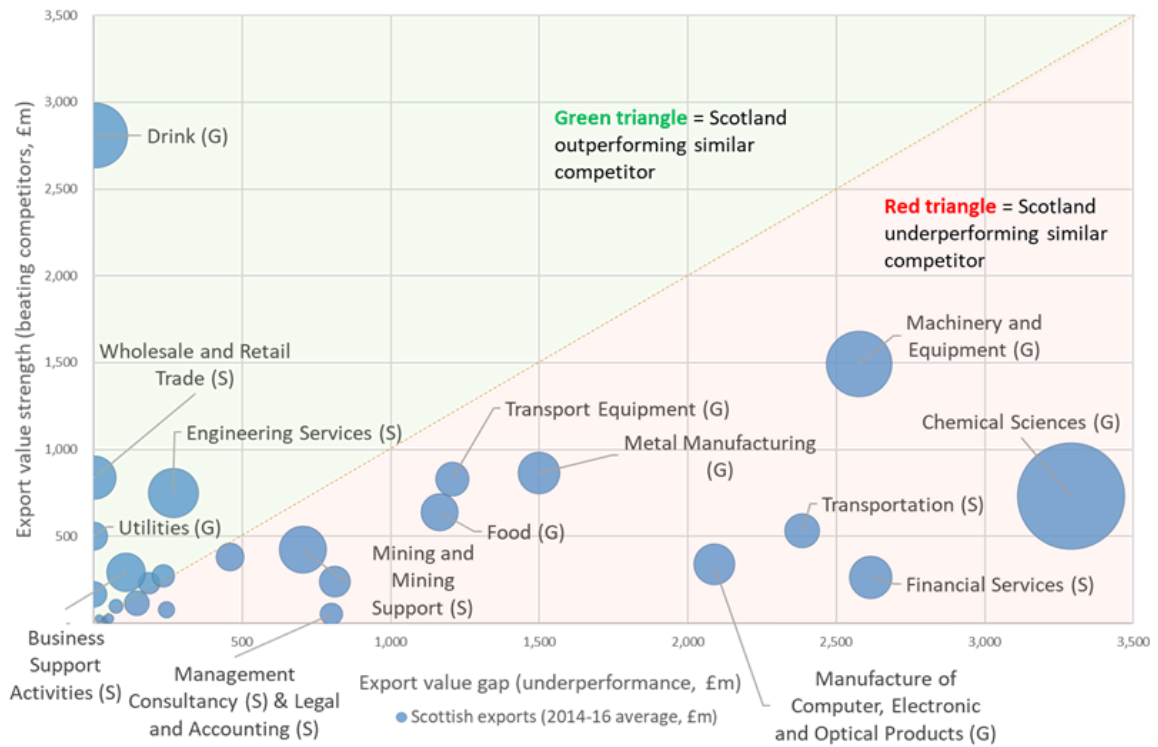
¹ Note: CtG (2018) The Gender Penalty (Based on men's mean average pay in 2004 (£13.62) and men's mean average pay in 2014, source: British Household Panel Survey 2005 and UK Household Longitudinal Survey 2013/14

**Annex F:
Additional
Information
related to 'Theme
4: Innovation'
Figure 17:
Innovation Logic
Model**

Strategic Context	Inputs / Resources	Programmes & Activities	Main Beneficiaries	Outcomes/Impacts		
				Short-term Outputs/Outcomes	Medium-term Outcomes/Impacts	Long-term Impacts
<p>Objectives</p> <p>National Performance Framework:</p> <p>A more globally competitive entrepreneurial, inclusive and sustainable economy.</p> <p>Thriving and innovative businesses with quality jobs and fair work for everyone.</p> <p>We are open, connected and make a positive contribution to internationally.</p> <p>We are well educated, skilled and able to contribute to society.</p>	<p>Programmes-R&D and Innovation Finance</p> <p>£469,979,435</p> <p>Of which: SG £401,864,819 Agency: £56,755,753 EU: £11,358,862</p> <p>Industry focussed: £123,524,448</p> <p>Academia focussed: £346,454,986</p> <p>Includes SFC Core Grants (£284,629,000)</p> <p>£75,000,000 in R&D tax credits to companies registered at Scottish addresses (2016/17).</p>	<p>SE and HIE</p> <ul style="list-style-type: none"> R&D Grants Loans & Investment Competitions and Challenges <p>SG</p> <ul style="list-style-type: none"> SNIB Products Innovation procurement City Deals; other co-funding Health Innovation funding Rural Innovation Fund Policy specific funding (e.g. energy transport) <p>SFC (Unis and Colleges)</p> <ul style="list-style-type: none"> IALF Innovation Vouchers UIF Research Funding <p>Innovate UK /UKRI</p> <ul style="list-style-type: none"> Competition and Challenges-ISCF Research Funding <p>European Commission</p> <ul style="list-style-type: none"> Horizon 2020 	<p>HE Colleges Private Sector (including start-ups) Public Sector</p>	<p>New product and/or process applications adopted by organisations engaged in programmes.</p> <p>Increased investment by the organisations in programme related R&D and other innovation activities</p> <p>Uplift in College and HE applied research funding from private and other sectors.</p> <p>Increased patents in programme related activities by participating companies.</p> <p>Public funds leveraged.</p>	<p>Increases in net returns, market reach and high value jobs in participating companies and college/HE providers.</p> <p>Positive ongoing investment returns to organisations from their initial programme funding</p> <p>Increased application of new products/processes by other non-programme companies in Scotland.</p> <p>Attraction of inward investment and other leveraged funding for participating companies/identified clusters.</p> <p>Increased patents in programme related activities by participating companies.</p>	<p>Increased Productivity</p> <p>Increased Tax Revenue</p> <p>Increased GVA per job</p> <p>Increased GVA Growth</p>
<p>Needs</p> <p>Address Major Barriers to Innovation:</p> <p>Availability/Cost of Finance</p> <p>Economic Risk</p> <p>Direct Innovation Costs</p> <p>Lack of Qualified Personnel</p>	<p>£ 5,271,531</p> <p>Of which SG £2,491,021 Agency £2,780,510</p> <p>Industry focussed: £5,117,258</p> <p>Academia focussed: £154,273</p> <p>Infrastructure and Facilities</p> <p>£28,617,247</p> <p>Of which: SG £10,162,500 Agency £18,640,634</p> <p>Industry Focussed: £27,797,634</p> <p>Academia: £819,000</p> <p>City Deal Funding for Innovation projects: £1,342,020 (Scottish, UK Government and partners investment over 10-15 years)</p>	<p>SE and HIE</p> <ul style="list-style-type: none"> Networking, Mentoring and Peer Support <p>SFC (Unis and Colleges)</p> <ul style="list-style-type: none"> KTP Scale Converge College Innovation Fund Interface and Knowledge Exchange <p>SG</p> <ul style="list-style-type: none"> Scotland Can Do <p>SE and HIE</p> <ul style="list-style-type: none"> Co Funded Investment e.g. NMIS <p>SG</p> <ul style="list-style-type: none"> City Deals Co-Funding e.g. NMIS/MMIC Innovation Centres with SFC <p>SFC</p> <ul style="list-style-type: none"> Unis and Colleges Innovation Centres Innovation Districts Incubators and Accelerators <p>Innovate UK/UKRI</p> <ul style="list-style-type: none"> Catapults Research infrastructure Co funded investments (e.g. MMIC, NMIS) 	<p>HE Colleges Private Sector (including start-ups) Public Sector Employees</p> <p>HE Colleges Private Sector (including start-ups) Public Sector Students & Employees</p>	<p>Number of participating organisations successfully engaged (e.g. patents, R&D Tax Credits, export advice, Interface etc.).</p> <p>New product and/or process applications adopted by organisations engaged in programmes.</p> <p>Increased investment by the organisations in programme related R&D and other innovation activities</p> <p>Uplift in College and HE applied research funding from private and other sectors.</p> <p>Number of learners that take up relevant (new) courses, CPDs and other skills training funded under identified programmes.</p> <p>New research funding for college and HE from other public sector and philanthropic sources.</p> <p>Increased investment by private sector and in applied research under identified programmes.</p> <p>Increase in relevant sectors of start-up and spin-out companies.</p>	<p>Increases in net returns, market reach and high value jobs in participating companies and college/HE providers.</p> <p>Increased application of new products/processes by other non-programme companies in Scotland.</p> <p>Attraction of inward investment and other leveraged funding for participating</p> <p>Increase in productivity of organisations employing learners.</p> <p>Increase in net returns, market reach and high value jobs in college/HE sectors.</p> <p>Positive ongoing investment returns to organisations from their initial programme funding.</p> <p>Attraction of inward investment funding for participating companies /identified clusters.</p>	<p>Increased Exports (Value and % of GDP)</p> <p>Increased Investment</p> <p>Inclusive Growth (metrics to be agreed)</p> <p>Public Sector Efficiency (metrics to be agreed)</p> <p>Regional Growth (metrics to be agreed)</p>

Annex G: Additional Information related to 'Theme 5: Exports'

Figure 18: Under- and over-performing exporting sectors in Scotland, in comparison to similar exporter.



Source: OCEA analysis using data from Export Statistics Scotland and UN COMTRADE.