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Economic Research Digest
Quarter 2 2018

The **Economic Research Digest** monitors recently published research across a number of economic areas relevant to the work of the Department for the Economy such as competitiveness, innovation, enterprise, trade, FDI, tourism and infrastructure. The Skills Research Digest deals separately with recently published skills and labour market research.

In each case, we provide a short summary of the key points and web links to the full article or report*. A full list of sources can be found at the end of the publication.

Highlights this quarter include:

- Reports on global rankings on competitiveness and cost of living.
- Plenty of analysis on productivity and growth, living standards and wellbeing in the UK and Northern Ireland.
- Several reports on how to provide sustainable energy and how to reduce carbon footprints to meet government pollution targets.

** Links are correct at the time of publication, however it is likely that some will break over time. The list of sources has more general links, which should help the reader to track down the original report.*

Contents

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Economic Outcomes

COMPETITIVENESS

IMD Global Competitiveness Rankings 2018 **published by the National Competitiveness Council assesses and ranks the competitiveness of economies.**

- Top 10 ranking economies- US (1), Hong Kong SAR (2), Singapore (3), Netherlands (4), Switzerland (5), Denmark (6), UAE (7), Norway (8), Sweden (9) and Canada (10).
- Ireland's competitiveness ranking has fallen from 6th to 12th most competitive economy and is the 3rd most competitive economy in the Euro Area.
  - Its overall performance in the rankings has generally followed an upward trajectory since 2011 when Ireland was ranked 24th.
- Ireland performs well in real GDP growth (1st), inflation (3rd), exports of commercial services (4th), and inward investment flows (5th).
- However it is ranked poorly in export concentration by partner and product (55th and 50th) and apartment and office rent affordability (51st and 53rd).
- Ireland's strengths lie in perceived attractiveness for investment incentives (1st), corporate tax rate (4th), lack of protectionism (4th) and number of procedures to start a business (5th).
- The overall productivity performance for Ireland remains strong (5th and 1st for industry productivity). In terms of perceptions regarding the ready availability of skilled labour it has fallen from 5th to 20th.
- Ireland is 32nd for R&D spend as a percentage of GDP, 17th in expenditure on education per capita and is 55th in terms of expenditure as a percentage of GDP.

PRODUCTIVITY AND GROWTH

Is Europe's Productivity Glass Half Full or Half Empty? **published by CEPS, looks at what drives the productivity recovery and in which parts of the economy it is occurring.**

- Among the large economies, France is the only country which may still significantly improve its productivity growth rate in 2018, in part because 2017 was a weak year to begin with.
  - Germany and Italy are expected to see rates similar to those in 2017, at 1.4% and 0.5% respectively.
  - Spain may see its productivity growth rate deteriorate somewhat versus 2017, though it should remain decent at 1.0%.
- The United Kingdom has delivered weak productivity performance for most of the post-recession period. In recent years, growth in GDP per hour worked has not managed to break out of the 0.5-1.0% band, well below its performance during the decade leading up to the global financial crisis.
  - There is no real predicted productivity improvement in the UK for 2018. The timing of the business cycle in the UK is different from that on the European continent, which started its current expansionary phase in earnest in the second half of 2013, whereas the UK economy seems to have peaked around 2015.
  - Much of Britain's post-recession recovery has been due to the strong performance of the labour market, but there are many indications that low-productivity firms, especially in the services sector of the economy, have been responsible for the employment-driven post-recession recovery.
- Average manufacturing labour productivity growth for the EU12 recovered to 1.4% on average in 2011-2015, this was still barely more than a third of the pre-crisis growth of 3.7%.
  - Total factor productivity growth also only recovered to a modest 0.9% from 2011-2015, again just a third of the pre-crisis growth rate. Recent estimates of manufacturing labour productivity from the International Labour Comparisons programme at The Conference Board show that growth rates for 2016 were about the same as in 2011-2015, namely 1.5%.

Investment as a transmission mechanism from weak demand to weak supply and the post-crisis productivity slowdown **published by the OECD.**

- Countries experiencing the most severe downturns have also suffered the most marked slowdown in capital stock growth. This suggests the operation of an important hysteresis-like effect over the post-crisis period, whereby continued weakness in demand has led to deterioration in potential output via weaker growth in the capital stock.
  - To illustrate the possible magnitude of this hysteresis-like effect, a simple model is constructed. The results suggests that, among the 19 OECD countries that experienced a banking crisis, the demand shock associated with the financial crisis may have typically reduced the capital stock by about 3.5% and for the most severely affected countries in the lowest quartile by more than 6%.
  - More specifically, this would suggest that Ireland, Luxembourg, Iceland, the United Kingdom and the United States experienced a peak loss in potential output of between 1 and 2% as a direct consequence of the accelerator response of investment to the demand shock.
- Recent weak trend labour productivity growth in many OECD countries reflects historically weak contributions from both total factor productivity (TFP) and capital per worker.
  - Slower TFP growth contributed more than 1% per annum to slowing trend labour productivity growth between 2000 and 2015 in the Czech Republic, Finland, Greece, Hungary, Ireland, Poland, the Slovak Republic and Sweden.
- For most OECD countries, the slowdown in trend productivity growth over the period 2000 to 2007 is mostly explained by a slowdown in TFP growth, but since the crisis, the further deceleration in trend productivity is mostly due to weak growth in capital per worker.
- Government investment as a share of GDP since the crisis has fallen in many OECD countries and in aggregate across the OECD. This may not only have contributed to a direct reduction in the growth rate of the productive capital stock, but may also have had adverse indirect spillover effects on business investment.
  - Countries where government investment has been cut back most sharply are also those where growth of the whole-economy capital stock has slowed the most.
- Recent OECD empirical work suggests that structural reforms which promote competition in product markets boost capital intensity. However, while product market regulation has become more competition-friendly, the rate of improvement has declined in the post-crisis period.

Productivity in the UK's low-wage industries **published by Joseph Rowntree Foundation (JRF) compares the productivity performance of the UK's low-wage sectors with other countries in the EU and with the US.**

- The UK's productivity performance varies considerably across low-wage industries, with some sectors performing relatively strongly when compared with the equivalent sectors in other major economies, while the productivity performance of other low-wage sectors is relatively weak.
- By combining output data for four broadly-defined low-wage sectors (agriculture, forestry and fishing; wholesale and retail; accommodation and food services; and administrative and support activities), they find that the UK is 20% less productive in these sectors than Germany and around 35% less productive than France.
- The UK's productivity problem spreads across low- and high-wage sectors alike.
  - The UK has relatively low levels of Total Factor Productivity (TFP) in accommodation and food service, and arts, recreation and leisure.
  - The productivity growth in the UK has been relatively weak in agriculture and in arts, entertainment and leisure, and relative weakness in TFP growth has been a major factor.
  - UK productivity growth accelerated in relative terms during the 1990s and 2000s, aided by a rapid rate of growth in TFP (particularly in market services), ICT-capital deepening and increases in skill levels.
  - The implication is that productivity growth would have been even weaker in the UK in recent years had it not been for the continued up-skilling of the workforce.
- During 2011–2015, productivity growth in the UK's low-wage sector as a whole has been relatively healthy, keeping pace with that of Germany and France and exceeding the rate of growth in the US.
  - In the low-wage sectors overall, the UK's relative productivity gaps with these countries have not been increasing.
- Raising levels of labour quality and capital intensity in low-wage sectors can play a part in closing these gaps. However, the UK's weakness lies at least as much in closing the TFP gaps with other countries and so close attention must also be given to management practices and the organisation of work in low-wage industries.

- The analysis finds that countries tend to have a TFP lead over the UK within a particular sector (or alternatively, have a smaller lag) in cases where they:
  - Engage a relatively higher share of employees in job-related training; have a higher share of employees subject to management practices such as performance related pay or continuous improvement; have a higher share of employees using ICT; have a lower share of employees on temporary contracts; or have less restrictive product market regulations in upstream industries.

Does increasing firm and sector productivity drive up wages for workers? **published by JRF looks at how far attempts to improve productivity might feed through to increases in wages and living standards.**

- The research provides little evidence of a strong relationship effect of increasing productivity at either the firm, sector or local labour market area level on nominal wages in this period.
- Looking across all sectors, an increase in firm productivity is associated with an increase in wages, but the effect is tiny: a 10% increase in productivity increases wages by just 0.05%.
- A positive relationship is found in both retail and wholesale trade and construction. In both cases this effect is larger than at the firm level, but the effect is still small. In construction, where the largest effect is found, a 10% increase in productivity is estimated to bring about a 1.7% increase in wages.
- Looking at the effects of changes in productivity on different types of workers – split out by wage quintiles or age – there are some differences in specific sectors.
  - For example, higher-paid workers seem to gain the most from increased sector productivity in construction and transport, while younger workers gain most from both increased firm and sector productivity in hospitality.
- Other studies, with a range of methodologies and in different countries, have tended to find that a 10% increase in labour productivity increases wages by 0.5% to 1.5% and the effects of sector productivity tend to be larger than firm productivity.
- Policies to drive up productivity need to be complemented by policies that will enable workers to gain more of a share of the gains from improving productivity to create 'an economy that works for all'.

Raising productivity in low-wage sectors and reducing poverty **published by JRF examines the role of productivity in employer' wage-setting decision in low wage sectors.**

- There appears to be a relationship between productivity and pay at the national level, at the firm level the findings from this research challenge the linear model of productivity increases being linked automatically to employers providing 'better work' and increases in pay.
- It's suggested that productivity is only one factor, and often not the most important factor, among several factors influencing wage-setting. Some employers emphasize the total reward package and consider non-wage factors as well as financial recompense. There is recognition that productivity is necessary for wage growth but it is not sufficient on its own.
- Increases in the statutory wage floor do seem to have stimulated firms to think about how to improve their productivity and therefore the introduction of the National Living Wage may provide a welcome boost to national productivity as well as increasing wages for those on the lowest pay.
- Policy recommendations for raising productivity:
  - The Government to invest in initiatives aiming to enhance management practices (including at a basic level for some small- and medium-sized enterprises) as a platform for setting in place systems and behaviours to enhance business performance.
  - The Government needs to consider and consult on new models for co-investment in skills linked to raising productivity both locally and by sectors (including through local and sectorial deals developed as part of the approach to industrial strategy), building on previous practice from demand-side pilots and programmes.
  - Complementary policies are therefore required to ensure that workers see the benefits from increased productivity. Possible mechanisms include: improving worker representation on boards; 'good employer' kitemarks; ensuring that the narrative on productivity in sector deals also extends to considerations of fair pay and reward.
  - Continue to raise statutory wage floors (with careful monitoring), alongside the provision of business support/advice for employers disproportionately affected by such wage increases.

Productivity Dirty Dozen: 12 policy Failures**, published by the TaxPayers Alliance, highlights twelve areas of policy which offer substantial opportunities to enhance productivity while cutting tax and waste, and raising incomes and employment.**

- Average weekly earnings in February this year would have been £164 higher, at £677 instead of £513, if British productivity matched US productivity. That's an £8,554 pay rise, from £26,730 to £35,284.
- The UK produces less economic output per hour worked than other G7 economies. While Italy and Canada produced about the same as in 2016 and Japan produces 13% less, France and Germany managed 25% more and the US tops the table with 32% more at $63 per hour compared to the UK's $48 per hour.
- The 12 policy areas identified include:
  - Planning restrictions and the housing crisis are contributory factors– homes are most expensive mainly in the areas where productivity is the highest. Therefore the government should grant property owners substantially more freedom to build homes where they're needed so housing costs can fall and more people, particularly younger people, can move and take up high productivity jobs.
  - Business property- Relaxing planning restrictions to allow taller office buildings and more commercial premises in high demand areas will raise productivity among office, retail and logistics workers.
  - Stamp duty on homes- Scrapping stamp duty will allow better use of the housing stock, directly reducing misuse of housing and also helping employees to find more productive jobs.
  - Taxes on low incomes- Reforming planning, energy, childcare and trade policy can help people escape the low-wage welfare trap and cutting national insurance will boost wages and improve incentives to earn more.
  - Taxes on high incomes- Cutting top tax rates will raise productivity by shrinking tax avoidance incentives, increasing returns on investments and encouraging the most productive people to work more.
  - International trade- Minimising barriers on imports, including tariffs, standards and other administration, as well as payments to farmers and fishermen, will raise productivity by intensifying competition.
  - Transport congestion- Introducing road pricing and cutting motoring taxes and subsidies while switching infrastructure spending to better value schemes will reduce congestion, enabling labour markets to function more effectively and reducing the cost of business travel and goods transport.
  - Government spending- Cutting spending, reallocating priorities to investment and devolving more tax will transfer resources to more productive uses and strengthen competition.
  - Corporate tax- Scrapping corporation tax entirely will enable more firms to relocate to the UK and more investments to become viable, unleashing the productive potential of the economy.
  - Capital gains tax- Scrapping capital gains tax will encourage investment, free up markets to reallocate assets efficiently and improve the management of fast-growing smaller firms.
  - Product regulation- Minimising unnecessary product regulation will enhance competition by encouraging entrants into markets as well as directly reducing compliance costs.
  - Zombie firms- Scrapping corporation tax to end the debt bias and acknowledging productivity concerns in monetary policy mechanisms will allow growing, healthy companies to expand.

LIVING STANDARDS, WELLBEING AND PROSPERITY

Multiple Deprivation in Northern Ireland **published by the Northern Ireland Assembly examines multiple deprivation levels across Northern Ireland using the most recent deprivation measures available.**

- On the overall measure, Belfast West, Foyle and Belfast North are the most deprived Assembly Areas in Northern Ireland. Belfast West contains a total of 50 super output areas (SOA), nearly half of which (46%) lie within the top 10% most deprived SOAs in Northern Ireland.
- The three most income-deprived constituencies are Foyle (30%), Newry and Armagh (26%), and Belfast North (22%). At the SOA level, Creggan (Newry and Armagh) is the most income-deprived in Northern Ireland, while Stranmillis (Belfast South) is the least income-deprived (not shown).
  - The least income-deprived constituencies are South Antrim, North Down and Lagan Valley, where none of the constituency SOAs lie within the most income-deprived 10%.
- The three most employment-deprived constituencies are Belfast West (58%), Foyle (37%), and Belfast North (31%). New Lodge (Belfast North) is the most employment-deprived SOA in Northern Ireland, while Stranmillis (Belfast South) is the least deprived on this measure.

- The most health-deprived constituencies in Northern Ireland are Belfast West, where over half (56%) of its SOAs are nested within the top decile of most deprived SOAs in Northern Ireland; followed by Foyle (30%) and Belfast North (29%).

Living standards, poverty and inequality in the UK: 2018 **published by the Institute for Fiscal Studies, examines changes in the distribution of household incomes in the UK, and the determinants and consequences of recent trends.**

- Since the beginning of the recovery (2011–12), real median household income has grown at an average of 1.6% per year – slower than the average 2.0% rate seen in the four decades before the recession. Median income now stands 5.6% higher than its 2007–08 level.
- Real median employee earnings are still 2–3% below their 2007–08 level. The effect of this decline on living standards has been partially offset by strong growth in the employment rate, which has increased by around 1.5% since 2007–08.
- Since 2011–12, median income for pensioners has risen by 8.3% and that for non-pensioners by 7.9%. However, since 2007–08, the picture is very different: pensioners have seen incomes rise by 13.5%, but non-pensioners by just 3.6%.
- Absolute child poverty fell from 28% in 2011–12 to 26% in 2016–17, surpassing the 1ppt reduction that occurred in the five years preceding the recession. Over 40% of the reduction since 2011–12 is due to falls in worklessness for families with children and rising numbers living with two or more working adults in the household.
- In 2002–03, 15% of children living in the poorest 20% of households lived in private rented accommodation, and this figure rose to 36% in 2016–17.
  - This has pushed up average housing costs because private renting is the tenure with the highest housing costs. Mean housing costs among this group of private renters stood at £136 in 2016–17 (£92 net of housing benefit), in comparison with £115 (£53) in 2002–03.
- People aged 25–54 with a long-standing illness are about 50% more likely to be in relative income poverty than healthy 25- to 54-year-olds (18% versus 12%).
  - Ill people are about 70% more likely to be on a persistently low income (10% versus 6%) and are nearly twice as likely to be 'materially deprived' (32% versus 17%).
- The absolute poverty rate for the lowest-paid 20% fell by 1.6% between 2015–16 and 2016–17, compared with small rises in absolute poverty for higher paid employees. This reflects modest (2%) growth in the average living standards of low-wage employees living in households with below-average incomes.

Opportunities for All: A Framework for Policy Action on Inclusive Growth **published by the OECD iLibrary. Requires subscription to access.**

- Opportunities for low-income groups are worsening.
  - In terms of real disposable household income, the poorest 20% earned one fifth of the income of the richest 20% in OECD countries in 2014.
  - Real wages of the richest 1% increased by 45% between 1995 and 2011 – three times higher than the growth in real median wages in the OECD countries. The richest 5% held on average more than one third of the total wealth; and the richest 1% nearly one fifth.
  - Social mobility is hampered by limited access to quality healthcare services, education and transportation services that are poorer for low-income groups and those living in lagging regions.
  - Many households in OECD countries are overburdened by housing costs: the median housing cost burden for mortgage payers is about 18% of disposable income and 23% for tenants. The cost burden is much higher for low-income households and, on average, represents more than one-third of disposable income.
- Digitalisation has not yet materialised into broad-based productivity growth.
  - OECD research confirms that global frontier firms in the information and communications technology (ICT) services sector have significantly widened the gap in terms of multi-factor productivity not only with regard to non-frontier firms, but even within the group of global frontier firms – where differences between the very top firms (top 2%) and other frontier firms have grown.
  - Globalisation and technological change have contributed to job creation, but also to a considerable restructuring of labour markets. Most OECD countries have experienced an increase in the share of employment in high-skilled (and to some extent in low-skilled) jobs and a decrease in the share of employment in middle-skilled jobs.

- High levels of inequality have negatively affected confidence in markets, and could further weigh on long-term growth and macroeconomic stability.
  - High levels of inequality may increase the risk that narrow interest groups could influence the policy-making process and "capture" its benefits, especially if not counter-balanced by well-designed regulation on lobbying and campaign finance.
  - Lower economic growth due to high inequality undermines the ability of the bottom 40% to invest in education, affecting their opportunities and productivity, as well as those of their children.

Discrimination and Inequality in Housing in Ireland **published by the Economic and Social Research Institute (ESRI), investigates the experience of housing discrimination and unequal housing outcomes in Ireland.**

- Females are more likely than males to experience environmental deprivation but are less likely to be homeless.
- 60% of homeless family units (defined as either a couple with or without children or a single parent with children) are lone mother families. In addition, lone parents experience higher levels of discrimination in access to housing, housing deprivation and environmental deprivation.
- Age is associated with all the housing dimensions considered. The youngest individuals (under 30 years) are particularly disadvantaged. This group experiences higher levels of discrimination, housing and environmental deprivation and over-crowding, and have a higher risk of being homeless.
- Non-EU nationals are found to be at greater risk of overcrowding compared to others on the same income and with the same characteristics. The non-EU group also experiences higher levels of housing deprivation but this works through the pathway of low income.
- People with a disability emerge to be among the most disadvantaged groups. They experience high risks of discrimination and housing and environmental deprivation, and are particularly over-represented among the homeless population: more than one-in-four homeless people have a disability.

Cost of Living City Ranking **published by Mercer ranks cities based on the cost of living.**

- Hong Kong is identified as the most expensive city in the study followed by Tokyo (2), Zurich (3), Singapore (4) and Seoul (5) Luanda (6), Shanghai (7), N'Djamena (8), Beijing (9), and Bern (10).
- Germany experienced some of this year's biggest surges in the ranking, with Frankfurt (68) and Berlin (71) jumping forty-nine spots while Munich (57) climbed forty-one places.
- In the United Kingdom, Birmingham (128) went up nineteen places from last year, Belfast (152) jumped eighteen spots, and Aberdeen (134) climbed twelve places from its previous ranking. London jumped ten spots to rank 19.
  - Leaping 18 places makes Belfast the 5th costliest city to live and rent in the UK.

INNOVATION AND ENTERPRISE

INNOVATION

Embracing Innovation in Government Global Trends 2018 **published by The World Government Summit, provides insights on government innovation.**

- The public sector is in need of a major course correction to cope with an increasing complex and uncertain global environment.
- Governments are viewing today's challenges as a call to action to reconceive the basic underpinnings of how they function, their purpose, and how they engage with and support citizens and businesses. In particular, governments are innovating to:
  - build and scale digital identity programmes that serve as a foundation for innovative services, while supporting people and businesses to express their unique identities and spur discussions of national identity in an increasingly borderless world;
  - embrace systems approaches and enablers to lead a paradigm shift in the way they provide services, by innovating to transform and re-align the underlying processes and methods of the business of government in cross-cutting ways;

- foster better conditions for inclusiveness and vulnerable populations, in order to address complex current and future problems, and to create a world in which no one is left behind and everyone has access to opportunities for a better life.

Accelerating Sustainable Energy Innovation **published by WEF identifies the key enablers of the innovation process and proposes some ideas to achieve step-changes in the pace of sustainable energy innovation.**

- According to the International Energy Agency, among 26 identified innovation areas, only solar PV and onshore wind, energy storage and electric vehicles are sufficiently mature and commercially competitive to conventional energy sources, and are on track to deliver their share of meeting climate objectives.
- Despite the recent surge in investment in clean energy and the evolution of enabling policy instruments, investments in clean energy research, development and demonstration (RD&D) are too low and significant barriers to innovation remain.
- A real step-change in funding must involve both governments and the private sector. Through the Mission Innovation collaboration, 22 governments and the EU – already representing 80% of global government clean energy RD&D have pledged to double their investments by 2021.
  - Public investment in sustainable energy RD&D can benefit from improved effectiveness, and there are few incentives for companies to invest in-house on research activities.
- Regulatory policies, public-funding programmes and innovation alliances are key catalysts necessary to accelerate the pace of innovation. Based on the review of positive examples from across different countries, the following are a few key success factors of the aforementioned catalysts:
  - Regulatory policies create an enabling environment for innovators, investors and consumers to participate in the new energy economy.
  - Public funding programmes provide much-needed early support to nascent technology areas in the form of RD&D subsidies, research infrastructure and interdisciplinary and multi-stakeholder collaboration.
  - Innovation alliances in the form of increased collaboration within and between public and private sectors are essential to ensure multi-stakeholder participation in sustainable energy innovation.
- A few forward-looking bold ideas to achieve step-changes in the innovation process:
  - Use an institutional approach to energy innovation to better connect isolated groups of experts and plug the gaps that prevent faster conversion of basic research to commercially feasible projects.
  - Provide better support to capital-intensive innovation areas and encourage collaboration in the pre-competitive stages of innovation through an independent international fund that pools RD&D investment from countries, companies and philanthropists.
  - Develop instruments for co-investment of public RD&D grants with venture capitalists to better target grant recipients, lower administration requirements of grant applications, create collaborations between public and private capital sources and enable better timing of grant availability.
  - Co-design technology roadmaps across the public and private sector, and across borders, to improve credibility, speed up commercialization and bridge the technical and financial "valleys of death" that plague innovation.
  - Mainstream public procurement strategies for sustainable energy solutions, redesigning them to be forward looking, to focus on outcomes rather than specific technologies, and to offer "demand-side assistance" to early-stage innovations in areas where technology solutions do not exist.
  - Improve transparency on public RD&D expenditure for sustainable energy innovation, employing existing multilateral frameworks such as Mission Innovation to facilitate better data sharing between countries, and identify and better address underserved innovation areas.

RESEARCH AND DEVELOPMENT

[No relevant material sourced for this quarter's release.]

SECTORS AND TECHNOLOGIES

Tech Nation report 2018: connection and collaboration - powering UK tech and driving the economy **published by Tech Nation provides an insight into the UK tech ecosystem to further understand the sector's key challenges, opportunities and trends.**

- Collaboration and global connectivity helps the UK tech sector grow 2.6 times faster than the rest of the economy.
- The UK is a global tech leader. Its digital tech sector is a shining light not only in Europe but also on a global scale. In London 33% of tech company customers are based outside the UK, compared to 30% in Silicon Valley and 7% in Beijing.
  - Global connections are key to domestic success, 25% of the world's entrepreneurs report a significant relationship with two or more others based in London, a figure beaten only by Silicon Valley.
- The UK has digital suburbs, not just cities. London's digital density is below the UK average at 0.92, while Newbury at 15.5 is the most tech specialised local economy in the UK.
- Healthy mix of growth stages across the UK. The highest proportion of clusters (36%) emerged as balanced ecosystems, 26% are scale-up dominant, and 12% start-up dominant.
- Access to talent and investment continue to challenge tech communities across the UK. In 83% of clusters, the tech community cited access to talent as their biggest challenge.
- UK software developers are highly collaborative. Data on 52,000 UK Github users reveals important, often hidden, ways that developers collaborate. Languages associated with web development are prevalent, the top three are JavaScript, Python and PHP.
- The UK tech community is highly connected. In the UK there are 3,527 tech meet-up groups, with over 1.6 million members across 283 locations. Their interactions indicate a vibrant grassroots tech scene and highlight emerging trends such as AI.

Future Scenarios and Implications for the Industry **published by World Economic Forum, examines what the Infrastructure and Urban Development industry (IU) could look like in the future and the strategic implications for key stakeholders and broader society.**

- Three extreme yet plausible versions of the future have been examined in this report:
  - building in a virtual world - in an era where people are immersed in virtual reality in all aspects of life, intelligent systems and robots run the construction industry;
  - factories run the world - a corporate-dominated society uses prefabrication and modularization to create cost-efficient structures; and
  - a green robot - a world with increasing conflicts over scarce resources and climate change rebuilds using environmental-friendly construction methods and sustainable materials.
- The scenarios suggest six common transformation imperatives that IU companies should take to remain relevant. The top three identified by chief executive officers of leading IU companies and ministers of several countries polled at the World Economic Forum Annual Meeting 2018 are: attract new talent and build up required skills; integrate and collaborate across the IU value chain; and adopt advanced technologies at scale.
  - The other three imperatives are: maximize the use of data and digital models throughout processes; review existing product portfolios and embrace new business opportunities; and enable change management and adaptiveness.
- A further exploration of each imperative suggests IU companies take specific steps to meet the coming challenges:
  - To attract new talent and build up required skills - IU companies must expand where they look for talent, improve the industry's image and establish continuous learning and development practices.
  - To increase integration and collaboration across the value chain - IU companies should depend on organic growth or acquire expertise through integrated contracts, joint ventures or mergers and acquisitions.
  - To adopt innovative technologies at scale - IU companies must effectively implement new approaches to innovation and integrate new technologies into existing workflows.
  - To implement digital models and data usage throughout processes - IU companies should develop suitable use cases, adopt complementary technologies and show that digital models are financially attractive.
  - To identify new products and services to sell and segments in which to compete - IU companies should increase the study of market developments, improve flexibility and hedge risks by maintaining a balanced portfolio.

- To react to changing market conditions more quickly - IU companies must embrace comprehensive change management programmes, flexible organizational structures and agile working methods.

ENTREPRENEURSHIP

[No relevant material sourced for this quarter's release.]

BUSINESS GROWTH

Small business growth: impacts of regulation **published by Department for Business, Energy and Industrial Strategy (BEIS), aims to identify the firm level effects of regulation on Small Medium Enterprises (SMEs) growth.**

- There is still very little firm-level empirical evidence of the effects regulation on SME growth. However regulation tends to be reported as a barrier to firm-level growth although rarely is it identified as a principal hurdle.
- Stability emerges as a powerful aspect, emphasising the perceived demands for the reliability and continuity of regulation. This is particularly relevant to entrepreneurs' considerations about the feasibility of business growth through bringing new products and services to the market.
- Initial firm-level studies identify no significant differences in SME growth between low and highly-regulated economies. Studies on property rights and corruption do indicate the necessity of regulation to create a sense of stability and security. A lack of stability and security can inhibit entrepreneurs' growth aspirations.
- Over-reliance on the 'SME' label masks differences that can be important for understanding the impacts of regulations on firms. Adapting earlier research, BEIS suggest seven dimensions to help usefully characterise SMEs: product market; labour market; resources; strategic choice; rules and routines; management style; and networks.
  - This approach allows researchers to identify how regulations might have effects on different types of firm but also where particular regulations may be relevant or have disproportionate effects on firm growth.

GROWTH FINANCE

Financing innovation in clean and sustainable mobility **published by European Investment Banks (EIB) assesses the access-to-finance conditions for innovative European road transportation companies.**

- The existence of a financing gap for European Innovative Transport start-ups and small-medium enterprises (SMEs) estimated to range between €5.5bn and €13bn annually, under varying assumptions, and composed of both an equity and debt financing gap. The financing gap is especially acute for companies in the growth phase that are investing in urban green mobility solutions and highly energy efficient road vehicles.
- The overall financing situation in the sector has improved, however, the distribution of money is highly concentrated in a few individual businesses outside of the EU and within specific business models. European companies have been profiting to a much lesser extent from this boom.
- The turnover generated by the automotive sector represents 6.5% of European GDP and European automotive companies are annually investing €44.7bn into R&D, generating around 6,000 patents.
- Nine recommendations have been developed to address the financing gap:.
  - Incentivise Public Transport Operators (PTOs) and Authorities (PTAs) to open up to third party digital mobility platforms;
  - Introduce a clear and standardised EU-wide definition and regulation of mobility services;
  - Tailor flexible grants for fast growing service companies;
  - Push the build-up of charging infrastructure through blending grants with flexible debt;
  - Support the uptake of alternative fuels in public fleets and the related value chain;
  - Align and amend European policies and legislation on autonomous driving and push for a technology-friendly testing environment;
  - Support and enhance ecosystems of existing and emerging mobility hubs;

- Address the growth-phase financing gap by supporting dedicated Innovative Transport or multi-corporate funds; and
- Raise awareness of existing instruments.

BUSINESS REGULATION

[No relevant material sourced for this quarter's release.]

SUCCEEDING GLOBALLY

TRADE

The "Red Tape" Cost of Brexit **published by Clifford Chance, provides analysis on the impact of Brexit on businesses.**

- The annual direct (or "red tape") cost of World Trade Organisation (WTO) tariff and non-tariff barriers is estimated to total around £27 billion for UK firms (1.5% GVA) and around £31 billion for EU27 firms (0.4% of GVA) after initial steps to mitigate the impacts have been taken.

- At a sectoral level, it's estimated that 70% of the extra costs arising from trade barriers will be incurred by just five sectors in the UK: financial services; automotive; agriculture, food and drink; consumer goods; and chemicals and plastics.
  - The direct costs will be equivalent to 5% of GVA or more in aerospace, chemicals & plastics, metals & mining and life sciences, where firms are highly integrated into European supply chains.
  - But the largest absolute impact will come from financial services due to London's role as Europe's financial centre and the fact that it will be hard to mitigate impacts in this sector.
- A customs union would reduce costs to the EU27 more than it would to the UK, given that 76% of EU27 exports to the UK are in goods compared to 62% for UK exports to the EU27.
  - The research estimates that remaining in a customs union rather than moving to WTO rules would reduce the UK impact to £17 billion (1.0% of GVA) and the EU27 impact to £14 billion (0.2% of GVA).
  - Due to the concentration of financial services firms in London, most of the benefits of remaining in a customs union would be felt outside of the capital.
- For many companies mitigations will reduce "red tape" costs by 10% to 30%. This varies significantly by sector and company: for some no mitigations will be possible and for others much higher mitigation could be achieved. Small firms will be least able to mitigate these costs.

Export status and SME productivity: learning-to-export versus learning-by-exporting **published by Enterprise Research Centre, examines the strategic choices of smaller firms in terms of exporting or non-exporting.**

- The direct effect of innovation on the probability of exporting is strong, and works exclusively through product innovation. However, the key influence of product innovation is in helping firms to become export-capable rather than in moving from export capability to actually exporting.
- The extent to which there is any indirect effect of innovation on exporting via productivity tends to be negative: export-capable firms exhibit a short-term decline in productivity relative to domestically-focused firms (DFFs), an effect which does not persist into the exporting phase. This may link to (negative) potential disruption effects to productivity from innovation noted in other innovation studies.
- There is some evidence that export-capable firms with previous export experience are more productive than other-non-exporters due to their prior export experience. This suggests a learning-by-prior-exporting effect.

INWARD INVESTMENT

Attracting FDI in middle-skilled supply chains **published by Ejournal offers evidence for strategies in developing countries that have successfully turned FDI into 'Quality FDI'.**

- Open up markets and allow for FDI inflows: Reduce restrictions on FDI. Provide open, transparent and dependable conditions for all kinds of firms, whether foreign or domestic, including: ease of

doing business, access to imports, relatively flexible labour markets and protection of intellectual property rights.

- Think carefully about sectors / activities to be targeted: Investment / location decisions of suppliers may be dependent on those of prime multinational investors into the host economy.
- Set up an Investment Promotion Agency (IPA): This should target suitable foreign investors and then become the link between them and the domestic economy. It should also act as a one-stop shop for the requirements such investors demand from the host country.
- Encourage first-time foreign direct investors: Foreign firms that are not already part of an extensive network of subsidiaries are more ready to accept linkages to domestic suppliers.
- Establish the infrastructure required by a quality investors such as sufficient close-by transport facilities (airport, ports), an adequate and reliable supply of energy; provision of adequately skilled workforce, facilities for the vocational training of specialized workers, preferably to be designed in co-operation with the investor.
- Encourage spill-overs from FDI to the indigenous economy: Local firms set up by managers who had started in multinational firms are more successful and more productive than others.

TOURISM

Northern Ireland Annual Tourism Statistics 2017 **published by Northern Ireland Statistics and Research Agency includes information on overnight trips, associated number of nights and expenditure of domestic and external visitors to Northern Ireland.**

- In 2017 there were an estimated 4.9 million overnight trips in Northern Ireland. This includes trips by external visitors to Northern Ireland and domestic trips taken by local residents. Estimated expenditure associated with these trips was £926m. These are the highest estimates on record.
- Within this, overnight trips to Northern Ireland by external visitors was estimated to be 2.7 million. Expenditure associated with these trips was £657m.
- An estimated 2.1 million hotel room nights were sold in Northern Ireland. Hotel room occupancy was estimated to be 73% in 2017.
- A total of 112 cruise ships docked at Northern Ireland ports in 2017. This was an increase compared to 93 cruise ships in 2016 and a marked increase from 33 cruise ships in 2011.

ECONOMIC INFRASTRUCTURE

ENERGY

Less in, more out: using resource efficiency to cut carbon and benefit the economy **published by Green Alliance.**

- The UK has had some striking successes in its efforts to cut carbon emissions, with power sector emissions falling by half between 2012 and 2017, however future carbon emissions are on course to exceed the fourth and fifth carbon budgets.
  - Resource efficiency in the construction sector offers the greatest opportunity to cut carbon emissions, with potential to reduce them by 79.14 MtCO2e between 2023 and 2032. This would reduce the emissions overshoot by more than half in the fourth carbon budget period and by 40% in the fifth.
- Using cars for longer, especially new models and electric vehicles, is one of the best ways to reduce carbon emissions from the vehicles sector. As with other products, the production process, including mining metals and manufacturing cars, is relatively carbon intense.
- Using lower carbon substitutes more widely in construction could cut emissions by 19.82 MtCO2e in the fourth carbon budget and 28.08 MtCO2e in the fifth.
- Reducing avoidable household food waste by 80%, in line with other European countries, could reduce UK emissions during the fourth carbon budget period by as much as 7.16 MtCO2e, and by more than 10 MtCO2e in the fifth.
- This report recommends that government:
  - Set up sector specific 'resource efficiency partnerships' which could agree benchmarks and identify and spread innovative ways to increase resource efficiency.

- Demonstrate and disseminate innovation- working in conjunction with UK Research and Innovation, the new resource efficiency partnerships could administer low cost loans to develop resource efficient products, processes and business models, targeted at: a technology, process or business model with potential for significant savings; or large scale deployment of existing resource efficient options.
- Consider implementing sector specific targets to achieve absolute reductions in whole life carbon emissions and material use. These could initially be voluntary but, if sufficient progress is not made, the government should move to statutory targets.

Living. Moving. Breathing. Ranking of European Cities in Sustainable Transport **published by Greenpeace, aims to enable European city stakeholders and the public to understand the current urban mobility situation through a point-based results framework.**

- Copenhagen ranked 1st, Amsterdam 2nd and Oslo 3rd. On the lower end, London ranked 10th, Moscow 12th and Rome ranked 13th.
  - It is important to note that a city ranking low in this sample of 13 European cities does not mean that its urban transport performs poorly in every category. For instance, most of the 13 cities have well performing public transport systems.
- The main findings and recommendations for each of the categories analysed are as follows:
  - Public Transport- In the high ranking cities like Zurich, it can be seen that when public transport is provided as a network and is integrated between rail and road-based systems, there are more people using the system;
  - A public transport network can also cover more city area than a few lines of metro or tram, therefore a network is crucial in large cities. Furthermore, a single ticket that allows users to switch between tram and bus to complete one journey increases the ease of travel compared to buying a ticket for every transfer;
  - Road safety- Amsterdam have heavily invested in improving facilities for walking and cycling. Segregating bicycles from motor vehicles not only improved the share of cycling but also increased safety for cyclists. In Oslo, the process-based approach in reaching a target of zero fatalities (Vision Zero Policy) has integrated urban design and technological solutions in road safety. The analysis shows that through ambitious road safety targets and strategies that prioritise safety of vulnerable road users, cities are made safer;
  - Air Quality- Oslo is the only city in the analysis that has concentrations below both the EU limit and the WHO guideline. Oslo is also closing its city centre for cars. Several parking places were removed and bicycle lanes were introduced. The analysis points to the fact that increasing public transport use improves air quality.
  - Mobility management- Copenhagen ranked 1st with low emissions zones, low congestion, shared mobility, smartphone apps for public transport and, more importantly, a high cost of parking. London ranked 2nd for similar reasons as Copenhagen and, in addition, the presence of a congestion charge. With no fiscal measures and lenient policies encouraging motorised travel, Rome ranked 13th. Cities have shown that charging motorists the real cost of their trips encourages car users to shift to cycling or public transport and reduce unnecessary trips.
  - Active mobility- Amsterdam and Copenhagen ranked 1st and 2nd place and Berlin ranks 3rd in this category.

TELECOMS

[No relevant material sourced for this quarter's release.]

Government

NORTHERN IRELAND

[No relevant material sourced for this quarter's release.]

ENGLAND

Industrial Strategy Artificial Intelligence Sector Deal **published by the Department for Business, Energy and Industrial Strategy (BEIS) sets out actions to promote the adoption and use of AI in the UK.**

- This Sector Deal is the first commitment from government and industry to realise this technology's potential, outlining a package of up to £0.95bn of support for the sector, which includes government, industry and academic contributions up to £603m in newly allocated funding, and up to £342m from within existing budgets, alongside £250m for Connected and Autonomous Vehicles.
- It reinforces the five foundations of the Industrial Strategy: ideas, people, infrastructure, the business environment and places. It also draws on the government's Digital Strategy, which focuses on reinforcing strengths in telecoms, data and enterprise.
- A key ambition of the Industrial Strategy is for the UK to be the world's most innovative economy – this Sector Deal aims to attract and retain both domestic and global AI talent; deliver major upgrades to digital and data infrastructure; ensure that the UK is the best place to start and grow an AI business; and contribute to communities' prosperity by spreading the benefits of AI across the country.
- Building on recommendations in Growing the AI industry in the UK and the commitments in the Industrial Strategy and Digital Strategy to grow science, technology, engineering and maths (STEM) and digital skills training, this Sector Deal sets out how the government, universities and industry will work together to greatly improve the supply of skills. It also sets out how to attract the best, and most diverse, global AI talent to the UK.
- The government is committed to working with the private sector to boost research and development (R&D) spending to 2.4% by 2027, and 3% over the longer term. This begins with a £725m investment through the Industrial Strategy Challenge Fund competition, designed to capture the value of innovation by commercialising a great idea in the lab to a successful business.
- This deal will help businesses around the UK to grow using AI, and is supported by the government's backing for the expansion of Tech City UK and Tech North into the national network Tech Nation, alongside its Scale Up campaign.

SCOTLAND

Energy Efficient Scotland Strategic Environmental Assessment Environmental Report **published by the Scottish Government.**

- This strategy recognises that Scotland cannot be entirely certain what the energy system will look like by 2050, but sets ambitious targets for 2030 which supports the principle of the pursuit of low or no regrets options to progress on the right path to a low carbon future:
  - The equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources;
  - An 30% increase in the productivity of energy use across the Scottish economy.
- Achieving these targets will mean that to be fit for the future Scottish homes, commercial properties and the public sector estate will need to be near zero carbon where feasible by the middle of this century.
- The Programme now frames its work around a number of key areas:
  - The setting and implementation of long term standards for both domestic and non-domestic sectors, introduced using a phased approach, with a backstop date of 2040 for all buildings in Scotland;
  - As part of the broader work on long term standards, the setting of a revised Energy Efficiency Standard for Social Housing (EESSH);
  - Local Heat & Energy Efficiency Strategies (LHEES) to provide a strategic framework for delivery of the Programme at a local level, and a new approach to regulation of district heating that creates a more attractive climate for investors and consumers with the intention of further expanding this source of heating across Scotland;
  - A revised approach to heating systems in existing buildings, with the phased removal of support for high carbon forms of fossil fuel heating from 2020;
  - An Offer to all which will provide a variable rate of advice, information, support and direct delivery for everyone in Scotland. The Offer will be fully mobilised by 2020.

Forecasting Child Poverty in Scotland **published by the Scottish Government, discusses the Child Poverty (Scotland) Act, recent developments in the UK Government's welfare reforms, as well as recent tax and social security measures which could have an impact on child poverty in Scotland.**

- The relative child poverty rate is forecast to rise sharply between 2015/16 and 2017/18 (from 26.5% to just under 31%). A further sharp increase is forecast between 2017/18 and 2020/21, to 34.5%. After this, during the 2020s, relative child poverty is forecast to continue increasing, but at a slower rate, before levelling out at just under 38% from 2027/28 onwards.
- The forecast for absolute child poverty measure begins to rise sharply after 2016/17, rising from just over 25% in 2016/17 to just under 32% in 2019/20. After this, absolute poverty rises more slowly before levelling off at just over 33% in 2021/22, and then gradually falling over the rest of the 2020s before reaching 31.6% in 2030/31 – around the same level it is forecast to be at in 2019/20.
- Combined material deprivation and low income is forecast to rise from just over 14% in 2016/17 to 16% in 2019/20, and then rises less quickly over the early 2020s before levelling off at around 16.5% in 2023/24. It is forecast to stay at around this level for the rest of the 2020s.
- Persistent poverty is projected to rise from just under 13% in 2015/16 to 15.5% in 2026/27 before levelling off at around this level for the rest of the forecast period.
- A key driver of the sharp increase in all four measures of child poverty is the reduction in the real-terms generosity of the social security system between 2016/17 and 2020/21 as a result of planned reforms by the UK Government.

WALES

[No relevant material sourced for this quarter's release.]

REPUBLIC OF IRELAND (ROI)

[No relevant material sourced for this quarter's release.]

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