The Impact of Enterprise and Entrepreneurship Education on Regional Development

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Abstract
The paper explores the ways in which enterprise and entrepreneurial education (EEE), delivered by HEI's, impacts regional development. To do this we analysed several datasets from The Higher Education Statistics Agency (HESA) and the Office for National Statistics (ONS) focusing on the ways in which HEI start-up activity impacts indicators including GDP and employment. This highlights where further research and investment is needed to ensure a consistent regional development policy which we believe aligns with the conference's focus on connecting practitioners and policymakers to create a genuine change in regional disparities.

Aim
The UK devolution agenda in a post covid-19 economy needs careful development to ensure that the political narratives such as levelling up are actively fostered in a meaningful fashion. This can only be achieved through building on the knowledge based economy in which higher education institutions (HEI's) play a central role.

Entrepreneurship has for some time been seen as an engine for the development of increased innovation, regional economic growth, and job creation. Enterprising and entrepreneurial approaches to education (EEE) are considered by many to be the way to achieve this, in tandem with the development of a university ecosystem designed to foster business incubation and knowledge transfer; the so-called entrepreneurial university. The difficulty herein is that the linkages between this activity in HEI's and regional development are poorly articulate in the research literature (Pittaway and Cope, 2007; Rideout and Gray, 2013; Bryne et al., 2014; Smith, 2015)

This paper seeks to address this by analysing the UK's Higher Education Business and Community Interaction (HE-BCI) survey results, in tandem with data from the UK Office for National Statistics (ONS), in an effort to better understand the impact which EEE in HEI's has on a range of regional factors, such as the creation of start-ups, business investment and business survival.

Methodology
The HE-BCI data for a four year period, between 2014-2018 was obtained and grouped into the 12 UK regions. This data consisted of student start-up numbers, business survival rates, investment in these businesses, turnover and employment creation. Data from other sources was then added to this to provide additional context as to regional performance, this included regional GDP per capita, business starts, active businesses, student numbers and regional population. This was then analysed to develop a comprehensive picture of the regional impact of universities.

Contribution
This study contributes to our understanding of the ways in which EEE in HEI's can impact regional development.

Results from the study suggest that there is considerable regional disparity in all factors under consideration even when these are explored in the aggregate. The initial findings show that Universities which are traditionally observed to be producing the majority of start-ups may actually have less economic impact in their region. This was most notable when we compared HEI's in London to those in Wales and the North East, in this instance the data showed that the regional HEI's contributed more business starts to their region than the HEI's in London.

In the areas where HEI's could be observed as having a notable impact on start-ups, the data also suggested that they were positively impacting the survivability of companies over the short to medium term. However, there was no observable link between these trends and average turnover, which, in most cases, seemed more closely correlated to the investment students had been able to secure.

The data also indicated that there is a relationship between regional GDP per capita and the number of student start-ups generated by the HEI's, although it is not consistent across all regions with a few notable outliers. Furthermore, the links between GDP, employment and turnover are not consistent across the regions. That said, there appears to be some link between the contribution that the start-ups make to regional GDP and their contribution to employment in the region which may suggest that some regions are better at generating larger, more competitive businesses than others.

The paper discusses these factors in more depth, along with several others, and presents reasoned insights into what might be driving these trends in the data, and what this might mean.

Implications for Policy
In the UK, there is currently no explicit regional development policy framework, and no consistent policy approach to the development of EEE. This study clearly shows where EEE is impacting regional development through business start-up activity. As such it has wide ranging implications for policy makers seeking to ensure a more targeted approach for future investment and for the formulation of new policy agendas.

Introduction
There are a number of trends which have come together to form current policy objectives within the UK government. Brexit has eliminated the narrative that the EU was to blame for the issues surrounding the economy. Covid-19 has increased the need for higher tax revenues. The loss of international trade to the EU has meant that the need for higher productivity so that companies can compete on a global marketplace. Devolution has created a series of issues of governance, especially around the issues raised above. This in one way has focused the

government to develop a policy around developing each region, which has been called levelling up.

This can only be achieved through building on the knowledge based economy in which higher education institutions (HEI's) in each region play a central role. This is not about individual universities but about the portfolio of HEIs in a region developing the economy for and within that region. It is also about developing the entrepreneurial human capital in the region to create new ventures, employ people and seek to attract investment into that region.

Literature Review

Since 1997 the UK has become a more devolved nation, with several distinct legislatures and executives (Northern Ireland, Scotland and Wales), a Greater London Authority (GLA), and elected mayors with increased powers to shape both civic and regional activity. While there are certainly complex drivers for this, especially for the creation of devolved parliamentary institutions (Bardbury, 2021), a notable theme undercutting all of these actions is a pervasive neo-liberal orthodoxy, which suggests that regional actors are best placed to deliver regional development (Tomaney and Pike, 2018). This perspective is likely the result of the continuing inability of central government to address social and economic changes which have led to in increasing regional inequalities across the UK (UK2070 Commission, 2020), leaving formerly industrialised areas with high levels of deprivation, and productivity akin to the poorer regions of Central and Easter Europe (McCann, 2016).

These 'left-behind' regions (Jennings and Stoker, 2016) have long been the target of government policy innovations aimed at encouraging inward investment (both foreign and domestic) and entrepreneurship (Tomaney and Pike, 2018). However, few of these interventions have resulted in sustained change; investment has proved fragile over the longer term (Pike et al., 2017), compounded by Brexit, while enterprise policies have vacillated between stimulating either small, lower value endeavours, that have lacked impact (Turner 2003), or larger businesses, which have often exacerbated economic issues by displacing incumbents (Storey et al. 2008) and shifting the location of economic activity.

At the time of writing this paper, the UK government is attempting to formulate a new policy approach to address these inequalities, which it has termed the Levelling Up Agenda (Tomaney and Pike, 2020). However, beyond a collection of statements by ministers little is known about the specific nature of any activity. The most visible intervention to date has been the launch of a £4.8 billion Levelling Up Fund, which is focused on infrastructure development (HM Treasury, 2021).

Against this backdrop higher education institutions (HEI's) have, for the last decade or more, been expected to act as hubs for regional development, driving innovation and growth through their ability to supply human capital and new knowledge derived from teaching and research activities (Kempton, 2019). One of the earliest models to describe this activity was Etzkowtiz's (1983) 'entrepreneurial university', wherein the author conceptualised a triple-helix of partnerships connecting government, business and the HEI, to deliver economic development, primarily through research commercialisation. While the model is widely discussed (Mian, 2011; Fayolle and Redford, 2014), and has been subsequently iterated (Etzkowtiz and Leysdorff, 1997; 2000; Etzkowitz, 2004; Carayannis and Campbell, 2006), it is, at its core, a US centric perspective on research commercialisation which lacks an explicit regional focus. Subsequent models have sought to explore how universities can adapt research approaches to solve local problems (Gibbons et al., 1994), act as regional innovation systems (Cooke, 2004), develop reciprocal partnerships with the wider community to share knowledge and resources (Gunasekara, 2004), and engage in a civic mission (Goddard, 2009; 2016). However, the

impact of any of these frameworks remain largely untested beyond a limited number of contextually grounded case studies which have proven difficult to replicate (Pugh et al., 2018, Kempton, 2019).

In the UK a dominant paradigm is Gibb et al.'s (2009) notion of the HEI as an entrepreneurial organisation. This work draws heavily on Etzkowtiz and Leydesdorff (2000) and Crow (2008), blending it to describe an agile, adaptable and competitive institution that is responsive to a range of local and national needs. In this model heterogeneity of institutional mission is encouraged, universities are free to apply their capacity to address the challenges which they believe they are best placed to respond to. At a policy level both the Wilson (2012) and Heseltine (2012) reviews have supported this notion, positing that universities should foster innovation, business development, networking and knowledge transfer whilst also producing entrepreneurial graduates. That said, the application of this idea in practice, and it's impacts, also remains under-explored in the literature.

At the forefront of these activities are academic and operational staff in HEIs, often in enterprise and entrepreneurship departments. Yet, as Pugh et al. (2018) note, surprisingly little research has addressed the roles and activities of these departments or their impacts on regional development. A broad review of the literature by Galvão et al. (2018) which analysed 383 publications that focused on entrepreneurship education and regional development from 1973 - 2016 found that there were no studies which directly connected the impact of entrepreneurial education programmes to regional development. They noted that limited work which does exist tends to focus on commercialisation (Johnstone and Huggins, 2016), and spin-out activities (Guerrero et al.'s, 2015) ignoring other mechanisms through which this could be measured. In Pugh et al. (2018 p1848) the authors explore the roles of two departments in their respective regions and suggest that they impact five areas of development: entrepreneurial spirit, the creation of start-ups, firm development and growth, the attractiveness of the region and the creation/development of entrepreneurial capital. However, the nature of the study means that these impacts aren't quantified so their significance, along with any broader patterns are difficult to judge. A limited literature has begun to explore HEI effects on GDP and employment specifically (Schubert and Kroll, 2014; Pastor et al., 2018), this work has identified positive correlations between HEIs and GDP but is a more nuanced analysis of this regionally, focused on the UK, is currently unavailable.

In this paper the authors seek to employ a novel approach to exploring the ways in which entrepreneurial education, provided by UK HEIs, is impacting the regions in which these institutions operate. Instead of focusing on qualitative approaches, we intend to explore regional data from the HE-BCI survey, along with ONS data focused on business development in an effort to ascertain what this can tell us about the impact universities are having on their regional economies. Although the HE-BCI data may be incomplete in some areas, it offers the best proxy for evaluating entrepreneurship activity linked to entrepreneurship education (Smith, 2015). The objective of this work is to prompt further investigation into this under-researched area, developing new conversations on the impact that entrepreneurial universities have on regional development.

Method

The UK higher education sector reports data on an annual basis to a series of agencies. Part of this data is collected under the UK's own Excellence Frameworks such as: the Research Excellence Framework (REF), the Teaching Excellence and Student Outcomes Framework (TEF), and the Knowledge Exchange Framework (KEF) which is based predominantly on the Higher Education Business and Community Interaction (HE-BCI) data (Johnson, 2020).

This paper seeks to analyse a subset of the data collected under the UK's HE-BCI survey in tandem with data collected from the UK Office for National Statistics (ONS), in an effort to better understand the impact which Enterprise and Entrepreneurship Education (EEE) in HEIs has on a range of regional factors. To achieve this we used HE-BCI data for 2014-2018 which was obtained from HESA (2020) for the following data fields[1]:

- Number of graduate new start-ups created. These are defined as all new business started by recent graduates (within two years) regardless of where any IP resides, but only where there has been formal business/enterprise support from the HE provider;
- Number of graduate start-ups still active which have survived at least 3 years;
- Number of active firms, the 'number' and 'number still active which have survived at least 3 years' plus those companies which have been active between one and three years;
- Estimated current employment (EFTE, Estimated Full Time Employees);
- Estimated current turnover (£000s);
- Estimated external investment (£000s) from external partners but excluding investment from HEFCE (now OfS)/BIS (now BEIS) third stream funds; and
- Student FTE numbers.

These fields were chosen because they were the most relevant for the analysis; the data relates to both undergraduate students and graduates (who have been actively supported by an institution). The additional data used in this research was the Mid Year Population Estimates 2019 from the UK's Office for National Statistics, ONS (2019) which provided the general population per region. The regional gross domestic product for 2019 was also taken from the ONS, ONS (2020). 2019 was used for both datasets as students within this study had graduated and contributed to these datasets at this period in time.

The UK is split into four nations, England (E), Scotland (S), Wales (W) and Northern Ireland (NI). England is then (commonly) divided into 9 regions, East Midlands (EM), East of England (EE), London (L), North East (NE), North West (NW), South East (SE), South West (SW), and West Midlands (WM). Therefore, the analysis will be conducted on the nine English regions, plus the three nations. All of which will be called regions within the text to aid readability and comparisons.

Within the analysis the Open University (OU) was excluded as it has students from across the UK but reports these centrally for HE-BCI purposes. This would have significantly skewed the results of the region in which the OU is based.

[1] The following fields were purchased from HESA with the support of an EEUK ERPF funding grant.

Context

Business birth and death rates by region were also taken from the Office for National Statistics - Inter-Departmental Business Register (2021), for 2018 which was the latest year available. Active Business by region was also taken to provide a complete figure of businesses in these regions. From these three datasets (HE-BCI 2014-2018, ONS 2019, ONS 2020), the following regional information was developed for Table 1. The general population (2019) per region varies from 1.89m (NI) and 2.6m (NE) to 8.9m (L) and 9.1m (SE) making SE having 4.8 times more people than NI. The largest GDP is from London £503.6m to Wales with £77.5m and NE with £64.2m. GDP per capita follows a similar pattern with L and SE topping the table and Wales and NE the lowest.

Table 1 : Regional Comparisons

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
General Population (2019)	4,835,928	6,236,072	8,961,989	2,669,941	7,341,196	1,893,667	5,463,300	9,180,135	5,624,696	3,152,879	5,934,037	5,502,967
Average Student Population (2014-2018)	127,886	105,956	314,971	86,995	197,293	39,889	188,899	203,688	141,005	98,250	175,880	167,576
Universities per Region	10	11	39	6	16	2	19	20	14	9	13	12
Students per 100k General Population	2,645	1,699	3,515	3,258	2,687	2,106	3,458	2,219	2,507	3,116	2,964	3,045
General Population per Student	37.8	58.9	28.5	30.7	37.2	47.5	28.9	45.1	39.9	32.1	33.7	32.8
GDP (2019) £(m)	129,854	190,962	503,653	64,260	212,843	48,584	166,957	327,102	163,941	77,517	163,624	146,746
GDP (2019) per Capita	26,851.93	30,622.16	56,198.80	24,067.95	28,992.96	25,656.04	30,559.73	35,631.50	29,146.64	24,586.10	27,573.81	26,666.71

To provide some further context to these regions and the need for the leveling up agenda, we started by looking at the regional economic activity by gross domestic product (GDP) and the yearly incremental growth/decline since 1999. Figure 1 (below) presents this analysis.

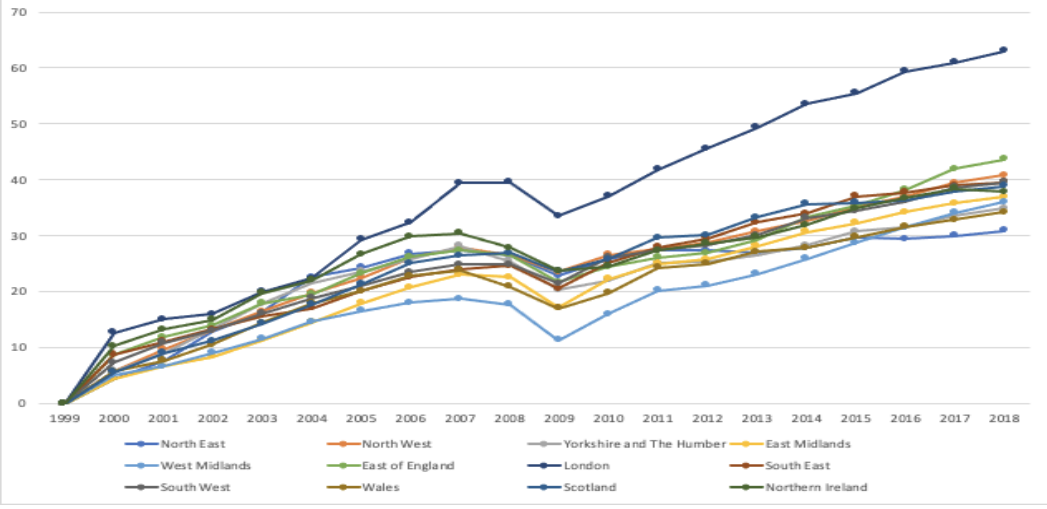

Figure 1 : Source: Office for National Statistics - Regional economic activity by gross domestic product, UK: 1999 to 2018

GDP over the period 1999 to 2018 has been steadily increasing at around 1.9% per year with some regions increasing their GDP by 30.9% (NE) in this period, whilst others (London) increased by 63%. These long term trends of regional development provide an indicator as to how these regional economies have been performing and the inherent disparity between London and most other regions.

Student populations in the regions are averaged over the years 2014-2018. We see that the NE has the largest universities with, on average, 14,499 students whilst NI has the smallest with 7,978 students. The general population per student is then calculated to understand how influential students are at a population level for each region. This shows the regions with the highest student numbers relative to their general population are London and Scotland and the least East of England and Northern Ireland. In the presentation of the data we use a 100k baseline so as to be able to draw normalised comparisons across the date. The data presented in tables will use a colour code to highlight the figures, red being the lowest to green being the highest.

Results

The results are presented across 5 sections which reflect the organisation of the datasets, each focusing on a different indicator: business start-up, business survival, employment creation, business turnover, and business investment. For each indicator we will present a discussion of our findings which explores regional performance trends and key differentials. Where applicable we will also attempt to provide insights into these trends, or highlight areas for further investigation.

Business start-up

The graduate new start-up (GNS) data provided by HE-BCI data for 2014-2018 is shown in the table below for the 12 UK regions. The overall number of graduate start-ups has stayed relatively static (4124 in 2014 to 4024 in 2018 at 98%) over this period. As we see from table 1, the number of universities in a region varies from 5 to 39, it stands to reason that if universities were providing a consistent number of start-ups we would see a replicable pattern in table 2. However, what we find herein is that there is no obvious relationship between the number of universities in a region and the start-ups generated. This suggests a wide variance in performance across HEIs which likely reflects inherent differences in institutions and their levels of provision for start-up support.

Table 2 : Graduate new start-ups per region per year

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
2014/15	474	367	1158	135	561	4	115	196	388	311	203	212
2015/16	492	311	1118	115	462	14	142	302	305	308	146	190
2016/17	395	323	1262	126	514	22	170	372	295	241	257	172
2017/18	322	247	1132	137	529	34	177	367	322	254	278	225
Total New Starts	1683	1248	4670	513	2066	74	604	1237	1310	1114	884	799

Table 3 further interrogates this data, to explore the mean number of start-ups per HEI over the four-year period (2014-2018). Northern Ireland and Scotland are the two lowest performing regions whilst the East Midlands, North West and Wales are three of the highest. The highest rates are more than 10 times the lowest rates, from 14.8 start-ups per HEI to 168.3, which clearly demonstrates the breadth of the variation across the sector.

Table 3 : Mean graduate new start-ups per HEI over 4 year period

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
GNS per HEI over period	168	113	120	86	129	15	32	62	94	124	68	67

Over the period of analysis we can see developmental trends (Figure 1), especially in Northern Ireland which has increased start-ups by 850% in the period with Scotland securing a 154% increase, both from a low base.

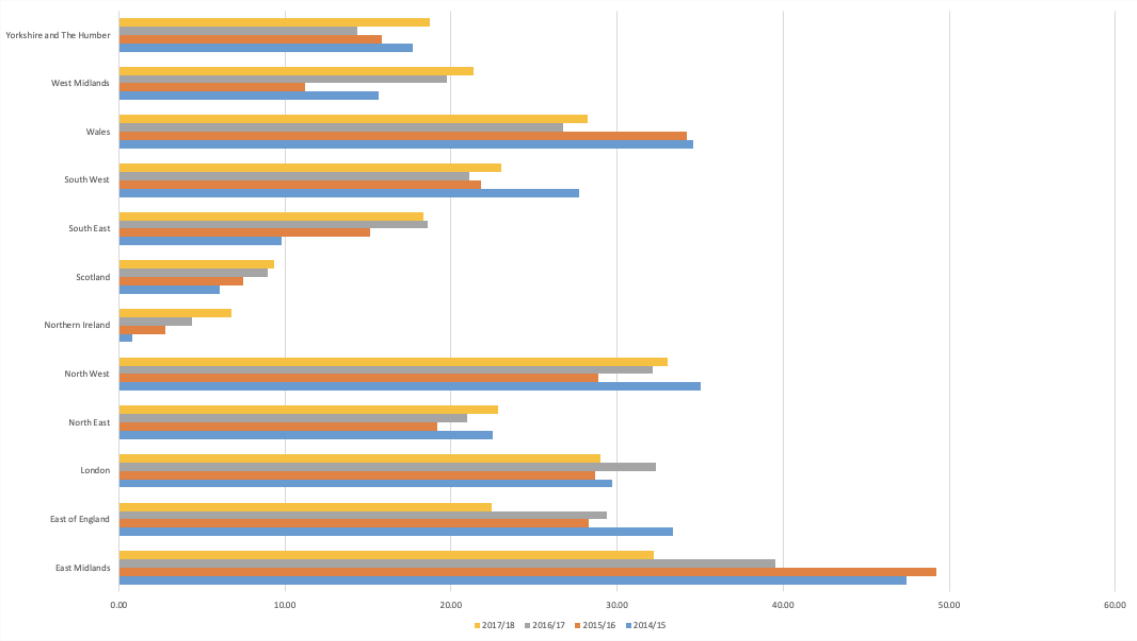

Figure 1 : Mean New Start-ups per HEI within regions

The challenge inherent in the analysis presented above is that, as shown in table 1, these regions have very different populations, student numbers, and numbers of universities. All of which serve to skew the data and colour our interpretations. Therefore, we need to normalise the data if we are to give a true comparison of EEE activity in each region.

The simplest way to normalise the data is to use a common factor across the regions, for this we have chosen population as it is already used in a similar fashion in the ONS data, making it more straightforward to integrate these datasets. To facilitate this, In table 4 we show the percentage of the population who are students in higher education for each region so that we can later factor this by population in table 5.

Table 4 Percentage of HEI Students to Population per region

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
Percentage of the population who are students	2.64%	1.70%	3.51%	3.26%	2.69%	2.11%	3.46%	2.22%	2.51%	3.12%	2.96%	3.05%

In table 5 we present the number of graduate new start-ups and business births in these regions to show start-ups per 100k of the general population and also per 100k of the student population in each region. Herein we see a very different picture across regions with London universities reporting the highest level of graduate new start-ups by population along with the highest level of regional business births. There is a strong relationship between graduate new start-ups and regional business births, suggesting that either regional norms have been transferred to students within these regions, or that HEIs are driving the trend within the region.

Table 5 : Graduate Start-ups per student and regional contribution

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
GNS per 100k of student population[1]	329.00	294.46	370.67	147.42	261.79	46.38	79.94	151.83	232.26	283.46	125.65	119.20
GNS 1per General Pop 100k[2]	8.70	5.00	13.03	4.80	7.04	0.98	2.76	3.37	5.82	8.83	3.72	3.63
Business birth rates by region[3]	36,000	24,000	100,000	10,000	39,000	7,000	22,000	55,000	25,000	12,000	36,000	25,000
GNS in the region per births in region[4]	0.0089	0.0103	0.0113	0.0137	0.0136	0.0049	0.0080	0.0067	0.0129	0.0212	0.0077	0.0090
Business Births per Pop	0.0074	0.0038	0.0112	0.0037	0.0053	0.0037	0.0040	0.0060	0.0044	0.0038	0.0061	0.0045
Percentage Proportion of GNS to Regional Business births	-0.42%	-0.09%	-0.75%	-0.23%	-0.27%	-0.32%	-0.32%	-0.45%	-0.21%	-0.10%	-0.48%	-0.34%

Notes:
1: Using the mean graduate new start-up rate and the mean student population for each year over the 4 year period from 2014-2018
2: Using ONS data for mid year population estimates for 2019
3: Using ONS data for 2018
4: Using 1 and 2 above

If we explore this trend in more detail, we see that Welsh HEI graduates have founded around 2% (0.02) of the start-ups in their region whereas Northern Irish graduates founded less than 0.5% (0.0049). The top three regions for reported graduate contribution to regional business start-ups are Wales, the North East and the North West. The bottom three are Northern Ireland, the South East and the West Midlands.

Comparing graduate new start-ups and regional business births per population we see that the East of England, Wales and the South West have the most similar start-up rates for each community whilst London, the West Midlands and the South East show the highest differential. This highlights where universities are bucking their wider regional trends and may, therefore, be driving development in their regional economies.

It is of particular note that Welsh HEIs contributed the most start-ups as a percentage to regional business births over the period of the analysis. HEIs in London, by contrast, contributed more graduate new start-ups overall, but less as a percentage of regional births. This suggests that the 9 HEIs in Wales have a more profound impact on start-up rates in the regional economy than the 39 HEIs in London. The reasons for this are complex and may include a variety of economic drivers, the exploration of which are beyond the scope of this paper, that said, it is impossible to ignore the implication that Welsh EEE policy (Pennycook, 2014, Davey et al., 2016) appears to have had a measurable impact on start-up creation through its activities in HEIs. The East Midlands is a region which needs further exploratory research, as the proportional rate of graduate start-ups is particularly impressive given its geographical location. Northern Ireland remains the lowest region for all indicators in this section, given its low GDP indicators and a smaller number of HEI's further research is also needed here to better understand the underlying issues around developing HEI based entrepreneurship within the region.

Business survival

The impact of new businesses on regional development takes time to be felt (Fritsch and Mueller, 2004; Fritsch et al., 2006) and, therefore, business survival is an important milestone which indicates the opportunities for inward investment, job creation and sustainable business environment. The HE-BCI data provides three data points which can be used to analyse business survival:

A. Number of graduate new start-ups created;
B. Number of graduate start-ups still active which have survived at least 3 years; and
C. Number of active firms, the 'number' and 'number still active which have survived at least 3 years' plus those companies which have been active between one and three years.

Table 6 shows in the second row the regional data from (C, Number of active firms, the 'number' and 'number still active which have survived at least 3 years' plus those companies which have been active between one and three years;), in the third row the number of all the active businesses in each region from the ONS Inter-Departmental Business Register, for 2018 and the final row, the ratio of HEI generated active businesses to those in the region. Looking at Wales, we see from the previous Table 4, that around 2% (0.02) of start-ups are from HEI and this Table 6 shows that 6.39% of active businesses are from HEI, demonstrating the long term regional benefit from these Universities. Other regions to note are the North East with 4.01% and North West with 2.63%.

If we look back to table 4 and note the regional student populations and compare this against the percent of active businesses per regional active businesses, we see a mixed picture. In Wales and the North East businesses started by graduates are more likely to still be economically active after 3 years, in London and Scotland we see that the inverse of this is true. This suggests that for some regions graduate businesses will, over time, likely represent the majority of active enterprises therein while for others they will not be as central to the regional enterprise diaspora. The reasons for this will also likely have their roots in a range of policy and practice interventions which further research should seek to explore.

Table 6 : Active Businesses per Region

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
C	4856	4270	10355	3084	7770	277	3786	6524	2950	6647	3537	3076
Active Businesses by region	297,000	195,000	634,000	77,000	295,000	64,000	183,000	462,000	237,000	104,000	241,000	202,000
Actives Business per Regional Active Business	0.016	0.022	0.016	0.040	0.026	0.004	0.021	0.014	0.012	0.064	0.015	0.015

To develop this further (Table 7) we compared start-ups to businesses surviving 1-3 years and those that survived more than 3 years. This was done by taking HE-BCI data field B and C, we then subtracted C from B to find the number of businesses which are active between 1 and three years. This is a more detailed indicator of business survival rates for each region.

Table 7 : Business Survival Rates

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
Total New Starts (GNS)	1683	1248	4670	513	2066	74	604	1237	1310	1114	884	799
1 to 3 year survival - Active - 3 year survival	2649	2730	6010	1417	3557	63	1433	3166	1863	3136	1603	1257
Number of GNS still active which have survived at least 3 years	2207	1540	4345	1667	4213	214	2353	3358	1087	3511	1934	1819
GNS to Active Business	0.76	0.81	1.07	0.31	0.49	0.35	0.26	0.37	1.21	0.32	0.46	0.44
Ratio GNS to 1 to 3 years	0.64	0.46	0.78	0.36	0.58	1.17	0.42	0.39	0.70	0.36	0.55	0.64
Ratio 3+ to 1-3 years	0.83	0.56	0.72	1.18	1.18	3.40	1.64	1.06	0.58	1.12	1.21	1.45

Empirical studies have shown that new firms are characterized by a relatively high risk of failure during the first years of their existence (Fritsch et al., 2006). Headd et al., (2010) conducted a 27 year analysis and discovered that around 80% of businesses survive the first year and 50% survive the first five years. The East of England reflects this pattern, we see that it created 1248 new starts within this period, over the same period 2730 businesses had survived 1 to 3 years, and 1540 have survived more than three years. The ratio of new starts to active

businesses is 0.81 (81%) indicating that 19% of these businesses did not survive past the first year. The ratio of businesses in the East of England which are new starts to those between 1-3 years is 0.46 (46%) which indicates that 54% of businesses did not survive the transit from being a start-up to surviving between 1 and 3 years. It should be expected that businesses would fail during this initial three year period, so a number lower than one in the ratios is acceptable. The final ratio is 3+ years to 1-3 years. We need to remember that 1-3 years is a two year period whilst 3+ is everything after three years, so the comparisons are harder to justify. Again, for the East of England we see this ratio being 0.56 or 56% of businesses surviving this initial period and becoming long term business prospects for that region.

Some regions are more successful at developing businesses to survive the first year, notability South West and London, whilst others are not so, Scotland and North East being examples of this. A notable outlier is Northern Ireland which is the most successful region for the development of businesses which survive for 3 years or more. The reasons for this, compared to the region's poor performance in other indicators, is difficult to explain, and this is certainly an area for further research.

Employment creation

Whilst it's important to create businesses, and for those businesses to survive past three years, the rate at which businesses employ people also provides a useful indicator as to the wealth being created in that region and its distribution (Mueller, et al., 2008). UK Universities reported that graduate businesses facilitated 186,189 new jobs over the research period, with an average 3.26 employees per business.

Table 8 shows the estimated current employment (ECE) created per business within each region. It's clear from this analysis that Northern Ireland is creating businesses which employ more people (35.26) than any other region, followed by Scotland (6.93), and the South East (4.08).

Table 8 : Employees per Business

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
ECE	11,142	6,447	35,929	10,463	21,864	9,766	26,238	26,589	9,680	12,710	7,006	8,355
ECE per Active Business	2.29	1.51	3.47	3.39	2.81	35.26	6.93	4.08	3.28	1.91	1.98	2.72

The East of England is lowest for both employment and also for the employees per business with the East Midlands (2.29) and the West Midlands (1.98). In other tables we have seen the East of England and the South East have similar scores, which may be driven by their proximity to London, however here the figure is more than halved. The Northern Ireland figure is, again, clearly outside the normal figures of the other regions and therefore we would suggest further research is needed to investigate these large discrepancies. This should also be extended to other regions as 41 HEIs reported no employment. Further research is also needed to better understand what is driving these trends, and at what stage of the business development a graduate business employs people.

Business turnover

The core statistic used in understanding the economy of a region is normally the GDP which is derived, in part, from business turnover. For each region this was previously presented in table 1, this showed that the GDP of these regions is diverse, and as with other indicators, we see that HEIs can and do appear to make a significant contribution to their local regional economies. Table 9 develops this by presenting the Estimated Current turnover (ECT) for GSU businesses and then exploring the ways in which graduate businesses contribute to their regional GDP(2019), in the East of England this was 0.1% of total GDP, in London 0.25%, in Scotland 1.45%, and Northern Ireland 2.09%.

Table 9 : Business Turnover and contribution to GDP

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
ECT £(000)	572,565	191,697	1,273,427	676,708	687,081	1,016,634	2,416,926	1,839,974	849,031	507,932	546,431	337,382
RGDP / Turnover	0.44%	0.10%	0.25%	1.05%	0.32%	2.09%	1.45%	0.56%	0.52%	0.66%	0.33%	0.23%
GDP £(m)	129,854	190,962	503,653	64,260	212,843	48,584	166,957	327,102	163,941	77,517	163,624	146,746
GDP (2019) per Capita	26,852	30,622	56,199	24,068	28,993	25,656	30,560	35,632	29,147	24,586	27,574	26,667

This data shows that HEIs do have an impact on GDP, which echoes previous work by (Schubert and Kroll, 2014; Pastor et al.,2017). This analysis builds on those insights by highlighting the fact that this effect is particularly pronounced in regions with lower GDP figures. In these areas, we suggest that HEIs play a significant role in regional development and improving productivity. The implications of this are important, as it makes a clear case for regional development agendas to involve HEIs, and indicates that this may be especially important in areas which are more economically disadvantaged.

Business investment

Finally, we explored investment into graduate businesses, regional investment is determined by a number of factors such as productivity, skills and innovation with a business (Hill, & Munday, 1991). We would expect businesses developed by graduates to be high in these attributes. The data shows that investment per graduate start-up in Wales, the North East and the East of England are the lowest, broadly following the GDP for that region.

If we consider this investment as a pot of money which could have potentially been shared out to the student population in this region, then (in row 2) we see a 12-fold difference between Wales (£761) and Northern Ireland (£9,611). This is followed through to Investment per graduate business which again shows Northern Ireland and Scotland ahead and Wales, the North West, and the North East lagging behind. This is demonstrating a regional capability in securing investment for their graduate businesses which requires further research in relation to their regional economic development.

Table 10 : Regional Investment

£	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
Investment £ (000)	1,071,726	134,816	1,671,702	111,965	221,232	383,372	957,468	1,355,776	221,045	74,811	151,909	271,919
Investment per student	8,380	1,272	5,307	1,287	1,121	9,611	5,069	6,656	1,568	761	864	1,623
Investment per Business	220,701	31,573	161,439	36,305	28,473	1,384,014	252,897	207,814	74,931	11,255	42,949	88,400
Investment per employee	96,188	20,911	46,528	10,701	10,119	39,256	36,492	50,990	22,835	5,886	21,683	32,546
Investment per turnover	1.87	0.70	1.31	0.17	0.32	0.38	0.40	0.74	0.26	0.15	0.28	0.81

It is normal for investment in a business to foster an increase in employment and also higher turnover (Williams, 2003). The last two rows of the table (10) highlight this analysis. The investment per employee (row 4) shows the investment needed in each region to gain an employee; the East Midlands requires the highest investment per employee whilst Wales the least.

The last row provides the investment per business turnover. So we would expect one pound to generate multiple pounds in turnover, therefore a good ratio should be less than one. This shows a similar picture with the East Midlands providing the least return on investment whilst Wales is the highest. Across the regions, we see on average that the lowest GDP regions have the greatest turnover gains, whereas higher GDP regions gain on average less turnover for the same investment.

Wales across the investment factors is the lowest, showing that regional investment in businesses is an issue, but does seem to be utilising this investment to increase employment and turnover. The North East, the South West and the West Midlands show consistent issues across these factors. Further research is needed on how regional clusters of HEIs can secure regional investment for graduate businesses otherwise the gap will continue to increase in terms of GDP as shown in Figure 1.

Discussion

The analysis detailed in the previous sections presents a mixed picture across the country as to the impact that HEIs, and their EEE activity, may be having. The data suggests a range of outcomes across the regions, along with several discernible trends which hint at underlying drivers, many of which were beyond the scope of this investigation to explore in more detail.

There are clear signs that some regions perform better than others against particular indicators, that said, no single region can be identified as an example of best practice across the dataset. This suggests that HEIs, civic institutions, regional legislatures, and the UK national parliament need to do more to build regional ecosystems that encourage business start-up and growth if they intend to ‘level-up’ regional development.

In this section we will explore the data we have presented in an effort to draw out key conclusions, and identify trends which are likely to offer new and novel insights into the ways in which HEIs may be contributing to the development of their regions. Table 11 takes the data from the previous tables and provides the ranking (1 to 12) of each region, 1 being the highest and 12 being the lowest for each of the indicators.

Table 11 : Comparison of indicators

	East Midlands	East of England	London	North East	North West	Northern Ireland	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
Percentage of the population who are students	8	12	1	3	7	11	2	10	9	4	6	5
Total GSU	3	5	1	11	2	12	10	6	4	7	8	9
GSU per HEI over period	1	5	4	7	3	12	11	10	6	2	8	9
GSU per 100k of student pop	2	3	1	8	5	12	11	7	6	4	9	10
GSU per Pop 100k	3	6	1	7	4	12	11	10	5	2	8	9
GSU in the region per Business Births in region	8	6	5	2	3	12	9	11	4	1	10	7
Actives Business per Regional Active Business	6	4	7	2	3	12	5	10	11	1	9	8
1 to 3 year survival - Active - 3 year survival	6	5	1	10	2	12	9	3	7	4	8	11
Number of GSU still active which have survived at least 3 years	6	10	1	9	2	12	5	3	11	4	7	8
ECE per Active Business	9	12	4	5	8	1	2	3	6	11	10	7
Regional GDP / Turnover	7	12	10	3	9	1	2	5	6	4	8	11
Investment per Active Business	3	10	5	9	11	1	2	4	7	12	8	6

Our analysis of the dataset highlights five key indicators that HEIs can impact through their activities; business start-up, survival, employment, turnover, and investment. In each instance we uncovered novel insights from the dataset which indicated how HEIs might be affecting their regional economies.

Firstly, there appears to be no discernible relationship between the percentage of students in a region and the new start-ups created in that region (See tables 4 and 5). This suggests that the student population is a poor predictor of regional entrepreneurial activity. Instead, it highlights the fact that there must be other factors underpinning the formation of these businesses related to the trends and norms in the region itself.

To compound this analysis, we also observed there is no relationship between the number of HEIs in the region and start-ups, nor the average number of students per university. This suggests that the size of the HEI is also not a factor, and this infers a relationship between the nature and/or quality of provision and start-ups, which should be an area for further research exploration.

Next, we explored the relationship between graduate start-ups in a region and the background level of business births in the same region. Here, there is a clear relationship between higher

levels of graduate start-up activity and higher levels of business births in the region. This certainly appears to support the notion that other factors in the regional economy are an important predictor of graduate start-up activity. That said, we cannot say for certain whether it is the region affecting graduates or, whether graduates are affecting the region.

From here, we shifted focus to explore the survivability of businesses across the regions, our initial observations found a relationship between new start-ups and high levels of active businesses in the regions. However, when we began to explore business survival over 1-3 years, and then over more than 3 years, we saw this relationship breakdown. Firstly, this suggests that simply creating more businesses in a region is a poor strategy for creating sustained economic development. Secondly, this further supports the notion that other factors in the regional economy are important, in addition to HEI activity.

We then investigated the relationship between employment, start-ups, active businesses and businesses who have survived for more than 3-years. Here we found that there was a weak relationship between longer-term business survival and employment, but no meaningful relationship between either start-ups or active businesses. This likely suggests that many of the businesses being created by HEIs are micro-enterprises who make limited contributions to regional employment.

Finally, we turned our attention to GDP and investment, our data showed that HEIs do have an impact on GDP and that this effect is particularly pronounced in regions with lower GDP levels. In these regions, we suggest that HEIs play a significant role in regional development and improving productivity. When we add investment into this picture, we see that regions with higher GDP generally attract more investment, however, it is regions with lower levels of GDP who benefit more from this suggesting that the return on investment in these regions is more favourable.

Conclusions

In this paper we have presented an exploration of data from the HE-BCI survey and UK Office for National Statistics (ONS) in an effort to address a question which over 40 years of scholarly activity has failed to answer (Galvão et al., 2018), namely, what is the impact of EEE activity in UK HEIs on regional economies.

Our investigation showed, for the first time, that it is possible to draw linkages between the outputs generated by some of the EEE activity in HEIs and key regional development indicators. Across the regions we found that EEE activity in HEIs appears to have a direct impact on business creation and GDP, the latter point echoing more general trends observed by Schubert and Kroll (2014) and Pastor et al. (2018). Furthermore, we were able to use several different indicators to infer a relationship between the nature and/or quality of provision and graduate start-up activity. That said, we also found numerous trends which we could not fully explain through the data, all of which need further research attention.

Taken together, our results suggest that EEE activity in HEIs does have a role to play in regional development. Importantly, the data indicates that the impact of EEE interventions may be particularly pronounced in regions with lower levels of GDP, and this implies that any agenda which seeks to foster UK-wide economic development, such as levelling-up, needs to fund HEIs in economically disadvantaged regions to develop this work.

Our results also noted that Wales, which has a specific policy agenda for the development of EEE, activity (Pennycook, 2014, Davey et al., 2016) appears to perform better in several

indicators when compared to similar regions across the UK. This suggests that a UK wide policy for the development of EEE activity may also prove to have beneficial economic effects.

Limitations and Further Research

Across the paper we have noted numerous areas which require additional investigation and further research focus. Central to this are the limitations inherent in HE-BCI data itself, including its lack of completeness, scope, depth, and the difficulty in connecting this directly to EEE interventions. Researchers interested in this field should direct their attention to studies which can more directly connect EEE activities in HEIs to outputs and link these to regional performance.

References

Bardbury, J. (2021) Constitutional Policy and Territorial Politics in the UK: Volume 1: Union and Devolution 1997–2007. Bristol University Press: Bristol.

Byrne, J., Fayolle, A., & Toutain, O. (2014). Entrepreneurship education: What we know and what we need to know. In Handbook of research on small business and entrepreneurship. Edward Elgar Publishing.

Carayannis, E. G., & Campbell, D. F. (Eds.). (2006). Knowledge creation, diffusion, and use in innovation networks and knowledge clusters: A comparative systems approach across the United States, Europe, and Asia. Greenwood Publishing Group.

Cooke, P. (2004). Introduction: Regional innovation systems – an evolutionary approach. In P. Cooke, M. Heidenreich, & H.-J. Braczyk (Eds.), Regional innovation systems: The role of governances in a globalized world (2nd ed., pp. 1–18). London: UCL Press.

Crow, M. M. (2008) 'Building an Entrepreneurial University' in 'the future of the Research University. Meeting the Challenges of the Global C21st University'. Paper to 2008 Kauffman-Planck Summit on Entrepreneurship Research and Policy held June 8-11, in Bavaria, Germany. Pp 31-41

Davey, T., Hannon, P., & Penaluna, A. (2016). Entrepreneurship education and the role of universities in entrepreneurship: Introduction to the special issue.

Etzkowitz, H. (1983). Entrepreneurial scientists and entrepreneurial universities in American academic science. Minerva, 21(2–3), 198–233. doi.org/10.1007/BF01097964

Etzkowitz, H., (2004) 'The evolution of the entrepreneurial university'. Int. J. Technology and Globalisation, Vol. 1, No.1, pp. 64-77.

Etzkowitz, H., & Leydesdorff, L. (1997). Universities and the global knowledge economy: A triple helix of university-industry-government relations. London: Printer.

Etzkowitz, H. and Leydesdorff, L. (2000) 'The dynamics of innovation: from National System and "Mode 2" to a Triple Helix of university-industry-government-relations'. Research Policy 29 (2000), pp. 109-123.

Fayolle, A., & Redford, D. (2014). Introduction: Towards more entrepreneurial universities - myth or reality? In A. Fayolle & D. Redford (Eds.), Handbook on the entrepreneurial university (pp. 1–10). Cheltenham: Edward Elgar.

Fritsch, M., & Mueller, P. (2004). Effects of new business formation on regional development over time. *Regional Studies*, *38*(8), 961-975.

Fritsch, M., Brixy, U., & Falck, O. (2006). The effect of industry, region, and time on new business survival–a multi-dimensional analysis. Review of industrial organization, 28(3), 285-306.

Galvão, A., Ferreira, J.J. and Marques, C. (2018), "Entrepreneurship education and training as facilitators of regional development: A systematic literature review", Journal of Small Business and Enterprise Development, Vol. 25 No. 1, pp. 17-40. https://doi.org/10.1108/JSBED-05-2017-0178

Gibb, A., Haskins, G. and Robertson, I. (2009). Leading the entrepreneurial university: Meeting the entrepreneurial development needs of higher education institutions. Universities in Change. NCGE

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). The new production of knowledge: The dynamics of science and research in contemporary societies. London: Sage.

Goddard, J. (2009). Reinventing the civic university. London: NESTA.

Goddard, J., Hazelkorn, E., Kempton, L., & Vallance, P. (2016). The civic university: The policy and leadership challenges. Cheltenham: Edward Elgar Publishing.

Guerrero, M., Cunningham, J., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. Research Policy, 44(3), 748–764. doi: 10.1016/j.respol.2014.10.008

Gunasekara, C. (2004). The regional role of universities in technology transfer and economic development. British Academy of Management Conference, August 30th–September 1st. St Andrews, Scotland.

Headd, B., Nucci, A., & Boden, R. (2010). What matters more: business exit rates or business survival rates?. Washington, DC: United States Census Bureau's Business Dynamics Statistics.

HESA (2020) HE Business and Community Interaction (HE-BCI) survey data 2014-2018, Higher Education Statistics Agency (HESA) - refers to data obtained student FTEs for 2018

Heseltine, M. (2012). No stone unturned: In pursuit of growth.

HM Treasury. (2021). Levelling-up fund: Prospectus. Retrieved March 27, 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/966138/Levelling_Up_prospectus.pdf

Hill, S., & Munday, M. (1991). The determinants of inward investment: a Welsh analysis. Applied Economics, 23(11), 1761-1769.

Jennings, W., & Stoker, G. (2016). The bifurcation of politics: Two Englands. The Political Quarterly, 87, 372–382. doi: 10.1111/1467-923X.12228

Johnson, M. T. (2020). The knowledge exchange framework: understanding parameters and the capacity for transformative engagement. Studies in Higher Education, 1-18.

Johnstone, A., & Huggins, R. (2016). Drivers of university–industry links: The case of knowledge-intensive business service firms in rural locations. Regional Studies, 50(8), 1330–1345. doi: 10.1080/00343404.2015.1009028

Kempton., L (2019) Wishful thinking? Towards a more realistic role for universities in regional innovation policy, European Planning Studies, 27:11, 2248-2265, DOI: 10.1080/09654313.2019.1628183

McCann, P. (2016). The UK Regional-National Economic Problem, Routledge: London.

Mian, S. (2011). University's involvement in technology business incubation: What theory and practice tell us? International Journal of Entrepreneurship and Innovation Management, 13(2). doi: 10.1504/IJEIM.2011.038854

Mueller, P., Van Stel, A., & Storey, D. J. (2008). The effects of new firm formation on regional development over time: The case of Great Britain. Small Business Economics, 30(1), 59-71.

Office for National Statistics - Inter-Departmental Business Register (2021)

ONS (2019) Mid Year Population Estimates 2019". Office for National Statistics. 24 June 2020. Retrieved 17 July 2020.

ONS (2020) Dataset, Regional gross domestic product: all ITL regions

Pastor, J. M., Peraita, C., Serrano, L., & Soler, Á. (2018). Higher education institutions, economic growth and GDP per capita in European Union countries. European Planning Studies, 26(8), 1616-1637.

Pennycook, L. (2014). The welsh dragon: the success of enterprise education in wales. Carnegie UK Trust.

Pike, A., Lee, N., MacKinnon, D., Kempton, L. and Iddewala, Y. (2017) Job creation and inclusive growth in cities, Joseph Rowntree Foundation: York.

Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. International small business journal, 25(5), 479-510.

Pugh, R., Wadid Lamine, Sarah Jack & Eleanor Hamilton (2018) The entrepreneurial university and the region: what role for entrepreneurship departments?, European Planning Studies, 26:9, 1835-1855, DOI: 10.1080/09654313.2018.1447551

Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education. Journal of Small Business Management, 51(3), 329-351.

Schubert, T., & Kroll, H. (2014). Universities' effects on regional GDP and unemployment: The case of Germany. Papers In Regional Science, 95(3), 467-489. doi: 10.1111/pirs.12150

Smith, K. (2015). Measuring the impact of enterprise education and entrepreneurship support in higher education: Can routinely collected data be of use?. Industry and Higher Education, 29(6), 493-503.

Storey, D., Greene, F., and Mole, K. (2008). Three decades of enterprise culture? Entrepreneurship, economic regeneration and public policy, Palgrave MacMillan: London.

Tomaney, J. and Pike, A., (2018). Brexit, devolution and economic development in 'left-behind' regions. Welsh Economic Review, 26, pp.29–37. DOI: http://doi.org/10.18573/wer.231

Tomaney, J., & Pike, A. (2020). Levelling Up?. The Political Quarterly, 91(1), 43-48. doi: 10.1111/1467-923x.12834

Turner, R. (2003). After coal, in R. Turner (Ed.) The British Economy in Transition: From the old to the new? Routledge: London.

UK 2070 Commission. (2020). Make No Little Plans–Acting At Scale For A Fairer And Stronger Future. Final Report of the UK2070 Commission.

Wilson, T. (2012). A review of business–university collaboration.

Williams, D. (2003). Explaining employment changes in foreign manufacturing investment in the UK. International Business Review, 12(4), 479-497.