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Universities, graduates and local labour markets

by

Helen Lawton Smith
Professor of Entrepreneurship
Birkbeck, University of London
Malet Street, Bloomsbury
London WC1E 7HX, UK
h.lawton-smith@bbk.ac.uk

And

Rupert Waters
Head of Economic Research
Thames Valley Local Enterprise Partnership
& CIMR
rupert@btvlep.co.uk

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Abstract

Universities as a supplier of the highly skilled have long been understood as a contributor to economic development (Glasson 2003). However, the direct impact of graduate education at the regional level is less clearly understood. This paper investigates patterns that emerge from 'first destination' data for all UK universities on where graduates begin work and what they actually do in successful regions. It compares this with recent policy rhetoric, for example in the UK's Industrial Strategy (HM Government 2017), the Adonis Growth Review 2014 and the 2014 Witty Review of *Universities and Growth*. It illustrates reality using case studies of Oxfordshire and Buckinghamshire which are both adjacent geographically and among the most competitive places in the UK, albeit with rather different HEIs. It addresses the issue of spatial differences, examining how different patterns of skills matching emerge even in adjacent regions. It also reflects on spatial mobility: whether and how the migratory behaviour of skills influences education-job match.

Keywords: universities, highly-skilled labour markets, Oxfordshire, Buckinghamshire

1. Introduction

Universities have come to be regarded as crucial actors in the development of high-technology local economies. Two broad contributions to science and technology-led economic development have been discerned – intellectual property and graduates. With respect to the latter, investment in skills is one of the three streams or 'legs' of university responsibilities (teaching, research and outreach) (Lawton Smith and Waters 2015).

In the UK, as elsewhere, the importance of a highly-skilled labour market to economic development is now recognised as being the key driver of innovation-led economic development (see Lopez-Rodriguez et al. 2007, Leitch Review of Skills 2006, Sainsbury Review 2007, and more recently the Adonis Growth Review 2014[1], *Mending the Fractured Economy* and the Witty Review of Universities and Growth, 2014. Universities UK (2017), however, highlighted the problems created by mobility of graduates away from their universities arguing that increased retention of graduates in the regions in which they studied could ease current skills shortages across the UK as well as drive local growth and productivity. There is significant regional variation in rates of graduate retention, including some differences by subject studied and industry into which the graduates enter.

In this paper we challenge the idea of a direct association between the presence of universities and the level of skills in the workforce by comparing two neighbouring counties in the South East of England, both prosperous areas in the UK: Oxfordshire

[1] https://www.policyforum.labour.org.uk/uploads/editor/files/Adonis_Review.pdf (accessed June 4 2019)

and Buckinghamshire, with the former being larger by population and physical area. To do this, we explore the relationship between universities and their local economies, in particular by setting out the proportion of young people that go to universities by local area; and mapping both whence universities recruit students and whither their recent graduates go to begin their careers.

The first rationale for the comparison of the two counties is that these are two of the most productive and entrepreneurial economies in the UK, ranking 4th and 5th for productivity (GVA per hour worked) among England's 38 Local Enterprise Partnerships[2]. The second is that although they have dense concentrations of the highly skilled, they have very different kinds of higher education institutes (HEIs). Third, that they are adjacent provides for an investigation of potential spillover effects through mobility at different stages in students' academic careers. The research questions addressed are: to what extent do local institutions reinforce local competitiveness? and what does this tell us about how high skilled labour markets function?

The focus on what happens with respect to spillover flows of labour between adjacent regions (both positive and negative) as a consequence of competition for labour (Baycan et al. 2017) is less well researched. This paper draws on previous studies which have examined the relationship between human capital and economic growth, with specific reference to students and where they locate following graduation (see for example Faggian et al. 2009, Iammarino and Marinelli 2015).

We examine the extent to which theory agrees with practice. We argue that national claims about the importance of universities may be overblown and not generalisable. Although distances are small in the UK compared with labour market areas in the US, we find considerable local variations in labour market behaviour. Our focus is on the very local NUTS[3] 3 level, within the context of the broader South East England labour market. We compare career histories in both locations which tell us about reinforcement of local competitiveness and how highly-skilled labour markets function. We show that even where there are concentrations of graduates, their impact on economic development varies. We recognise that there is a time effect, with patterns of employment changing as people mature and life styles differ.

The paper is organised into this and four further sections. In the first we review arguments on the relationship between graduates and local economic development. In the second we provide the political context to the evidence. The third explains the case study methodology and contains the analysis. In the final section conclusions are drawn.

2. Local economic development, high level skills and universities

The importance of skills to economic development has long been recognised at the national level. Skills are a key driver of labour productivity i.e. output per worker or hour worked. The stock of skills has a strong link with national economic

[2] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/february2019 (accessed June 4 2019)
[3] http://ec.europa.eu/eurostat/web/nuts/overview (accessed April 10 2015)

performance, wealth and prosperity (UKCES 2014). This is the sum total of those individuals who have higher levels of human capital in this case university graduates - in other words their skills and experience, knowledge and ability. These are people who also likely to be more productive and more highly paid (Wales 2012).

Accordingly, areas which have higher levels of human capital are also likely to be more innovative leading to higher levels of productivity (Faggian et al. 2009). This is because individuals are better able to absorb new knowledge following a shift in the technological frontier (Faggian and McCann 2006, Falvey et al. 2007). Two other issues in relation to universities as suppliers of the highly skilled are important. The first is that of mobility and the second is that of the type of university. Faggian and McCann (2009) report that university attendance in Great Britain is generally associated with very significant levels of human capital mobility. They also note that only certain types of higher education institution play a significant employment role in their local economies, finding that less research intensive universities have higher local retention rates.

2.1 Human capital arguments

Local economic growth is associated with such factors as the quality of the skill base and the level of entrepreneurship. It has been argued to be predicated on the match of supply and demand for such skills, the fit between university education and graduate jobs (Corominas et al. 2010). It is not just that graduates stay in the place where they studied for their initial work, there are also indirect effects. For example, studies such as those by Bercovitz and Feldman (2006) have shown that the highly skilled are attracted to particular locations by the presence of other professionals and by other factors such as quality of life. Other studies have suggested that workers are more productive when they locate around others with high levels of human capital (Black and Henderson 1999).

Both effects contribute to the accumulation of stocks of human capital which relates specifically to educational attainment (Becker 1964) while Florida's (2002) creative class concept relates to an individual's occupation (Faggian et al. 2014). In turn these are associated with the effectiveness of the labour market as a means of supporting the flow of knowledge (sometimes called collective learning or knowledge spillovers) through mobility of staff between firms. Faggian et al. (2014) suggest that human capital theory and the creative class concept have in common the assumption that highly talented people are generally more mobile than the rest of the population.

Glaeser (1999) found that access to common pools of labour is what underpins the tendency of firms to cluster together in regional agglomerations, rather than inter-firm linkages. In the new growth theory, the connection is made between knowledge, human capital and economic growth: the stocks of ideas resident in the science base and the local labour market determine the rate of creation of new ideas. Moreover, the size of the labour force engaged in the production of ideas also determines the rate of the production of ideas (Romer 1986 in Engelstoft et al. 2002).

Early studies of labour market activity in high technology local economies have demonstrated a strong relationship between locality and recruitment. Angel (1991, 1508) found that semiconductor firms in Silicon Valley fill at least 85 per cent of their

vacancies from within the cluster, regardless of occupation. He argues that this demonstrates that, "labor-market activity in Silicon Valley is dominated by a localized dynamic of interfirm worker mobility in which experienced workers move from one firm to another as labor demands change and new employment opportunities arise….. Rather than hiring workers at the entry level and generating skills in-house, semi-conductor firms in Silicon Valley are able to respond swiftly to changing labour demands by hiring experienced workers from the local labour market". This ease with which experienced workers can be recruited from the local labour market is, for Angel, one of the "central advantages attracting semiconductor producers to Silicon Valley".

Other studies of labour markets have argued along both lines: an increase in the level of skills in the economy has a number of direct and indirect spillover effects. These operate through the skill composition of the workforce as this has an impact on kinds of technology used and in formation processed by firms because skilled and educated workers are better able to absorb knowledge and implement new technologies (see Wozniak 1984; Bartel and Lichtenberg 1987; Dankbaar, 2004).

2.2 Universities: supply and demand and explaining productivity

The conceptual issue addressed is how changes within labour markets for the highly-skilled are central to an understanding of how local economies evolve over time and how universities are part of that process. This relates to the quality and match of skills and the extent to which graduates are recruited locally and whether local institutions – universities - reinforce local competitiveness.

Universities in UK policy are exhorted to match supply with local needs for skills, with an agenda of work-readiness. Corominas et al. (2010) argue that the fit between higher education and work normally revolves around relationships of dependency and autonomy relative to a university's functions and the requirement of the economy and the production sector. The dependency model assumes a correspondence between the education profiles of graduates and the jobs they fill – matching responds to the demands of the workplace. The autonomy model questions the existence of a pre-supposed correspondence and proposes a dynamic relation through flexible and successive adjustments between the labour supply and a production sector that adapts to the labour force that is available at a given time and context (Salas Velesco 2007).

The argument is that universities are a critically important source of the highly-skilled, and as they are highly internationally mobile (Meyer et al. 2001), they bring with them knowledge and expertise gained in other countries, thus adding to the mix of ideas and information resident in receiving regions through their networks (Waters and Lawton Smith 2008). Potential employees from universities for firms in local high-technology economies range from academic staff to post-doctoral employees, PhD students to undergraduates. Faggian and McCann (2006, 2009) argue that the primary role of the university system is to act as a conduit for bringing potential high quality undergraduate human capital into a region. Having a highly skilled labour pool far outweighs the benefits generated by knowledge spillovers (see also Iammarino and Marinelli 2015).

Reasons for potential mismatches lie in the structure of the economy compared with graduates' academic qualifications, areas of expertise and their propensity to work in London or bigger firms (see for example Belt et al. 2000, Faggian et al. 2009). For many regions there are potential challenges to ensuring a high quality supply of labour to employers across the UK because of geographically uneven patterns of skills. These uneven patterns largely reflect employer demand for skills, as 'people with higher levels of qualification tend to migrate to areas with high-level jobs and associated high wages' (UKCES 2014, 6). This situation has further implications for both job creation within existing regional industrial structures and for actual firm/HEI relationships in the local higher education system.

Moreover, the reinforcing effect continues as workers resident in these areas learn new skills from other individuals with whom they interact (Glaeser 1999). In addition, creative workers as well as being part of the creative class (Florida 2002) are a key indicator of the quality of place that might contribute to the attraction/retention of further creative professionals. Their location choice and migration patterns are, argue Faggian et al. (2014), important from a local/regional development perspective.

Evidence has shown that Oxford, Oxford Brookes and Cambridge universities exert a strong locational pull on their graduates thus reinforcing the already high-skill profile of their respective local economies, but the effect has traditionally been stronger in Cambridgeshire than in Oxfordshire and particularly so for physicists (Waters and Lawton Smith 2008). Other evidence suggests this effect does not extend to attracting graduates out of London. However, this effect is not constant over time as professionals make other choices with respect to labour market mobility as their career priorities change.

There are a number of caveats to the universality of spillover effects at the regional level other than through human capital effects. For example, studies have recognised that not all types of industrial structures can generate knowledge spillovers equally successfully. In addition they do not appear to be constant over time and they affect mature and young industries differently (Acs and Armington 2004). Even more important in this context is the finding by Faggian et al. (2009) on the basis of a study of graduate migration in the UK, that migration of human capital plays an essential role over and above other possible knowledge transfers, such as spillovers between universities and firms in the regional innovation performance of high technology industries. When graduates have either attended or worked in other countries, the spillovers from international networks are obtained directly by their employers and indirectly to the locality.

Moreover, Faggian et al. (2014) and Comunian et al. (2014) focus on different types of graduates and the highly skilled – those in the more creative sectors – Arts and Humanities - rather than treating all graduates as having equivalent sets of human capital. Faggian et al. (2014) find that graduates from disciplines such as business/management and more importantly engineering/technology are more migratory and more likely to be repeat migrants and land higher paid jobs. By contrast graduates from creative arts, education or law are less mobile and on average earn less.

In line with the finding by Faggian et al. (2009) earlier studies have found that recruitment of university students and personnel by firms is mediated by the research and teaching profile of universities and the potential match with the firms within a local or regional economy (see Beeson and Montgomery 1993). Different models of university system produce different kinds of connections via the scientific labour market with further variation by industry. Some are more hierarchical than others. Lanciano-Morandat and Nohara's (2002) study illustrate a number of distinctive features of the organization of career paths in different countries which are dependent on the type of university.

The nature of the immediate geographical hinterland, however, may be more important that the formal stance by a university in facilitating recruitment. Firms in areas with strong universities may have an advantage in implementing new technologies and sustaining innovation thereby increasing their growth and potentially further increasing demand for graduates. Possibilities for universities to contribute to the supply, training and mobility of the highly-skilled are also mediated by a number of factors relating to the geographical scale at which processes are occurring. These include universities as 'talent magnets' (Florida et al. 2006) for both students and the highly-qualified, especially in increasingly important international labour markets, through participation in international training and mobility programmes, and allowing/facilitation of 'hybrid occupational labour markets' whereby scientists and engineers both work in their own firms or in other firms while retaining their academic posts (Lanciano-Morandat and Nohara 2002).

3. The UK context, Oxfordshire and Buckinghamshire skills bases

The political context to this discussion is the Witty Review (2014) which recommends that the UK commit to becoming a world leader in skills by 2020. The Government agreed with Lord Heseltine that business and universities should have closer engagement in order to ensure that courses are relevant and build employability skills. It is important for businesses and HEIs to take ownership and to develop collaboration in ways that best suit local skills, priorities and characteristics (HM Government 2013, in Response to Heseltine).

As in other countries, there has been a national rise in the number of graduates. In 2013, there were 12 million graduates in the UK labour market with the number having increased steadily over the previous decade (ONS 2014). By 2017 this had risen to 13 million. Graduates from the top UK universities were earning more than graduates from other UK universities. London was the area with the highest concentration of graduates with 50% of the population being graduates. The South east as a whole was 4th with 44% of the population having degrees behind Wales and Scotland.[4]

Here we are interested in how policy makes the link notably in the reviews by Adonis (2014) and Witty (2013). The Adonis Review recommended that all the Local Enterprise Partnerships (LEPs) should have universities represented on their boards so

[4] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/graduatesintheuklabourmarket/2017 (accessed June 3 2019).

that there would be a match of interests. Witty identified a geography to competitive sectors, one which is associated with the national budget for research excellence. If universities are so crucial then it ought to be possible to show that where there are high local levels of graduate retention then there is also stronger economic performance.

As the political complexion of national government change, local delivery of the national skills priority also changes. Currently, governance of skills development in the UK is in the hands of LEPs. Their remit is to drive improvements in infrastructure, economic regeneration, skills, exports, and inward investment.

The UK is outperformed on measures of skills when compared to many other developed countries (UKCES 2014). It has a geographically and structurally polarised workforce. In 2009 it was ranked 12th for high skills, but 19th for low and 24th for intermediate skills (UKCES 2014).

3.1 Background – populations and methodology

Buckinghamshire in 2011 had a population of 505,300, it is therefore smaller than Oxfordshire which in the same year had a population of 653, 800. Oxfordshire's county town, Oxford, had a population of 151,900. Buckingham's county town Aylesbury had a significantly smaller population of 65,500 and its largest town High Wycombe has a population of around 125,000

Successive sets of data from the Office of National Statistics (ONS) show inner London has the highest labour productivity when the UK is broken down into 41 subregions (NUTS2). In 2017 this was 50% above the UK average. Outside London, the Berkshire, Buckinghamshire and Oxfordshire NUTS2 region recorded the UK's highest labour productivity levels were in 2017 (14% above the UK average)[5].

LEPs with the highest proportions of adults with Level 4 qualifications (university degrees) had over twice the share of highly qualified workers compared to those with the lowest shares. The top three are London, Oxfordshire and Buckinghamshire & the Thames Valley (UKCES 2014). Over time this concentration has increased as the areas with the highest level skill levels in 2004 tended to see greater proportional increases (to December 2013).

Sectoral profiles in the country have changed as is reflected in the skill base in different locations. There has been widespread growth in the numbers of people employed in financial services, banking, insurance; and decline in sectors hit by the recession e.g. manufacture, construction and agriculture. As Lee et al. (2013) put it, employment has been slowly polarising into 'good' and 'bad' jobs. Alongside technological change which has substantially substituted computers for skilled but routine occupations, there has been strong growth in high-skill, cognitive employment.

5 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/february2019 (accessed June 2 2019)

Migration is also related to changing skills bases for both the highly skilled and the low-skilled (UKCES 2014, 10). Again the highly skilled are attracted to high growth places. At the same time there has been a decrease in public spending on investment in R&D and education but a shift to post-secondary vocational education and training (UKCES 2014, 12). This in principle could provide a greater role for the LEPs as these are more local in focus than in university education, being informed by local needs.

The data here are extracted from the Office of National Statistics (ONS) data to illustrate the differences in the two adjacent counties in the composition and patterns within the labour markets. We demonstrate the high ranking of the two counties in national productivity and by patenting. We then describe the university systems in the two counties. This is followed by the industrial structure, educational attainment, migration and finally career destinations.

3.2 The knowledge base

Although the focus here is the universities within the two counties, within 50 miles of Buckinghamshire's county town Aylesbury, there are many universities in other counties - Oxfordshire, Northants, Berkshire and of course London which has 42 Higher Education Institutes. Oxfordshire has two universities, a top ranked and a highly regarded 'new' university (post-1992), both with large populations of students. Buckinghamshire also has two universities but both are small, particularly the University of Buckingham which is the UK's only private university. The University of Buckingham is much smaller than the other three and offers a narrow range of disciplines to a restricted base of students. Thus there is less significance in many of the comparisons made. Buckinghamshire has some of the best high schools in the country but their pupils tend not go to local universities. It has the highest percentage of school leavers going to Oxford and Cambridge (Oxbridge) (3.7%) and the top research universities, the Russell Group, in the UK[6][7].

	Postgrads	Undergrads
University of Oxford	8,925	16,745
Oxford Brookes University	4,240	13,625
University of Buckingham	730	1,360
Buckinghamshire New University	1,005	8,200

Table 1 Student populations 2012/13

[6] https://russellgroup.ac.uk/about/our-universities/ (accessed June 3rd 2019)
[7] https://www.gov.uk/government/statistics/destinations-of-ks4-and-ks5-pupils-2017 (accessed June 4 2019)

3.3 Employment and structures

	All categories: Industry	A, B, D, E Agriculture, energy and water	C Manufacturing	F Construction	G, I Distribution, hotels and restaurants	H, J Transport and communication	K, L, M, N Financial, Real Estate, Professional and Administrative activities	O, P, Q Public administration, education and health	R, S, T, U Other
1. Managers, directors and senior officials	125.1	111.4	142.6	126.6	115.1	137.7	121.3	133.2	108.0
2. Professional	103.9	77.0	133.1	99.9	145.7	123.9	99.4	101.1	91.3
3. Associate professional and technical	110.5	110.2	142.9	89.9	145.5	130.7	100.1	97.6	102.0
4. Administrative and secretarial	96.6	131.4	127.2	107.6	120.1	93.6	95.4	83.3	91.4
5. Skilled trades	106.4	104.8	93.6	100.6	101.9	116.8	141.2	101.1	127.9
6. Caring, leisure and other service	100.7	161.2	89.1	64.0	89.1	87.7	92.5	107.8	102.9
7. Sales and customer service	87.4	73.5	118.3	75.7	88.5	63.8	79.7	71.7	83.0
8. Process, plant and machine operatives	74.1	91.4	57.1	83.4	83.6	67.7	84.9	92.5	99.5
9. Elementary	80.0	91.0	57.1	87.7	80.1	71.3	78.5	87.5	84.7

Table 2 Workplace occupations by industry Buckinghamshire
Source: ONS 2011 Census Workplace Population, Table WP6604EW.

	All categories: Industry	A, B, D, E Agriculture, energy and water	C Manufacturing	F Construction	G, I Distribution, hotels and restaurants	H, J Transport and communication	K, L, M, N Financial, Real Estate, Professional and Administrative activities	O, P, Q Public administration, education and health	R, S, T, U Other
1. Managers, directors and senior officials	106.3	125.2	107.9	100.4	107.0	131.4	99.3	124.1	103.5
2. Professional	125.4	92.4	126.1	84.6	113.4	136.2	135.8	111.2	135.6
3. Associate professional and technical	108.3	104.9	118.1	94.1	105.5	120.0	92.3	114.0	100.9
4. Administrative and secretarial	91.2	118.8	103.0	94.5	105.8	100.3	84.3	81.6	101.2
5. Skilled trades	97.2	102.2	89.3	105.4	99.5	72.9	124.6	146.6	123.4
6. Caring, leisure and other service	89.2	170.5	116.4	106.4	97.9	53.6	87.4	78.2	92.8
7. Sales and customer service	84.1	37.1	101.8	96.9	95.4	82.9	65.9	82.2	68.3
8. Process, plant and machine operatives	82.5	91.8	90.9	89.4	92.5	68.3	87.4	119.0	102.5
9. Elementary	88.7	98.1	85.0	99.8	97.5	82.5	84.7	95.8	74.7

Table 3 Workplace occupations by industry Oxfordshire
Source: ONS 2011 Census Workplace Population, Table WP6604EW.

Tables 2 and 3 show location quotients as percentages, where England =100. The data are drawn from the 2011 ONS Census Workplace Population, table WP6604EW. Occupations are on the left hand axis and industry sector across the top. The top two lines show the top status positions. The tables show the higher status of jobs in Buckinghamshire and Oxfordshire when compared with the national average.

Buckinghamshire has lots of senior people who work in London. Oxfordshire has lots of professionals many of whom are employed in education and the numerous hospitals. In 2015/6 Oxford has the highest proportion of people in the UK employed

within the public sector with 48% (mainly education and the health service) (Oxford City Council 2018).

Buckinghamshire percentages show that it is least top heavy in senior people in the agriculture etc. sector which tend not to have HQs in London. The professional, scientific and technical sector is the largest in Buckinghamshire, accounting for 20.9 per cent of all businesses in the county. This is the highest share of any LEP outside London. This sector has been responsible for most new businesses in Buckinghamshire. This is the case over the last year and since the start of the recession in 2008.

New firm formation rates are high in both Oxfordshire and Buckinghamshire, far outstripping the UK as a whole. The tables show relatively little low value activity. In both counties there are relatively low levels of process plant, elementary jobs etc. in all sectors. Overall, the main difference is that Buckinghamshire attracts a number of expert people leading corporate lives in London whereas clever Oxford people migrate to London.

3.4 Migration

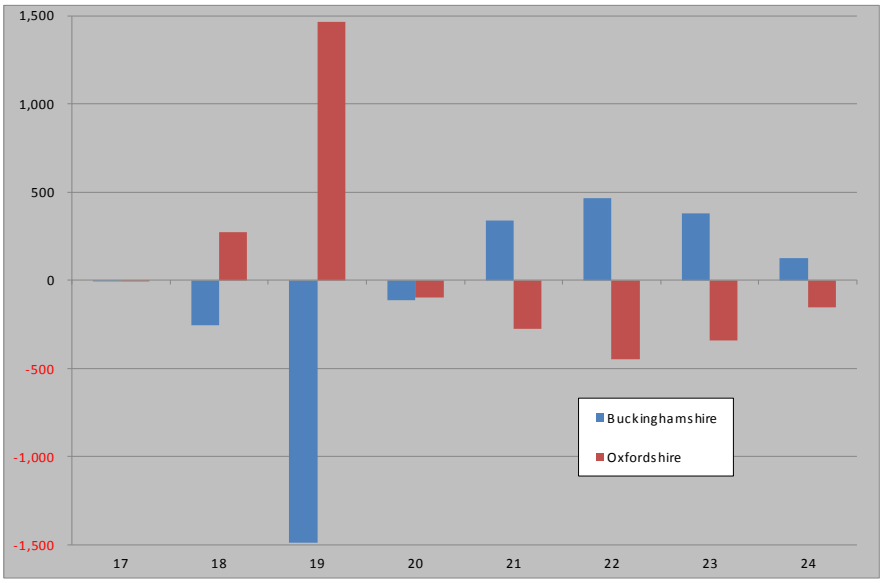

Figure 1 Migration by age

Nationally 25% of employed graduates moved away from their home region to study, but returned home to work. They made up a particularly large proportion of employed graduates in the east, south-east and West Midlands respectively (Higher Education Careers Services Unit (Hecsu) 2015)[8].

In the case of Oxfordshire and Buckinghamshire, Figure 1 shows the ebbs and flows of young people who go to university. At age 18 large numbers go out of

[8] https://www.theguardian.com/business/economics-blog/2015/feb/04/brain-drain-which-uk-regions-hold-on-to-their-graduates (accessed June 2nd 2019)

Buckinghamshire and large numbers flow into Oxfordshire which has many more university places than Buckinghamshire. At age 20 there are small outflows in each. However, at ages 21/122//23 there are flows back into Buckinghamshire and flows out of Oxfordshire following graduation. The general pattern is that new undergraduates leave Buckinghamshire but flock into Oxfordshire which has a far higher population of university places.

However, there is a reverse but overall somewhat weaker pattern after graduation with graduates flowing out of Oxfordshire and graduates returning to Buckinghamshire. This is consistent with Faggian and McCann (2009) who argue that the less research universities have the most local impact: Buckinghamshire New University appears to have a much stronger local impact than the others.

3.5 First destinations

	First degree			Postgraduate		
	Total	Work	%	Total	Work	%
Oxford Brookes University	1,850	1,440	77.8	835	740	88.6
The University of Oxford	2,360	1,290	54.7	1,330	990	74.4
Buckinghamshire New University	845	620	73.4	135	120	88.9
The University of Buckingham	70	40	57.1	165	155	93.9
England	204,930	146,620	71.5	80,210	66,750	83.2

Table 4 First destinations, 2012/13

Table 4 shows that the main differences between the universities lie in the proportions of undergraduates who go into work rather than stay at university for further study After graduation, 54.7 per cent of Oxford University undergraduates enter employment, with the bulk of the remainder going on to further study. This was the lowest share among the four universities in Oxfordshire and Buckinghamshire, behind the University of Buckingham (57.1), Buckinghamshire New University (73.4) and Oxford Brookes (77.8) and well below the national level of 71.5 per cent. Thus the most research intensive universities had smaller percentage of undergraduates going into the workforce compared with the national average and the less research intensive ones higher and slightly higher. For postgraduates, the share entering employment ranges from 74.4 per cent in at Oxford University, below the national rate of 83.2 per cent, to 93.9 per cent at Buckinghamshire New University.

As well as being less likely to enter employment after undergraduate degrees, Oxford University students are also less likely to remain in the county after graduation, with 9 in 10 taking employment elsewhere. By contrast, more than a third of Buckinghamshire New University students enter employment in the county, as shown in Table 5.

Turning to where graduates work, Tables 5, 6 and 7 give data on whether they work in the same places as where they study, employment destinations, whether in their respective counties, in London or outside the UK. Data are taken from HESA, Destinations of Leavers of Higher Education (DLHE) 2012.

	%
Buckinghamshire New University	36.9
The University of Buckingham	7.9
Oxford Brookes University	25.9
University of Oxford	9.9

Table 5 Working in place of study

If Oxford University and the University of Buckingham are not the major local sources of skills, where do other people come from to work in those counties? Consistent with Faggian and McCann (2009) Buckinghamshire New University has a much stronger local impact. Does this mean that it is truly a local university and doing what the policymakers have been demanding, or that graduates are most commonly older people who are less mobile due to family commitments? It could therefore be that the pattern shows inertia or that the students are not desirable to employers as the graduates of other universities who have the mobility to take jobs from a wider geography.

	University of Oxford		Oxford Brookes		University of Buckingham		Bucks New University	
	No.	%	No.	%	No.	%	No.	%
In county	1,045	16.8	2,353	31.4	68	15.6	1,336	38.5
In the City	451	7.3	479	6.4	7	1.6	45	1.3
In London	2,175	35.0	1,393	18.6	70	16.1	1,103	29.2
Outside UK	998	16.1	193	2.6	60	13.8	145	4.2

Table 6 Employment destinations

This raises the issue of whether older rather than younger people in Buckinghamshire are the cause of its prosperity. However, as the earlier figure shows, they are more likely to work as consultants. Figures for employment destinations indicate the strong pull of London for University of Oxford University graduates. The pull is much less strong for the other universities. The City of London, however, is a strong recruiter from both Oxford University and Oxford Brookes University.

In Oxfordshire it looks like many top graduates leave but maybe in Buckinghamshire they have gone already before graduation – to universities outside the county such as Oxbridge. More data such as the age profile of graduates in work would give an idea of who is staying in which county, and in what occupations.

	University of Oxford		Oxford Brookes		University of Buckingham		Buckinghamshire New University	
	No.	%	No.	%	No.	%	No.	%
1. Managers, directors and senior officials	53	5.0	229	9.0	7	14.9	141	15.1
2. Professional	686	65.0	816	32.0	23	48.9	191	20.4
3. Associate professional and technical	151	14.3	852	33.4	7	14.9	266	28.4
4. Administrative and secretarial	93	8.8	178	7.0	2	4.3	56	6.0
5. Skilled trades	3	0.3	25	1.0	0	0.0	19	2.0
6. Caring, leisure and other service	24	2.3	212	8.3	3	6.4	76	8.1
7. Sales and customer service	26	2.5	136	5.3	4	8.5	128	13.7
8. Process, plant and machine operatives	4	0.4	12	0.5	0	0.0	6	0.6
9. Elementary	16	1.5	93	3.6	1	2.1	52	5.6
Total	1056		2553		47		935	

Table 7 Occupational profile.

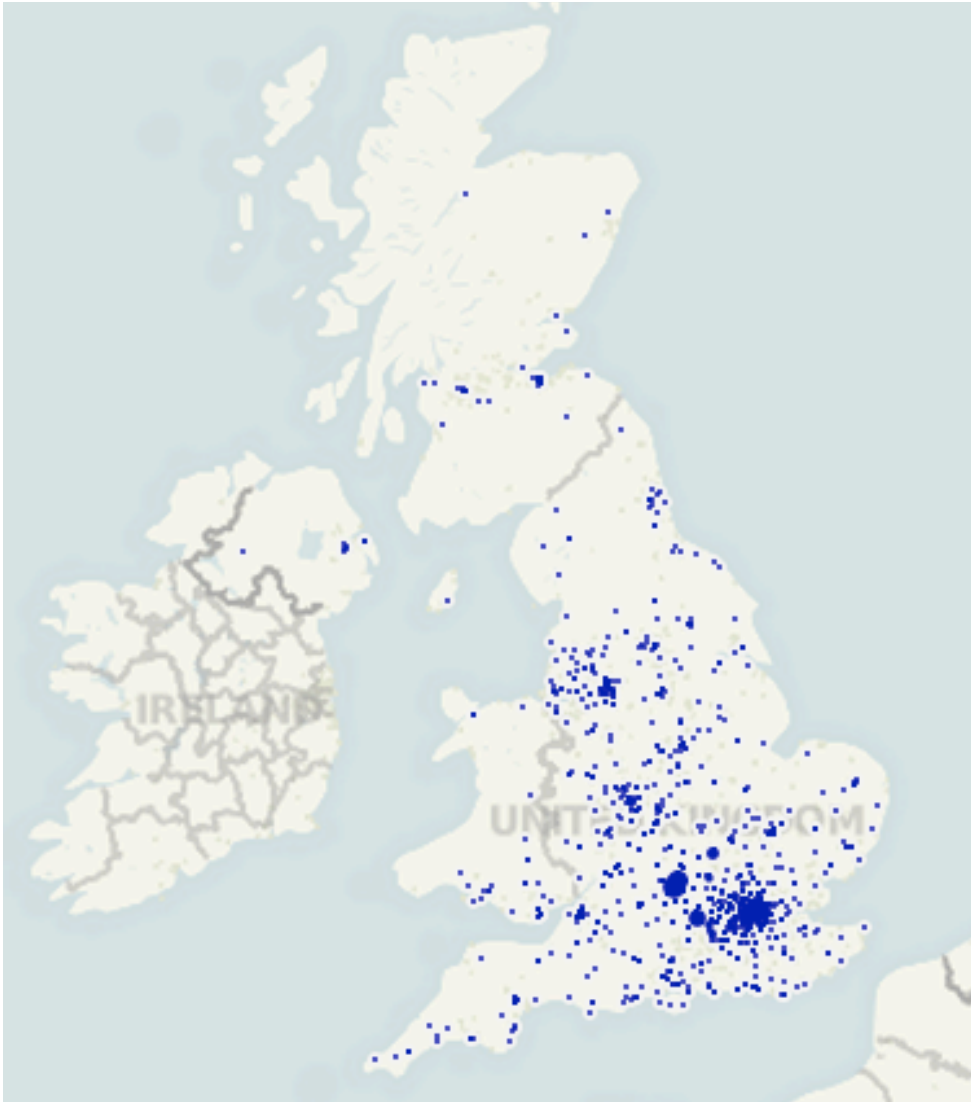

Figure 2 Geographical Distribution of Employment Locations for "Work only" respondents Oxford University
Source: Oxford University https://public.tableau.com/views/UniversityofOxford-DLHESurvey/EmploymentLocationsintheUK?%3Aembed=y&%3Adisplay_count=yes&%3AshowTabs=y&%3AshowVizHome=no (accessed June 4 2019)

Table 7 shows that 65% of University of Oxford graduates become professionals, compared to 49% of the University of Buckingham. There is a significant difference between the Oxford Brookes profile and that of Oxford which shows that a third go to associate professional and technical, higher even than Buckinghamshire New University. However, it is hard to get data that show by occupation what they are doing where. Figure 2 shows the first employment destinations of Oxford University graduates.

4. Conclusions

The link between universities and the supply of skills or human capital to graduates to labour markets has formed both a subject of academic study (see for example Angel 1991, Faggian and McCann 2006, 2009, Faggian et al 2014.) and more recently a policy agenda. The UK, for example, has made the link - notably Adonis (2014) and Witty (2013) between the supply of skills from universities and local demand. The Adonis report recommended that all the LEPsshould have universities represented on their boards so that the match can be made via a dialogue between the different stakeholders. Witty sees that there is a geography to competitive sectors hence the budget for research excellence has a geographical dimension.

The rationale for this assumption is retention of graduates will ease local skill shortages (Universities UK 2017) by improving recruitment possibilities (Angel 1991), will create and sustain creative spillovers in the form of new ideas and information (Faggian et al 2014), and improve local productivity, directly and indirectly through spillover effects (Black and Henderson 1999). There seems to be evidence of this in Oxfordshire and Buckinghamshire as these are two of the most productive counties in the UK.

However, there are caveats to these assumptions. They include mismatches in the structure of the economy, differences between universities in their locational pull and also earning capacity of graduates, differences between regional industrial structures to generate spillovers even with a potential supply of graduates. There is also a regional dimension to the universities serving as talent magnets particularly for international students and staff (Florida et al. 2006) whereby such students bring different sets of skills and knowledge to particular local labour markets.

The evidence shows that there are differences in whence universities recruit with different patterns of migration and return migration. For example, Buckinghamshire has some of the best high schools in the country but their students tend not go to local universities. The county has the highest percentage of school leavers going to Oxbridge and Russell Group universities in England. The evidence shows the higher status of jobs in Buckinghamshire and Oxfordshire compared with the national average.

However, we have shown that, given the assumption that universities are so crucial, then it ought to be able possible to show that there are high local levels of graduate retention. This is not completely consistent with the evidence. At age 18 large numbers go out of Buckinghamshire and into Oxfordshire which has many more university places than in Buckinghamshire. At age 20 there are small outflows in each.

However, at ages 21, 22, and 23 there are flows back to Buckinghamshire and out of Oxfordshire following graduation but less overall than the previous inflows.

Consistent with Faggian and McCann (2009) which argue that the less research universities have the most local impact, Buckinghamshire New University appears to have a much stronger impact than the others. Looking at occupational profile, the data show that two thirds of University of Oxford graduates become professionals, compared to a half at the University of Buckingham. There is a significant difference between the Oxford Brookes profile and that of Oxford which shows that a third go to associate professional and technical, higher even than Buckingham New University.

Local skills retention is clearly stronger at the non-research intensive higher education institues in our study. Perhaps this is not surprising as the local skills agenda forms a larger part of the missions of these institutions. National policy and areas of international research and teaching excellence are more important at universities such as Oxford and this contributes strongly to the data above. The UK government compartmentalisation between regional and national policy means that the agenda compete at each institution. It may be necessary for an overarching policy that recognies and melds the two.

Although the evidence has shown patterns of inflows and outflows of pupils and students, people with high levels of human capital, it can only be conjectured what that means for spillovers. It is likely that there will be differences in extent and quality of spillovers with subsequent implications for productivity in the two counties. The research could also be extended to explore what the patterns mean in terms of competition for labour between organisations in the two counties (Stough 2017). We also recognise that there is a time effect, with patterns of recent graduation changing as people mature and life styles differ. This is another avenue for further research.

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