State of the Art Review

University research and regional development

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University research contributes to regional development through the way it becomes incorporated into different kinds of 'products' that make technological knowledge more accessible for local innovating companies. However, universities do not exclusively contribute through their research; their expenditure effects can be important, and teaching activities building regional human capital can also contribute to region's territorial innovation capacity.

University research contributes in many different ways to regional development, not only through formal commercialisation activities and supporting human capital development, but also through informal engagement & strategic leadership activities. Universities' main role is as a connection point to global knowledge resources *in ways that make that knowledge more easily available to local partners*. This means that universities' regional development contributions are strongly shaped by the regional absorption capacity for the knowledge they import: in less favoured regions their contribution needs infrastructure to help less-innovative firms absorb new knowledge. Moreover, regional development is never a core mission for universities in comparison to teaching and research: stimulating a regional mission involves creating opportunities for mutually beneficial interaction between universities and regional partners.

Background

Academic interest in how university contributions to their regions can trace their pedigree to a dispute between academics in St. Andrews over whether the Golf Club or the University was more significant to the region (Benneworth & Kitagawa, 2017). Since the 1970s, there has been a growing research focus understanding on how universities contribute to stimulating regional development (Harrison & Turok, 2016).

This was driven by a recognition that innovative economic activities were essential to local economic success (Saxenian, 1994) and universities were playing an important role in building these world leading clusters, even where, as with Johns Hopkins University, university leaders explicitly forbade commercialisation activities (Feldman & Desrochers, 2002). Goldstein & Drucker (2016) note some debate remains regarding how significant university research is as a significant driver of regional development, and that local structural and contextual conditions are more influential for shaping regional development but also potential university contributions.

There is the question of what universities contribute. Yigitcanlar (2010) argues that universities are central to the model of knowledge based urban and regional development: in this model university knowledge spills out into the wider society, contributing preferentially to local innovation activities via externalities and agglomeration. Indeed Mowery & Ziedonis (2014) highlight clear demonstrable localisation effects in knowledge transfer via patents in leading US universities.

But at the same time, the contributions university make are extremely diverse: Lendel (2017) shows that universities exchange knowledge via what she calls "products" rather than directly through their teaching and research activities, making it hard to differentiate the impacts of research on regional development from those of other activities. This brief follows Lendel to explore the way that university research-influenced 'products' affect regional development.

Evidence

Lendel (2017, p. 212) has suggested that "higher education is a multiproduct industry with seven distinct products: (1) education, (2) contract research, (3) cultural products, (4) trained labor, (5) technology diffusion, (6) new knowledge creation, and (7) new products and industries". Here we focus solely on university contributions that are related to research, and particularly to knowledge spill-over contributions. There are many different ways to segment university research contributions to regional development, including:

- Between formal interactions based on commercialisation via contracts versus informal interactions via engagement (Olmos Peñuela *et al.*, 2013; Perkmann *et al.*, 2013)
- Between impacts via knowledge transfer versus human capital (Eunivation, 2017), and
- Between impact estimations using qualitative versus quantitative approaches (Kitagawa & Benneworth, 2017)

These segmentations cluster around two main kinds of analysis,

- ***qualitative*** approaches analysing university-centred innovation networks' systemic properties, and
- ***quantitative*** (often econometric) approaches analysing commercialisation transactions.

Qualitative evidence

Multidimensionality

There is no one single way in which universities contribute to regional development, and even a single university may be active in many qualitatively different areas (Eunivation, 2017; Benneworth *et al.*, 2016).

Connectivity

Universities provide connections to external knowledge partners, these connections assist local firms to more easily access remote knowledge resources, the "global pipelines, local buzz" model of regional development (Bathelt *et al.*, 2004). Universities can help to build cross-border innovation spaces which help build critical mass and drive regional development in peripheral border regions (Van den Broek *et al.*, 2019). Pugh (2016) highlights how universities help to import and embed new regional development policy approaches and persuade recalcitrant policy-makers of their value.

Upgrading

Universities may provide knowledge services to industry (generative effects), improve local capacities for knowledge exploitation (developmental impacts), and increase local knowledge absoprtion capacities (Gunasekara, 2006; Uyarra, 2007). Universities can contribute by participating in collective regional activities that help plug gaps in regional knowledge and developing collective action plans for innovation-led growth (Asheim *et al.*, 2010; McCann & Orteges-Argiles, 2013; Benneworth, 2017).

Quantitative evidence

The general effects:

Anselin *et al.* (1997) provided the first demonstration of local spill-over effects with US universities contributing to local innovation activity. Valero & Van Reenen (2019) confirmed this to to be generally true globally, and specifically as a result of knowledge spill-overs through knowledge exchange and student effects rather than expenditure effects. Guerrero *et al.* (2015) likewise find that "for the majority of the United Kingdom's universities, research activities have contributed the most to economic growth." (p. 756).

Borrowed size:

There is evidence to confirm that universities benefit places that lack critical mass and returns to scale of their knowledge activities. Goldstein & Drucker (2006) provided evidence from the US evidence that universities raise local graduate earnings by increasing economic opportunities and innovation; they speculated that this improved regional labour market quality where there were no large cities. Bonander *et al.* (2016) found that Swedish university college mergers did not of itself increase regional benefits.

Different roles for universities in different places

Lehmen & Menter (2017) note that universities and regions to co-evolve together, with universities reflecting their regions and regions affecting their higher education sector. Huggins & Prokop (2017) find that universities occupy critical positions within networks

of knowledge exchange that facilitate business innovation: the regional development effects of these networks increases as the innovativeness of the region increases. Qiu *et al.* (2017) demonstrated that in China, building global pipelines only made sense for universities in more innovative regions; in less successful regions, promoting regional development was associated with universities partnering with local companies. Likewise, more generally, Morozau *et al.* (2017) revealed that university research contributions are only important for regional development in industrialised and knowledge-based economies, whilst human capital contributions are important for all kinds of region, including low production cost economies.

Overview and gaps

University research contributes to regional development through a wide range of mechanisms not all of which are immediately reducible to economic transactions; shadow prices do not adequately cover collective and public goods (McMahon, 2009). Fairly representing these contributions requires bringing these very different mechanisms together in a comparable way, and this is a non-trivial task; failing to do this produces misleading analyses of what it is that matters and can be harmful for higher education policy-making and practice (Benneworth *et al.*, 2016).

There are four main areas that require better understanding in order to be able to capture the breadth of ways in which university research-based products contribute to regional development:

- Why are universities motivated to undertake regional engagement: although they may have a public goal, universities are not regional development agencies and allowing their research to drive growth is not necessarily institutionally rational (Víquez-Abarca, 2012; Benneworth, 2017a)

- Why are academics motivated to engage with regional partners: regional engagement brings tensions and engagement has a dark side, so what barriers and problems emerge at the micro-scale of interaction (Bozeman 2013; Nieth *et al.*, 2013)?

- How do other kinds of policy & regulation framing university research behaviour affect their regional development consequences (such as prioritising global excellence publishing in English) (Benneworth *et al.*, 2017b)?

- What kinds of conflicts can arise when university research spills-over into regional contexts, and which tensions may involving other partners bring to university governance (Christopherson & Clark,2010)?

Our focus here has been on university research. Other research traditions consider the effects of university & student expenditures on their regional economies (cf Cooke, 1970; Florax, 1992; Hermannson et al., 2013), the induced economic effects of university technology transfer infrastructure (Hobbs et al., 2018) and the expenditure effects of university research activities (Lane et al., 2018).

Sources

Anselin, L., Varga, A. and Acs, Z., 1997. Local geographic spillovers between university research and high technology innovations. Journal of urban economics, 42(3), pp.422-448.

Asheim, B. T., Boschma, R., & Cooke, P. (2011) Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases, Regional Studies 45(7), 893-904.

Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. Progress in human geography, 28(1), 31-56.

Benneworth, P. S. & Kitagawa, F. (2017) "Universities and Regional Development in the Periphery" in J.C. Shin, P. Teixeira (eds.), Encyclopedia of International Higher Education Systems and Institutions, Dordrecht: Springer DOI 10.1007/978-94-017-9553-1_353-1

Benneworth, P. S. Pinheiro, R. & Karlsen, J. (2017a) "Strategic Agency and Institutional Change: Investigating the Role of Universities in Regional Innovation Systems (RISs)" Regional Studies 51 (2) pp. 235-248 doi: 10.1080/00343404.2016.1215599.

Benneworth, P., Pinheiro, R. and Sánchez-Barrioluengo, M. (2016) One size does not fit all! New perspectives on the university in the social knowledge economy. Science and public policy, 43(6), pp.731-735.

Benneworth, P., Zeeman, N., Pinheiro, R. & Karlsen, J. (2017b) "National higher education policies challenging universities' regional engagement activities" EKONOMIAZ, 92 (2) pp. 146-173

Bonander, C., Jakobsson, N., Podestà, F. and Svensson, M., 2016. Universities as engines for regional growth? Using the synthetic control method to analyze the effects of research universities. Regional Science and Urban Economics, 60, pp.198-207.

Bozeman, B., Fay, D., & Slade, C. P. (2013). Research collaboration in universities and academic entrepreneurship: the-state-of-the-art. The Journal of Technology Transfer, 38(1), pp. 1-67. doi:10.1007/s10961-012-9281-8

Christopherson, S. & Clark, J. (2010) Limits to 'The Learning Region': What University-centered Economic Development Can (and Cannot) do to Create Knowledge-based Regional Economies. Local Economy 25 pp. 120-130

Cooke, E. D. (1970) "Analyzing university student contribution to the economic base of the community" Annals of Regional Science 4 (1) pp 146-153

The Eunivation Consortium (2017) "Measuring the contribution of higher education to innovation capacity in the EU" Luxemburg, OOPEC, Available online here https://publications.europa.eu/en/publication-detail/-/publication/75e52dab-1442-11e7-808e-01aa75ed71a1

Feldman M. and Desrochers, P. (2003) Research Universities and Local Economic Development: Lessons from the History of the Johns Hopkins University, Industry & Innovation 10, 5-24.

Florax, R.J.G.M. (1992) The university: A regional booster? Economic impacts of academic knowledge infrastructure, Aldershot, UK: Avebury.

Goddard, J., Kempton, L. and Vallance, P., 2013. Universities and Smart Specialisation: challenges, tensions and opportunities for the innovation strategies of European regions. Ekonomiaz. Revista vasca de economia, 83(02), pp.83-102.

Goldstein, H. and Drucker, J., 2006. The economic development impacts of universities on regions: Do size and distance matter?. Economic development quarterly, 20(1), pp.22-43.

Guerrero, M., Cunningham, J.A. and Urbano, D., 2015. Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. Research Policy, 44(3), pp.748-764.

Harrison, J. and Turok, I. (2017) Universities, knowledge and regional development, Regional Studies, 51:7, 977-981, DOI: 10.1080/00343404.2017.1328189

Hermannsson K, Lisenkova K, McGregor P G, Swales J K, 2013, "The expenditure impacts of individual higher education institutions and their students on the Scottish economy under a regional government budget constraint: homogeneity or heterogeneity?" Environment and Planning A 45(3) 710 – 727

Hobbs, K.G., Link, A.N. and Shelton, T.L., 2018. The Regional Economic Impacts of University Research and Science Parks. Journal of the Knowledge Economy, pp.1-15.

Huggins, R. and Prokop, D., 2017. Network structure and regional innovation: A study of university–industry ties. Urban Studies, 54(4), pp.931-952.

Lane, J. I., Goldschlag, N., Weinberg, B. A., & Zolas, N. (2018). Proximity and Economic Activity: An Analysis of Vendor-Business Transactions. Journal of Regional Science. https://doi.org/10.1111/jors.12397

Lehmann, E.E. and Menter, M., 2016. University–industry collaboration and regional wealth. The Journal of Technology Transfer, 41(6), pp.1284-1307.

Lendel, I., 2010. The impact of research universities on regional economies: The concept of university products. Economic Development Quarterly, 24(3), pp.210-230.

Nieth, L., Benneworth, P., Fonseca, L., Rodrigues, C., Salomaa, M., Charles, D. & Stienstra, M. (2018) "Embedding entrepreneurial regional innovation ecosystems. Reflecting on the role of effectual entrepreneurial discovery processes?" European Planning Studies Special Issue on Regional innovation systems and entrepreneurial embeddedness, published online first, 5th October 2018. https://doi.org/10.1080/09654313.2018.1530144

Olmos-Peñuela, J., Molas-Gallart, J. and Castro-Martínez, E., 2013. Informal collaborations between social sciences and humanities researchers and non-academic partners. Science and Public policy, 41(4), pp.493-506.

McMahon, W. W. (2009) Higher Learning, Greater Good: The Private and Social Benefits of Higher Education, Baltimore: Johns Hopkins University Press.

Marozau, R., Guerrero, M. and Urbano, D., 2016. Impacts of universities in different stages of economic development. Journal of the Knowledge Economy, pp.1-21.

Mowery, D.C. and Ziedonis, A.A., 2015. Markets versus spillovers in outflows of university research. Research Policy, 44(1), pp.50-66.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., & Krabel, S. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. Research policy, 42(2), 423-442.

Pugh, R. (2016). Universities and economic development in lagging regions: 'Triple helix' policy in Wales. Regional Studies. doi:10. 1080/00343404.2016.1171306

Qiu, S., Liu, X. and Gao, T., 2017. Do emerging countries prefer local knowledge or distant knowledge? Spillover effect of university collaborations on local firms. Research Policy, 46(7), pp.1299-1311.

Saxenian, A.-L. (1994) Regional Advantage: culture and competition in Silicon Valley and Route 128, Cambridge MA: Harvard.

Valero, A. and Van Reenen, J., 2019. The economic impact of universities: Evidence from across the globe. Economics of Education Review, 68, pp.53-67.

Víquez-Abarca, R. (2012) “Public Higher Education, the Knowledge Economy and Regional Development in Costa Rica”, Unpiblished Ph.D. thesis, Newcastle University, Newcastle upon-Tyne

Uyarra, Elvira (2008) : The impact of universities on regional innovation: A critique and policy implications, Manchester Business School Working Paper, No. 564, The University of Manchester, Manchester Business School, Manchester (Available via: https://www.econstor.eu/bitstream/10419/50728/1/584768265.pdf)

Yigitcanlar, T. (2010). Making space and place for the knowledge economy: Knowledge-based development of Australian cities. European Planning Studies, 18(11), 1769–1786. doi:10.1080/09654313.2010.512163

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