ERC
Enterprise Research Centre

RESEARCH REPORT

Universities and local economic development – a review of academic literature

November 2026

UKRI Economic and Social Research Council

wbs
WARWICK BUSINESS SCHOOL
THE UNIVERSITY OF WARWICK

About the Enterprise Research Centre

The Enterprise Research Centre (ERC) is an independent research centre based at Warwick Business School focusing on growth, innovation and productivity in small and medium-sized enterprises. The Centre is funded by the Economic and Social Research Council, Department for Business, Innovation, Science and Trade, Innovate UK, the British Business Bank and the Intellectual Property Office.

ERC research informs policy and practice relating to business start-up, growth, innovation, productivity and access to finance.

Further information is available at: www.enterpriseresearch.ac.uk.

Disclaimer

The views expressed in this report are those of the authors and do not necessarily represent those of the funders. Whilst every effort has been made to ensure the accuracy of the information contained in this publication, neither ERC nor any of its partners accept any responsibility for errors or omissions.

Acknowledgements

The authors are grateful for comments on an earlier draft from Research and Innovation Directorate colleagues in BIST.

Suggested Citation

Suggested citation: Ri, A., and Roper, S. (2026). *Universities and local economic development – a review of academic literature.* ERC Research Report. Enterprise Research Centre, Warwick Business School. Available at: www.enterpriseresearch.ac.uk [Accessed: DD Month YYYY].

Authors	Anastasia Ri, Stephen Roper
Published	November 2026

Contents

Executive Summary 5
Key themes 5
Context and objectives 5
Regional growth and productivity 6
Innovation and knowledge spillovers 6
Entrepreneurship and spin-outs 7
Structural change and regional resilience 7
Impacts of institutional diversity 7
Methodological challenges 8
Universities in lagging regions 8
Policy implications 8
Section 1. Universities and local economic development 10
1.1 Context and objectives 10
1.2 Structure of the review 11
Section 2: University contributions to regional growth and prosperity – conceptual overview 13
Section 3: Universities' contribution to regional growth and productivity 15
3.1 Universities and regional productivity 15
3.2 Universities and regional innovation 16
3.3 Universities and regional diversity 17
3.4 Summary 19
Section 4: Human Capital and Labour Market Outcomes 21
4.1 Universities, Human Capital and Regional Labour Markets 21
4.2 Graduate Retention, Mobility and Spatial Sorting 21
4.3 Employment and Wage Outcomes 24
4.4 Institutional Diversity and Uneven Regional Effects 24
4.5 Summary 25
Section 5: Innovation and Knowledge Spillovers 27
5.1 Influences on university-owned patents 27
5.2 University research and firm-level patenting 27
5.3 Summary 30
Section 6: Universities, Entrepreneurship and Spinouts 32
6.1 Universities, Entrepreneurship and New Firm Formation 32
6.2 Academic Entrepreneurship and University Spinouts: Creation, Survival, and Growth 33
6.3 Summary 36

Section 7: Universities, Structural Change and Regional Resilience 37
7.1 Universities, Structural Change and Regional Transformation 37
7.2 Universities and Regional Economic Resilience 39
7.3 Governance and Civic Engagement 40
7.4 Summary 42
Section 8: Institutional and governance effects on university impacts 44
8.1 Institutional Type Variations 44
8.2 Autonomy, organisational and clustering effects 46
8.3 Summary 46
Section 9: Measurement and methodological limitations 48
9.1 Measurement 48
9.2. Attribution and causal inference 49
9.3 Summary 50
Section 10: Universities in lagging regions 52
10.1 Different dimensions of impact 52
10.2 Achieving impact in lagging regions – the importance of human capital 53
10.3 Regional Engagement and Governance 54
10.4 Summary 55
Section 11: Policy Implications: Universities and Regional Development in Different Contexts 57
11.1 Financial challenges and regional engagement 57
11.2 Policy implications 58
References 61
ANNEX Selected Quantitative Evidence 71
Section 3 Annex. Empirical evidence on universities' contribution to regional growth and productivity 71
Section 4 Annex. Empirical evidence on universities, human capital and regional labour markets 74
Section 5 Annex. Empirical evidence on innovation and knowledge spillovers 77
Section 6 Annex. Empirical evidence on universities, entrepreneurship and spinouts 79
Section 7 Annex. Empirical evidence on universities, structural change and regional resilience 81
Section 8 Annex. Empirical evidence on institutional diversity and regional economic outcomes 82
Section 10 Annex. Empirical evidence on universities in lagging and peripheral regions 83

Executive Summary

Key themes

The evidence suggests that universities make important—but highly uneven—contributions to regional and national economic development. Across OECD economies, the most consistent empirical evidence points to human capital formation, innovation spillovers, and productivity growth. However, these effects are not automatic. They depend critically on regional context, institutional characteristics, and complementary assets such as firm-level absorptive capacity, skilled labour demand, and effective governance systems.

A central conclusion is that university impacts are mediated through wider systems of firms, government actors, and institutions, and therefore depend on how well these systems function. Universities often act as enabling and coordinating institutions, but can also contribute more directly to developing regional capabilities and processes of economic transformation. In economically advanced regions, universities tend to reinforce existing strengths through high-quality research and innovation spillovers. In lagging regions, human capital development, institutional stability and civic engagement can be particularly important, while the benefits from research commercialisation depend more strongly on complementary business capabilities and wider entrepreneurial ecosystems.

The evidence also underscores the importance of institutional diversity. Research-intensive universities, teaching-focused institutions, and applied or vocational providers contribute in different ways. Attempts to impose uniform expectations—particularly around spinouts and commercialisation—risk overstating the potential of universities in weaker regions while undervaluing broader contributions, such as workforce development and regional coordination.

Alongside concerns about the financial sustainability of UK universities and the implications for their regional contribution, the evidence suggests that effective policy should adopt a place-based, system-oriented approach, recognising that universities are part of wider regional development ecosystems rather than a standalone solution to structural economic challenges.

Context and objectives

Governments increasingly view universities as central actors in regional growth strategies, capable of supporting innovation, skills development, and economic transformation. At the same time, a large and diverse academic literature has emerged examining these roles. This literature does not offer a single, unified conclusion but instead highlights multiple mechanisms through which universities influence economic outcomes, together with significant variation across contexts. The review, therefore, focuses on synthesising the main empirical findings, identifying where the evidence is strongest, and noting where it remains more limited.

The conceptual literature offers a useful starting point by identifying complementary mechanisms linking universities to economic development. Universities contribute through knowledge spillovers, human capital formation, collaboration within regional innovation systems, and their roles as large civic or anchor institutions. These frameworks show that universities operate through interacting channels rather than a single pathway. For example, research activity generates knowledge that can diffuse to firms, while teaching produces skilled graduates who contribute directly to productivity. At the same time, collaboration with government and industry shapes the effectiveness of these processes. A consistent insight across these perspectives is that university impacts depend heavily on context: the same institution may have very different effects depending on the characteristics of the regional economy in which it is embedded.

Regional growth and productivity

Empirical evidence linking universities to regional growth and productivity is broadly positive but highly variable. Across countries, a consistent finding is that increases in university presence—measured by the number of institutions, student populations, or research intensity—are associated with higher GDP per capita and productivity. These effects appear to operate through a combination of direct expenditure (including university employment and procurement) and supply-side mechanisms linked to innovation and skills.

There is also substantial evidence of spatial spillovers, with benefits extending beyond the immediate locality of universities to surrounding regions. At the same time, the magnitude of these effects varies considerably across regional contexts. Economically advanced and urbanised regions may be better placed to absorb and utilise university-generated knowledge, although some studies find important effects in smaller or less prosperous regions. Additional evidence suggests that while universities can support the development of new economic activities, they more often reinforce and deepen existing regional specialisations rather than create entirely new ones.

Some of the most robust and consistent evidence base concerns the human capital role of universities. A large body of work shows that higher levels of graduate employment are associated with increased productivity and wage growth, not only for graduates themselves but also for other workers through spillover effects. Universities therefore play a central role in shaping regional labour markets and supporting long-term economic performance.

However, this contribution is strongly mediated by patterns of graduate mobility. Graduates are highly mobile and frequently relocate to areas with better employment opportunities, concentrating skills in already prosperous regions. As a result, the benefits of university education are not necessarily retained locally. This creates a tension for policy: universities may increase the supply of skilled labour in a region, but without sufficient local demand, many graduates will leave.

Evidence also shows that different types of institutions can have distinct labour-market impacts, with teaching-focused and applied institutions potentially playing particularly important roles in supplying skills to local and regional labour markets, while research-intensive universities often operate across wider national and international networks.

Innovation and knowledge spillovers

A substantial literature also examines the role of universities in generating innovation and knowledge spillovers. Across OECD countries, there is strong evidence that university research contributes to firm-level innovation, often measured through patenting activity and productivity gains. Studies consistently find that increases in university research activity are associated with higher levels of innovation in nearby firms.

Collaboration between universities and industry is also linked to improvements in firm productivity, suggesting that interactive knowledge exchange plays an important role alongside more passive spillover processes. However, these effects depend critically on the absorptive capacity of firms. Firms with stronger internal R&D capabilities and higher skill levels are generally better able to benefit from university knowledge, while regions lacking these capabilities may derive limited benefits. However, these capabilities are not fixed, and universities can themselves contribute to their development through skills formation, collaboration and knowledge exchange.

Geographic proximity is also important, with stronger effects observed close to universities, although long-distance collaborations can also be significant in some sectors.

Overall, the evidence suggests that universities contribute meaningfully to innovation, but that these contributions are conditional on the wider characteristics of regional innovation systems.

Entrepreneurship and spin-outs

The relationship between universities and entrepreneurship is similarly nuanced. The presence of universities is generally associated with higher rates of new firm formation, particularly in knowledge-intensive sectors. This reflects a combination of mechanisms, including the commercialisation of research, the diffusion of tacit knowledge, and the entrepreneurial activity of graduates.

Empirical studies suggest that applied sciences and engineering disciplines have particularly strong links to firm creation. At the same time, the literature highlights important limitations. University spinouts, while highly visible in policy discussions, represent only a small part of wider entrepreneurial activity linked to universities, which also includes graduate and student entrepreneurship, businesses established by academics outside formal university spinout arrangements, and new firm creation stimulated by university-generated knowledge and skills. Their subsequent growth and regional retention vary considerably and depend on access to finance, networks, entrepreneurial expertise and wider ecosystem conditions. Furthermore, successful firms often relocate as they grow, limiting the extent to which benefits are retained locally.

These findings suggest that universities can contribute to entrepreneurship, but only as part of broader entrepreneurial ecosystems that provide the necessary supporting conditions.

Structural change and regional resilience

The evidence on structural change and regional resilience is less extensive and more qualitative. Universities can contribute to long-term economic transformation by supporting diversification, fostering innovation, and participating in regional governance systems. Their contribution generally occurs through interaction with firms, public institutions and wider regional networks, although universities can themselves play an active role in developing regional capabilities and shaping new development paths.

Case study evidence indicates that successful transformations involve sustained collaboration between universities, firms, and public institutions, often over long time periods. Similarly, the idea that universities make regions more resilient to economic shocks receives limited empirical support. While universities can provide some stability through employment and local demand, their ability to “recession-proof” regions appears to depend on the nature of the shock and the broader economic context.

More generally, universities appear to contribute to adaptive capacity by supporting skills, knowledge, and institutional learning, rather than directly preventing economic downturns.

Impacts of institutional diversity

Institutional diversity emerges as a key theme throughout the literature. Universities differ significantly in their missions, capabilities, and strategic priorities, and these differences shape their economic impacts.

Research-intensive universities tend to generate stronger innovation effects, particularly in regions with well-developed innovation systems. In contrast, teaching-focused and applied institutions often have more direct and consistent impacts on local labour markets and workforce development.

Governance and organisational factors also play an important role. Universities with greater autonomy and stronger internal leadership are generally more effective in translating resources into economic outcomes. At the same time, alignment between university activities and regional needs appears to be critical. Where universities focus primarily on national or global objectives, local economic benefits may be reduced.

Methodological challenges

The review highlights important methodological challenges in assessing university impacts. A key issue is endogeneity: universities are often located in economically stronger regions, making it difficult to separate cause and effect. Spatial spillovers further complicate attribution, as benefits frequently extend beyond the regions in which universities are located.

In addition, many impacts—particularly those related to structural change and resilience—take place over long time periods, making them difficult to measure. The literature also tends to focus on measurable indicators such as patents and spinouts, which may understate broader contributions related to teaching, civic engagement, and institutional leadership. As a result, while the overall direction of evidence is broadly positive, the strength of causal claims varies across different domains.

Universities in lagging regions

The role of universities in lagging regions highlights many of these dynamics. Evidence suggests that universities can have measurable economic impacts in less-developed areas, including contributions to employment, firm creation, and regional income. However, the mechanisms through which these impacts occur differ from those in more advanced regions.

Human capital formation and workforce development are particularly important, while the benefits from research commercialisation and high-technology entrepreneurship tend to be more dependent on complementary business capabilities, networks and wider entrepreneurial ecosystems. In some cases, universities can act as substitutes for missing knowledge infrastructure, providing skills and services that would otherwise be absent.

Nonetheless, limited absorptive capacity and strong outward migration of graduates can reduce the scale of local benefits. At the same time, universities can contribute to developing regional capabilities through skills formation, business support, knowledge exchange and participation in regional institutions and networks. These findings suggest that universities can play a valuable role in supporting development in lagging regions, but that expectations should be aligned with local conditions and capabilities.

Policy implications

Recent evidence highlights the importance of universities' financial sustainability for maintaining their regional roles. Financial pressures are already affecting patterns of engagement, with some institutions reducing support for local activities even as leadership engagement increases. This underlines the need to consider the funding environment as a key determinant of universities' ability to contribute to regional development.

More broadly, the evidence points to several important policy implications:

- **Adopt place-based approaches** - policies must reflect regional differences in economic structure, absorptive capacity, and institutional context.
- **Recognise institutional diversity -** different types of universities contribute in different ways; policy frameworks should not impose uniform expectations.
- **Strengthen absorptive capacity - i**nvestment in firms, skills, and intermediary organisations can increase the benefits from university spillovers, while universities can themselves contribute to developing these capabilities.

- **Focus beyond commercialisation metrics -** human capital, workforce development, and institutional roles capture important dimensions of university contribution that are not reflected in patents and spinouts alone.
- **Support long-term strategies -** regional transformation requires sustained investment and coordination over decades.
- **Enhance governance and coordination -** universities are most effective within collaborative regional systems involving multiple actors.

Overall, the review concludes that universities are important contributors to economic development, but their impacts are neither automatic nor uniformly distributed. They play a central role in shaping human capital, supporting innovation, and contributing to regional systems of governance and coordination.

However, their capacity to address broader structural weaknesses in regional economies is constrained, and they cannot be expected to do so in isolation. Their effectiveness depends on the wider context in which they operate and on the alignment between university activities and regional needs. For policy, this implies a shift away from university-centric models towards more integrated approaches that recognise universities as one component of broader regional development systems.

Key Findings at a Glance

- Finding one: Universities make a positive but highly uneven contribution to regional economic development, with the scale and nature of their impacts varying across institutional types, regional economic conditions and development contexts.
- Finding two: Human capital formation, innovation and knowledge spillovers are among the most consistently evidenced channels of university contribution, although their economic benefits frequently extend beyond universities' host regions.
- Finding three: Universities contribute to entrepreneurship, structural change and regional resilience through multiple channels, but the magnitude and effectiveness of these contributions depend on wider business capabilities, institutional networks and regional ecosystems.
- Finding four: In lagging and peripheral regions, universities can play particularly important roles in skills development, workforce upgrading and institutional coordination, while also helping to build the regional capabilities needed to support future innovation and growth.
- Finding five: Effective policy requires a differentiated, place-based approach that recognises institutional diversity, strengthens regional capabilities and supports sustained university engagement rather than relying on uniform commercialisation targets or university-led growth strategies.

Section 1. Universities and local economic development

1.1 Context and objectives

Concerns about national growth and uneven place-based development have fuelled discussion around the role of universities in regional growth strategies. Policy documents such as the UK Industrial Strategies of 2017 and 2025 and the Levelling Up White Paper (2022), emphasise universities' roles in local innovation systems, driving regional productivity and delivering "anchor institution" functions (skills, R&D, cluster formation). More recent reports by Universities UK quantify the economic impact of universities through teaching, research, and innovation[1] and provide a "blueprint" for maximising the local and national benefits of the university sector[2]. Similar emphasis on the role of universities in supporting local development is evident in reports from think tanks[3], banks[4], and governments in the other home nations. For example, the Independent Report on Regional Economic Development in Scotland (2025) devotes an entire chapter to the roles of universities as creators of knowledge, hubs and enablers of entrepreneurship and leading actors in regional cluster development.[5]

The policy focus on universities – and particularly their role in stimulating R&D based growth – has been longstanding in the UK, with Johnston and Huggins (2021) tracing the story since the establishment of the National Physical Laboratory in 1900 (Box 1.1). Internationally, similar concerns have also been evident with the OECD having a consistent focus on the potential role of universities as a driver of growth and productivity[6]. Most recently, in partnership with NCIA, the OECD has stressed the 'potential' contribution of higher education institutions (HEIs) to the UK economy and emphasised the importance of developing closer eco-system relationships and support for entrepreneurship[7].

Box 1.1: Universities and the economy – a brief UK policy history

Johnston & Huggins (2021) trace the history of UK focused policy using R&D to support economic development through the establishment of the National Physical Laboratory (1900), the Department of Scientific and Industrial Research (1916) and subsequently Military applications of knowledge were directed by a series of laboratories set up to pursue work relevant to all branches of the armed forces, the Admiralty Research Laboratory (1921), the Royal Aircraft Establishment (1918), and the Explosives Research and Development Establishment (1945).

After WWII the Development of Inventions Act (1948) created the National Research Development Corporation (NRDC) charged with exploiting inventions from public research and granting licences for the use of public research by other organisations. In 1967, a committee of industrialists and university vice-chancellors was formed to investigate links between universities and industry in the UK. Published in 1971, 'The Docksey Report' suggested that university-business interactions were widespread, particularly in STEM disciplines and social sciences. Subsequently, economic conditions distracted policy attention away from science policy until 'A Strategy for the Science Base' (1987), which focused grant funding on curiosity-driven research and a reliance on market forces to drive commercialisation.

[1] See https://www.universitiesuk.ac.uk/sites/default/files/field/downloads/2024-09/LE-UUK-Impact-of-university-TL-and-RI-Final-Report.pdf.
[2] See https://www.universitiesuk.ac.uk/sites/default/files/field/downloads/2025-01/opportunity-growth-and-partnership-a-blueprint-for-change-170125.pdf.
[3] See, for example, https://ied.co.uk/wp-content/uploads/2025/07/How-Universities-Can-Help-Drive-Local-and-Regional-Economies-FINAL1.pdf.
[4] See https://www.lloydsbankinggroup.com/assets/pdfs/who-we-are/our-purpose/universities-as-drivers-of-growth-report.pdf.
[5] See https://scottishlabour.org.uk/wp-content/uploads/2025/11/Independent-Report-on-Regional-Economic-Development-in-Scotland.pdf.
[6] See, for example, https://files.eric.ed.gov/fulltext/ED494412.pdf.
[7] See https://www.oecd.org/en/publications/the-geography-of-higher-education-in-england-and-wales_be1c6f52-en.html.

As Johnston & Huggins (2021, p. 59) note: "Essentially, this approach represented a shift in policy from a focus on intermediary organisations designed to link universities and industry, to a focus on supporting independent university research". Subsequent reports emphasised the role of university-generated knowledge as a commercial resource for innovation, beginning with 'Our Competitive Future' (1998). This theme has continued in more recent policy documents, including the Lambert Review (2003), the Witty Review (2012), the Wilson Review (2015), and the McMillan Review (2016). These reviews repeatedly refer to the UK's 'world-class research and innovation system', a theme that persists in more recent policy documents.

Alongside this policy discussion, and often rather separately, universities and their local and national impacts have been the subject of intense academic interest. Basic searches on Web of Science, one of the main research bibliographies, yields over 1,000 research papers focused on either universities and productivity or universities and growth. The scale and cadence of this literature mean that any attempt to provide a comprehensive review is likely to fail. A number of dominant themes and repeated findings do, however, emerge from this literature and these are the focus of the remainder of this review. A key focus throughout the literature has been an attempt to understand, and calibrate, the impact of universities on local and national economies and to identify the mechanisms through which these impacts occur. The challenges this involves prove complex and continue to stimulate new calibration attempts such as the Knowledge Exchange Framework (2017-)[8] and the newly developed spin-out register[9] as part of on-going revisions to the HEBCI survey.

The central question we address in this review is: What do we currently know about universities' effects on regional and national economic outcomes? Our aim is to provide a representative (rather than comprehensive) synthesis of academic evidence on how, and under what conditions, universities affect economic outcomes at regional and national scales. We focus in particular on:

- The magnitude and direction of effects across multiple outcome domains.
- The mechanisms and channels through which effects operate.
- Contextual moderators that condition effects (place type, institutional profile, governance).
- Measurement and attribution challenges that complicate interpretation.

We include academic literature across disciplines (regional science, innovation studies, labour economics, higher education studies) and both UK and international studies. Our primary focus is on evidence from the OECD and other advanced economies. We largely exclude the rapidly growing literature on universities in developing countries.

1.2 Structure of the review

The remainder of this report is structured as follows:

- **Section 2: University contributions to regional growth and prosperity – conceptual overview** - this section outlines the key theoretical frameworks used to understand how universities contribute to regional economic development. It synthesises leading models—including knowledge spillovers, human capital formation, regional innovation systems and civic/anchor institution perspectives—to provide a conceptual foundation for interpreting the empirical evidence reviewed in subsequent sections.
- **Section 3: Universities' contribution to regional growth and productivity -** this section reviews empirical evidence linking universities to regional economic performance, including GDP, productivity and employment. It distinguishes between direct effects and supply-side mechanisms and examines how impacts vary across regions with different economic characteristics and levels of development.
- **Section 4: Human capital and labour market outcomes -** this section focuses on universities' role in the production, attraction and retention of skilled labour. It examines

[8] See https://kef.ac.uk/about.
[9] See https://www.hesa.ac.uk/data-and-analysis/business-community/spin-out-register

graduate mobility, wage and employment outcomes, and the extent to which universities contribute to local labour markets versus redistributing talent across regions.

- **Section 5: Innovation and knowledge spillovers** - this section considers how university research contributes to innovation within firms and regional economies. It reviews evidence on patents, research collaboration and knowledge transfer mechanisms, and assesses how institutional factors and regional absorptive capacity shape the scale and distribution of spillover effects.
- **Section 6: Universities, entrepreneurship and spinouts** - this section examines the role of universities in supporting entrepreneurship, new firm creation and spinout activity. It evaluates both the generation of entrepreneurial ventures and the longer-term challenges of survival, growth and regional retention, highlighting the importance of wider ecosystem conditions.
- **Section 7: Universities, structural change and regional resilience** – explores the contribution of universities to long-term economic transformation, industrial diversification and resilience to economic shocks. It emphasises the conditional and system-based nature of these effects, including the role of governance, institutional coordination and civic engagement.
- **Section 8: Institutional and governance effects on university impacts** - investigates how differences between universities—such as research intensity, mission, autonomy and organisational structure—shape their economic impacts. It highlights the importance of institutional diversity and governance arrangements in mediating outcomes across regions.
- **Section 9: Measurement and methodological limitations** - reviews the methods used to assess university impacts and the associated challenges. It discusses issues of measurement, attribution, causality and time horizons, highlighting the strengths and limitations of the existing evidence base.
- **Section 10: Universities in lagging regions** - focuses specifically on the role of universities in less-developed and peripheral areas. It examines the mechanisms through which universities can support development in these contexts, including human capital formation, entrepreneurship support and institutional engagement, while emphasising contextual constraints.
- **Section 11: Policy implications: universities and regional development in different contexts** - draws together the evidence to identify key policy implications. It emphasises the need for place-based, context-sensitive approaches and highlights how different university roles and mechanisms are most effective in different regional settings.

Section 2: University contributions to regional growth and prosperity – conceptual overview

A substantial body of theory has developed to explain how and why universities contribute to regional productivity, moving beyond simple "knowledge spillover" ideas. These theories of change differ in their mechanisms and scale, but they are largely complementary rather than competing. Collectively, they show that universities can affect regional development both through the resources they generate—knowledge, skills and research—and through more active roles in shaping networks, institutions and regional capabilities. They also highlight the importance of institutional and regional diversity for the scale and nature of these effects. There are eight main frameworks that help explain the channels through which universities may influence regional development and productivity:

The knowledge spillover theory of entrepreneurship – the central idea is that universities generate knowledge that spills over into the regional economy, raising productivity by enabling firms and entrepreneurs to commercialise research findings that larger companies do not exploit. Originally developed in the 1990s, this theory links universities to entrepreneurial outcomes in their host regions and can help explain why regions with strong universities often have higher firm entry and innovation rates (Audretsch and Feldman, 1996; Acs et al., 2013). Here, spillovers are seen as occurring through codified knowledge (publications, patents), local tacit knowledge exchange via informal interaction, and academic entrepreneurship and spin-outs. The importance of tacit knowledge exchange emphasises the role of co-location, and tacit knowledge spillovers decay with distance.

Human Capital and Skills Formation – this theory focuses on the human capital benefits of universities and suggests that universities raise regional productivity primarily through graduate supply and skills deepening (Moretti, 2004; Glaeser and Saiz, 2003). Graduate retention is critical for this effect to operate, although universities may also contribute to productivity through lifelong learning and by supporting workforce upskilling and the development of managerial and professional talent. This model is helpful in extending arguments about the productivity impact of universities to non-research-intensive universities.

Triple Helix Model (University–Industry–Government) – here the core idea is that productivity gains emerge when universities, firms, and governments co-evolve and co-produce innovation capacity meaning that university research and innovation meets the needs of local firms (Etzkowitz and Leyesdorff, 2000; Ranga and Etzkowitz, 2013). Developing in the early years of the 21st century, this model emphasises the role of interaction and collaboration and the importance of mechanisms such as collaborative research programmes, policy co-design and intermediate institutions (science parks, innovation hubs).

Entrepreneurial University – this focuses attention on the nature of universities themselves, including their strategies and autonomy. The key argument is that universities can shape regional productivity by acting entrepreneurially, not just by educating or researching (Sanchez-Barrioluengo et al., 2019; Etkowitz et al., 2000). This is likely to be reflected in institutional leadership, a focus on commercialisation strategies, and an organisational culture that prioritises engagement alongside researchers' scientific contributions. The focus on university agency can help explain variations in the impacts of similar universities and the importance of aligning university objectives with regional needs.

Regional Innovation Systems (RIS) – In this framework, universities contribute to productivity as systemic components of regional innovation ecosystems (Cooke et al., 1997; Molica et al., 2026). This focuses attention on the context in which universities operate and the importance of complementary assets (skills, finance) that enable the adoption and exploitation of university-generated knowledge and the best use of university assets. Widely adopted in policy analysis, this type of model focuses attention on knowledge flows and transfer, complementary resources within the region, and the long-term development of regional capabilities.

Civic and Anchor Institution Theory - Universities are often among the oldest and most substantial institutions in particular areas (Goddard et al., 2016; Jeffrey, 2025). In this sense, they often provide institutional stability and consistent local investment. This can lead to direct multiplier effects through local procurement and employment and also contribute cultural and social capital to an area. Universities are also often key actors in the establishment of innovation districts and urban regeneration projects. Anchor models may be particularly important in explaining the impact of universities in "left-behind" localities.

Absorptive Capacity – Universities' ability to impact local productivity depends on the ability of a region's firms to absorb and use university-generated knowledge. This model, therefore, provides a critical complement to knowledge spillover frameworks and the triple-helix model. Absorptive capacity is typically linked to firm-level R&D, skills and managerial capability, but may also depend strongly on the sectoral composition and size range of local business populations (Cohen and Levinthal, 1989, 1990; Martin and Moodysson, 2013). The model suggests that university-generated knowledge alone may be insufficient to generate local productivity impacts where complementary capabilities are weak. Importantly, however, these capabilities should not be regarded as fixed: universities may themselves contribute to their development through skills formation, collaborative research, knowledge exchange and the attraction and circulation of skilled people.

Mission-Oriented Innovation - the idea here is that universities contribute most positively to productivity when aligned with regional missions (net zero, health, digitalisation). Reflecting aspects of the Triple-Helix model, this emphasises the importance of focused investment, organisational alignment and clear regional prioritisation of key challenges (Mazzucato, 2018; Uyarra et al., 2019). Very much an emergent area of conceptual development, this type of model moves beyond narrow economic impacts to integrate potential productivity benefits with broader societal goals.

Taken together, these frameworks suggest that there is no single mechanism through which universities influence regional growth and prosperity. Some mechanisms operate relatively directly through human capital, research, entrepreneurship, employment and expenditure, while others depend on interaction with firms, government and wider regional institutions. Importantly, regional conditions do not simply determine the effectiveness of universities: universities can also help reshape those conditions by developing skills, attracting talent and investment, building networks and supporting new institutional and technological capabilities. The relative importance of these mechanisms is likely to vary across types of university and regional economy, making institutional and regional diversity central to understanding the empirical evidence reviewed in the following sections.

Section 3: Universities' contribution to regional growth and productivity

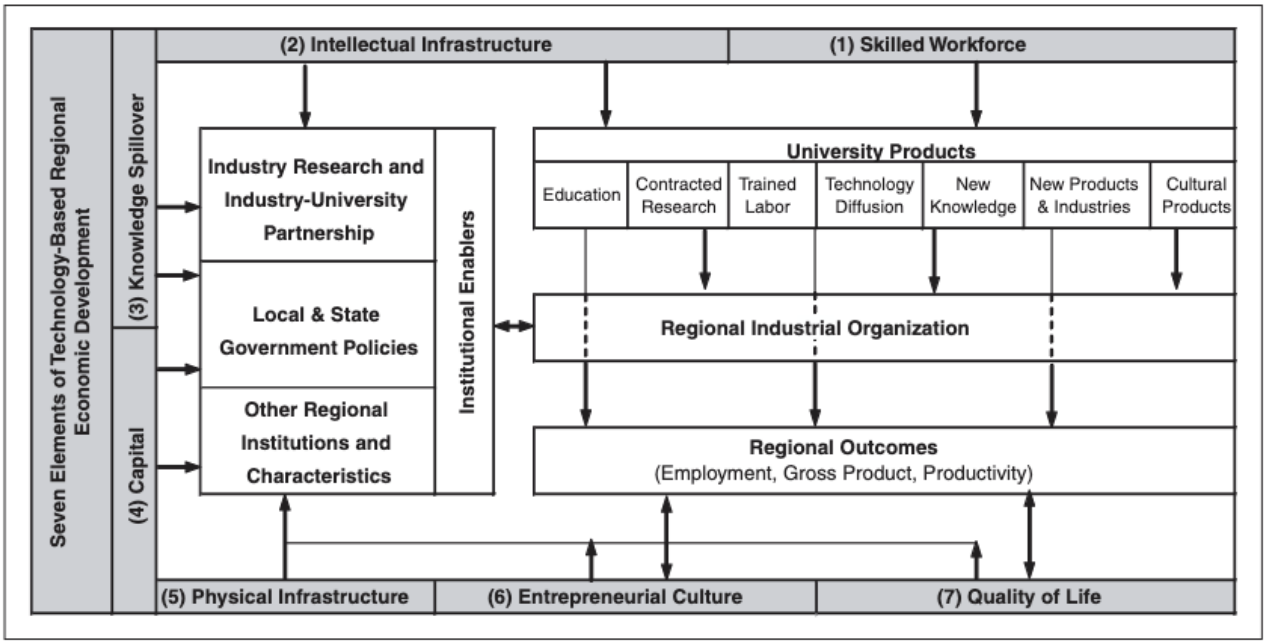
3.1 Universities and regional productivity

This section reviews the evidence on the links between universities and measures of regional growth and productivity. Section 3.2 focuses more specifically on the links between universities and innovation in local firms. This split reflects a broader division within the literature on universities and regional development, which is divided into two strands:

- Studies which focus on the relationship between universities and regional GDP or other measure of regional prosperity, and
- Studies which focus more specifically on the supply-side effects of universities and their influence on local businesses and eco-systems.

Studies investigating the link between universities and regional GDP have typically focused on a single country, e.g. the US (Goldstein and Drucker, 2006; Lendel, 2010; Drucker, 2016); Germany (Schubert and Kroll, 2016); and Italy (Agasisti et al., 2019). The US evidence is the most extensive. For example, Goldstein and Drucker (2006) examine the impact of universities on metropolitan areas in the US and find that university research, teaching and technology-development activities are positively associated with regional earnings, but that their importance varies substantially with regional size and university function. Effects are particularly important in small and medium-sized metropolitan areas; for medium-sized areas, the estimated earnings gain associated with university R&D is more than four times that for the average metropolitan area. They also find evidence of strong spatial spillovers, suggesting that the benefits of universities spread to adjacent areas within the US.

Figure 3.1: University products and the links to the regional economy: Lendel (2010)



Source: Lendel (2010), Figure 3.

Lendel (2010) develops the notion of 'university products' to represent the links between universities and the regional economy. Illustrating the complexity of these links, they identify seven university products which they argue are linked to different aspects of the regional economy (Figure 3.1): (1) education, (2) contract research, (3) cultural products, (4) trained labour, (5) technology diffusion, (6) new knowledge creation, and (7) new products and industries. Their analysis suggests a strong link between university R&D presence and regional employment growth. Evidence is not uniformly positive across activities or outcomes. Drucker (2016), using US metropolitan data, finds more

modest and heterogeneous effects than much of the earlier literature: university R&D is positively associated with earnings growth during 2007–11, but effects on employment and production are weaker, while university patenting is largely unrelated to regional economic performance. University-related effects extend beyond host metropolitan areas, with spillovers detectable over approximately 60 miles, although their direction varies across outcomes and periods.

European evidence is somewhat more limited, but Schubert and Kroll (2016) use spatial panel data models for German regions (2000-11) and find positive effects on local GDP and negative effects on unemployment, alongside significant regional spillovers. Agasisti et al. (2019) consider Italian university efficiency (measured by proximity to frontier performance in teaching, research and third mission activity) and find positive links to GDP per capita as well as positive regional spillovers. Fewer empirical studies have covered multiple countries, most notably Valero and Van Reenen (2019), Agasisti and Bertoletti (2022), Marrocu et al. (2022), and Agasisti and Bertoletti (2022). Using data for around 1,500 regions in 78 countries between 1950 and 2010, Valero and Van Reenen (2019) find a robust positive relationship between university expansion and subsequent regional economic growth. A 10% increase in the number of universities per capita is associated with approximately 0.4% higher future GDP per capita, with evidence of positive spillovers into neighbouring regions. Direct expenditure effects are reinforced by supply-side mechanisms linked to human capital upgrading and innovation. Agasisti and Bertoletti (2022) find a similar link between university density and GDP per capita growth for European regions. Their results emphasise the importance of research quality and STEM specialisation. Marrocu, Paci, and Usai (2022), analysing 270 European regions, find positive effects of universities on regional TFP through both direct and indirect channels. A 10% increase in the number of universities is associated with a 1.8% increase in long-run regional TFP, rising to 5.2% when spatial spillovers are included and to 6.8% when indirect effects through human and technological capital and their spatial spillovers are also considered. Crespo et al. (2022) identify similar links between university performance and labour productivity growth for Spanish provinces (2009–2016), while Rehman (2025) finds that business, government, and higher education R&D expenditure all positively and significantly affect TFP across 264 European NUTS2 regions.

Hausman (2012) finds a significant link between university innovation and employment and payroll growth in co-located firms in the US in the aftermath of the Bayh-Dole Act. Higher levels of university funding for innovation were found to contribute to faster regional employment growth, reflecting a combination of new entrants and employment declines among incumbents, suggestive of a creative destruction process.

Another potential benefit of university research is that it might open up new industrial activities in the local region creating new local specialisations. This is the focus of a study by Caviggioli et al. (2023) focusing on universities and regional transformation in the EU from 2003 to 2014. Drawing on notions of co-evolution and a range of regional data to capture growth and specialisation their results suggest that only in a few cases new regional specialisations are led by the local academic research system. This is most likely where universities are large relative to the region and have a STEM orientation. More commonly, regional specialisation is dependent on pre-existing R&D and the activities of private firms that contribute to the development of applied research in the region.

3.2 Universities and regional innovation

The second stream of the literature focuses on universities' effects on the supply side – local firms' and local systems' productivity growth. These studies are often motivated by a knowledge production function (KPF) approach that relates knowledge (often derived from university research) to local innovation. Early studies in this body of evidence examined the extent to which university R&D creates positive spillovers for local firms within the regional system of innovation. For example, Acs et al. (1994) identified spillovers from US industry and university R&D across states and industries, linking them to local innovation. In their study, spillover effects were stronger for smaller firms. More recent studies, such as Buesa et al. (2010), extend the range of regional factors considered within

the KPF framework to include other aspects of regional innovation systems. Buesa et al. (2010), in particular, find that while a range of aspects of innovation systems and their interactions are important for regional innovation outputs (patents), university and public administration research remain relatively unimportant. Ponds et al. (2010) find that university R&D is positively associated with regional patenting in the Netherlands and that academic knowledge spillovers operate at multiple spatial scales. In addition to geographically localised spillovers, university–industry research collaboration transmits knowledge over longer distances, suggesting that the benefits of university research are not confined to the university's host region.

A study by Capello and Lenzi (2015) on European regions adds detail to previous studies by examining the impact of university activity on regions characterised by different types of innovation activity. Their starting point is the observation that innovation does not necessarily require scientific knowledge and may instead be based on "non-scientific, informal knowledge and/or spillovers that might be as efficient in exploiting innovation for productivity gains as modes of innovation based on scientific internal knowledge". For this reason, the distinctions between scientific versus non-scientific knowledge, on the one hand, and between knowledge and innovation, on the other, drive the analysis (p. 1790). This suggests that different types of university activity may create positive spillovers in different types of regions, and that the benefits of science-based knowledge are likely to be concentrated in a relatively small number of regions. Innovation spillovers, however, are more pervasive, even in regions with low scientific knowledge endowments.

Capello and Lenzi (2015) suggests a number of important conclusions which suggest that a "one-solution fits all' view of university-regional interaction is inappropriate:

- First, an 'average' regional effect of universities on innovation or productivity is likely to be 'not particularly informative', as regions differ markedly in innovation behaviour and performance. Reflecting these differences in innovation patterns in policy is important if productivity gains are to be maximised.
- Second, while innovation in some regions is grounded in scientific knowledge, in regions with a more limited scientific knowledge base, innovation is more strongly grounded in human capital. "In some cases, therefore, a policy supporting R&D can prove to be extremely valuable, while it may produce virtually little, if not nil, effect in regions where the path to innovation is not based on the development of an internal scientific knowledge base." (p. 1801)
- Third, policy should align with the nature of the underlying innovation processes in each region "to reinforce the already established innovation pattern in each region, by boosting the effectiveness of accumulated knowledge, fostering new applications and diversification, and enlarging and deepening the local knowledge base" (p. 1802).

The need to reflect regional diversity in understanding the links between universities and regional development has led to a focus on contrasts in how university-regional interaction works in urban/leading v peripheral/lagging regions. The next section summarises the key insights from this literature.

3.3 Universities and regional diversity

The need to allow for the diversity of UK regions in understanding the role of universities in innovation and commercialisation processes is well reflected in previous reviews (Sainsbury 2007). As Huggins and Johnson (2009) comment, however, the "Further and Higher Education Act of 1992, which … implicitly pushed an agenda of homogenisation across the higher education sector … has meant that the breadth of differentiated aims and activities across UK institutions has become somewhat opaque from a policy-making perspective." (p. 1092). Huggins and Johnson's (2009) analysis of universities across UK regions emphasises some of the key contrasts. First, they find that universities in the Greater South East are generally more productive (have higher value added per employee) than those in Northern and more peripheral regions. Second, traditional research

universities outperform newer institutions, and third university productivity is strongly linked to knowledge commercialisation capacity. This suggests that while weaker regions tend to be more dependent on their universities for income and innovation, those same universities underperform relative to counterparts in economically stronger regions. Huggins and Johnson (2009) suggest that this is because "uncompetitive regions lack the additional knowledge infrastructure, besides universities, which is more commonly a feature of competitive regions." (p. 1088). Similar tensions are evident in other countries, with the case studies published in Benneworth (2018) emphasising: (1) the challenges of creating critical mass for research excellence in peripheral regions; (2) the dependence of peripheral regions on university research and innovation; and (3) the importance (and frequently weakness) of intermediate institutions.

Bonaccorsi (2017) provides a detailed conceptual discussion of the factors which limit the potential contributions of universities to innovation and productivity in peripheral regions. He stresses the 'structural mismatch' between universities' research mission and the needs of regional actors and argues that effective alignment rarely occurs (Uyarra, 2010). In terms of peripheral regional economies, he argues that research excellence is a necessary but not sufficient condition for impact. Reflecting the findings of Huggins and Johnson (2009) on university productivity, Bonaccorsi (2017) focuses attention on the need for critical mass to build research excellence and the need for local absorptive capacity, co-specialisation and intermediary quality to capture the benefits of university research. Each may be weaker or absent in peripheral regions. His analysis of European peripheral regions shows - like Huggins and Johnson (2009) - that their universities are generally below the research excellence frontier, which constrains knowledge spillovers, an effect exacerbated by the characteristics of local innovation systems. Bonaccorsi (2017) draws a range of policy implications (Box 3.1) which provide a useful framework for reflecting on university policy in peripheral regions. For the UK, these recommendations highlight the importance of recognising differences in university missions, research strengths and regional economic conditions. They suggest that regional engagement should build on areas of genuine complementarity between university capabilities and business needs, rather than assuming that local university–industry collaboration is always the most effective approach. Where such complementarities are limited, connections to knowledge and expertise outside the region may be equally important. The broader implication is the need for differentiated, long-term approaches that combine support for research excellence with skills development, applied engagement and wider regional capability-building, rather than expecting all universities to contribute through the same mechanisms.

Box 3.1: Policy steps to maximise university impacts in peripheral regions (Source: Bonaccorsi, 2017)

- First, take a long-term view – it can take up to 10 years for an institution, and 20 years nationally, to attain a positive rate of return – so national and regional policies must be credible over a long time horizon.
- Second, look for complementarities between research and innovation but also between research and human capital formation or training. Public investment has a higher return if all these activities are carried out in the same territory.
- Third, strive for achieving critical mass in resources, linkages and knowledge flows.
- Fourth, look for co-specialisation between university research, technological capabilities, and industrial interest. Co-specialisation can also take the form of related variety.
- Fifth, if co-specialisations are not found, the policy imperative becomes: decouple. Do not try to achieve collaboration between local university and local industry if there is no common interest.
- Sixth, aim at a differentiation of mandates for universities. De facto differentiation can be achieved by regional governments by allocating additional funding according to clearly defined goals. However, few universities produce really excellent research. Moreover, they are excellent in a few fields, and these fields do not match, in general, with the regional industrial structure.
- Seventh, policymakers need to understand the organisational complexity of universities. These are not unitary or hierarchical organisations, but organised anarchies and loosely

coupled systems. They do not have a central strategy. The best way to involve researchers in external engagement is to provide opportunities that fit with their own research interests.

Crespo et al. (2022) consider the impact of universities on GDP per capita in Spanish provinces and identify positive average effects. However, more detailed analysis suggests spatial asymmetry: the positive link between university performance and labour productivity growth holds only in provinces with productivity levels above the median. For below-median provinces, the effect is insignificant. This suggests the relationship is contingent on regional absorptive capacity, and that university improvement could slow rather than accelerate convergence between regions. Similar issues related to regional absorptive capacity may also limit weaker regions ability to benefit from inter-regional knowledge spillovers from universities. As Cortinovis and Van Oort (2018) conclude in their study of inter-regional spillovers across European regions "Expertise, skills and human capital contribute to build up the necessary knowledge base, without which R&D spillovers do not significantly impact on local productivity." (p. 1254). These findings should not, however, be interpreted as implying that universities necessarily have weaker effects in less developed regions. Other evidence finds larger university-related effects in smaller or less wealthy regions (Goldstein & Drucker, 2006; Domínguez, 2021).

Case studies of individual university developments illustrate these processes and the long-term nature of universities contributions to regional development (Bonaccorsi, 2017). Evers (2019) case study of Aalborg University in North Denmark, founded in 1974 as a deliberate policy instrument to revitalise a peripheral region, finds positive effects on graduate wages and on retaining local young people, but also shows that through time the university became a national rather than purely regional supplier of human capital. As the university became more established students were attracted from across the country and conversely graduates dispersed broadly across the country. Evers (2019) concludes that local critical mass and regional embeddedness are prerequisites for a peripheral region to absorb graduates and benefit fully from the university's presence (see also Rossi and Goglio, 2020).

3.4 Summary

Overall, the evidence suggests that universities make a positive contribution to regional productivity, innovation and economic development, although the magnitude and channels of these effects vary substantially across regions and university activities. Much of the quantitative evidence on the magnitude of these effects is international. Studies covering European regions and the US identify positive effects through research, human-capital formation, innovation and knowledge spillovers, with benefits frequently extending beyond the university's host region. Estimates vary considerably across studies, however, reflecting differences in measures, methods and regional contexts.

The evidence also indicates that regional conditions matter for the extent to which university activity translates into local economic benefits. Stronger and more innovative regions may be better placed to exploit university-generated knowledge because of their existing human capital, industrial structure, innovative firms and knowledge-exchange infrastructure. UK evidence is consistent with this in showing that universities in more competitive regions tend to be more productive and have stronger knowledge-commercialisation capabilities, while weaker regions are often more dependent on their universities for income and innovation (Huggins & Johnston, 2009). At the same time, the international evidence does not uniformly show that university effects are larger in stronger regions: some studies find particularly important effects in smaller or less wealthy regions, suggesting that universities can partly compensate for weaker agglomeration economies and contribute to building regional capabilities.

For weaker and peripheral regions, a further challenge is that the benefits generated by universities may not remain locally embedded. Graduates, researchers, innovative firms and knowledge can move towards regions offering deeper labour markets, stronger business demand and more developed innovation ecosystems, creating a risk of brain drain and limiting local capture of

university-generated benefits. Conversely, such mobility and knowledge flows also generate benefits beyond university host regions. Regional absorptive capacity should therefore be understood not simply as a fixed prerequisite for university impact, but as something that universities may themselves help develop over time.

Taken together, the evidence points to a positive but highly heterogeneous regional contribution from universities. The UK evidence is particularly informative about differences in university productivity, regional dependence and institutional context, while the broader international literature provides stronger quantitative evidence on productivity effects and spatial spillovers. These findings do not imply a simple choice between concentrating university resources in already strong regions and redistributing them towards weaker ones. Rather, they highlight the importance of the interaction between university capabilities, regional economic structures, local capacity to retain and use university-generated resources, and the wider spatial diffusion of knowledge and human capital.

Section 4: Human Capital and Labour Market Outcomes

4.1 Universities, Human Capital and Regional Labour Markets

Universities contribute to regional development through multiple channels, but one of their most fundamental roles lies in the education, attraction, and retention of skilled labour (Benneworth, 2019). Within endogenous growth theory and regional development literature, skills and knowledge are viewed not simply as inputs into production, but as factors shaping innovation capacity, labour productivity, adaptability, and long-term regional competitiveness (Becker, 1964; Lucas, 1988). Universities contribute to these processes through multiple channels, including graduate education, postgraduate training, professional development, and lifelong learning activities. The human capital perspective emphasises the role of universities as institutions embedded within regional labour markets and wider systems of knowledge circulation, through which skills, capabilities, and knowledge diffuse across regional economies.

Within urban and regional economics, subsequent work argued that concentrations of skilled workers may generate positive externalities extending beyond private returns to education. Moretti (2004a,b), for example, finds that increases in the local share of college graduates are associated with wage gains not only for graduates themselves, but also for less educated workers, suggesting the presence of human capital spillovers operating through knowledge diffusion, learning, and productivity enhancement. These effects appear strongest in urban labour markets characterised by dense interaction and diversified economic structures. Related work in regional economics emphasises the role of human capital in explaining uneven regional growth trajectories. Glaeser and Saiz (2003) show that cities with higher initial skill levels experienced faster long-term population and economic growth across the United States, arguing that skilled regions are better able to adapt to structural and technological change.

Regional innovation systems (RIS) approaches view universities as central components of regional knowledge infrastructures, contributing through interconnected processes of knowledge creation, skills development, technology diffusion, and institutional engagement (Trippl et al., 2015). Charles (2006) emphasises the role of universities in shaping regional human, social, and knowledge assets through their interactions with firms, governments, and wider regional actors. From this perspective, universities influence regional labour markets through graduate supply, workforce development, lifelong learning, and participation in broader institutional and governance networks that support learning and innovation processes. OECD work on the regional contribution of higher education institutions similarly stresses that universities contribute to regional development through multiple interconnected pathways, including skills upgrading, knowledge exchange, and support for regional absorptive capacity (OECD, 2007; Arbo & Benneworth, 2007).

At the same time, the literature increasingly stresses that universities do not automatically generate local economic benefits simply through the production of graduates. The extent to which human capital translates into regional productivity gains depends heavily on local labour market conditions, industrial structures, and regional absorptive capacity. In many cases, universities may educate highly skilled individuals who subsequently migrate elsewhere, meaning that the geography of graduate mobility becomes critical in determining where the economic benefits of higher education are ultimately realised. The next section examines this issue through the literature on graduate retention, mobility, and spatial sorting.

4.2 Graduate Retention, Mobility and Spatial Sorting

The contribution of universities to regional labour markets depends not simply on the production of skilled labour, but on whether graduates are retained, attracted, and effectively matched to local economic opportunities. A substantial literature therefore examines the geography of graduate migration and the extent to which universities contribute to the accumulation of human capital within their host regions. This literature emphasises that higher education systems do not simply increase

the aggregate stock of skills within national economies; they also shape the spatial distribution of talent across regions and cities.

Kodrzycki (2001), using longitudinal data from the United States, showed that college graduates are substantially more geographically mobile than non-graduates and that migration decisions are strongly shaped by local labour market conditions, wages, amenities, and previous migration experience. Subsequent studies developed a more dynamic understanding of graduate mobility as a sequential process involving movement to higher education, transition into employment, and later career mobility. Faggian, McCann and Sheppard (2007), for example, analyse migration flows among Scottish and Welsh students and show that students who move away from their home region for university study are substantially more likely to migrate again after graduation. This suggests that universities may simultaneously act as anchors of local talent and as mechanisms through which skilled labour is redistributed across regional economies.

The literature also emphasises that migration decisions are closely linked to labour-market opportunities and regional economic structures. Using evidence from the United States, Winters (2011) argues that the growth of “smart cities” is partly driven by students moving to areas with high levels of human capital to pursue higher education and subsequently remaining after graduation. Many of these cities are associated with major universities, suggesting that higher education institutions may contribute to urban growth indirectly through graduate retention and the cumulative concentration of skilled labour. Related work by Whisler et al. (2008) highlights the importance of amenities, quality of life, and broader urban environments in shaping the migration patterns of highly educated workers, suggesting that graduate retention depends not only on employment opportunities but also on wider place-based characteristics.

This literature also connects graduate mobility to broader patterns of regional divergence and cumulative growth. Faggian and McCann (2009) find that graduate migration and regional innovation are closely linked in England and Wales, although the direction of causality appears to operate in both directions: innovative regions attract graduates, while inflows of skilled labour may further reinforce regional innovation capacity (Box 4.1). The authors find less evidence for direct localised knowledge spillovers from universities themselves, suggesting that embodied human capital flows may represent a more important mechanism through which universities contribute to regional development. Similar arguments appear in broader urban and regional literature, where highly skilled labour is viewed as both a driver and outcome of regional competitiveness and adaptability (Moretti, 2004; Glaeser & Saiz, 2003; Winters, 2011).

At the same time, several studies caution against assuming that universities automatically increase local human capital stocks. Abel and Deitz (2012), for example, find only a relatively small relationship between metropolitan degree production and local human capital levels in the United States, suggesting that graduate migration substantially weakens the local retention of skills. However, they also find that university research and development activity contributes positively to local human capital accumulation by increasing demand for skilled labour. This distinction between the supply of graduates and the local demand for skilled workers highlights the importance of regional absorptive capacity and labour-market structure in shaping outcomes.

The implications of graduate mobility may be particularly significant for peripheral and weaker regions. While universities may increase educational participation and local skills formation, economically stronger metropolitan regions frequently attract graduates away from less dynamic local economies. This creates a potential tension between individual mobility and regional development objectives. From the perspective of graduates, migration may improve career opportunities, wages, and job matching. From the perspective of weaker regions, however, outward migration may reduce the local economic returns to investments in higher education and reinforce existing spatial inequalities. Recent UK evidence similarly suggests that London and other high-opportunity urban regions remain major beneficiaries of graduate mobility, contributing to the continued concentration of human capital within already prosperous regions (Britton et al., 2021).

Recent work has also moved beyond simple “brain drain” interpretations to consider the quality of graduate employment outcomes. Aronica et al. (2023), for example, find that graduate mobility can improve education-job matching and reduce levels of overeducation and overskilling among postgraduates. This suggests that outward migration from university regions may partly reflect uneven access to appropriate graduate employment opportunities across regional economies rather than graduate loss alone.

Overall, the literature suggests that graduate mobility is a central mechanism linking universities and regional development. Universities influence not only the production of human capital, but also its spatial allocation across regional labour markets. However, the extent to which these processes generate local economic benefits depends heavily on the ability of regional economies to attract, retain, and utilise skilled labour effectively.

The UK evidence is particularly strong in explaining the geography of graduate mobility, graduate retention, and the relationship between graduate flows and regional innovation. International evidence, primarily from the United States, reinforces these findings by demonstrating the importance of labour-market opportunities, urban amenities, and university research activity in shaping graduate location decisions and local human capital accumulation. Taken together, the evidence indicates that universities shape regional human capital through two interconnected mechanisms: by producing skilled graduates and by influencing where those graduates subsequently study, work, and settle.

Box 4.1. Graduate Mobility and the Geography of Opportunity in the UK

Research on graduate mobility in the UK highlights an important tension in the regional impacts of universities. While universities contribute to local human capital formation, graduates do not necessarily remain in the regions where they study. Instead, migration patterns are strongly shaped by the uneven geography of employment opportunities, wages, and knowledge-intensive industries.

A series of studies by Faggian, McCann and co-authors emphasise the sequential nature of graduate migration, whereby students first move for higher education and subsequently relocate again for employment (Faggian et al., 2006; Faggian et al., 2007). Their work shows that previous migration behaviour strongly influences subsequent labour-market mobility, consistent with “migration-on-migration” dynamics. Graduates who move away from home to attend university are substantially more likely to undertake additional migration after graduation, particularly towards stronger labour markets.

The literature also highlights important territorial asymmetries within the UK. Examining Scottish and Welsh graduates, Faggian et al. (2007) find that institutional and geographical differences shape mobility patterns. Scottish students were substantially more likely to study within Scotland, partly reflecting the structure of the Scottish higher education system, while Welsh students exhibited greater outward mobility. The authors argue that lower initial migration propensities may subsequently reduce labour-market mobility and limit access to wider employment opportunities.

More recent UK evidence points to the continued dominance of London and other large metropolitan regions within graduate mobility patterns. Using linked administrative data, Britton et al. (2021) show that graduates disproportionately migrate towards stronger urban labour markets characterised by higher wages and denser concentrations of graduate employment. These patterns contribute to the continued concentration of skilled labour within already prosperous regions, reinforcing spatial inequalities in human capital distribution.

At the same time, the literature suggests that graduate mobility should not be interpreted solely as “brain drain”. Migration may improve education-job matching and allow graduates to access more specialised and productive labour markets. Universities therefore shape not only the production of human capital, but also its spatial allocation across regional economies.

4.3 Employment and Wage Outcomes

A growing literature examines whether universities generate measurable labour-market benefits through employment growth and wage effects. Much of this evidence suggests that the effects of universities vary considerably across regional contexts and depend heavily on local labour-market conditions.

Moretti (2004) finds that increases in the local share of college graduates in US metropolitan areas are associated with wage gains for both graduates and non-graduates, suggesting that concentrations of skilled labour may generate wider labour-market benefits. More recent quasi-experimental evidence provides a more mixed picture. Ferhat (2022), examining the establishment of new universities in France, finds positive effects on local wages and employment in disadvantaged regions, while effects are weaker in already highly educated and economically dynamic areas. Berlingieri et al. (2022), examining college openings in Germany, find positive effects on local skill composition and high-technology activity, but more limited effects on overall wages and employment.

Taken together, the international evidence suggests that universities can contribute positively to regional employment and wage outcomes, although the magnitude of these effects varies substantially across regional contexts. Evidence from France and Germany indicates that employment and wage gains tend to be strongest in regions with lower initial human capital stocks, while evidence from the United States highlights wider wage spillovers associated with concentrations of skilled labour.

4.4 Institutional Diversity and Uneven Regional Effects

The labour-market effects of universities also vary significantly across institutional types and regional contexts. Much of the literature on universities and regional development focuses on research-intensive universities and high-technology regions, but this provides only a partial account of how higher education institutions shape local labour markets. A growing body of work suggests that teaching-focused, applied, and vocationally oriented institutions may play distinct roles in workforce development, skills retention, and local labour-market formation.

O'Neill and Bagchi-Sen (2022), examining the State University of New York system in the United States, argue that higher education systems consist of multiple institutional layers with different functions in attracting, training, and retaining students. Their analysis suggests that wage and retention outcomes vary substantially by institution type, degree level, and regional location, indicating that labour-market effects cannot be inferred from university presence alone. Similarly, Velluzzi's (2010) case study of Walla Walla Community College in the US state of Washington highlights how locally embedded institutions may contribute to workforce development and regional industry formation through specialised training, employer engagement, and support for local skills ecosystems.

Related evidence suggests that institutional missions and educational models also shape labour-market spillovers. Examining the establishment of Swiss Universities of Applied Sciences (UASs), Pfister et al. (2021) argue that applied higher education institutions may contribute to regional economies through the local supply of graduates combining vocational experience with applied scientific training. The authors note that UASs were designed to support applied research and close collaboration with local firms, while relatively low graduate mobility strengthened the localisation of these effects outside major innovation centres. UK evidence emphasises similar factors. For example, Tijssen et al. (2020) examine the spatial patterns of university-business collaboration of the largest UK universities. Based on research publications and the locations of co-authors, knowledge transfer income and spinouts levels of university-business collaboration have grown consistently with an increasing trend towards more distant collaborations. Heterogeneity is observed across institutions however, with some "globalising" and focusing on more distant collaborations and others "glocalising", growing levels of collaboration across all distances. Reflecting other studies which emphasise both institutional and locational factors in universities local economic benefits, they

identify four key factors as determinants of levels of U2B collaboration; business R&D spend in the locality; research volume; citation level; human factors linked to researcher mobility and orientation.

More recently, Audretsch et al. (2022) examined the impact of the introduction of REF in the UK on university outcomes. Audretsch et al. (2022) interpret the introduction of the Research Excellence Framework (REF) as a policy intervention capable of influencing universities' strategic priorities. Econometric analysis suggests mixed impacts. Negative effects are observed on the retention of human capital and regional skill needs, balanced by positive impacts on entrepreneurship, meeting community needs, patents and research contracts. These differential impacts link to discussion on the different mechanisms which link universities and local development in leading and lagging regions. In particular, negative effects on human capital and regional skills may weaken the main channel by which universities drive regional growth in economically weaker regions.

Taken together, the evidence suggests that universities should not be treated as a single regional development instrument. Different institutional types contribute to regional labour markets through different combinations of graduate supply, workforce development, employer engagement, and local retention, with effects varying substantially across regional economic contexts.

4.5 Summary

Taken together, the studies reviewed here highlight that universities contribute to regional labour-market development through multiple interconnected mechanisms linked to the production, attraction, retention, and circulation of skilled labour. Human capital effects extend beyond the direct education of graduates and include broader spillovers associated with knowledge diffusion, labour-market matching, and workforce upgrading. However, the extent to which these effects generate local economic benefits depends heavily on regional labour-market structures and the capacity of local economies to absorb and retain skilled workers.

Graduate mobility emerges as a particularly important mechanism shaping the geography of university impacts. While universities may strengthen local human capital formation, economically stronger metropolitan regions often capture a disproportionate share of graduate talent through migration and spatial sorting processes. This creates tensions between individual labour-market opportunities and regional development objectives, particularly for peripheral and weaker regions.

The evidence on employment and wage effects is generally positive but uneven. International evidence, particularly from the United States and continental Europe, demonstrates that universities can generate measurable improvements in wages, employment, and workforce skills, although the magnitude of these effects varies considerably across regional contexts. Recent quasi-experimental studies further suggest that benefits are often strongest where universities complement local labour-market demand and existing economic capabilities, rather than acting as stand-alone drivers of regional development.

The literature also demonstrates that universities should not be treated as a single type of labour-market institution. Drawing primarily on comparative international evidence, studies show that research-intensive, teaching-focused, applied, and vocationally oriented institutions contribute through different combinations of graduate supply, workforce development, employer engagement, and local retention. UK evidence complements this perspective by highlighting how institutional strategies and university-business engagement shape local labour-market outcomes. Consequently, the labour-market impacts of universities depend not only on the scale of higher education provision, but also on institutional missions and wider regional economic conditions.

Overall, the evidence on universities' contributions to regional labour-market development is among the strongest and most consistent within the wider regional development literature. UK evidence is particularly strong on graduate mobility, regional retention, labour-market sorting, and the differentiated roles of higher education institutions. It shows that graduate mobility is substantial but geographically uneven, with retention influenced by local employment opportunities and regional

labour-market conditions, meaning that the benefits of graduate formation are not necessarily retained in the university's host region. International evidence provides stronger causal evidence on wage spillovers, employment outcomes, and institutional diversity. Taken together, the literature consistently shows that universities contribute to regional labour-market development, although the scale and distribution of these benefits vary systematically with institutional missions and regional economic conditions.

Section 5: Innovation and Knowledge Spillovers

A number of studies provide evidence of universities' contributions to patent-based innovation across OECD regions. This literature has two strands. First, a relatively small number of papers examine the generation of academic and university-owned patents. Second, a larger body of literature examines spillovers from universities to firm patenting and over innovation outcomes, exploring a range of knowledge spillover mechanisms. We consider each strand of the literature in turn.

5.1 Influences on university-owned patents

Acosta et al. (2009) consider European university patents registered during the period 1998-2004 and find a strong and stable concentration of university patenting in a small number of European regions, mostly associated with capital cities. Their econometric analysis suggests a strong relationship between university knowledge production (university patents) and regional university R&D funding, with weaker effects from local demand factors. At a national level these links are less clear with Azagra-Caro (2014) finding an insignificant relationship between university-owned patents and university R&D expenditure across European nations. However, they do find a significant and positive link between the industry share of university R&D funding and university-owned patenting.

Other factors apart from R&D funding can also have a significant effect on university-owned patents. For example, university governance has been shown to be associated with university patenting and university research rankings (Aghion et al., 2009). Aghion et al. (2009) find strong positive effects of autonomy and competition on university patenting in Europe and the US. Autonomy and competition also enhance a university's ability to respond to funding shocks and merit-based competition for funding. Sedlacek (2017) similarly identifies positive associations between dimensions of university autonomy and research performance across European university systems, although the analysis is based on a relatively small cross-country sample. The study also considers the impact of government intervention in university governance and finds a negative effect. Hegde (2005) compared patent quality and generality among public and private universities in the US and found that public universities are associated with lower average quality of patents and those with lower generalisability. Other OECD evidence suggests that the rate of patent applications granted is lower for research institutes (universities and public research institutes) than for industry, suggesting lower patent application quality (Paunov et al., 2019).

Beale et al. (2008) provide some UK evidence on the quantity and quality of university patents across the Devolved Regions for the period 1983-2005. Levels of patent applications per researcher are found to vary between regions – higher in Scotland and Wales and lower in Northern Ireland. Patent quality indicators are less favourable to Wales, while both activity levels and conversion of applications into grants are poorer in Northern Ireland. Overall, the evidence indicates considerable variation in university patenting across both countries and institutions, reflecting differences not only in research resources but also in governance, institutional characteristics and links with industry.

5.2 University research and firm-level patenting

As Špurek and Rehák (2022) comment: "The mere presence of the university does not guarantee a significant contribution to the performance of the innovation system. The contribution depends on the quality of research and the intensity of interaction between the universities and the other actors of the innovation system". In this section, we review the evidence linking university presence within a region and firm-level patenting activity and consider the factors which condition or moderate this relationship.

The literature envisages a number of different mechanisms through which such knowledge spillovers might occur and uses different indicators of university research activity. Some studies are based on patents derived from university research as the catalyst for local knowledge spillovers. Špurek and Rehák (2022) draw an important distinction between academic patents and those which are

university-owned, citing EU research suggesting that around two-thirds of patents resulting from university research (i.e. academic patents) are not owned by universities (Crespi et al. 2010; Lissoni et al. 2008). Academic patents therefore consist of two groups: university-owned and university-invented applications (which are not university-owned). Writing in 2022, Špurek and Rehák (2022) highlight a number of key statistics relating to the landscape of university and firm-level patenting across European regions:

- The average share of academic patents in European regions increased from 4% in 1976-1985 to 13% in 2006-2015.
- The analysis confirms that two-thirds of academic patents in Europe are not owned by universities, but by private firms, institutes, or individuals.
- By 1995, universities owned less than 11% of academic patents. Between 1995 and 2015, the university-owned share increased to 33% of academic patents.
- The most innovative regions have a smaller share of academic patents but differences between regions are substantial. “Universities tend to hold higher proportions of patents in capital regions or when there is a strong tradition of academic patenting. Similarly, the share of academic patents is higher in regions of Eastern Europe, but also in Portugal, Spain, Ireland, southern Italy and Sweden.” (Špurek and Rehák 2022, p. 156)

Nontheless, Špurek and Rehák (2022) find that across European regions a 1% increase in university patents/per million inhabitants increases local firms’ patents/per million inhabitants by 1.034%, suggesting substantial spillover effects.

The US provides an interesting setting for an investigation of public and private universities, with State governments providing support to public universities which benefit regional innovation-led economic development. Hegde (2005) compared the spillover footprint of university patents (measured by local patent citations) in public and private universities finding little overall difference. Public universities are associated with lower average quality of patents and those with lower generalizability which Hegde (2005) suggests may account for the similarity in spillover footprint.

Piergiovanni and Santarelli (2001) examine the impacts of university and industry R&D spend on manufacturing patents in regions of France. Both university and industrial R&D are positively associated with manufacturing patenting, with the estimated relationship substantially stronger for university R&D. The authors suggest that this reflects particular characteristics of the French innovation system, where industrial firms were relatively more specialised in development activities, while universities and public research institutions concentrated on basic research with potential commercial applications. Established knowledge-transfer mechanisms, including intermediary organisations and cooperation agreements, may have enabled firms, particularly smaller ones, to access and exploit this publicly generated knowledge more effectively. These results are consistent with those for other countries, e.g., Audretsch and Feldman (1996) and Feldman (1994) for the US and Piergiovanni et al. (1997) for Italy.

Graf and Henning (2009) use networks of patent collaborators to examine the impact of universities and public research organisations on four East German regions. Their analysis emphasizes the centrality of universities and other public research organisations to regional patenting networks but also the marked differences between regions in the centrality of public research. This suggests that universities may contribute to regional innovation not simply through their own patents but by connecting actors and knowledge within regional innovation networks. Veugelers et al. (2012) also consider university patent applications and their citation by firms across a range of countries. Their analysis demonstrates the importance of distinguishing the creation of university technology from its subsequent use by firms and reveals substantial differences across national innovation systems. US universities dominate the creation of university-owned patents, particularly highly cited patents, while European and Asian countries display greater variation and stronger home-country patterns in the use of university technology. In the UK, 15% of university-owned patents were subsequently cited by company patents, while around 7% of UK company patents that cited earlier inventions drew on at. least one university-owned patent. This provides evidence of a measurable flow of patented university knowledge into subsequent private-sector technological development.

Also reflecting a social network approach, Huggins et al. (2020) consider the network centrality of UK universities and their knowledge commercialization outcomes (spinouts, collaborative research grants). Based not on patent-citation data but an analysis of university reports and announcements this study considered links over the 2005-08 period. While a range of organizational and outcome related factors influence universities network ties, location is found to be of little importance. Universities generating more spinouts and attracting more external research funding tend to occupy more central positions in these networks, while higher patenting is negatively associated with their role as bridges connecting different organisations within knowledge networks (known as *betweenness centrality*). This relationship is particularly evident for connections between regions, although it is not robust across all model specifications. The authors suggest that intellectual property protection may constrain knowledge sharing and the development of such connections. The findings suggest that research-intensive universities frequently form knowledge relationships beyond their immediate regions and caution against assuming that university knowledge networks are primarily local.

Pfister et al. (2021) exploit the development of Universities of Applied Sciences (UASs) in Switzerland in the 1990s to explore their effects on regional innovation (Box 5.1). Defining 'treated' areas as municipalities within 25km of a UASs they show that the establishment of a UAS increases regional patenting by 6.8% and patent quality by up to 9.7%. The effects emerge over several years and are not confined to large R&D-intensive firms or established inventors. They conclude: "our analysis provides strong evidence that the establishment of Swiss UASs … had a positive quantitative and qualitative effect on innovation activities in the regions where they were established. Our results also suggest that the establishment of such applied research institutions helps fostering innovation outside major innovation centers by spreading innovation activities to such areas, often through more traditional and small or medium-sized firms." (Pfister et al., 2021, p. 15)

Box 5.1: UASs and traditional academic universities in Switzerland (Pfister et al., 2021)

The establishment of UASs occurred as a result of policy reform in the 1990s aimed at revitalizing and strengthening the Swiss economy. The aim was to provide apprenticeship graduates from the dual vocational education and training system with an academic career by offering them an opportunity to earn an undergraduate degree in addition to their apprenticeship qualification. UASs are legally required to conduct applied R&D and collaborate with, public or private sector firms to transfer of knowledge and technology. UASs are legally required to adhere to the practical research needs of Swiss firms and to focus on applied research and development projects and public services. By contrast, the traditional academic universities perform basic research, provide academic training, and are expected to compete internationally in terms of scientific output.

Harris et al. (2011) show that innovation collaboration with HEIs is associated with higher TFP in Great Britain, although the gains differ across production and non-production sectors and between domestic- and foreign-owned establishments. Harris et al. (2013) extend this analysis and identify substantial regional heterogeneity. Their results suggest that the benefits associated with HEI collaboration depend on the characteristics of firms and regional economies rather than accruing uniformly across locations.

Belderbos et al. (2014) examine the relationship between academic activity in EU regions and greenfield investments in internationally mobile R&D. Over the 2003-08 period, they find that academic strength (publications) is positively related to attracting R&D investment. A one-standard-deviation increase in academic research strength increases the average probability of a region being selected for R&D investment by 28%. The supply of PhD graduates emerges as a key linkage indicating that PhD supply creates opportunities for collaboration and hiring that attract industry investment.

Drucker (2016), working with US data for metropolitan areas, goes beyond previous studies by considering the impact of both research and teaching universities and considering multiple economic outcomes (earnings, employment growth, productivity and business birth rates). University activity is measured by R&D spend and degree awards in different subject areas. Effects are generally weaker than in earlier studies with university patents having little relationship to economic outcomes but science and engineering degrees having positive economic, spillover and entrepreneurship benefits. The results therefore caution against equating university patenting or commercialisation directly with wider regional economic performance and suggest that universities may contribute through a wider range of research and human-capital channels.

Other studies focus on proximity as the key determinant of spillover effects. Paunov et al. (2019) using data from across the OECD find that geographic proximity matters significantly for patent spillovers: Geographical proximity to research institutions is associated with higher industry patenting (see also Hausman, 2012). However, these effects depend on the type of technology: significant proximity effects are found for life sciences and digital technologies but not for environmental technologies. This reinforces the broader finding that the geographical reach of university knowledge depends on the type of knowledge, technology and interaction involved rather than following a single spatial pattern.

5.3 Summary

The evidence reveals a positive but heterogeneous relationship between university activities and innovation outputs across OECD contexts, with the magnitude and geographical reach of these effects varying substantially with regional economic context, institutional characteristics, technology and the channels through which university knowledge reaches firms.

The international evidence provides some relatively strong estimates of the magnitude of these effects. In Switzerland, the establishment of Universities of Applied Sciences increased regional patenting by around 7% and patent quality by up to 9.7% (Pfister et al., 2021). Across European regions, academic patenting is strongly associated with private-sector patenting (Špurek & Rehák, 2022), while stronger academic research substantially increases the attractiveness of European regions for internationally mobile R&D investment (Belderbos et al., 2014). Evidence from France similarly identifies sizeable associations between university R&D and manufacturing patenting (Piergiovanni & Santarelli, 2001). The strength of the research designs varies, however: some of these findings are descriptive or associational, while studies such as Pfister et al. (2021) and the instrumental-variable analyses in Aghion et al. (2009) and Paunov et al. (2019) provide stronger evidence of causal effects.

Regional context is important, but the evidence does not support a simple distinction in which universities matter only as gap-fillers in weaker regions and as catalysts in stronger ones. Academic patents represent a larger share of overall patenting in some less innovative European regions (Špurek & Rehák, 2022), and the Swiss evidence indicates that applied-research institutions can stimulate innovation outside established innovation centres (Pfister et al., 2021). At the same time, strong academic research and PhD supply can attract internationally mobile R&D investment (Belderbos et al., 2014), while research-intensive universities may participate in networks extending well beyond their host regions (Huggins et al., 2020). Universities may therefore both benefit from existing regional capabilities and contribute to developing those capabilities over time.

Institutional characteristics also matter. Funding is positively associated with university patent production in some regional studies, but R&D expenditure alone does not consistently predict university patent ownership across countries (Acosta et al., 2009; Azagra-Caro, 2014). Governance, autonomy, competition and industry engagement provide additional explanations for differences in research and patenting outcomes (Aghion et al., 2009; Azagra-Caro, 2014; Sedláček, 2017). These findings suggest that the relationship between resources and innovation depends partly on the institutional environment through which those resources are deployed.

Geographical proximity matters for some knowledge flows, but the evidence does not support a single pattern of localisation. International evidence indicates that proximity to research institutions can increase firm patenting, particularly in life sciences and digital technologies (Paunov et al., 2019), while universities and public research organisations can occupy important positions in regional innovation networks (Graf & Henning, 2009). Yet Hegde (2005) finds no evidence that US public universities generate more localised patent spillovers simply because of their state-oriented missions, and Huggins et al. (2020) show that leading UK universities frequently develop networks across regional boundaries. The spatial reach of university-generated knowledge therefore depends on the nature and quality of research, the technology involved, firms' capabilities and the networks through which knowledge travels.

The UK evidence reinforces this picture of heterogeneity. Patent activity and quality differ substantially across Wales, Scotland and Northern Ireland (Beale et al., 2008), while firm-level evidence shows that productivity gains associated with HEI collaboration vary by sector, ownership and region (Harris et al., 2011; 2013). UK universities also participate in knowledge networks that frequently extend beyond their immediate regions (Huggins et al., 2020), and patent-citation evidence demonstrates a measurable flow of UK university technology into subsequent corporate technological development (Veugelers et al., 2012). The UK evidence therefore provides little support for treating university innovation effects as uniformly local or assuming that benefits will automatically be retained within the university's host region.

Research quality is relevant to innovation impact, but the evidence does not imply that internationally oriented research is necessarily more valuable than locally oriented activity. US universities dominate the creation of highly cited university patents (Veugelers et al., 2012), while Hegde (2005) finds that research quality is more closely associated with the localisation of patent spillovers than public or private university ownership. At the same time, the Swiss evidence demonstrates that institutions explicitly oriented towards applied research and local firm needs can generate substantial regional innovation effects (Pfister et al., 2021). Different types of university research may therefore contribute through different innovation channels.

Some evidence also indicates that university innovation effects develop over time rather than occurring immediately. In Switzerland, the effects of new Universities of Applied Sciences on regional patenting emerged several years after establishment (Pfister et al., 2021). More generally, the different mechanisms identified across the literature—from patents and research collaboration to PhD supply, firm capabilities and knowledge networks—operate over different time horizons. This makes it difficult to capture the full regional contribution of universities through contemporaneous patenting or commercialisation indicators alone.

Taken together, the evidence suggests that universities can contribute to regional innovation both directly, through research, patents and skilled researchers, and indirectly, by connecting firms to knowledge and networks and helping to develop regional innovation capabilities. Existing absorptive capacity influences the extent to which firms and regions can exploit university-generated knowledge, but it should not be viewed as a fixed prerequisite: universities can themselves contribute to building capabilities through research collaboration, skills formation and the attraction of R&D activity. The evidence does not point to a single model of university contribution or a simple policy choice between concentrating resources in stronger innovation regions and supporting universities in weaker ones. Rather, the nature and scale of university effects depend on the interaction between university capabilities, firm characteristics, regional innovation systems and the geographical reach of knowledge flows.

Section 6: Universities, Entrepreneurship and Spinouts

This section examines the contribution of universities to regional entrepreneurship, focusing on new firm formation, academic entrepreneurship and university spinouts. Universities can support entrepreneurial activity through several channels, including the generation and diffusion of knowledge, graduate and academic entrepreneurship, formal technology transfer and the creation of spinout firms. The evidence also highlights substantial variation across industries, universities and regions, and shows that the regional contribution of academic entrepreneurship depends not only on firm creation but also on firms' subsequent development, networks, retention and mobility.

6.1 Universities, Entrepreneurship and New Firm Formation

A substantial literature links universities to regional entrepreneurship and new firm creation through processes of knowledge spillover, human capital formation, and entrepreneurial ecosystem development. Within the knowledge spillover theory of entrepreneurship, universities are viewed as important generators of knowledge that may create entrepreneurial opportunities not fully exploited by incumbent firms (Audretsch, 1995; Acs et al., 2009). New firms emerge partly as mechanisms through which individuals commercialise ideas, technologies, and capabilities originating within universities and wider research systems (Acs et al., 2009; Audretsch & Lehmann, 2005). From this perspective, universities contribute not only through formal technology transfer and spinout activity, but also through broader processes of tacit knowledge diffusion, graduate entrepreneurship, research collaboration, and entrepreneurial culture formation (Guerrero et al., 2015; OECD, 2019).

A number of empirical studies report positive relationships between university presence and levels of entrepreneurial activity or new firm formation, particularly in knowledge-intensive and technology-oriented sectors. Using German data on publicly listed high-technology start-ups, Audretsch et al. (2005) find that knowledge-intensive firms exhibit a strong tendency to locate close to universities, suggesting that geographical proximity facilitates access to university knowledge spillovers. Their analysis further suggests that these effects vary depending on both the type of knowledge produced and the mechanisms through which spillovers occur, including research collaboration and human capital formation. Baptista et al. (2011), examining the establishment of new higher education institutions in Portuguese municipalities between 1992 and 2002, find that the creation of a university had a positive and significant effect on subsequent entry rates of knowledge-based firms, although effects differed substantially across sectors. Positive impacts were concentrated in knowledge-intensive activities, while some lower-technology manufacturing sectors experienced negative effects. This reinforces wider evidence suggesting that universities do not uniformly increase entrepreneurship across all industries, but instead exert differentiated effects depending on sectoral knowledge requirements and local economic structures.

Several studies also emphasise the importance of university specialisation and the nature of university knowledge. Bonaccorsi et al. (2013) show that universities specialised in applied sciences and engineering have broad positive effects on local new firm creation across a range of industries, particularly services, whereas the effects of basic sciences are more concentrated within science-based manufacturing sectors. Universities specialised in social sciences and humanities were found to have little measurable effect on local firm creation within their framework. The authors argue that different forms of university knowledge generate different entrepreneurial opportunities and interact differently with sector-specific innovation patterns.

Related work by Bonaccorsi et al. (2014) further distinguishes between codified and tacit forms of university knowledge. Their analysis of Italian provinces suggests that tacit knowledge embodied in university graduates and local scientific activity exerts predominantly localised effects on the creation of knowledge-intensive firms, whereas codified knowledge embedded in academic patents may generate spillovers over wider spatial scales, although these effects diminish with distance. Importantly, the positive effects were concentrated among higher-quality universities, suggesting that research quality conditions the extent to which universities stimulate entrepreneurial activity.

At the same time, the literature generally cautions against interpreting universities as automatic generators of regional entrepreneurial dynamism. Drucker (2016), examining metropolitan areas in the United States, finds positive but comparatively modest relationships between university activity and entrepreneurship outcomes once broader regional conditions are taken into account. Effects were stronger for advanced human capital indicators, such as science and engineering graduates, than for university patenting activity itself. More broadly, entrepreneurship effects appear heavily conditioned by local absorptive capacity, industrial composition, access to finance, and the wider strength of regional innovation systems. Universities therefore appear to contribute most effectively to entrepreneurship where complementary ecosystem conditions already exist, rather than acting as isolated drivers of local firm creation.

6.2 Academic Entrepreneurship and University Spinouts: Creation, Survival, and Growth

The literature increasingly distinguishes between academic entrepreneurship more broadly and university spinouts specifically. Academic entrepreneurship encompasses a wide range of activities through which academics and universities engage in commercial and entrepreneurial activity, including consulting, collaborative ventures, start-ups, contract research, and informal commercialisation processes. University spinouts or university spin-off companies (USOs), by contrast, generally refer to firms created to commercialise knowledge or intellectual property originating within universities, although the ownership of the underlying intellectual property may reside either with the university or with individual academic founders (Wennberg et al., 2011; Rossi et al., 2023). This distinction is important because a substantial share of entrepreneurial activity linked to universities occurs outside formal IP commercialisation systems. Fini et al. (2010), for example, find that many academic start-ups are not based on disclosed university inventions and therefore remain largely invisible within conventional university commercialisation metrics.

Despite this broader understanding of academic entrepreneurship, policy attention has often focused primarily on formal university spinouts as visible indicators of research commercialisation and regional economic impact. A substantial part of the spinout literature focuses on the factors shaping spinout creation and emergence. Existing studies emphasise that spinout formation is influenced by a combination of individual, organisational, and regional conditions, including research quality, disciplinary orientation, institutional incentives, technology transfer capabilities, entrepreneurial culture, and access to external finance (Di Gregorio & Shane, 2003; O'Shea et al., 2008; Clarysse et al., 2011). Opizzi et al. (2025), reviewing the literature on academic spin-off emergence, argue that spinout formation should be understood as an organisationally embedded and processual phenomenon shaped by interactions between individual agency and university context. Earlier work similarly highlights the importance of institutional support structures, entrepreneurial role models, social capital, and university governance arrangements in shaping academics' entrepreneurial decisions (Ndonzuau et al., 2002; Vohora et al., 2004).

At the same time, the literature increasingly stresses that spinout creation alone is an insufficient indicator of economic impact. While universities may generate substantial numbers of start-ups and spin-offs, the survival, growth, and scaling of these firms depend heavily on wider ecosystem conditions. Caputo et al. (2022) note that policy debates have often focused disproportionately on spinout formation despite relatively limited evidence on long-term growth and regional transformation effects. Existing evidence suggests that many university spin-offs remain small, experience limited growth, or fail to survive beyond early stages of development (Shane, 2004; Harrison & Leitch, 2010). Successful scaling appears strongly associated with access to venture capital, experienced management, external entrepreneurial networks, market opportunities, and wider innovation-system resources (Hayter, 2013; Shane & Stuart, 2002). Mathisen and Rasmussen (2019) similarly argue that the literature has historically prioritised spinout creation over longer-term performance, growth, and development trajectories.

The regional implications of academic entrepreneurship and university spinouts also appear highly uneven. While some successful science-based regions have developed dense local ecosystems linking universities, firms, investors, and entrepreneurial networks, other regions struggle to translate university research into sustained local economic growth. Prokop and Kitagawa (2022), analysing UK university spin-offs across regions, emphasise the importance of shareholder and network structures in shaping firm development over time. Their findings suggest that university spin-offs evolve through different developmental stages and that network configurations vary substantially across regional contexts. The authors further distinguish between different types of entrepreneurial regions, including “entrepreneurial cores”, “entrepreneurial peripheries”, and “peripheral lock-in”, highlighting the spatial unevenness of spinout development pathways (Prokop & Kitagawa, 2022).

These findings resonate with wider critiques of universalised models of the entrepreneurial university. For example, Pugh et al., (2022) consider the role of universities’ broader role in regional development in the context of the notion of the entrepreneurial university. They refer to the definition suggested by Guerrero et al. (2016) who define an entrepreneurial university as one that undertakes entrepreneurial activities with the objective of improving regional or national economic performance as well as the university’s own financial advantage and that of its faculty. Working with data from across England they identify three models of university engagement in regional growth as “supporter”, “steerer” and “driver”. Defined by the nature of interaction with other regional actors, these roles are summarised in Table 6.1. McCann et al. (2023) analyse the role of universities in City Deals established across the UK since 2008. Their analysis reflects that of Pugh et al. (2022) highlighting varying patterns of engagement depending on the degree of commitment of the university and the structure and focus of each specific City Deal.

Table 6.1: University roles in supporting regional growth

	Supporter	**Steerer**	**Driver**
Roles in region	Supporting local business through support provision	Triggering and steering the direction of the programme and complementing other local organizations	Driving the programme by providing coordination and management support
Function	Knowledge producer for regional growth	Building network and looking to build strength of the region	Provide leadership to deliver the programme
Main partners	Business, other universities	BIS, chamber of commerce, other universities within the steering group	BIS, chamber of commerce, other universities, business and all the stakeholders
Direction of engagement	Horizontal	Vertical	Horizontal and vertical

Source: Pugh et al., 2022, Table 1, p. 968.

More broadly, the literature suggests that universities contribute most effectively to regional entrepreneurial outcomes where complementary ecosystem conditions already exist, including absorptive capacity, skilled labour pools, business services, finance, and collaborative institutional networks (Benneworth & Charles, 2005; Fitjar & Rodríguez-Pose, 2017). Universities may therefore act as important components of entrepreneurial ecosystems, but rarely function as isolated generators of sustained regional firm growth and economic transformation.

The literature also increasingly questions the assumption that the economic benefits of university spinouts are necessarily retained within their originating regions. While spinouts often emerge close to their parent institutions, their longer-term development trajectories may involve increasing integration into national and international innovation networks, including selective relocation towards regions offering stronger finance, managerial capabilities, specialised labour, and market opportunities (Rossi et al., 2023). More broadly, recent evidence suggests that regional outcomes depend not only on spinout creation, but also on retention, attraction, and the capacity of regions to

support firm scaling over time. Box 6.1 summarises key findings from the emerging literature on university spinout mobility and its implications for regional development policy.

Box 6.1. University Spinout Mobility and Regional Development: Key Findings and Policy Implications Source: Ri (2026)

Research on university spinout mobility suggests that the regional economic benefits of academic entrepreneurship depend not only on where spinouts are created, but also on whether they remain, grow, and embed themselves within local economies over time. Existing evidence points to three recurring patterns.

First, university spinouts exhibit strong early-stage spatial stickiness. Firms typically remain close to their parent institutions during initial stages of development due to continued reliance on university infrastructure, tacit knowledge, academic networks, and founder ties. However, spatial embeddedness is not purely geographic: relational proximity and ongoing social connections to the parent university also play an important role.

Second, mobility tends to increase selectively as firms mature and scale. Relocation is often associated with changing resource requirements, particularly access to venture capital, specialised labour, managerial expertise, customers, and wider innovation ecosystems. Evidence suggests that mobility frequently occurs later in the firm lifecycle rather than immediately after formation, indicating that spinout relocation is closely linked to scaling dynamics and capability development.

Third, regional outcomes are highly uneven. Regions that successfully retain spinouts are not necessarily those that attract spinouts from elsewhere. Retention tends to be associated with continued university linkages and lower operating costs, whereas attraction depends more strongly on agglomeration economies, innovation-system depth, and the availability of finance and specialised support services. As a result, peripheral and institutionally weaker regions may succeed in generating and initially retaining spinouts, while struggling to support longer-term scaling and inward mobility.

Policy implications

- Spinout creation alone is a weak indicator of regional economic impact.
- Greater policy attention should focus on survival, scaling, retention, and regional value capture.
- Retention and attraction require different policy approaches and ecosystem conditions.
- Strengthening regional finance, management capabilities, networks, and absorptive capacity may be as important as increasing spinout formation itself.
- Policy frameworks should recognise the heterogeneity of spinouts and move beyond “one-size-fits-all” commercialisation models.
- Better longitudinal and linked data are needed to understand spinout trajectories, relocation decisions, and long-term regional impacts.

A further caution concerns the concentration and generalisability of the spinout evidence base. Much of the policy enthusiasm around university spinouts is influenced by a small number of highly visible success stories, often associated with research-intensive universities, science-based sectors, and already strong innovation ecosystems. Recent UK evidence points to substantial concentration within the spinout landscape. Spinout activity remains heavily concentrated among a relatively small number of research-intensive universities with strong STEM capabilities and established commercialisation infrastructures (Ulrichsen, 2019; Tracey & Williamson, 2023). At the same time, access to external investment appears uneven geographically, with spinouts connected to universities in London, Oxford, Cambridge, and the wider Greater South East attracting a disproportionate share of venture capital and growth finance (Ulrichsen, 2019; Roupakia & Ulrichsen, 2025). Caputo et al. (2022) argue that growing policy interest in university spin-offs has not always

been matched by equally strong evidence on their long-term contribution to regional development. More broadly, the entrepreneurial university literature has been criticised for over-emphasising technology commercialisation and spinout activity, potentially obscuring softer and more widely distributed forms of knowledge exchange such as consulting, contract research, informal networking, and graduate education (Abreu & Grinevich, 2024).

6.3 Summary

The evidence indicates that universities contribute to regional entrepreneurship through multiple channels, including knowledge spillovers, graduate and academic entrepreneurship, collaboration with firms and university spinouts. International quantitative evidence shows positive effects on new firm formation, but substantial heterogeneity across industries, types of university knowledge and regions. Effects tend to be strongest in knowledge-intensive activities, while the geographical reach of university knowledge varies: tacit knowledge is generally more localised, whereas codified knowledge such as patents can travel further, although its influence also declines with distance (Audretsch et al., 2005; Baptista et al., 2011; Bonaccorsi et al., 2013, 2014). Academic entrepreneurship is also broader than formal spinout and patenting activity, meaning that conventional commercialisation measures capture only part of universities' entrepreneurial contribution (Fini et al., 2010).

UK evidence provides particularly useful insights into the subsequent development, networks and mobility of university spinouts. Spinout ecosystems differ considerably across regions, but not along a simple core–periphery divide: some peripheral regions provide access to valuable external networks despite thinner local ecosystems (Prokop & Kitagawa, 2022). Moreover, 70.4% of active or acquired UK spinouts remained in the region of their originating university, but the conditions associated with retaining spinouts differ from those associated with attracting them from elsewhere (Rossi et al., 2023). Spinout creation alone is therefore an incomplete indicator of regional economic benefit.

UK qualitative evidence also shows that universities can play different roles within regional entrepreneurial ecosystems, from providing knowledge and business support to coordinating networks and helping shape regional development priorities (Pugh et al., 2022; McCann et al., 2023). While this evidence does not establish the magnitude of economic effects, it suggests that universities are not simply dependent on pre-existing regional capabilities but can also contribute to developing them.

Overall, universities can contribute to both entrepreneurial activity and the capabilities that support its subsequent development, but these contributions are highly context dependent. Existing regional resources and networks influence whether university-generated firms survive, scale and remain locally embedded, while universities can themselves strengthen skills, networks and entrepreneurial support. The evidence therefore does not support either a single model of the entrepreneurial university or a simple distinction between successful core regions and constrained peripheral regions.

Recent evidence on spinout mobility further highlights that regional benefits depend not only on where firms are created, but also on whether regions can retain and support them as they scale. This suggests that policies focused narrowly on increasing spinout numbers may have limited impact unless accompanied by broader place-based strategies that strengthen regional absorptive capacity, finance, networks, and innovation-system coordination.

Section 7: Universities, Structural Change and Regional Resilience

This section examines the evidence on the contribution of universities to regional structural change, economic resilience and governance. The literature increasingly positions universities not simply as providers of education and research, but as actors embedded within wider regional innovation, governance and civic systems, where they may both draw on and contribute to the development of regional capabilities. However, the evidence also suggests that university impacts are highly context-dependent and mediated through institutional arrangements, industrial structures and collaboration networks. The following subsections review the literature on universities and structural transformation, their role in regional resilience and adaptation, and the governance and civic arrangements through which universities engage with regional development processes.

7.1 Universities, Structural Change and Regional Transformation

A substantial body of literature in economic geography, regional studies and innovation studies argues that universities can contribute to processes of regional structural change through knowledge creation, human capital formation, research collaboration, entrepreneurship support and institutional leadership. However, the evidence generally suggests that universities are rarely autonomous "drivers" of transformation in isolation. Rather, their influence is mediated by wider regional capabilities, governance arrangements, industrial structures, and extra-regional networks (Vallance, 2016; Tödtling and Trippl, 2018; Frenken et al., 2023).

Within evolutionary economic geography, universities are increasingly understood as contributors to regional adaptive capacity and new path development. Earlier evolutionary approaches focused primarily on firms and market selection processes, often neglecting the role of universities and other public research organisations (Vallance, 2016). Vallance argues that universities differ from firms in important respects, particularly through their longer-term orientation, exploratory research functions, and institutional diversity, which may enhance the adaptive capacity of regional economies. Universities can therefore support experimentation and knowledge recombination associated with new path creation, especially when linked to broader innovation systems and institutional networks rather than operating as isolated actors (Vallance, 2016).

Related diversification perspectives similarly emphasise the importance of existing regional capabilities and institutional coordination in shaping structural transformation. Recent work suggests that regions diversify more successfully into activities related to their existing industrial and knowledge base, while institutional arrangements help coordinate the capabilities needed for more complex forms of production (Frenken et al., 2023). However, Frenken et al. (2023) caution against overly territorial interpretations of "regional capabilities". Firms frequently combine capabilities across inter-regional and global value chains, meaning that structural change depends not only on local assets but also on networks and institutions that support knowledge exchange across spatial scales. This aligns with relational approaches in economic geography, which emphasise the importance of extra-regional linkages and "global pipelines" alongside localised knowledge spillovers (Bathelt et al., 2004). Universities may contribute to these processes by generating specialised knowledge, supplying skilled labour, facilitating capability recombination, and linking regions to wider scientific and innovation networks. However, university capabilities alone are insufficient to generate transformation without supporting institutional and industrial structures (Frenken et al., 2023).

The literature on regional innovation systems and new path development also highlights the role of universities within broader multi-actor governance arrangements. Tödtling and Trippl (2018) argue that new industrial paths emerge not simply through market dynamics or entrepreneurial activity, but through interactions between firms, universities, public agencies and external knowledge flows. Universities may support path branching, upgrading and the creation of new industries through research, spin-offs and collaboration, yet these processes are strongly conditioned by policy

frameworks, institutional coordination and extra-regional linkages. Their review explicitly cautions against narrowly market-led or university-centric interpretations of regional transformation.

Empirical evidence generally supports this more conditional interpretation of university influence. Studies of university-linked regional development often identify universities as important participants within broader innovation ecosystems rather than singular catalysts of growth. Youtie and Shapira's (2008) analysis of Georgia Tech describes how the university evolved into a "knowledge hub" through leadership, boundary-spanning organisations (including the Advanced Technology Development Center, which connected academic entrepreneurs with business and venture capital networks, and VentureLab, which helped researchers commercialise their research) and institutional partnerships connecting academia, industry, finance and government. The study suggests that regional transformation depended not only on research excellence, but also on the development of intermediary functions, entrepreneurial support structures and long-term institutional coordination (Youtie and Shapira, 2008). The authors also note that attempts to replicate such models elsewhere often face significant limitations where industrial absorptive capacity and supporting innovation institutions are weak (Youtie and Shapira, 2008).

Similar conclusions emerge from European case studies. Comparing Aalborg, Twente and Kaiserslautern, Nieth and Radinger-Peer (2023) show how universities contributed to regional path development through different combinations of leadership, institutional engagement and collaboration with regional partners. In Twente, the university supported industrial restructuring following textile decline through entrepreneurship and regional engagement, while Aalborg combined problem-oriented research and close industry collaboration with broader regional coalition-building. Kaiserslautern similarly demonstrated the importance of long-term coordination between universities, firms and public actors in supporting new industrial paths. Additionally, Pugh et al. (2016) report a case study of a mid-sized English university and focus on its role in the governance of regional development initiatives. They suggest that its role within the region allows the university to act as a "network enabler", a "neutral intermediary" and as a catalyst for "reflective and interactive learning". Adopting these roles suggests challenges both for university governance and regional policy actors. Across the cases, universities contributed to path upgrading, diversification and institutional coordination, but always as part of wider regional governance and innovation systems rather than as isolated drivers of transformation.

The UK literature on industrial renewal similarly suggests that innovation-led transformation is geographically uneven and difficult to engineer through universities alone. Sunley et al. (2023), examining advanced manufacturing in Britain, find that advanced manufacturing growth has not consistently favoured traditional industrial regions despite industrial policy efforts and university-linked innovation initiatives. While universities and Catapult centres have been assigned prominent roles in creating innovation districts and supporting industrial upgrading, the geography of advanced manufacturing has remained uneven, with some traditional industrial regions continuing to lose relative ground (Sunley et al., 2023). The study highlights the importance of long-term industrial trajectories, institutional stability and existing regional capabilities in shaping outcomes (Sunley et al., 2023).

Classic UK cases such as Cambridge also illustrate the importance of complementary regional conditions. Although the "Cambridge phenomenon" is frequently associated with the presence of a major research university, the wider literature emphasises the interaction between university research, entrepreneurship, labour mobility, venture finance, policy support and external linkages in supporting regional diversification and cluster development. More broadly, the evidence suggests that universities are most effective in contributing to structural transformation where they are embedded within dense regional and extra-regional innovation networks, aligned with existing or emerging industrial capabilities, and supported by stable governance arrangements.

Overall, the literature provides stronger support for the view that universities contribute to and shape processes of structural change than for claims that they independently drive regional transformation.

Their influence appears most significant when combined with broader institutional capacity, industrial absorptive capability, entrepreneurial ecosystems and coordinated policy support.

7.2 Universities and Regional Economic Resilience

The literature on regional economic resilience provides a useful but conceptually contested framework for understanding how regions respond to economic shocks and structural change. Early resilience research often drew on equilibrium-based interpretations focused on the ability of regional economies to “bounce back” to pre-shock growth paths (Martin and Sunley, 2015). However, more recent work in economic geography has increasingly emphasised evolutionary and adaptive perspectives, arguing that resilience should be understood not simply as recovery, but as the capacity of regions to adapt, reorganise and develop new growth paths in response to disruption (Christopherson et al., 2010; Pike et al., 2010; Martin and Sunley, 2015).

This distinction is important for understanding the role of universities. The literature provides limited evidence that universities “recession-proof” regions in any simple or universal sense. Rather, universities are more plausibly linked to adaptive and transformative resilience through their contribution to skills, research capacity, institutional learning and innovation networks. As Christopherson et al. (2010) note, resilience has become associated with regional adaptation and evolutionary approaches to regional change, particularly in contexts where regions face repeated economic and technological restructuring. Similarly, Pike et al. (2010) argue that resilience should be understood through the interplay between adaptation and adaptability, rather than as a simple return to equilibrium.

Martin and Sunley (2015) further caution that resilience has often been used ambiguously in policy discourse, with insufficient clarity regarding what exactly regions are expected to recover from, recover to, or adapt towards. They distinguish between different dimensions of resilience, including resistance to shocks, recovery, reorientation and renewal, and argue that regional resilience cannot be separated from broader processes of uneven regional development and long-term structural change. This broader framing is particularly relevant to universities, whose contribution may lie less in shielding regions from shocks than in supporting longer-term processes of economic adaptation and capability building.

Empirical evidence on the direct contribution of universities to regional resilience remains relatively limited and mixed. A recent study by Jump and Scavette (2025), examining US counties containing flagship research universities, provides one of the few direct quantitative analyses of universities and recession resilience. Using synthetic difference-in-differences models, the authors find that counties with flagship universities experienced lower unemployment during the 2008–09 financial crisis, but not during the 2001 recession, and performed worse during the Covid-19 recession when campuses were closed. The authors therefore caution against general claims that research universities systematically “recession-proof” regions. Instead, they suggest that resilience effects vary across different types of shocks and may partly reflect the stabilising role of university-related consumption demand in local service economies rather than broader structural transformation alone.

Case-study evidence from the UK similarly points to a more conditional and institutionally mediated role for universities. Goddard et al. (2012), examining Technology and Innovation Centres (TICs) in North-East England, analyse attempts to connect university research with industrial renewal in a historically lagging industrial region. The study suggests that universities can contribute to adaptive renewal through collaboration with intermediary organisations and sector-specific innovation infrastructures, particularly in areas linked to historically embedded industrial capabilities. However, the authors also conclude that both universities and TICs operated primarily within national science and innovation systems, with regional development often remaining a secondary concern. The case therefore highlights both the potential and limits of university-led regional adaptation.

The wider UK resilience literature reinforces the importance of structural and institutional context. Martin et al. (2021), in their analysis of “left behind places”, argue that regional resilience is closely connected to long-term processes of industrial change, uneven development and institutional capacity. Regions differ substantially in their ability to absorb and adapt to shocks because of variations in industrial structure, innovation systems, governance arrangements and labour-market composition. In this context, universities may support resilience where they strengthen regional skills, research capacity and institutional coordination, but their effects are unlikely to offset broader structural disadvantages on their own.

Recent contributions also increasingly emphasise resilience-building as an active and long-term policy process rather than a passive regional characteristic. Martin and Sunley (2026) argue that resilience should be understood as closely connected to the broader trajectories of regional economic development and to the behaviour of firms, workers, institutions and governments across multiple spatial scales. They further suggest that resilience-building depends on governance capacity, institutional coordination and the ability of regions to adapt to repeated and evolving shocks. Within this framework, universities may contribute to resilience-building through research, skills, institutional leadership and connectivity to wider knowledge networks, although the literature does not support claims that universities alone can generate resilient regional economies.

7.3 Governance and Civic Engagement

The literature increasingly suggests that university contributions to regional transformation and resilience are mediated through governance arrangements, institutional networks and forms of civic engagement rather than through isolated research or commercialisation activities. Universities appear most effective where they are embedded within broader regional innovation systems involving firms, public authorities, intermediary organisations and civic actors. This perspective draws on regional innovation systems theory, Triple and Quadruple Helix approaches, and more recent work on civic and anchor universities, all of which emphasise the relational and institutional dimensions of regional development (Etzkowitz and Leydesdorff, 2000; Uyarra, 2010; Tödtling and Trippl, 2018). However, the literature also cautions against assuming that collaborative governance arrangements emerge naturally or operate effectively in all contexts.

Early Triple Helix approaches conceptualised universities, industry and government as interacting institutional spheres supporting innovation and regional development (Etzkowitz and Leydesdorff, 2000). Subsequent work extended this perspective towards broader regional innovation systems, recognising the importance of intermediary organisations, institutional coordination and extra-regional linkages (Cooke, 2005; Asheim and Gertler, 2005). For example, Pugh (2017) considers the specific challenges of research commercialisation in Wales, questioning local firms’ absorptive capacity and the variable success of local science park and incubator projects (e.g. Technium). She suggests “Two main problems with the Welsh triple helix programmes are identified: the gap between design and implementation, and a supply and demand mismatch with too much focus on the innovation-push out of universities instead of increasing the absorptive capacity and capabilities of the business sphere, resulting in a lack of business engagement in many programmes” (Pugh, 2017, p. 990).

This illustrates the difficulty of applying policy models which work in advanced regions to lagging regions in policy terms, it requires a stronger focus on demand-side measures and an appreciation of the wider regional role of universities beyond innovation-push. More recent “Quadruple Helix” approaches additionally incorporate communities and civil society actors, reflecting growing attention to co-production, participation and civic engagement (Carayannis and Campbell, 2009). Within these frameworks, universities are increasingly viewed not only as knowledge producers but also as conveners, brokers and institutional partners within wider governance systems.

At the same time, the literature increasingly critiques narrow or one-directional conceptions of engagement. Uyarra (2010) argues that policy discussions have often relied on simplified

assumptions regarding university regional engagement, frequently overstating universities' capacity to drive regional development independently of wider structural conditions. Similarly, more recent civic university literature emphasises that engagement should not be understood solely as technology transfer or outreach, but as a broader process of reciprocal interaction between universities and their localities (Goddard and Vallance, 2013). Jones and Columbano (2022), for example, argue that civic engagement increasingly involves moving from working "for" communities towards working "with" them through collaborative and participatory forms of knowledge production.

The literature on civic and anchor universities further highlights the importance of institutional embedding and long-term commitment. Historically, civic universities emerged in industrial cities with explicit educational, cultural and professional missions linked to local development (Jones, 2026). Contemporary civic university agendas similarly emphasise the importance of universities being simultaneously global institutions and locally embedded actors. However, this role is not viewed as automatic. Goddard et al. (2014) and Ehlenz (2018) both caution that "anchor institution" frameworks are often normative, while actual university engagement practices vary substantially across institutions and places. Ehlenz's (2018) comparative study of 22 US universities finds that universities frequently prioritise property-led or economic development initiatives, while broader social and community-oriented ambitions remain less consistently embedded in practice.

Empirical evidence across UK, European and US case studies points to several recurring governance patterns. First, universities rarely operate as isolated agents of regional transformation. Instead, successful examples typically involve intermediary or hybrid governance arrangements, including innovation centres, civic partnerships, anchor networks, translational organisations and collaborative platforms. In North-East England, for example, Goddard et al. (2012) show how universities engaged with Technology and Innovation Centres to support industrial adaptation and innovation in advanced manufacturing and renewable energy sectors. However, the study also notes that these organisations often remained more strongly embedded within national innovation systems than regional development agendas, illustrating the challenges of sustaining place-based coordination.

Second, many successful cases involve universities with strong territorial or applied missions rather than purely globally oriented research strategies. Comparative work by Nieth and Radinger-Peer (2023) examining Aalborg, Twente and Kaiserslautern demonstrates how universities contributed to regional path development through different forms of long-term institutional engagement and coalition-building. In Twente, the university became closely involved in regional restructuring following industrial decline through entrepreneurship support and regional collaboration. Aalborg combined problem-oriented research with strong regional partnerships and institutional coordination, while Kaiserslautern relied on sustained collaboration between universities, firms and public actors. Across all three cases, universities contributed to regional diversification and upgrading through embedded governance relationships rather than through research commercialisation alone.

Third, the literature increasingly highlights the importance of civic participation and co-production. In Birmingham, O'Farrell et al. (2022) examine the USE-IT! programme, which brought together universities, local organisations and residents through participatory research and community researcher training schemes. The authors argue that universities can function as "just anchors" by facilitating social, economic and epistemic inclusion through collaboration with communities and anchor networks. However, they also criticise the fragmented and project-based nature of much civic engagement activity, arguing that universities often lack sustained institutional infrastructures for long-term community partnership. Similar themes emerge in Birmingham City University's CoLAB projects, which sought to move beyond one-directional outreach towards collaborative and place-based forms of engagement through "live" projects involving students, community organisations and local stakeholders (Jones and Columbano, 2022).

The Covid-19 pandemic further illustrated the governance and civic roles universities can play under conditions of crisis. Charles (2023), examining Newcastle, shows how civic university partnerships involving universities, local authorities and health actors were rapidly mobilised during the pandemic

to support emergency responses and longer-term recovery planning. The case highlights how pre-existing civic and governance relationships enabled universities to participate in local coordination structures extending beyond traditional teaching and research functions. At the same time, the study also reflects broader governance challenges in the UK context, including fragmented regional institutions, shifting policy frameworks and tensions between global university incentives and local engagement priorities.

Several broader patterns emerge across these studies. More regionally engaged universities are frequently institutions with applied orientations, strong regional identities or historical civic missions, rather than globally dominant research-intensive universities focused primarily on international rankings and research concentration. Effective governance arrangements also tend to rely on long-term institutional continuity, intermediary organisations and coalition-building rather than short-term project-based initiatives. Furthermore, the literature increasingly suggests that universities contribute most effectively where they act as embedded coordinators, conveners and institutional partners within wider regional governance ecosystems.

At the same time, the evidence base remains stronger regarding governance processes and institutional arrangements than regarding measurable economic outcomes. Much of the literature relies on qualitative case studies, institutional analysis and comparative interpretation rather than causal evaluation of long-term regional impacts. Governance fragmentation, unstable funding arrangements and tensions between national higher education incentives and local engagement goals remain persistent constraints, particularly within the UK context. Overall, the literature suggests that universities can contribute meaningfully to regional governance, civic engagement and institutional coordination, but that these roles are contingent, uneven and highly dependent on wider political, institutional and territorial conditions.

7.4 Summary

The evidence suggests that universities can contribute to regional structural change and resilience through knowledge creation, skills, entrepreneurship, institutional change and participation in regional networks and governance. International comparative and case-study evidence shows that universities can play active roles in the development of new regional paths, including by modernising existing industries, supporting new activities, attracting skills and external resources, and helping to build the institutions and networks that underpin regional development (Youtie & Shapira, 2008; Nieth & Radinger-Peer, 2023). Universities therefore do not simply operate within existing regional capabilities; in some circumstances, they can contribute to developing and reshaping them.

Evidence on economic resilience is more limited and suggests that university effects depend on the nature of the shock. US evidence finds that regions containing flagship research universities experienced lower increases in unemployment during the 2008–09 recession, but no significant advantage during the 2001 recession and poorer relative performance during Covid-19 when normal university activities were disrupted (Jump & Scavette, 2025). This supports a view of universities as potential contributors to resilience rather than institutions that systematically insulate regions from economic shocks.

UK evidence is particularly informative about the institutional and governance conditions surrounding university contributions. Studies of Wales, North-East England, Birmingham and Newcastle show universities acting as conveners, intermediaries and partners in regional development, but also identify constraints arising from fragmented governance, weak business engagement, discontinuous initiatives and tensions between national higher-education incentives and regional objectives (Goddard et al., 2012; Pugh, 2017; O'Farrell et al., 2022; Charles, 2023). Evidence on British advanced manufacturing similarly cautions against assuming that university research and innovation infrastructure will by themselves generate structural transformation in weaker industrial regions (Sunley et al., 2023).

Overall, the evidence is stronger on the mechanisms and institutional conditions through which universities contribute to structural change and resilience than on the magnitude of their economic effects. Much of the literature is based on qualitative, comparative and institutional case studies rather than causal evaluation. It nevertheless indicates that universities can contribute actively to regional adaptation and capability-building, particularly when research, skills, entrepreneurship and civic engagement are connected to wider regional and extra-regional networks. Their contribution is therefore neither automatic nor simply determined by pre-existing regional absorptive capacity, but emerges through interaction between university agency, regional institutions, economic structures and wider governance arrangements.

Section 8: Institutional and governance effects on university impacts

In this section, we focus on how the diversity of universities and their governance arrangements lead to variations in their impact on growth and productivity, and on the mechanisms through which these effects operate. In terms of the diversity of universities, the key distinction in the literature is between research-intensive and teaching-focused institutions, a distinction that does not map neatly onto the UK system. Here, the evidence suggests that research-intensive universities generate larger economic impacts through innovation, but only in regions with strong existing infrastructure, while teaching-focused universities produce more reliable benefits through human capital development.

Governance arrangements reflect universities' degree of autonomy, internal organisational arrangements, and the nature of inter-university competition. Explicit comparisons between governance models are scarce. The limited evidence suggests that governance operates as an enabling or constraining factor rather than a primary determinant of the magnitude of impact, with optimal approaches varying by institutional type and regional context rather than following universal prescriptions.

8.1 Institutional Type Variations

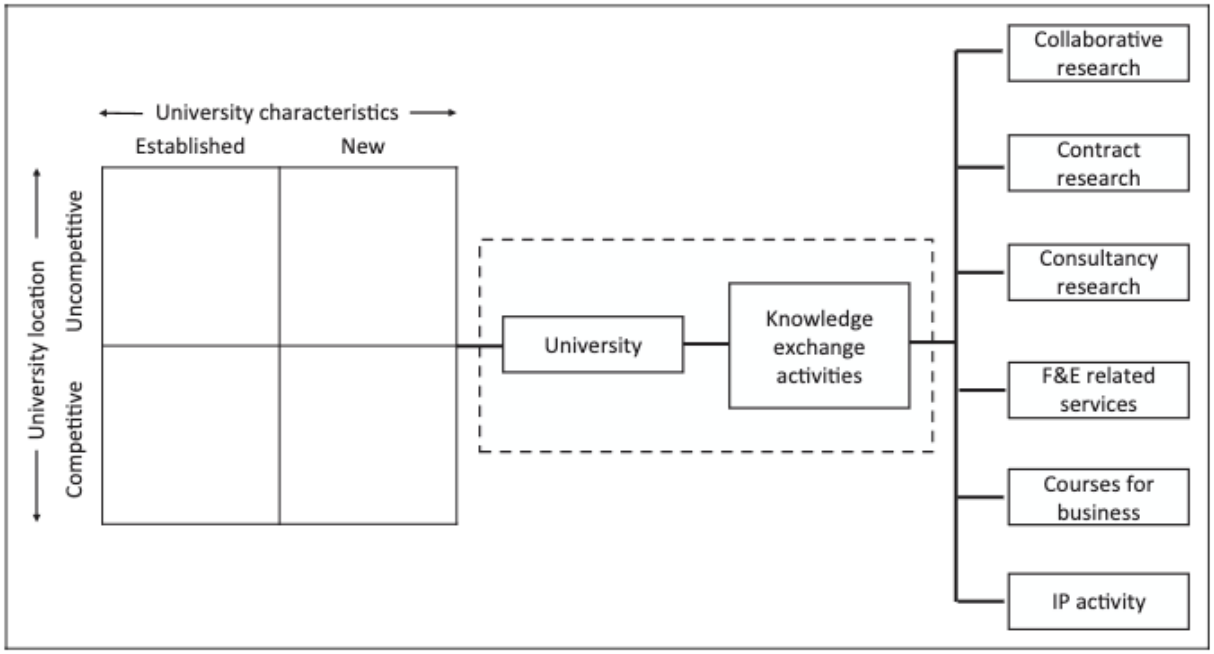
Writing in 2009, Huggins and Johnston (2009, p. 1093) note differences in the composition of universities across UK regions: "In general, pre-1992 institutions account for the leading research-intensive universities … Regions differ in the proportion of the institutions they possess that are either pre-1992 or post-1992 universities. In London, Eastern England, the North East, South East, Wales, and Yorkshire and the Humber there is a relatively even split. The East Midlands, North West, South West, and West Midlands are biased towards post-1992 institutions, while in Scotland two-thirds of institutions are classed as pre-1992". Using data from HESA for 2005/06, they calculate the value added internally by universities and find that pre-1992 universities generated more than twice the value added of post-1992 universities. These differences extend to both the extent and the mechanisms through which research-intensive and teaching-focused institutions impact regional economies. Some reinforcing differences have also been identified in terms of UKRI research funding. For example, Johnston & Wells, (2020) consider the regional distribution of competitive research funding. They emphasise the points evident in Zhang (2018) and Pugh (2017) of the diversity of universities and their contexts and the consequent difficulty of assuming the universalism of positive local linkages. Competitive research funding (per capita) in the priority sectors identified in the 2017 Industrial Strategy was strongly biased towards London and the South East with universities in other regions having distinct sectoral specialisms. "This means that the Industrial Strategy should refrain from proposing a universal role for universities and treating them as isomorphic" Johnston & Wells (2020, p. 398).

As Sánchez-Barrioluengo and Consoli (2016, p. 808) note, "Recent research takes a critical stance toward the prototypical 'one-size-fits-all' model on the grounds that it overlooks the complex nature of the university qua institution and treats them as homogenous entities with equal capacity to contribute to social engagement … this calls for a policy response that accommodates the continuing demand for globally competitive knowledge, while at the same time tailoring knowledge creation and mobilisation activities to the specific opportunities and challenges that emerge from the diverse mix of local economies". Their empirical investigation of Spanish universities suggested that research-intensive institutions often prioritise activities beyond their host regions, thereby reducing localised economic benefits. While the teaching aspect of a university's mission robustly predicts high-skill employment, the impact of research and knowledge transfer depends strongly on the host region's characteristics. This pattern suggests that research excellence does not automatically translate into regional economic development.

Zhang (2018) considers this in terms of the role of university and regional characteristics on the performance of UK universities in knowledge exchange. Universities are divided into "established"

and “new” and locations into “competitive” and “uncompetitive” areas (Figure 8.1). The regional classification is based on the UK Competitiveness Index, with London, the South East and East of England identified as competitive regions because they scored above the UK average; the remaining nine regions are classified as uncompetitive. Knowledge-exchange income was consistently higher among established universities, while regional context mattered particularly for new universities. Established universities performed similarly across stronger and weaker regions, whereas new universities in more competitive regions generated significantly more knowledge-exchange income than their counterparts in less competitive regions (Zhang, 2018). Zhang (2018, p. 89-90) concludes: “Overall, the innovation policy agenda in the United Kingdom has not paid sufficient attention to the heterogeneity of the country’s higher education sector, including the institutional and locational characteristics of its universities.”

Figure 8.1: University and regional characteristics and knowledge exchange



Source: Zhang (2018), Figure 1, p. 83.

Sánchez-Barrioluengo and Consoli (2016) find a consistent positive relationship between universities' teaching orientation and high-skill employment, while the relationships with research and knowledge-exchange activities are more sensitive to regional socioeconomic conditions. Similar evidence for the UK is identified by Lawton-Smith and Waters (2020) in their in-depth study of the labour market impacts of research-intensive and non-research-intensive universities in Oxfordshire and Buckinghamshire. They find that local skills retention is stronger at non-research-intensive universities. They comment: “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”.

Evidence from Japan also shows that non-research universities can generate local economic effects. A 10% increase in small, non-research private universities was associated with approximately 0.3–0.4% higher GDP per capita growth over the subsequent five-year period, although the effect was concentrated in Japan's earlier rapid-growth period and was close to zero after 1990 (Yanagiura & Tateishi, 2024). The effect was not associated with increased local human capital or innovation, but primarily with temporary local demand and capital investment.

8.2 Autonomy, organisational and clustering effects

As Lawton-Smith and Waters (2020) suggest, the strategic objectives of research-intensive and non-research-intensive vary markedly, with the latter often having a stronger local focus. This reflects the degree of autonomy which universities have in terms of their own strategic and organisational priorities and development strategy. This can either enable or restrict local impacts.

Sánchez-Barrioluengo & Consoli (2016) note that Spanish universities have significant autonomy in administrative and financial matters, with funding agreements negotiated directly with regional governments. This helps prioritise local engagement and local labour market impacts. In an Australian context, Gunasekara (2006) identifies a range of institutional and organisational factors that also influence universities' engagement with the local economy, alongside the characteristics of the regional economy. These include senior (university) management's commitment to regional engagement, engagement mechanisms, and the history of engagement between the university and regional actors. Both influences are likely to be stronger in contexts where there is complementarity between the strengths of the university and regional needs, and where there are regional champions for university-business engagement.

Broadly based evidence on the impact of these organisational factors on universities is limited, but case study evidence suggests that these factors can either enhance or undermine local impacts. Breznitz (2014) contrasts the cases of Yale and Cambridge Universities in the 1990s and suggests that while Yale created organisational structures and a corporate culture that encouraged engagement and technology transfer, Cambridge implemented frequent policy changes and, with a focus on over-centralised management policies, undermined industry relationships. As one reviewer of Breznitz (2014) commented: "Professor Breznitz connects intra-university and external factors as jointly critical to success …. The internal emphasis includes the 'university culture' – leadership and an entrepreneurial faculty, policies to enhance action, and an organization to enable the processes" (Harrington, 2016, p.622).

Regional clustering of universities may also affect university strategies and, consequently, levels of technology transfer. Es-Sadki and Arundel (2021) examine outcomes across several European countries and find that, where universities are geographically clustered, the number of research and licensing agreements tends to decline. They interpret this as indicating that "there is a limited demand for the knowledge outputs of universities, such that an increase in the regional supply of knowledge is not matched by an equivalent increase in private sector demand' (p. 22). However, their results also suggest potential clustering benefits (spillovers, signalling), but only for the highest-ranked universities. Clustering benefits are also reported in studies of the impact of universities on local development in Italy (Agasisti et al., 2019). Here, clustering is seen as promoting competition for students, increasing local opportunities, and contributing to institutional efficiency. Both, in turn, may be beneficial for local growth.

8.3 Summary

The evidence shows substantial variation in how different types of universities contribute to regional economies. UK evidence indicates that established, generally more research-intensive universities generate higher knowledge-exchange income than newer universities, but also suggests that institutional type and regional context interact. Established universities appear relatively less sensitive to regional competitiveness, potentially reflecting their wider and more mature networks, whereas the knowledge-exchange performance of newer universities is more strongly associated with the characteristics of their host region (Zhang, 2018). Competitive research and innovation funding is also unevenly distributed across UK regions, alongside substantial differences in regional sectoral specialisation and university–industry engagement (Johnston & Wells, 2020).

International evidence indicates that different university orientations are associated with different forms of regional contribution. In Spain, a stronger teaching orientation is consistently associated with high-skill employment, suggesting an important role for universities in supplying skilled workers to regional labour markets, while the relationships between research and knowledge-exchange

activities and high-skill employment are more sensitive to regional socioeconomic conditions (Sánchez-Barrioluengo & Consoli, 2016). Evidence from Japan shows that small, non-research universities can also contribute to regional economic growth, although these effects appear highly dependent on the wider economic context and, in this case, operated primarily through local demand and investment rather than human-capital or innovation channels (Yanagiura & Tateishi, 2024).

Institutional and governance arrangements also shape universities' regional engagement, although the evidence here is less conclusive. University autonomy, internal organisation, leadership and mechanisms for external engagement can enable or constrain regional activity, while the geographical concentration of universities can generate both competition and complementarities. European evidence suggests, for example, that proximity to other strong universities can reduce some forms of knowledge exchange while benefiting the licence income of the highest-ranked institutions (Es-Sadki & Arundel, 2021). Much of the wider evidence on governance and organisational arrangements remains comparative or case-based, making it difficult to identify their independent effects on regional economic outcomes.

Overall, the evidence does not identify a single institutional model that maximises universities' regional contribution. Research-intensive, teaching-focused, established and newer universities can contribute through different mechanisms and with different sensitivity to regional conditions. Institutional characteristics and regional capabilities therefore need to be considered jointly: regional context can shape university impacts, while universities can themselves contribute to developing skills, networks and other regional capabilities over time. This heterogeneity also cautions against drawing simple conclusions about the regional economic effects of particular university types or funding arrangements.

Section 9: Measurement and methodological limitations

9.1 Measurement

The literature on universities and regional development employs a wide range of approaches to defining and measuring “impact”, reflecting the multiple economic, social and institutional roles universities perform within regional economies. Some studies focus on direct economic effects such as employment, procurement and student expenditure, while others examine broader outcomes including productivity growth, innovation, entrepreneurship, human capital formation, resilience and governance. As a result, the evidence base is methodologically diverse and varies substantially in terms of measurement strategies, causal identification and analytical robustness.

Earlier studies frequently relied on expenditure-based economic impact assessments, estimating the contribution of universities through local employment, procurement and multiplier effects. However, the literature increasingly distinguishes between direct economic footprint effects and broader development impacts associated with knowledge creation, skills, innovation and institutional change (Goldstein and Drucker, 2006; Drucker, 2016). More recent work therefore tends to focus on indirect economic outcomes such as productivity, regional competitiveness, innovation performance and labour-market upgrading (Valero and Van Reenen, 2019; Marrocu et al., 2022).

Human capital impacts are typically measured through graduate retention, migration, wages and labour-market outcomes. Studies in this tradition typically combine labour-market and migration data with econometric strategies addressing spatial selection and endogeneity, including simultaneous equation models, instrumental variables and longitudinal case-study analysis (Faggian and McCann, 2006; Abel and Deitz, 2012; Evers, 2019). Innovation and knowledge-spillover studies commonly use patents, R&D activity, university-industry collaboration and firm-level productivity indicators, often employing knowledge production functions, spatial econometrics and network analysis (Acosta et al., 2009; Ponds et al., 2010; Harris et al., 2013). The entrepreneurship literature similarly relies on measures such as spinout formation, firm survival and new business creation, drawing on firm-level datasets, survival analysis and case-study evidence (Di Gregorio and Shane, 2003; Clarysse et al., 2005; García-Estévez and Duch-Brown, 2020).

By contrast, structural transformation, resilience and civic engagement are more difficult to operationalise empirically. Research in evolutionary economic geography and regional resilience often examines long-term processes such as path development, diversification, institutional adaptation and network formation, which are less amenable to standard quantitative indicators (Vallance, 2016; Martin and Sunley, 2015). Similarly, governance and civic engagement studies frequently focus on institutional relationships, partnership structures, co-production and anchor functions, relying predominantly on qualitative case studies and institutional analysis (Uyarra, 2010; Goddard and Vallance, 2013; O’Farrell et al., 2022).

Table 9.1 summarises the main domains of university regional impact examined in the literature, together with the most common measurement approaches and associated methodological challenges.

Table 9.1: Measuring Universities' Contributions to Regional Development: Domains, Methods and Limitations

Domain	Typical measures	Common methodologies	Key limitations/issues
Direct economic footprint	Employment, procurement, student spending, local demand	Input-output models, multipliers, economic impact assessments	Measures economic footprint rather than additionality; limited counterfactuals; risk of double counting and overstating local effects
Indirect economic development impacts	GDP growth, productivity, TFP, wages, regional competitiveness	Panel econometrics, fixed effects, spatial econometrics, growth models	Endogeneity between university strength and prosperous regions; long time lags; omitted institutional and industrial factors
Human capital and labour markets	Graduate retention, migration, skills, wages, labour-market upgrading	Labour-market analysis, migration models, longitudinal datasets, quasi-natural experiments	Graduate mobility complicates regional attribution; benefits may accrue outside the university region
Innovation and knowledge spillovers	Patents, citations, R&D, university-industry collaboration, firm productivity	Knowledge production functions, patent analysis, firm-level productivity models, spatial and network econometrics	Knowledge spillovers cross regions; patent-based indicators favour STEM and commercial outputs; difficult attribution of causality
Entrepreneurship and spinouts	Firm creation, spinouts, survival, growth, entrepreneurial activity	Firm-level datasets, survival analysis, case studies, quasi-natural experiments	Selection bias towards successful spinouts; spinout counts may not capture wider economic value or regional retention
Structural change and diversification	Path development, sectoral upgrading, related diversification, industrial restructuring	Evolutionary analysis, comparative case studies, longitudinal regional studies	Effects may emerge only over long periods, complicating evaluation and attribution; multiple interacting regional factors
Regional resilience	Employment recovery, adaptation, renewal, adaptive capacity	Longitudinal regional analysis, synthetic controls, comparative studies	Resilience concept contested; mechanisms difficult to operationalise; limited quantitative evidence
Governance and civic engagement	Partnerships, anchor networks, co-production, institutional leadership, civic participation	Qualitative case studies, institutional analysis, policy evaluation	Outcomes difficult to quantify; evidence often process-oriented and qualitative; limited causal attribution

9.2. Attribution and causal inference

The diversity of approaches reflects the complexity of university impacts, but it also creates important challenges for attribution and causal inference. Several recurring methodological issues emerge across the literature.

First, there is an endogeneity issue: the establishment and evolution of universities are closely intertwined with broader regional economic and institutional conditions, making it difficult to isolate the effects of universities from wider regional development trajectories. Strong regional economies may therefore help attract and strengthen universities, rather than universities independently generating regional success. This creates significant endogeneity problems, particularly in studies examining productivity, innovation and regional growth. More recent studies increasingly attempt to address these issues through panel fixed effects, instrumental variables and quasi-natural experimental designs (Valero and Van Reenen, 2019; García-Estévez and Duch-Brown, 2020). These approaches strengthen causal identification to varying degrees, but their ability to identify university effects depends on the assumptions underlying the particular research design. Nevertheless, a substantial proportion of the literature remains primarily associational, making it difficult to isolate universities' independent regional effects.

Second, spatial spillovers complicate regional attribution. University knowledge flows frequently extend beyond local administrative boundaries through graduate mobility, firm collaboration networks, patent citation flows and global research partnerships. As a result, university benefits may accrue to regions other than those in which universities are physically located. This issue is particularly important within innovation and human capital studies, where inter-regional and international knowledge linkages often play a central role (Bathelt et al., 2004; Frenken et al., 2023).

Third, the time horizons associated with university impacts are often much longer than standard evaluation periods. Direct expenditure and labour-market effects may emerge relatively quickly, but broader processes of institutional change, path development, entrepreneurial ecosystem formation and industrial diversification may take decades to materialise. Studies examining structural transformation therefore face particular challenges in identifying causal relationships because effects may emerge only over long periods, complicating evaluation and attribution (Youtie and Shapira, 2008; Nieth and Radinger-Peer, 2023).

Fourth, the literature displays important indicator biases. Innovation and entrepreneurship studies frequently rely on patents, spinouts and research commercialisation because these outcomes are relatively measurable and internationally comparable. However, such indicators may privilege STEM-intensive and commercially oriented activities while underrepresenting teaching, social innovation, public-sector collaboration, civic engagement and institutional leadership. Several authors caution that narrow commercialisation metrics risk overlooking broader university contributions to regional development (Uyarra, 2010; Goddard and Vallance, 2013). Recent research further suggests that measurement frameworks themselves may shape perceptions of university impact. Firms appear substantially more likely to identify universities as sources of innovation-related knowledge when exposed to broader definitions of engagement, indicating that conventional survey instruments may understate diffuse, informal and relational forms of university contribution within regional innovation ecosystems (Angenendt and Salter, 2026).

Fifth, the evidence base varies substantially across domains. Human capital, graduate retention and some innovation outcomes are comparatively well measured using longitudinal and administrative datasets. By contrast, governance, resilience and civic engagement remain heavily reliant on qualitative case studies and institutional interpretation. While such studies provide rich insights into mechanisms and regional context, they often lack robust counterfactuals and are more limited in establishing causal regional effects.

Finally, the literature exhibits a degree of case-selection bias towards successful or highly visible examples. Cases such as Cambridge, Waterloo, Twente and Georgia Tech appear prominently throughout the literature because they represent relatively successful examples of university-led or university-supported regional transformation. However, less successful cases and instances where universities generated limited regional impacts are comparatively underrepresented. This creates a risk that the literature overstates the generalisability of successful university-region relationships.

Overall, the evidence base is strongest for human capital and labour-market outcomes and for some innovation-related impacts, with a growing quantitative evidence base on firm creation and entrepreneurship. The evidence is more mixed for broader productivity and regional development outcomes, and remains comparatively limited for governance, civic engagement, resilience and long-term structural transformation. The literature therefore supports cautious claims that universities contribute to regional development through multiple interacting mechanisms, while also highlighting substantial methodological and attribution challenges in isolating their independent effects.

9.3 Summary

The literature on universities and regional development employs a wide range of approaches to defining and measuring impact, reflecting both the diversity of university functions and the different

regional outcomes examined. The evidence is strongest for human capital and labour-market outcomes and for some innovation-related impacts, where measurable indicators, longitudinal data and increasingly robust empirical methods are available. A growing quantitative literature also examines entrepreneurship and firm creation. By contrast, structural transformation, resilience, governance and civic engagement are more difficult to operationalise and rely more heavily on qualitative, comparative and institutional evidence.

Several methodological challenges cut across these different strands of evidence. Universities are embedded within regional economies and institutions, making it difficult to separate university effects from the characteristics and development trajectories of the regions in which they are located. Spatial spillovers further complicate attribution because graduates, knowledge, firms and collaborative networks frequently cross regional boundaries. Long time horizons are particularly important for capability-building, structural transformation and resilience, where university contributions may take many years to materialise. At the same time, reliance on readily measurable indicators such as patents, spinouts and commercialisation income can underrepresent less visible contributions through teaching, networks, institutional leadership and civic engagement.

More recent studies increasingly use panel methods, instrumental variables, quasi-natural experiments and other approaches designed to strengthen causal identification, but a substantial part of the evidence remains associational. The strength of conclusions therefore differs across the mechanisms examined in this report: quantitative estimates of particular labour-market, innovation and economic effects can sometimes be identified with reasonable confidence, whereas evidence on longer-term institutional and structural contributions is generally stronger in identifying mechanisms than in establishing their magnitude or causal effect. These differences in evidence should not be interpreted as implying that the less readily measurable contributions are necessarily less important, but they do require greater caution in assessing their scale and generalisability.

Section 10: Universities in lagging regions

In this section, we examine the evidence on the economic development benefits of universities in lagging regions. In general, studies find that universities create measurable economic impacts in lagging regions, although the strength and nature of these effects depend critically on regional context and the type of mechanism. Human capital development through education and workforce training emerges as particularly critical in less-developed regions, whereas research commercialisation and spin-off formation require stronger industrial bases and absorptive capacity rarely present in peripheral areas. Some of the stronger causal evidence comes from quasi-experimental analysis of university expansion in Spain, while longitudinal evidence from Denmark documents substantial changes in graduate supply and absorption following the establishment of a university in a peripheral region (García-Estévez & Duch-Brown, 2020; Evers, 2019).

10.1 Different dimensions of impact

Universities in lagging regions have demonstrated measurable employment impacts through multiple pathways. A study by Pereira et al. (2021) of the impact of the Polytechnic Institute of Portalegre on Portugal's Alentejo region identified it as the third major employer in the region. Using a demand-side approach that measures the impact of the university on individuals, firms and organisations in the region, the university effect was estimated at around 4% of GDP and provided a return of around 1:1.85 for every Euro invested.

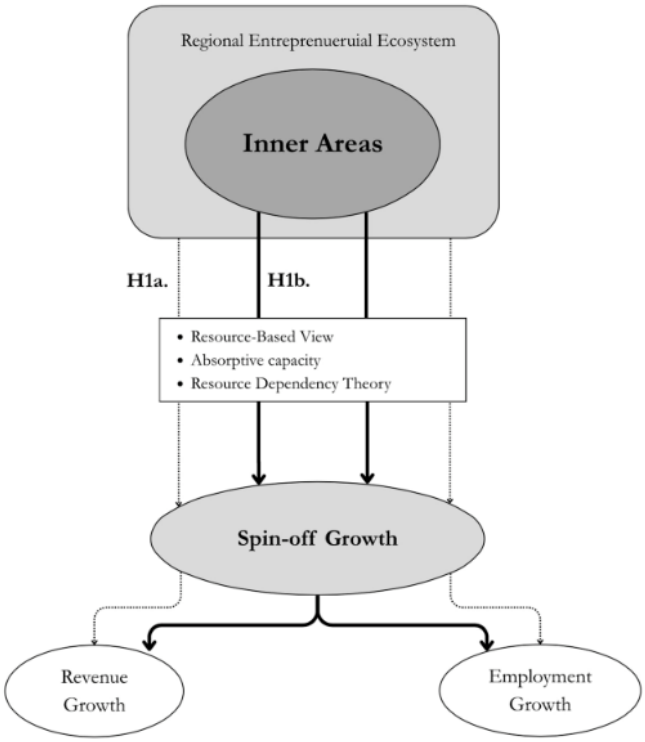
Elsewhere, the development of entrepreneurial universities has been seen as bridging the gap between contributing to the local economy and the international knowledge base. For example, Lazzeretti & Tavoletti (2005) conclude their review of the impact of the University of Twente with the comment that “For a long time the University of Twente has been a ‘regional booster’ for the development of a regional ‘knowledge economy’, starting from a previously depressed local economy, achieving a relevant international position in the world of Strategic Science and with all of its graduates finding good jobs” (Lazzeretti & Tavoletti, 2005, p. 490). Specific interventions by universities in lagging regions have also been shown to be positive in terms of employment (McCauley-Smith et al., 2022) and business value creation (Fish and Lambert, 2021).

Establishing new universities or expanding existing ones has been shown to drive new firm creation in several contexts. In Spain, García-Estévez and Duch-Brown (2020) exploited the expansion of the Spanish university system post-1983 to examine the effect on new firm creation. They find that establishing a new university had a statistically significant positive effect on new firm creation, with particularly strong impacts in the medium-high and medium-low technology manufacturing sectors, as well as in knowledge-intensive market and financial services. The creation of health faculties specifically had significant positive effects on high-tech manufacturing firm formation. This entrepreneurial effect appears more pronounced where universities adopted explicit entrepreneurial strategies and support structures (Lazzeretti and Tavoletti, 2005). Other evidence suggests the value of university-based programmes in supporting the growth and development of local businesses. For example, the LEAD programme at Lancaster University – a demand-led, peer-learning SME management development programme - demonstrated that 90% of participating firms expected increases in sales, employment, and productivity over the next 2-3 years (Decter et al., 2011, p. 370).

Previous sections have summarised the evidence on the role of university patenting in corporate patenting, suggesting that these effects are stronger in regions lacking other innovative companies (Spurek & Rehák, 2022). In particular, the share of academic patents was higher in Eastern Europe and in regions where innovative companies were scarce (Spurek & Rehák, 2022). In Italy, stronger regional entrepreneurial ecosystems amplified revenue growth for university spin-offs in lagging areas, partially offsetting more localised structural disadvantages (Prencipe & Fioretti, 2026) (see Box 10.1).

Box 10.1: Spin-outs in lagging regions (Prencipe & Fioretti, 2026)

Prencipe & Fioretti (2026) consider spin-outs from Italian universities in lagging regions. They frame their analysis by noting that "spin-offs do not operate in isolation. Rather, they are embedded in local ecosystems that can be more or less favourable, depending on the configuration of institutional networks, infrastructures, and economic dynamics. Understanding spin-off growth thus requires an integrated perspective capable of considering internal firm resources alongside external territorial conditions" (p. 3). This leads to their conceptual model:



Source: Prencipe & Fioretti (2026), Figure 1.

Their empirical analysis suggests that stronger local business eco-systems do facilitate spin-out growth, however, these structural disadvantages are often locally specific. Spin-out success depends also on the quality of the wider regional (rather than local) business eco-system.

Finally, universities contribute to regional development through human capital upgrading and labour market effects. In Denmark's peripheral North region, Evers (2019) documents substantial growth in the supply and employment of university graduates following the establishment of Aalborg University in 1974. The share of graduates in the regional workforce increased from 1.5% in 1982 to 8.5% in 2006, while graduate retention remained relatively stable and wage developments were broadly comparable with those in other Danish urban labour markets. This suggests that the regional economy was able to absorb a substantial expansion in highly skilled labour, although the study does not use a counterfactual design and therefore cannot establish how much of this change was attributable specifically to the university.

10.2 Achieving impact in lagging regions – the importance of human capital

Universities employ diverse mechanisms for knowledge transfer, adapted to regional contexts. In less-developed regions, universities can serve as substitutes for missing knowledge-intensive business services. For example, in their analysis of firms in Andalusia, Spain, Pinto, et al., (2015) find that universities function as a substitute for the weakness of private sector knowledge-intensive business services by providing advanced services and human resources. These links are facilitated by intermediary organisations such as technology transfer offices and innovation centres (e.g. SPECIFIC (solar energy) and the Compound Semiconductor Centre in Wales, Marques et al. 2019).

However, such institutions may find it more difficult to overcome barriers to collaboration due to rurality and distance from university centres (Johnson and Prokop, 2021).

Human capital development proved particularly critical in peripheral regions. Universities acted as "net importers" of science and technology graduates in regions such as the Northern Powerhouse and the Midlands Engine, helping to upgrade regional workforce capabilities *(*Cacciolatti & Rosli, 2022). Targeted training programmes have measurable impacts. The Leading Growth programme in the North East of England enhanced leadership and management skills among SME owner-managers through business development education (McCauley-Smith et al., 2022). The LEAD programme at Lancaster University developed leadership capacity in SMEs, with 90% of participants expecting improvements in business performance (Decter et al., 2011).

Structured entrepreneurship programmes have also been used to translate research into commercial activity. The University of Twente's TOP (Temporary Entrepreneurial Positions) programme provided infrastructure and support for entrepreneurs, with approximately 75% of participating companies established since the programme's launch in 1984 still operating in 2000, and a reported five-year survival rate of approximately 89% (Sijde and Tilburg, 2000). Similar initiatives have been implemented at other universities internationally, such as the University of Waterloo in Canada (Bramwell and Wolfe, 2008).

Universities can establish physical and organisational infrastructure to support innovation through business incubators and technology and innovation centres that bridge the gap between research and industry. In North-East England, universities engaged with Technology and Innovation Centres focused on process innovation in high-value manufacturing and renewable energy, although both were more strongly engaged with national rather than regional development agendas (Goddard et al., 2012). It is suggested that fostering stronger regional engagement is likely to require a long-term strategy, translational and collaborative research programmes, and related teaching programmes. Triple Helix-type collaboration agreements can help develop this constellation of related initiatives, as illustrated by the agreement between Sweden's Värmland region, Karlstad University, and local industry (Kempton, 2015).

Universities can also support innovation processes in companies. In Wales, the Clwstwr programme for the creative industries demonstrated that university engagement significantly improved the efficiency of firms' innovation processes, enhancing returns on investment in innovation (skills, networking, training, funding) and outcomes (Marlen and Miklós, 2025).

10.3 Regional Engagement and Governance

Universities also engage in broader regional development processes, building on their status as established regional anchor institutions. For example, as mentioned earlier, in Sweden's Värmland region, Triple-Helix collaboration agreements between the university, regional, and private-sector partners aligned academic activities with regional innovation strategies (Kempton, 2015). In the UK, Cacciolatti & Rosli (2022) discuss the role of universities as "gravitational centres for network co-ordination and skills development" and their potential to support distinctive areas of specialisation. Within a Quadruple-Helix model (i.e. university-government-business-citizens), they describe the foundational role of local universities in the development of the Northern Powerhouse and Midlands Engine.

Vallance et al. (2018) suggest that this identifies two areas where universities can make a key contribution to regional specialisation in lagging regions. First, through their educational (rather than research) function, universities can help address specific knowledge or skills gaps in regional labour markets. Second, engaged universities in less-innovative regions can contribute to, or even lead, the development of coalitions to enable regional specialisation and economic development. Critical to both roles is the university's function as an anchor institution, which extends beyond economic spending to include the provision of regional public goods such as access to education, research infrastructure, and human capital development (McCauley-Smith et al., 2022).

10.4 Summary

The evidence indicates that universities can make important contributions to economic development in lagging and peripheral regions, but the mechanisms and magnitude of these contributions vary substantially across regional contexts. Quantitative studies identify contributions through firm creation, human capital and labour-market outcomes, while programme evaluations and case studies point to additional effects through business support, entrepreneurship and regional innovation infrastructure. Some of the stronger causal evidence comes from university expansion in Spain, while longitudinal evidence from Denmark documents substantial growth in graduate supply and local absorption following the establishment of a university in a peripheral region. Much of the wider evidence, however, remains based on programme evaluations, economic-impact studies and case studies, for which attribution is more difficult.

University impacts vary systematically by regional characteristics, with evidence pointing to context-dependent rather than universally applicable effects. Studies reporting strong positive effects on firm creation and employment growth are predominantly found in regions where universities fill structural gaps in innovation infrastructure. Špurek and Rehák (2022) draw on evidence from 29 countries and suggest that universities held higher patent shares in regions lacking innovative companies, indicating a compensatory role rather than an additive contribution to already-strong innovation systems.

The strength of regional entrepreneurial ecosystems significantly moderates the impact of universities. Prencipe and Fioretti (2026) find that higher regional ecosystem quality, measured through indicators of human capital, employment, income and patenting activity, is associated with stronger spin-off revenue growth particularly in peripheral areas. This relationship is not statistically significant in more central areas, suggesting that supportive regional conditions may be especially important in helping spin-offs overcome territorial disadvantages. The authors also find that stronger ecosystems are associated with higher spin-off employment growth across regions, irrespective of their degree of peripherality. Conversely, in regions with weaker innovation systems, universities may struggle to translate research strengths into commercial outcomes. Marques et al. (2019) illustrate this challenge in Wales, where universities with established research capabilities operated within a regional economy with important production facilities in industries such as steel, electronics and aviation, but relatively little locally embedded R&D activity. This reflected the region's *branch-plant economy*, in which manufacturing activities were located in Wales while research, innovation and strategic decision-making were often concentrated elsewhere. These constraints were compounded by institutional pressures favouring short-term commercialisation.

Different mechanisms underlie the impacts of universities across distinct contextual conditions. Human capital development through education and training was particularly important in less developed regions (Vallance et al., 2018). By contrast, research commercialisation and spin-off formation require specific enabling conditions rarely present in lagging regions. Successful spin-off ecosystems in Twente and Tampere emerged only after decades of institution-building, including entrepreneurial governance reforms, dedicated funding mechanisms, and the development of regional industry partnerships (Lazzeretti and Tavoletti, 2005; Benneworth, 2018).

Importantly, the time horizons for realising impacts varied substantially by mechanism type. Human capital effects through graduate retention showed measurable impacts within years (Evers, 2019), while business support programmes generated measurable revenue and employment effects within 2-3-year programme periods (McCauley-Smith et al., 2022; Fish and Lambert, 2021). Research commercialisation and spin-off development required longer timeframes and exhibited stronger path dependencies (Lazzeretti & Tavoletti, 2005).

Regional innovation system development appears even more path-dependent and slow-moving. The study of the Spanish university establishment (García-Estévez & Duch-Brown, 2020) found significant effects on firm creation emerging within nine years, but the full realisation of innovation ecosystem benefits likely requires longer periods to develop absorptive capacity, network relationships, and institutional arrangements.

Overall, the evidence does not suggest that universities are inherently more or less effective in lagging regions. Rather, their contribution depends on the interaction between university capabilities, the mechanisms through which they engage with their region, and the surrounding economic and institutional environment. Human-capital and skills channels may generate benefits even where private innovation systems are relatively thin, while research commercialisation and spinout growth tend to be more sensitive to complementary business capabilities and networks. Importantly, these regional conditions are not fixed: universities may themselves contribute to developing skills, networks and institutional capabilities over time.

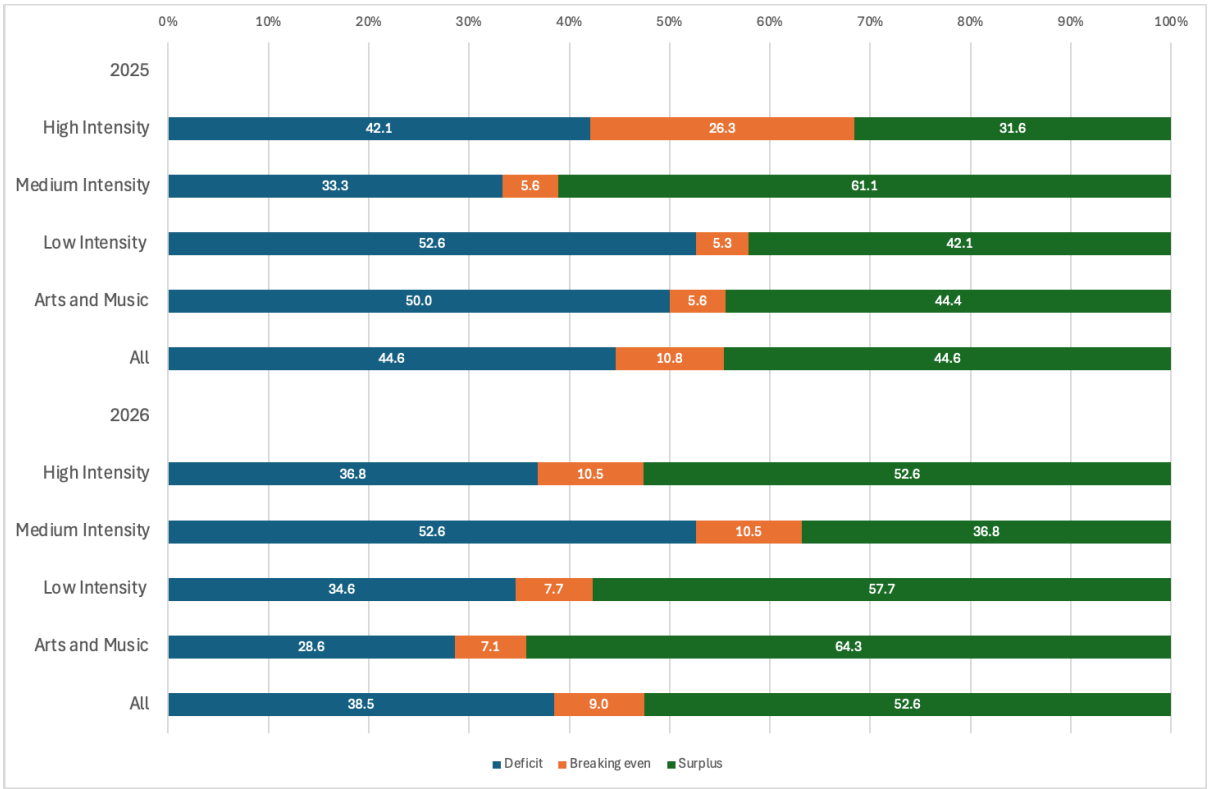
Section 11: Policy Implications: Universities and Regional Development in Different Contexts

The evidence reviewed throughout this report suggests that universities can make important contributions to regional productivity, innovation, entrepreneurship, skills development and institutional capacity. However, the scale and nature of these contributions depend on regional conditions, institutional capabilities and universities' capacity to sustain regional engagement over time. Recent evidence suggests the financial pressure many UK universities are currently facing and its impact on regional engagement and other areas of activity (Roper and Vorley, 2025 and 2026). Their research documents reductions in university support for research infrastructure, early-stage businesses and civic activities, potentially weakening universities' capacity to support regional innovation, entrepreneurship and wider economic development. However, some institutions have increased their engagement with industry and regional stakeholders, suggesting that financial pressures are also prompting a reorientation of activities rather than a uniform withdrawal from regional engagement.

11.1 Financial challenges and regional engagement

Based on surveys of finance directors at English universities, Roper and Vorley (2025, 2026) provide an indication of universities' financial circumstances in the 2024–25 and 2025–26 financial years, respectively, and how these are affecting regional engagement. Figure 11.1 summarises the overall financial status of English universities by broad TRAC group. In 2026, just over half of respondents (52.6 per cent) reported an operating surplus, compared with 44.6 per cent in 2025. The proportion of institutions reporting an operating deficit fell from 44.6 per cent in 2025 to 38.5 per cent in 2026. High- and low-research-intensity institutions, as well as arts and music colleges, all improved their positions significantly. However, the position of medium-research-intensity institutions deteriorated between 2025 and 2026, with 33.3 per cent reporting a deficit in 2025 compared with 52.6 per cent in 2026 (see Figure 11.1).

Figure 11.1: Current operating position of respondents by TRAC group



Where deficits are occurring, there is a commonality in the factors driving these within TRAC groups. However, reflecting the institutional diversity noted earlier, the origins of financial weakness differ markedly across the groups. Among High Research Intensity universities in 2026, staff cost increases (100 per cent) and international tuition fees (66.7 per cent) were the most commonly cited reasons for their financial positions, followed by under-recovery of research costs. Pension cost increases were not regarded as particularly significant here. Medium and Low Research Intensity institutions considered pension costs an important factor. Specialist Arts and Music institutions viewed rising costs and pension expenses as significant, along with declines in UK fee income.

The survey also examined institutions' civic and regional roles and how the financial situation has affected them. Focusing on universities which were either breaking even or in deficit, 2026 saw a decrease in support or sponsorship for non-university activities, reported by 19.1 per cent of institutions, and an increase in regional engagement by university leadership, reported by 18.1 per cent of institutions (Table 11.1). Both shifts were similar to those observed in 2025 and reflect a cumulative effect.

Table 11.1: Has financial stringency impacted institutions' civic and regional roles?

(% institutions, N=61)

	Reduced	Same	Increased
2025			
Regional engagement of the leadership team	4.9	65.6	29.5
Support of local non-university activities	32.1	64.3	3.6
Staff volunteering or local engagement	10.7	78.6	10.7
Access programmes or outreach	11.7	80.0	8.3
Community access to university facilities	4.9	82.0	13.1
2026			
Regional engagement of the leadership team	10.0	72.0	18.0
Support of local non-university activities	19.1	78.7	2.1
Staff volunteering or local engagement	9.3	88.4	2.3
Access programmes or outreach	8.0	86.0	6.0
Community access to university facilities	2.0	94.0	4.0

11.2 Policy implications

A consistent finding across the evidence base is that university contributions are highly uneven across places and depend strongly on wider regional economic conditions, governance arrangements and institutional complementarities. The literature therefore provides limited support for universal or "one-size-fits-all" approaches to university-led regional development.

University contributions are also most effective when embedded within broader regional innovation and governance systems rather than operating as isolated drivers of growth. Their impacts depend not only on university quality and institutional strategy, but also on local absorptive capacity, industrial structure, entrepreneurial ecosystems, governance stability, and the ability of firms and institutions to utilise university-generated knowledge. Universities can act as enabling and coordinating institutions, but in some contexts, they can also contribute more directly to developing regional capabilities and shaping processes of economic transformation.

The evidence also suggests that different mechanisms matter in different regional contexts. In economically advanced and innovation-intensive regions, universities often contribute through research excellence, innovation spillovers, specialised human capital, and participation in globally connected innovation networks. In these contexts, policies supporting research quality, university-industry collaboration, doctoral training, and international connectivity can generate important benefits. However, the literature also indicates that many of these gains depend on pre-existing industrial and institutional strengths rather than university activity alone.

By contrast, in lagging and peripheral regions, human capital formation, workforce upgrading, institutional stability and regional coordination can be particularly important channels of university contribution. Research commercialisation and spinout activity can also generate benefits, but appear more dependent on complementary business capabilities, networks and wider entrepreneurial ecosystems. The evidence suggests that teaching, skills provision, applied engagement, and civic or anchor functions can therefore be particularly important alongside research and commercialisation activities in weaker regions. Policies expecting all universities to replicate the entrepreneurial and spinout-intensive models associated with a small number of globally connected research universities are therefore unlikely to be effective across all places.

Several implications follow for regional and higher education policy:

- First, policy frameworks should recognise institutional diversity across universities. Research-intensive, teaching-focused, applied and vocationally oriented institutions contribute through different mechanisms and should not be evaluated against identical regional development expectations. The literature repeatedly cautions against treating universities as homogeneous institutions with equivalent capacities or missions.

- Second, policies focused narrowly on patents, spinouts and research commercialisation risk overstating the contribution of a relatively small number of universities and regions while underestimating broader forms of impact. Human capital formation, workforce development, graduate retention, applied collaboration, institutional coordination and civic engagement can be at least as important for regional development as formal technology transfer metrics alone, particularly outside major innovation hubs.

- Third, strengthening regional absorptive capacity emerges as a central policy priority. University knowledge spillovers are strongest where firms possess sufficient skills, managerial capability, R&D capacity and institutional support to utilise external knowledge effectively. In weaker regional economies, investment in local firms, intermediary organisations, management capability and innovation adoption may therefore be as important as investment in universities themselves. However, regional capabilities are not fixed: universities can themselves contribute to developing absorptive capacity over time through skills formation, knowledge exchange, business support, talent attraction and participation in regional institutions and networks.

- Fourth, the literature highlights the importance of long-term and stable institutional strategies. Structural transformation, ecosystem development and resilience-building frequently occur over decades rather than short funding cycles. Many successful cases identified in the literature — including Aalborg, Twente and Cambridge — illustrate the importance of long-term institutional continuity, coalition-building and cumulative capability development. Short-term competitive funding regimes and fragmented policy interventions may therefore limit universities' capacity to contribute effectively to regional development.

- Fifth, governance and intermediary capacity also matter. Universities appear most effective where they participate within collaborative regional governance arrangements involving firms, public agencies, civic actors and intermediary organisations. Successful regional engagement often depends less on university activity alone than on the quality of coordination and institutional alignment within wider regional systems.

- Finally, the evidence suggests the need for more realistic expectations regarding what universities can achieve in isolation. Universities can support adaptation, diversification, skills upgrading and innovation capacity, but their ability to address broader structural weaknesses such as limited private-sector demand, thin innovation systems, weak infrastructure or long-term industrial decline is necessarily constrained. The literature therefore supports a shift away from overly university-centric regional development models towards broader place-based approaches in which universities operate as one component of wider regional development ecosystems.

Overall Conclusion

The evidence supports a differentiated and context-sensitive approach to university policy. Universities matter for regional development, but their contributions vary systematically across places, institutional types and policy environments. Effective policy therefore requires aligning university missions, regional capabilities and governance arrangements with the specific development challenges and opportunities facing different regions. This also requires recognising that sustained regional engagement depends on universities having sufficient institutional and financial capacity to maintain these activities over time.

References

Abel, J. R., & Deitz, R. (2012). Do colleges and universities increase their region's human capital? *Journal of Economic Geography*, 12(3), 667–691. https://doi.org/10.1093/jeg/lbr020

Abreu, M., & Grinevich, V. (2024). The entrepreneurial university: Strategies, processes, and competing goals. *Journal of Technology Transfer*, 49, 1991–2034. https://doi.org/10.1007/s10961-024-10085-7

Acosta, M., Azagra-Caro, J. M., & Coronado, D. (2016). Access to Universities' Public Knowledge: Who is More Regionalist? *Regional Studies*, *50*(3), 446-459. https://doi.org/10.1080/00343404.2014.923094

Acosta, M., Coronado, D., & Navarro, M. (2020). Especialización vs diversificación del conocimiento tecnológico universitario en las regiones europeas. https://doi.org/10.25115/EEA.V32I1.3214

Acosta, M., Coronado, D., León, M. D., & Martínez, M. Á. (2009). Production of University Technological Knowledge in European Regions: Evidence from Patent Data. *Regional Studies*, *43*(9), 1167–1181. https://doi.org/10.1080/00343400802154573

Acs, Z. J., Audretsch, D. B., & Feldman, M. P. (1994). R&D Spillovers and recipient firm size. *The Review of Economics and Statistics*, 76, 336–340. https://doi.org/10.2307/210988

Acs, Z. J., Audretsch, D. B., & Lehmann, E. E. (2013). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, *41*(4), 757-774. https://doi.org/10.1007/s11187-013-9505-9

Acs, Z. J., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, 32(1), 15–30. https://doi.org/10.1007/s11187-008-9157-3

Agasisti, T., & Bertoletti, A. (2022). Higher education and economic growth: A longitudinal study of European regions 2000–2017. Socio-Economic Planning Sciences, 81, 100940. https://doi.org/10.1016/j.seps.2020.100940

Agasisti, T., Barra, C., & Zotti, R. (2019). Research, knowledge transfer, and innovation: The effect of Italian universities' efficiency on local economic development 2006−2012. *Journal of Regional Science*, *59*(5), 819-849. https://doi.org/10.1111/jors.12427

Aghion, P., Dewatripont, M., Hoxby, C., Mas-Colell, A., & Sapir, A. (2009). *The Governance and Performance of Research Universities: Evidence from Europe and the U.S*. National Bureau of Economic Research Working Paper 14851. http://dx.doi.org/10.3386/W14851

Angenendt, D., & Salter, A. (2026). Do firms report more university knowledge sourcing when informed about engagement channels? Evidence from a field experiment. *Research Policy*, *55*(8), 105527.

Arbo, P., & Benneworth, P. (2007). *Understanding the Regional Contribution of Higher Education Institutions: A Literature Review*. Paris: OECD. https://doi.org/10.1787/161208155312

Asheim, B. T., & Gertler, M. S. (2005). The geography of innovation: Regional innovation systems. In J. Fagerberg, D. Mowery, & R. Nelson (Eds.), *The Oxford handbook of innovation* (pp. 291–317). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199286805.003.0011

Audretsch, D. B. (1995). *Innovation and Industry Evolution*. Cambridge, MA: MIT Press.

Audretsch, D. B., & Feldman, M. P. (1996). R&D spillovers and the geography of innovation and production. *American Economic Review*, *86*(3), 630-640.

Audretsch, D. B., Belitski, M., Guerrero, M., & Siegel, D. S. (2022). Assessing the impact of the UK's Research Excellence Framework on the relationship between university scholarly output and education and regional economic growth. *Academy of Management Learning & Education*, *21*(3), 394-421. https://doi.org/10.5465/amle.2021.0240

Audretsch, D. B., Lehmann, E. E., & Warning, S. (2005). University spillovers and new firm location. *Research Policy*, 34(7), 1113–1122. https://doi.org/10.1016/j.respol.2005.05.009

Azagra-Caro, J. M. (2014). Determinants of national patent ownership by public research organisations and universities. *Journal of Technology Transfer*, *39*(6), 898-914. https://doi.org/10.1007/s10961-013-9322-y

Bajmócy Z (2006) Egyetemi üzleti inkubáció lehetőségei elmaradott térségekben. https://doi.org/10.17649/TET.20.3.1065

Baptista, R., Lima, F., & Mendonça, J. (2011). Establishment of higher education institutions and new firm entry. *Research Policy*, 40(5), 751–760. https://doi.org/10.1016/j.respol.2011.02.006

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. https://doi.org/10.1191/0309132504ph469oa

Beale, A., Blackaby, D., & Mainwaring, L. (2008). University Patenting in Wales, Scotland and Northern Ireland: A Comparative Analysis. *Higher Education Quarterly*, *62*(1-2), 101-119. https://doi.org/10.1111/j.1468-2273.2008.00377.x

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.

Belderbos, R., Van Roy, V., Leten, B., & Thijs, B. (2014). Academic research strengths and multinational firms' foreign R&D location decisions: evidence from R&D investments in European regions. *Environment and Planning a-Economy and Space*, *46*(4), 920-942. https://doi.org/10.1068/a45536

Benneworth, P (2018). Universities and Regional Economic Development: Engaging with the Periphery. (2019), ABINGDON: ROUTLEDGE.

Benneworth, P. (2019). University engagement with regional development: A state-of-the-art review. In A. Curaj, L. Deca, & R. Pricopie (Eds.), *European Higher Education Area: The Impact of Past and Future Policies* (pp. 379–398). Cham: Springer. https://doi.org/10.1007/978-3-030-56316-5_24

Benneworth, P., & Charles, D. (2005). University spin-off policies and economic development in Less successful regions: Learning from two decades of policy practice. *European Planning Studies*, *13*(4), 537–557. https://doi.org/10.1080/09654310500107175

Berlingieri, F., Gathmann, C., & Quinckhardt, M. (2022). *College Openings and Local Economic Development* (No. 15364). IZA Discussion Papers. https://docs.iza.org/dp15364.pdf

Bonaccorsi, A. (2017). Addressing the disenchantment: universities and regional development in peripheral regions. JOURNAL OF ECONOMIC POLICY REFORM, 20(4), 293-320. https://doi.org/10.1080/17487870.2016.1212711

Bonaccorsi, A., Colombo, M. G., Guerini, M., & Rossi-Lamastra, C. (2013). University specialization and new firm creation across industries. *Small Business Economics*, *41*(4), 837-863.

Bonaccorsi, A., Colombo, M. G., Guerini, M., & Rossi-Lamastra, C. (2014). The impact of local and external university knowledge on the creation of knowledge-intensive firms: Evidence from the Italian case. *Small Business Economics, 43*(2), 261–287. https://doi.org/10.1007/s11187-013-9536-2

Bramwell, A., & Wolfe, D. A. (2008). Universities and regional economic development: The entrepreneurial University of Waterloo. *Research policy 37*, 1175-1187.

Breznitz, S M (2014) The Fountain of Knowledge: The Role of Universities in Economic Development. Stanford, CA: Stanford University Press.

Britton, J., van der Erve, L., Waltmann, B., & Xu, X. (2021). London calling? higher education, geographical mobility and early-career earnings. *Department for Education. Institute for Fiscal Studies.* https://ifs.org.uk/publications/london-calling-higher-education-geographical-mobility-and-early-career-earnings

Buesa, M., Heijs, J., & Baumert, T. (2010). The determinants of regional innovation in Europe: A combined factorial and regression knowledge production function approach. *Research Policy*, 39, 722–735. https://doi.org/10.1016/j.respol.2010.02.016

Cacciolatti, L., & Rosli, A. (2022). The role of universities in the development of the local knowledge base: supporting innovation ecosystems through skills development and entrepreneurship. International Journal of Intellectual Property Management, 12, 1.

Capello, R., & Lenzi, C. (2015). Knowledge, Innovation and Productivity Gains across European Regions. *Regional Studies*, *49*(11), 1788-1804. https://doi.org/10.1080/00343404.2014.917167

Caputo, A., Charles, D., & Fiorentino, R. (2022). University spinoffs: Entrepreneurship, growth and regional development. *Studies in Higher Education*, 47(10), 1999–2006. https://doi.org/10.1080/03075079.2022.2122655

Carayannis, E. G., & Campbell, D. F. J. (2009). 'Mode 3' and 'Quadruple Helix': Toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management, 46*(3–4), 201–234. https://doi.org/10.1504/IJTM.2009.023374

Caviggioli, F., Colombelli, A., De Marco, A., Scellato, G., & Ughetto, E. (2023). Co-evolution patterns of university patenting and technological specialization in European regions. *Journal of Technology Transfer*, *48*(1), 216-239. https://doi.org/10.1007/s10961-021-09910-0

Charles, D. (2006). Universities as key knowledge infrastructures in regional innovation systems. *Innovation: The European Journal of Social Science Research*, 19(1), 117–130. https://doi.org/10.1080/13511610600608023

Charles, D. (2023). University-Civic Engagement in the Time of the Pandemic. In: Pinheiro, R., Balbachevsky, E., Pillay, P., Yonezawa, A. (eds) The Impact of Covid-19 on the Institutional Fabric of Higher Education. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-26393-4_9

Christopherson, S., Michie, J., & Tyler, P. (2010). Regional resilience: Theoretical and empirical perspectives. *Cambridge Journal of Regions, Economy and Society, 3*(1), 3–10. https://doi.org/10.1093/cjres/rsq004

Clarysse, B., Wright, M., & Van de Velde, E. (2011). Entrepreneurial origin, technological knowledge, and the growth of spin-off companies. *Journal of Management Studies*, 48(6), 1420–1442. https://doi.org/10.1111/j.1467-6486.2010.00991.x

Clarysse, B., Wright, M., Lockett, A., Van de Velde, E., & Vohora, A. (2005). Spinning out new ventures: A typology of incubation strategies from European research institutions. *Journal of Business Venturing*, 20(2), 183–216. https://doi.org/10.1016/j.jbusvent.2003.12.004

Cohen, W. M., & Levinthal, D. A. (1989). Innovation and Learning: the two faces of R&D. *The Economic Journal*, *99*, 569-596.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, *35*, 128-152.

Cooke, P., Uranga, M. G., & Etxebarria, G. (1997). Regional innovation systems: Institutional and organisational dimensions. *Research Policy*, *26*(4-5), 475-491. https://doi.org/10.1016/S0048-7333(97)00025-5

Cortinovis, N., & van Oort, F. (2019). Between spilling over and boiling down: network-mediated spillovers, local knowledge base and productivity in European regions. *Journal Of Economic Geography*, *19*(6), 1233-1260. https://doi.org/10.1093/jeg/lby058

Crespi G, Geuna A, Nomaler O, Verspagen B (2010) University IPRs and knowledge transfer: is university ownership more efficient? Economics of Innovation and New Technology 19, (7):627 648.

Crespo, J., Peiró-Palomino, J., & Tortosa-Ausina, E. (2022). Does university performance have an economic payoff for home regions? Evidence for the Spanish provinces. *Industry and Innovation*, *29*(4), 564-596. https://doi.org/10.1080/13662716.2021.1990019

Decter, M., Cave, F., Rose, M., Peers, G., Fogg, H., & Smith, S. M. (2011). Universities and economic development activities A UK regional comparison. *INDUSTRY AND HIGHER EDUCATION*, *25*(5), 359-374. https://doi.org/10.5367/ihe.2011.0058

Di Gregorio, D., & Shane, S. (2003). Why do some universities generate more start-ups than others? *Research Policy*, 32(2), 209–227. https://doi.org/10.1016/S0048-7333(02)00097-5

Domínguez, J. F. C. (2021). Higher education, regional growth and cohesion: insights from the Spanish case. *Regional Studies*, *55*(8), 1403-1416. https://doi.org/10.1080/00343404.2021.1901870

Drucker, J. (2016). Reconsidering the regional economic development impacts of higher education institutions in the United States. *Regional Studies*, *50*(7), 1185-1202. https://doi.org/10.1080/00343404.2014.986083

Ehlenz, M. M. (2018). Defining University Anchor Institution Strategies: Comparing Theory to Practice. *Planning Theory & Practice*, *19*(1), 74–92. https://doi.org/10.1080/14649357.2017.1406980

Es-Sadki, N., & Arundel, A. (2021). THE INFLUENCE OF REGIONAL SUPPLY, DEMAND AND COMPETITION FACTORS ON THE KNOWLEDGE TRANSFER OUTCOMES OF

UNIVERSITIES. *International Journal of Innovation Management*, *25*(07), Article 2150078. https://doi.org/10.1142/S136391962150078X

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations. *Research Policy*, *29*(2), 109-123. https://doi.org/10.1016/S0048-7333(99)00055-4

Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, *29*(2), 313-330. https://doi.org/10.1016/S0048-7333(99)00069-4

Evers, G. (2019). The impact of the establishment of a university in a peripheral region on the local labour market for graduates. *Regional Studies Regional Science*, *6*(1), 319-330. https://doi.org/10.1080/21681376.2019.1584051

Faggian, A., & McCann, P. (2009). Human capital, graduate migration and innovation in British regions. *Cambridge Journal of Economics*, 33(2), 317–333. https://doi.org/10.1093/cje/ben042

Faggian, A., McCann, P., & Sheppard, S. (2007). Human capital, higher education and graduate migration: An analysis of Scottish and Welsh students. *Urban Studies*, 44(13), 2511–2528. https://doi.org/10.1080/00420980701667177

Feldman M. P. (1994) *The Geography of Innovation*. Kluwer Academic, Dordrecht.

Ferhat, S. (2022). *The impact of university openings on labor market outcomes* (No. 2022-18). THEMA (THéorie Economique, Modélisation et Applications), Université de Cergy-Pontoise.

Fini, R., Lacetera, N., & Shane, S. (2010). Inside or outside the IP system? Business creation in academia. *Research Policy*, 39(8), 1060–1069. https://doi.org/10.1016/j.respol.2010.05.014

Fish S, and Lambert C (2021) A mixed-methods approach to developing and evaluating an SME business support model for innovation in rural England. Journal of Construction Materials 2, p. 1-15. https://doi.org/10.36756/JCM.V2.4.5

Fitjar, R. D., & Rodríguez-Pose, A. (2017). Nothing is in the air. *Growth and Change*, 48(1), 22–39. https://doi.org/10.1111/grow.12161

Frenken, K., Neffke, F., & van Dam, A. (2023). Capabilities, institutions and regional economic development: A proposed synthesis. *Cambridge Journal of Regions, Economy and Society, 16*(3), 405–416. https://doi.org/10.1093/cjres/rsad021

Fritsch, M., & Aamoucke, R. (2017). Fields of knowledge in higher education institutions, and innovative start-ups: an empirical investigation. *Papers in Regional Science*, *96*, S1-S27.

García-Estévez, J., & Duch-Brown, N. (2020). The relationship between new universities and new firms: evidence from a quasi-natural experiment in Spain. *Regional Studies Regional Science*, *7*(1), 244-266. https://doi.org/10.1080/21681376.2020.1784778

García-Vega, M., & Vicente-Chirivella, Ó. (2020). Do university technology transfers increase firms' innovation? *European Economic Review*, *123*, 103388. https://doi.org/10.1016/j.euroecorev.2020.103388

Glaeser, E. L., & Saiz, A. (2003). *The Rise of the Skilled City*. NBER Working Paper No. 10191.

Goddard, J., & Vallance, P. (2013). The University and the City (1st ed.). Routledge. https://doi.org/10.4324/9780203068366

Goddard, J., Hazelkorn, E., Kempton, L., & Vallance, P. (2016). ***The Civic** University: The Policy and Leadership Challenges.* Cheltenham: Edward Elgar. https://doi.org/10.4337/9781784717728

Goddard, J., Kempton, L., & Vallance, P. (2014). Universities and smart specialisation: Challenges, tensions and opportunities for the innovation strategies of European regions. *Ekonomiaz, 83*(02), 83–102.

Goddard, J., Robertson, D., & Vallance, P. (2012). Universities, Technology and Innovation Centres and regional development: the case of the North-East of England. *Cambridge Journal of Economics*, *36*(3), 609-627. https://doi.org/10.1093/cje/bes005

Goldstein, H. A., & Renault, C. S. (2004). Contributions of universities to regional economic development: A quasi-experimental approach. *Regional Studies*, *38*(7), 733-746. https://doi.org/10.1080/0034340042000265232

Goldstein, H., & Drucker, J. (2006). The economic development impacts of universities on regions: Do size and distance matter? Economic Development Quarterly, 20, 22–43. https://doi.org/10.1177/0891242405283387

Graf, H., & Henning, T. (2009). Public Research in Regional Networks of Innovators: A Comparative Study of Four East German Regions. *Regional Studies*, *43*(10), 1349-1368. https://doi.org/10.1080/00343400802251460

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

Gunasekara, C. (2006). Reframing the Role of Universities in the Development of Regional Innovation Systems. *The Journal of Technology Transfer*, *31*(1), 101-113. https://doi.org/10.1007/s10961-005-5016-4

Harrington, J. J. (2016). The Fountain of Knowledge: The Role of Universities in Economic Development. *REVIEW OF HIGHER EDUCATION*, *39*(4), 621-622.

Harris, R., Li, Q. C., & Moffat, J. (2011). The impact of higher education institution-firm knowledge links on firm-level productivity in Britain. *Applied Economics Letters*, *18*(13-15), 1243-1246. https://doi.org/10.1080/13504851.2010.532098

Harris, R., Li, Q.C. And Moffat, J. (2013), The Impact of Higher Education Institution–Firm Knowledge Links on Establishment-Level Productivity in British Regions. The Manchester School, 81: 143-162. https://doi.org/10.1111/j.1467-9957.2011.02276.x

Harrison, R., & Leitch, C. (2010). Voodoo institution or entrepreneurial university? Spin-offs and regional development in the UK. *Regional Studies*, 44(9), 1241–1262. https://doi.org/10.1080/00343400903167912

Hausman, Naomi, University Innovation, Local Economic Growth, and Entrepreneurship (June 1, 2012). US Census Bureau Center for Economic Studies Paper No. CES-WP- 12-10, Available at SSRN: https://ssrn.com/abstract=2097842 or http://dx.doi.org/10.2139/ssrn.2097842

Hayter, C. S. (2013). Harnessing university entrepreneurship for economic growth. *Economic Development Quarterly*, 27(1), 18–28. https://doi.org/10.1177/0891242412471845

Hegde, D. (2005). Public and Private Universities: Unequal Sources of Regional Innovation? *Economic Development Quarterly*, *19*(4), 373-386. https://doi.org/10.1177/0891242405280111

Huggins, R., & Johnston, A. (2009). The economic and innovation contribution of universities: a regional perspective. *Environment And Planning C-Government and Policy*, *27*(6), 1088-1106. https://doi.org/10.1068/c08125b

Huggins, R., Prokop, D., & Thompson, P. (2020). Universities and open innovation: the determinants of network centrality. *Journal of Technology Transfer*, *45*(3), 718-757. https://doi.org/10.1007/s10961-019-09720-5

Jaumotte, F., & Pain, N. (2005). *From Ideas to Development*: The Determinants of R&D and Patenting", *OECD Economics Department Working Papers*, No. 457, OECD Publishing, http://dx.doi.org/10.1787/702226422387

Jeffrey, C. (2025). Builder, broker, beacon and base: Universities as anchor institutions. *Progress in Human Geography*, *49*(6), 581-598. https://doi.org/10.1177/03091325251350307

Johnston, A., & Huggins, R. (2021). Universities and the UK economy. In *Networks, SMEs, and the University*. Edward Elgar Publishing. https://doi.org/10.4337/9781789903386.00012

Johnston, A., & Prokop, D. (2021). Peripherality and university collaboration: Evidence from rural SMEs in the UK. *Journal of Rural Studies*, *88*, 298-306. https://doi.org/10.1016/j.jrurstud.2021.08.014

Johnston, A., & Wells, P. (2020). Assessing the role of universities in a place-based Industrial Strategy: Evidence from the UK. *Local Economy*, *35*(4), 384-402, Article 0269094220957977. https://doi.org/10.1177/0269094220957977

Jones, M., & Columbano, A. (2022). From civic responsibility to socio-spatial civic agency: Critiquing the civic university movement through live projects. *Charrette, 8*(2), 8–32.

Jump, R. C., & Scavette, A. (2025). Do research universities recession-proof their regions? Evidence from state flagship college towns. *Journal of Economic Geography*. https://doi.org/10.1093/jeg/lbaf041

Kempton L (2015) Delivering smart specialization in peripheral regions: the role of universities. Regional Studies, Regional Science. https://doi.org/10.1080/21681376.2015.1085329

Komorowski, M., & Fodor, M. M. (2025). Universities as innovation agents for the creative industries – An exploratory quantitative study from Wales. *City, Culture and Society*, *43*, 100670. https://doi.org/10.1016/j.ccs.2025.100670

Kodrzycki, Y. K. (2001). Migration of recent college graduates: Evidence from the National Longitudinal Survey of Youth. *New England Economic Review*, January/February 13–34.

Lawton-Smith, H., & Waters, R. (2020). Universities, local labour markets and regional economic development. *International Journal of Entrepreneurship and Small Business*, *42*(1-2), 8-26. https://doi.org/10.1504/IJESB.2021.112268

Lazzeretti, L., & Tavoletti, E. (2005). Higher education excellence and local economic development: The case of the entrepreneurial university of Twente. *European Planning Studies*, *13*(3), 475-493. https://doi.org/10.1080/09654310500089779

Lendel, I. (2010). The impact of research universities on regional economies: The concept of university products. Economic Development Quarterly, 24, 210–230. https://doi.org/10.1177/0891242410366561

Lissoni F, Llerena P, Mckelvey M, Sanditov B (2008) Academic patenting in Europe: new evidence from the KEINS database. Research Evaluation 17, (2):87 102.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Marques, P., Morgan, K., Healy, A., & Vallance, P. (2019). Spaces of novelty: Can universities play a catalytic role in less developed regions? *Science and Public Policy*, *46*(5), 763-771. https://doi.org/10.1093/scipol/scz028

Marrocu, E., Paci, R., & Usai, S. (2022). Direct and indirect effects of universities on European regional productivity. *Papers in Regional Science*, *101*(5), 1105-1134. https://doi.org/10.1111/pirs.12698

Martin, R., & Moodysson, J. (2013). Comparing knowledge bases: on the geography and organization of knowledge sourcing in the regional innovation system of Scania, Sweden. *European Urban and Regional Studies*, *20*(2), 170-187. https://doi.org/10.1177/0969776411427326

Martin, R., & Sunley, P. (2015). On the notion of regional economic resilience: Conceptualization and explanation. *Journal of Economic Geography,* *15*(1), 1–42. https://doi.org/10.1093/jeg/lbu015

Martin, R., & Sunley, P. (2026). On resilience building for regional and local economies: What would it take? *Journal of Economic Geography*, lbag2023. https://doi.org/10.1093/jeg/lbag023

Martin, R., Gardiner, B., Pike, A., Sunley, P., & Tyler, P. (2021). *Levelling up left behind places: The scale and nature of the economic and policy challenge*. Routledge.

Mathisen, M. T., & Rasmussen, E. (2019). The development, growth, and performance of university spin-offs: A critical review. *Journal of Technology Transfer*, 44(6), 1891–1938. https://doi.org/10.1007/s10961-018-09714-9

Mazzucato, M. (2018). Mission-oriented innovation policies: challenges and opportunities. *Industrial and Corporate Change*, *27*(5), 803-815. https://doi.org/10.1093/icc/dty034

McCann, L., Hutchison, N., & Adair, A. (2023). The role of UK universities as economic drivers in a localisation agenda: A case study of City Deals. *Land Use Policy*, *134*, Article 106938. https://doi.org/10.1016/j.landusepol.2023.106938

McCauley-Smith, C., Smith, S., Nantunda, L., & Zhu, X. X. (2022). The role of anchor institutions in creating value for SMEs: insights from North East of England owner-managers. *Studies in Higher Education*, *47*(6), 1121-1133. https://doi.org/10.1080/03075079.2020.1861593

Miskolczi Z, Erdős K (2020) Universities and Regional Development in Central and Eastern Europe – Far from being obvious. Marketing & Menedzsment. https://doi.org/10.15170/mm.2020.54.ksz.i.05

Molica, F., Cappellano, F., & Makkonen, T. (2026). Rethinking Regional Innovation Systems in the Age of De-Globalisation. *Tijdschrift Voor Economische En Sociale Geografie*. https://doi.org/10.1111/tesg.70077

Moretti, E. (2004a). Estimating the social return to higher education: Evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics, 121*(1–2), 175–212. https://doi.org/10.1016/j.jeconom.2003.10.015

Moretti, E. (2004b). Chapter 51 - Human Capital Externalities in Cities. In J. V. Henderson & J.-F. Thisse (Eds.), *Handbook of Regional and Urban Economics* (Vol. 4, pp. 2243-2291). Elsevier. https://doi.org/https://doi.org/10.1016/S1574-0080(04)80008-7

Ndonzuau, F. N., Pirnay, F., & Surlemont, B. (2002). A stage model of academic spin-off creation. *Technovation*, 22(5), 281–289. https://doi.org/10.1016/S0166-4972(01)00019-0

Nieth, L., & Radinger-Peer, V. (2023). Universities as strategic agents in regional path development? A European comparison. *European Planning Studies, 31*(10), 2128–2147. https://doi.org/10.1080/09654313.2022.2104604

Nilsen TT, Lauvås T (2018) The Role of Proximity Dimensions in Facilitating University-Industry Collaboration in Peripheral Regions: Insights from a Comparative Case Study in Northern Norway. Arctic Review on Law and Politics. https://doi.org/10.23865/ARCTIC.V9.1378

O'Farrell, L., Hassan, S., & Hoole, C. (2022). The university as a just anchor: Universities, anchor networks and participatory research. *Studies in Higher Education, 47*(12), 2405–2416. https://doi.org/10.1080/03075079.2022.2072480

O'Neill, M., & Bagchi-Sen, S. (2023). Public universities and human capital development in the United States. *GeoJournal*, *88*(1), 733-751.

O'Shea, R. P., Allen, T. J., Chevalier, A., & Roche, F. (2008). Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy*, 37(5), 994–1009. https://doi.org/10.1016/j.respol.2005.05.011

OECD. (2007). *Higher Education and Regions: Globally Competitive, Locally Engaged*. Paris: OECD Publishing. https://doi.org/10.1787/9789264034150-en

OECD. (2019). *University-Industry Collaboration: New Evidence and Policy Options*. Paris: OECD Publishing. https://doi.org/10.1787/e9c1e648-en

Opizzi, L., Bjørnåli, E. S., & Gerli, F. (2025). Academic spin-off emergence: A systematic literature review and future research agenda. 10.1016/j.technovation.2025.103296

Palaščáková D (2021) Impact of the universities on regional development in the Slovak Republic. Technology audit and production reserves. https://doi.org/10.15587/2706-5448.2021.248815

Paunov, C., M. Borowiecki and N. El-Mallakh (2019), "Cross-country evidence on the contributions of research institutions to innovation", *OECD Science, Technology and Industry Policy Papers*, No. 77, OECD Publishing, Paris, https://doi.org/10.1787/d52d6176-en.

Pereira, C., Mourato, J., Alves, J., & Serafim, M. (2021). The Impact of Higher Education Institutions in Low-Density Territories. *Economies*, *9*(3), 112. https://doi.org/10.3390/economies9030112

Pfister, C., Koomen, M., Harhoff, D., & Backes-Gellner, U. (2021). Regional innovation effects of applied research institutions. *Research Policy*, 50(4), 104197. https://doi.org/10.1016/j.respol.2021.104197

Piergiovanni, R., & Santarelli, E. (2001). Patents and the geographic localization of R&D spillovers in French manufacturing. *Regional Studies*, *35*(8), 697-702. https://doi.org/10.1080/00343400120101434

Piergiovanni, R., Santarelli, E. and Vivarelli, M. (1997). From which source do small firms derive their innovative inputs? Some evidence from Italian manufacturing, *Review of Industrial Organization,* 12, 243–58.

Pike, A., Dawley, S., & Tomaney, J. (2010). Resilience, adaptation and adaptability. *Cambridge Journal of Regions, Economy and Society, 3*(1), 59–70. https://doi.org/10.1093/cjres/rsq001

Pinto, H., Fernandez-Esquinas, M., & Uyarra, E. (2015). Universities and Knowledge-Intensive Business Services (KIBS) as Sources of Knowledge for Innovative Firms in Peripheral Regions. *Regional Studies*, *49*(11), 1873-1891. https://doi.org/10.1080/00343404.2013.857396

Ponds, R., van Oort, F., & Frenken, K. (2010). Innovation, spillovers and university-industry collaboration: An extended knowledge production function approach. *Journal of Economic Geography*, 10, 231–255. https://doi.org/10.1093/jeg/lbp036

Prencipe, A., & Fioretti, D. (2026). Regional Ecosystem Quality and University Spin-Off Growth in Internal Areas: Evidence on Territorial Resilience from Italian Academic Entrepreneurship. *Sustainability*, *18*(2), Article 927. https://doi.org/10.3390/su18020927

Prokop, D., & Kitagawa, F. (2022). Shareholder networks of university spinoff companies: firm development and regional characteristics. *Studies in Higher Education*, *47*(10), 2101–2116. https://doi.org/10.1080/03075079.2022.2122662

Pugh, R. (2017). Universities and economic development in lagging regions: "triple helix' policy in Wales. *Regional Studies*, *51*(7), 982-993. https://doi.org/10.1080/00343404.2016.1171306

Pugh, R., Hamilton, E., Jack, S., & Gibbons, A. (2016). A step into the unknown: universities and the governance of regional economic development. *European Planning Studies*, *24*(7), 1357-1373. https://doi.org/10.1080/09654313.2016.1173201

Pugh, R., Hamilton, E., Soetanto, D., Jack, S., Gibbons, A., & Ronan, N. (2022). Nuancing the roles of entrepreneurial universities in regional economic development. *Studies in Higher Education*, 47(5), 964–972. https://doi.org/10.1080/03075079.2022.2055320

Ranga, M., & Etzkowitz, H. (2013). Triple Helix systems: an analytical framework for innovation policy and practice in the Knowledge Society. *INDUSTRY AND HIGHER EDUCATION*, *27*(4), 237-262. https://doi.org/10.5367/ihe.2013.0165

Rehman, N. U. (2025). R&D, wages and productivity nexus: evidence from European regions. *JOURNAL OF ECONOMIC STUDIES*. https://doi.org/10.1108/JES-03-2025-0214

Ri, A. (2026). *Spinout Mobility: Why University Spinouts Move and How Regions Can Retain and Attract Them*. State of the Art Review No. 69. https://www.enterpriseresearch.ac.uk/publications/spinout-mobility-why-university-spinouts-move-and-how-regions-can-retain-and-attract-them/

Roper, S. and Vorley, T. (2025) University Financial Health and Implications in England: Wave 1. Innovation and Research Caucus, Report No. 027. https://ircaucus.ac.uk/publications/university-financial-health-and-implications-in-england-wave-1/

Roper, S. and Vorley, T. (2026) University Financial Health and Implications in England: Wave 2. Innovation and Research Caucus, Report . *forthcoming*

Rossi, F., & Goglio, V. (2020). Satellite university campuses and economic development in peripheral regions. *Studies in Higher Education*, *45*(1), 34-54. https://doi.org/10.1080/03075079.2018.1506917

Rossi, F., Baines, N., & Lawton Smith, H. (2023). Which regional conditions facilitate university spinouts retention and attraction? *Regional Studies*, 57(6), 1096–1112. https://doi.org/10.1080/00343404.2021.1959909

Roupakia, Z., & Coates Ulrichsen, T. (2025). *Toward a strategic classification of university spinouts*. Policy Evidence Unit for University Commercialisation and Innovation. https://doi.org/10.17863/CAM.122916

Sainsbury, D. (2007). The Race to the Top: A Review of Government's Science and Innovation Policies (The Stationery Office, London)

Sánchez-Barrioluengo, M., & Consoli, D. (2016). Regional human capital and university orientation: A case study on Spain. *Science and Public Policy*, *43*(6), 798-811. https://doi.org/10.1093/scipol/scw032

Sánchez-Barrioluengo, M., Uyarra, E., & Kitagawa, F. (2019). Understanding the evolution of the entrepreneurial university. The case of English Higher Education institutions. *Higher Education Quarterly*, *73*(4), 469-495. https://doi.org/10.1111/hequ.12230

Schubert, T., & Kroll, H. (2016). Universities' effects on regional GDP and unemployment: The case of Germany. Papers in Regional Science, 95(3), 467–489. https://doi.org/10.1111/pirs.12150

Sedlácek, J. (2017). The Impact of Governance on the Research Performance of European Universities in Cross-Country Comparisons. *REVIEW OF ECONOMIC PERSPECTIVES*, *17*(4), 337-362. https://doi.org/10.1515/revecp-2017-0018

Shane, S. (2004). Academic Entrepreneurship: University Spinoffs and Wealth Creation. Cheltenham: Edward Elgar.

Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management Science*, 48(1), 154–170. https://doi.org/10.1287/mnsc.48.1.154.14280

Sijde, P. V. D., & Tilburg, J. V. (2000). Support of university spin-off companies. *The International Journal of Entrepreneurship and Innovation*, *1*(1), 13-21. https://doi.org/10.1177/146575030000100103

Špurek, M., & Rehák, Š. (2022). Development of Academic Patenting in European Regions – A Large-Scale Analysis. *GeoScape*, *16*(2), 148-157. https://doi.org/10.2478/geosc-2022-0012

Stoicovici D, Banica M, Ungureanu M, Stoicovici M (2017) The impact of collaborations between universities and private organizations on cluster development and competitiveness in Romania. IOP Conference Series: Materials Science and Engineering. https://doi.org/10.1088/1757-899X/200/1/012051

Sunley, P., Evenhuis, E., Harris, J., Harris, R., Martin, R., & Pike, A. (2023). Renewing industrial regions? Advanced manufacturing and industrial policy in Britain. *Regional Studies, 57*(6), 1126–1140. https://doi.org/10.1080/00343404.2021.1983163

Tereshchenko, D., & Shcherbakov, V. (2021). The Impact of Scientific Activity of Universities on Economic and Innovative Development. *Economy of Region*. https://doi.org/10.17059/EKON.REG.2021-1-17

Tijssen, R. (2025). Research Cooperation Between Universities and Local Firms: Comparing University Ecosystems in China and the USA. *Journal of the Knowledge Economy*, *17*(1), 2209-2231. https://doi.org/10.1007/s13132-025-02588-x

Tijssen, R., van de Klippe, W., & Yegros, A. (2020). Localization, regionalization and globalization of university-business research co-operation in the United Kingdom. *Papers in Regional Science*, *99*(5), 1215-+. https://doi.org/10.1111/pirs.12531

Tödtling, F., & Trippl, M. (2018). Regional innovation policies for new path development—Beyond neo-liberal and traditional systemic views. *European Planning Studies, 26*(9), 1779–1795. https://doi.org/10.1080/09654313.2018.1457140

Tracey, I. and Williamson, A. (2023) *Independent Review of University Spin-out Companies*. London: Department for Science, Innovation and Technology and HM Treasury. Available at: Independent review of university spin-out companies

Trippl, M., Sinozic, T., & Lawton Smith, H. (2015). The role of universities in regional development: Conceptual models and policy institutions in the UK, Sweden and Austria. *European Planning Studies*, 23(9), 1722–1740. https://doi.org/10.1080/09654313.2015.1052782

Ulrichsen, T. C. (2019). Developing university spinouts in the UK: Key trends in spinout activity, investments and investor involvement. University of Cambridge, Institute for Manufacturing, Policy Evidence Unit for University Commercialisation and Innovation. Available at: https://www.ifm.eng.cam.ac.uk/uploads/UCI/knowledgehub/documents/2019_Ulrichsen_Developing_University_Spinouts.pdf

Uyarra, E. (2010). Conceptualizing the regional roles of universities, implications and contradictions. *European Planning Studies, 18*(8), 1227–1246. https://doi.org/10.1080/09654311003791275

Uyarra, E., Ribeiro, B., & Dale-Clough, L. (2019). Exploring the normative turn in regional innovation policy: responsibility and the quest for public value. *European Planning Studies*, *27*(12), 2359-2375. https://doi.org/10.1080/09654313.2019.1609425

Valero, A., & Van Reenen, J. (2019). The economic impact of universities: Evidence from across the globe. Economics of Education Review, 68, 53–67. https://doi.org/10.1016/j.econedurev.2018.09.001

Vallance, P. (2016). Universities, public research and evolutionary economic geography. *Economic Geography, 92*(4), 355–377. https://doi.org/10.1080/00130095.2016.1146076

Vallance, P., Blazek, J., Edwards, J., & Kveton, V. (2018). Smart specialisation in regions with less-developed research and innovation systems: A changing role for universities? *Environment and Planning C-Politics and Space*, *36*(2), 219-238. https://doi.org/10.1177/2399654417705137

Velluzzi, N. D. (2010). Community colleges, clusters, and competition: A case from Washington wine country. *Regional Studies*, *44*(2), 201-214.

Veugelers, R., Callaert, J., Song, X. Y., & Van Looy, B. (2012). The participation of universities in technology development: do creation and use coincide? An empirical investigation on the level of national innovation systems. *Economics of Innovation and New Technology*, *21*(5-6), 445-472. https://doi.org/10.1080/10438599.2012.656527

Vohora, A., Wright, M., & Lockett, A. (2004). Critical junctures in the development of university high-tech spinout companies. *Research Policy*, 33(1), 147–175. https://doi.org/10.1016/S0048-7333(03)00107-0

Wanzenböck, I., & Piribauer, P. (2018). R&D networks and regional knowledge production in Europe: Evidence from a space-time model. Papers in Regional Science, 97(Supplement 1), 1–25. https://doi.org/10.1111/pirs.12236

Wennberg, K., Wiklund, J., & Wright, M. (2011). The effectiveness of university knowledge spillovers: Performance differences between university spinoffs and corporate spinoffs. *Research Policy*, 40(8), 1128–1143. https://doi.org/10.1016/j.respol.2011.05.014

Whisler, R. L., Waldorf, B. S., Mulligan, G. F., & Plane, D. A. (2008). Quality of life and the migration of the college-educated: A life-course approach. *Growth and Change*, 39(1), 58–94.

Winters, J. V. (2011). Why are smart cities growing? Who moves and who stays. *Journal of Regional Science*, 51(2), 253–270. https://doi.org/10.1111/j.1467-9787.2010.00693.x

Yanagiura, T., & Tateishi, S. (2024). Local economic impact of small, non-research private universities: evidence from Japan. *Economics of Education Review*, *102*, Article 102576. https://doi.org/10.1016/j.econedurev.2024.102576

Youtie, J., & Shapira, P. (2008). Building an innovation hub: A case study of the transformation of university roles in regional technological and economic development. *Research Policy, 37*(8), 1188–1204. https://doi.org/10.1016/j.respol.2008.04.012

Zhang Q, MacKenzie NG, Jones-Evans D, Huggins R (2016) Leveraging knowledge as a competitive asset? The intensity, performance and structure of universities' entrepreneurial knowledge exchange activities at a regional level. Small Business Economics. https://doi.org/10.1007/s11187-016-9759-0

Zhang, Q. (2018). Theory, practice and policy: A longitudinal study of university knowledge exchange in the UK: A longitudinal study of university knowledge exchange in the UK. *Industry and Higher Education*, *32*(2), 80-92.

ANNEX Selected Quantitative Evidence

Section 3 Annex. Empirical evidence on universities' contribution to regional growth and productivity

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
Agasisti, Barra & Zotti (2019)	Italy; universities and local labour-market areas, 2006–2012	Greater university technical efficiency is positively associated with local economic development; spatial models also identify effects extending to neighbouring areas.	A 1% increase in university technical efficiency is associated with approximately 0.051% higher local GDP per capita when lagged university efficiency and GDP per capita are used (Table 4, p. 831).
Agasisti & Bertoletti (2022)	284 European NUTS2 regions, 2000–2017	Expansion of regional higher-education systems is positively associated with subsequent GDP-per-capita growth. Research performance and expansion of STEM provision are also positively associated with growth, while the available third-mission indicator is not statistically significant.	A 10% increase in the number of universities is associated with approximately 0.15% higher GDP per capita two years later; a 10% increase in research output with approximately 0.05% higher GDP per capita; and a 10% increase in higher-education-system size with approximately 0.27% higher GDP per capita after one year (pp. 9–10).
Buesa, Heijs & Baumert (2010)	European regions; regional innovation systems	Universities make a statistically significant contribution to regional patent production, although the university factor is generally less influential than characteristics of innovating firms and the wider regional and national innovation environment.	In the preferred intragroup models, the university factor has a coefficient of **9.55 for patents per capita and 7.42 for high-tech patents per capita (both p<0.001)** (Table 3, p. 730). The authors emphasise that regional environment and innovating firms generally exert larger effects.
Crespo, Peiró-Palomino & Tortosa-Ausina (2022)	Spanish provinces, 2009–2016	Improvements in university-system performance are positively associated with labour-productivity growth, primarily through technical progress, but the relationship is statistically significant only in provinces with productivity above the median.	University performance and its efficiency and technical-change components are not statistically significant in below-median-productivity provinces, whereas the positive relationships remain significant among above-median-productivity provinces (Table 5, pp. 581-583).
Drucker (2016)	US metropolitan areas, 2001–2011	Higher-education activities have more modest and heterogeneous relationships with regional economic performance than suggested by much of the earlier literature. University R&D is positively associated with earnings growth in 2007–11, although effects on employment and production are weaker; university patenting is largely unrelated to economic performance.	For earnings growth in 2007–11, university R&D has a positive coefficient of 0.747 (p=.013). Drucker estimates that raising the earnings-change index by its sample mean (0.66) would require approximately $176 million of additional annual university R&D expenditure over five years, compared with average annual university R&D expenditure of $110 million across the sample MSAs

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
		Educational composition is more relevant to entrepreneurship. University-related effects extend beyond host metropolitan areas, with statistically significant spillovers detectable over approximately **60 miles (97 km)**, although their direction varies across outcomes and periods.	(Table 2, p. 1193). Spillover measures within 60 miles (97 km) are jointly significant at above the 98% confidence level in 2007–11; smaller and larger distance bands produce substantively similar but statistically weaker results (pp. 1191, 1194).
Goldstein & Drucker (2006)	US metropolitan statistical areas; analysis differentiated by metropolitan size, 1986–2001	University research, teaching and technology-development activities are positively associated with regional earnings growth, but their importance varies substantially with regional size. University effects are strongest in small and medium-sized metropolitan areas, suggesting that university activities can partly substitute for agglomeration economies. Medium-sized regions benefit particularly from university R&D, whereas in small regions teaching and technology development are more important. Positive university-related spillovers are also found across regional boundaries.	For medium-sized metropolitan areas, the estimated earnings gain associated with university R&D is more than four times that for the average metropolitan area (1.01 versus 0.23 points on the regional earnings index; p. 33).
Hausman (2012)	US counties and industries, 1977–1997; interaction of Bayh–Dole with pre-existing university technological strengths	Following Bayh–Dole, employment, payroll and payroll per worker grew more rapidly in industries more closely related to nearby university innovation. Effects increase with proximity to the university; new establishments, particularly multi-unit expansions, account for much of the employment response.	Over 1977–97, industries with greater exposure to relevant university innovation gained an estimated 34 additional workers per county-industry for a one-standard-deviation increase in exposure, compared with average initial employment of around 100 workers. The effect was stronger closer to the university: the corresponding estimate was 68 additional workers in counties containing the university, compared with 39 when counties within 75 miles were included (pp. 19, 26–27).
Huggins & Johnston (2009)	UK universities; comparison across UK regions and institutional types, 2005-2006	University labour productivity differs significantly by regional competitiveness and institution type: HEIs in more competitive regions and pre-1992 universities have higher productivity. Less competitive regions tend to be more dependent on their universities for income and innovation despite having less productive HEIs, while university productivity is positively related to knowledge-commercialisation capabilities.	University value added per FTE employee ranged from £36,991 in Yorkshire and the Humber to £48,016 in Eastern England, compared with a UK average of £40,759. Universities accounted for between 0.80% of regional GVA in the South West and 1.36% in Wales (Table 5, p. 1097).
Lendel (2010)	US metropolitan areas; research universities across expansion and contraction	The presence of major research universities is positively associated with metropolitan employment growth beyond cyclical economic changes, with stronger effects for	During the 1998–2001 expansion, metropolitan areas containing a top-100 research university experienced about 1.2 percentage points higher employment growth.

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
	phases of the business cycle, 1998-2004	universities with larger R&D expenditures. The relationship varies across phases of the business cycle.	During the 2002–04 contraction, the estimated advantage was about 1.3 percentage points for top-100 research universities and 2.6 percentage points for the more selective group of 87 leading research universities (Table 3, p. 223).
Marrocu, Paci & Usai (2022)	European regions, 2000–2016	Universities are positively associated with regional TFP growth through direct effects and indirectly through human- and technological-capital formation. University effects also spill over into other regions. Research-oriented university activity, particularly PhD production, is associated with stronger productivity effects.	A 10% increase in the number of universities is associated with a 1.8% increase in long-run regional TFP; the estimated effect exceeds 5% when spillovers from neighbouring regions are included (Table 2, p. 1118), and reaches 6.8% when indirect effects through human and technological capital and their spatial spillovers are also included (p. 1127).
Ponds, van Oort & Frenken (2010)	Netherlands; seven science-based industries	Academic R&D is positively associated with regional patenting. Academic knowledge spillovers operate both through geographical proximity and through university–industry collaboration networks, with networks extending the geographical reach of knowledge flows.	In the fixed-effects specifications, own-region university R&D, spatially proximate university R&D and network-mediated university R&D all show positive statistically significant coefficients; the results indicate that geographical proximity and collaboration networks constitute distinct channels for academic knowledge spillovers (Table 2, p. 245).
Rehman et al. (2025)	264 NUTS2 regions in 28 European countries, 2000–2016	Higher-education R&D expenditure is positively associated with regional TFP in dynamic panel estimates and has a larger estimated coefficient than business or government R&D. Results also indicate complementarities between different sources of R&D.	A 10% increase in higher-education R&D expenditure is associated with approximately 0.16% higher regional TFP in the baseline specification; the estimate remains positive at approximately 0.13% when additional controls are included (coefficients 0.0156 and 0.0134 respectively; Table 3, p. 9).
Schubert & Kroll (2016)	German regions, 2000–2011	Higher-education activities are positively associated with regional GDP per capita and reduce unemployment in the long run. A substantial part of the estimated economic contribution operates through spatial spillovers beyond the region in which the HEI is located.	At the sample mean, HEI activities are estimated to contribute approximately €8,309 to regional GDP per capita, comprising €761 from the own-region effect and €7,548 from spatial spillovers (Table 2, p. 480). The corresponding long-run reduction in unemployment is approximately 3.79 percentage points, almost entirely attributable to spatial spillovers (Table 3, p. 481).
Valero & Van Reenen (2019)	Nearly 1,500 subnational regions in 78 countries, 1950–2010	Growth in university presence is robustly associated with higher subsequent regional GDP per capita. Positive effects also extend into neighbouring regions, with human-capital formation and innovation accounting for part of the relationship.	A 10% increase in universities per capita is associated with approximately 0.4% higher future regional GDP per capita. The preferred regional-trend specification has a coefficient of approximately 0.047; the association

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
			remains statistically significant under more demanding specifications (Table 3, p. 59).

Section 4 Annex. Empirical evidence on universities, human capital and regional labour markets

Study	Country / context	Main statistically significant finding	Illustrative empirical result (where reported)
Abel & Deitz (2012)	United States; 283 metropolitan areas	Degree production is positively, but only modestly, associated with local human capital stocks. University R&D activity is also positively associated with local human capital accumulation, suggesting that universities influence both the supply of and demand for skilled labour.	The elasticity of degree production is estimated at approximately 0.03–0.12, depending on the specification, implying that a doubling of university degree production is associated with up to a 12% increase in the human capital stock of the host metropolitan area. The corresponding elasticity for university R&D activity ranges between 0.04 and 0.09 (Table 3, pp. 676–677).
Audretsch et al. (2022)	United Kingdom; 131 universities, 2009–2016; analysis of university outcomes and regional scholarly impacts around REF 2014	Different university outputs are associated with distinct regional economic impacts. Graduate composition is significantly related to regional human-capital capabilities and retention, while research contracts and particular disciplinary profiles are associated with knowledge commercialisation, collaboration, SME support and community engagement. Higher REF quality scores were positively associated with universities' reported contributions to SME support and meeting regional community needs, and strengthened the positive associations between patents and knowledge commercialisation, and between research contracts and regional collaboration. At the same time, REF moderated negatively the estimated contribution of graduates in several disciplines to regional human-capital capabilities and retention	A 1% increase in business graduates is associated with a 5.36% increase in reported regional human-capital capabilities; corresponding estimates are 4.45% for STEM, 3.66% for social sciences and 3.25% for health graduates (p. 24[10]). A 1% increase in STEM graduates is associated with 7.08% higher knowledge-commercialisation impact and 7.92% higher collaboration with regional knowledge actors; business graduates are associated with 3.81% greater SME-support impact and 8.48% greater community-needs impact (pp. 25–26). Each additional £1,000 of research contract income per university is associated with a 0.63-unit increase in reported knowledge commercialisation and a 1.76-unit increase in reported regional research collaboration (p. 26). A one-point increase in the REF2014 quality-profile grade point average (GPA) is associated with increases of 1.49 and 3.95 units in universities' reported contributions to regional knowledge commercialisation and research collaboration, respectively, but with decreases of 4.13 and

[10] The page numbers cited refer to the pre-print version of Audretsch et al. (2022), available at: https://repositorio.udd.cl/server/api/core/bitstreams/90e7291f-d8f2-467c-b24a-8a850e6009e6/content

Study	Country / context	Main statistically significant finding	Illustrative empirical result (where reported)
			5.69 units in reported contributions to regional human-capital capabilities and talent retention, respectively (p.28).
Berlingieri et al. (2022)	Germany; technical college openings (matched difference-in-differences)	New technical colleges substantially increased the local supply of highly skilled workers but generated little evidence of aggregate wage or employment growth. Benefits were concentrated in high-technology manufacturing and more dynamic local labour markets.	Young high-skilled employment increased by approximately 13% within ten years of college opening, while no statistically significant overall wage or employment effects were detected (pp. 2–3).
Britton et al. (2021)	England; linked administrative education, location and earnings data	Graduates are substantially more geographically mobile than non-graduates and disproportionately move towards stronger labour markets, particularly London and other large cities. Graduate mobility is also associated with higher early-career earnings.	By age 27, around 35% of graduates compared with 15% of non-graduates had moved from their age-16 travel-to-work area. After controlling for observed characteristics, graduates were around 10 percentage points more likely to move. Male graduate movers earned around 10% more and female movers around 4% more than comparable stayers (pp. 2–3).
Faggian & McCann (2009)	Great Britain (England and Wales)	Graduate inflows and regional innovation are jointly related in a cumulative two-way process. Graduate migration is particularly important for high-technology innovation.	For England and Wales, a 1% increase in inflows of highly mobile graduates is associated with a 1.26% increase in all-sector innovation and a 2.00% increase in high-technology innovation. Conversely, a 1% increase in all-sector and high-technology innovation is associated with increases of 0.39% and 0.20%, respectively, in graduate inflows (Table 5, p. 330).
Faggian et al. (2007)	United Kingdom; Scottish and Welsh graduates	Previous migration for higher education is positively associated with subsequent migration into employment, supporting a “migration-on-migration” process. Graduate mobility also varies with individual human capital, institutional quality and regional context.	For Scottish-domiciled students educated in Scotland, a 1% increase in the distance moved to university is associated with a 0.28% increase in subsequent migration distance. For Welsh-domiciled students, the corresponding elasticities are 0.47 for those educated in Wales and 0.49 for those educated outside Wales (Tables 4 and 7, pp. 2519–2521).
Ferhat (2022)	France; university openings (difference-in-differences)	University openings improved labour-market outcomes in disadvantaged regions but had no measurable impact in regions with lower unemployment and more favourable socio-economic conditions. The human-capital channel was consistently positive, while spillover effects varied across regions.	University openings increased the probability of employment by approximately 8 percentage points and wages by around 5% in disadvantaged regions. No significant labour-market effects were found in regions with lower unemployment and more advantaged socio-economic backgrounds. The estimated effect operating through the human-capital channel was consistently positive, whereas the spillover channel could be positive, negative or negligible (pp. 12–18; 33).

Study	Country / context	Main statistically significant finding	Illustrative empirical result (where reported)
Glaeser & Saiz (2003)	United States; cities and metropolitan areas, 1970–2000	Higher initial human capital is associated with faster subsequent metropolitan growth. The relationship is robust to a wide range of controls and metropolitan fixed effects, and the authors interpret the effect as operating mainly through higher productivity and greater capacity to adapt to adverse economic shocks rather than through amenities alone.	At metropolitan level, a 1 percentage-point increase in the adult college-graduate share is associated with almost 0.5% higher decadal population growth; at city level, the corresponding association is around 0.2% (pp. 8–9). Doubling the pre-1940 number of colleges per capita is associated with roughly 4% higher decadal population growth (pp. 13–14). Using colder US metropolitan areas—many of which experienced manufacturing decline—as a proxy for adverse economic shocks, the authors find that a 1 percentage-point increase in the share of college graduates is associated with approximately 1.3% higher population growth over 1980–2000, compared with a much weaker relationship in warmer metropolitan areas (pp. 39–40). The findings support the view that human capital enhances regional adaptability and economic "reinvention" following adverse shocks.
Moretti (2004)	United States; metropolitan labour markets	Higher local shares of college graduates are associated with higher wages across education groups, consistent with human capital spillovers.	A one percentage-point increase in the local share of college graduates is associated with average wage gains of 0.6–1.2%; estimated gains are 1.9% for high-school drop-outs, 1.6% for high-school graduates and 0.4% for college graduates (p. 177).
Pfister et al. (2021)	Switzerland; establishment of Universities of Applied Sciences (difference-in-differences)	Establishing Universities of Applied Sciences increased both the quantity and quality of regional innovation, demonstrating the regional contribution of applied higher education institutions.	Regional patenting increased by 6.8%, patent quality by up to 9.7%, and first-time patent applicants by more than 3% (pp. 2, 14).
Tijssen et al. (2020)	United Kingdom; 48 largest research universities (2008–2017)	University-business research collaboration varies substantially by institutional and regional characteristics. Across distance bands, collaboration volumes are most consistently associated with local business-sector R&D intensity, university research scale, research quality, and researchers' prior business-sector experience. Researcher mobility is particularly important at short-to-medium distances, while institutional specialisation and spinout/start-up activity are more closely associated with longer-distance collaboration.	University-business research publication output increased by 79% between 2008 and 2017. The annual growth rate of university-business research collaborations increased with geographical distance, rising from 3.3% for collaborations within 0–49 km to 12.1% for collaborations over 500–4,999 km and 13.3% for collaborations beyond 4,999 km (pp. 1226–1228).

Section 5 Annex. Empirical evidence on innovation and knowledge spillovers

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
Acosta et al. (2009)	202 European regions; 378 universities and 4,580 university patents, 1998–2004	University patent production is positively associated with regional university R&D funding, with estimates indicating approximately constant returns to scale. University patenting is also strongly concentrated geographically and technologically, while regional industrial potential does not significantly explain university patent production.	A 10% increase in regional university R&D funding is associated with approximately a 10% increase in university patent production (Table 6, p. 1178).
Aghion et al. (2009)	European and US universities	University autonomy and competition are positively associated with research output; US IV estimates indicate that greater autonomy and local competition enable research universities to generate more patenting from a given exogenous increase in expenditure, particularly closer to the technological frontier.	In New Jersey, where university autonomy and private-university competition are relatively high and the state is close to the technological frontier, an additional $1,000 of research-university expenditure per person in the cohort is estimated to increase state patenting by 0.146 standard deviations (Figure 13, p. 23).
Azagra-Caro (2014)	EU27 countries, 1982–2007	University-owned patenting is positively associated with the share of university R&D funded by business, while university R&D expenditure itself has no statistically significant effect on university-owned patents.	The coefficient on the share of business funding of university R&D is 2.89 ($p<0.01$); the coefficient on university R&D expenditure is not significant (−0.01) (Table 3, pp. 907–909).
Beale et al. (2008)	Wales, Scotland and Northern Ireland	Descriptive evidence shows similar patenting activity per researcher in Wales and Scotland, but substantially lower activity in Northern Ireland; differences are more pronounced for indicators of patent quality and commercial collaboration.	Patent filings per researcher were 0.52 in Wales, 0.44 in Scotland and 0.27 in Northern Ireland. Patent grants per researcher were 0.12, 0.11 and 0.05, respectively (Table 2, p. 108; Table 5, p. 112).
Belderbos et al. (2014)	65 NUTS-1 regions in EU-15 countries; 394 foreign greenfield R&D projects, 2003–2008	Greater regional academic research strength significantly increases the probability of attracting foreign R&D investment by multinational firms. The availability of PhD students is also positively associated with R&D location, suggesting an important human-capital channel.	A one-standard-deviation increase in academic research strength increases the average probability that a region is selected for R&D investment by 28%, compared with 21% for a one-standard-deviation increase in regional technological strength (Table 3, pp. 932–933).
Graf & Henning (2009)	Four East German regions: Dresden, Jena, Halle and Rostock, 1995–2001	Universities and other public research organisations occupy more central positions than private actors in regional innovator networks, although the strength and statistical significance of this relationship varies across regions.	Public research actors had substantially higher average network centrality than private actors—for example, 22.2 vs 4.2 in Dresden and 27.3 vs 4.8 in Jena. Regression analysis controlling for actor size confirms that public research actors are significantly more central in both regions (Tables 4–5, pp. 1364–1365).
Harris et al. (2011)	Great Britain; establishment-level CIS and ARD data	Establishments collaborating with HEIs have significantly higher total factor productivity (TFP), with substantial	Across all industries, establishments collaborating with HEIs had approximately 12% higher TFP. Among foreign-owned firms in non-production industries, those with HEI

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
		heterogeneity between production and non-production sectors and between domestic- and foreign-owned firms.	links were approximately 36.5% more productive; no significant TFP gain was found for foreign-owned production establishments (Table 1, pp. 1244–1245).
Harris et al. (2013)	Great Britain; establishment-level CIS and ARD data	HEI collaboration is associated with higher TFP overall, but the productivity benefit varies substantially across regions, sectors and ownership. In production industries, domestically owned Scottish establishments benefit less, while foreign-owned establishments in Scotland and some English regions experience larger gains.	In production industries, HEI collaboration was associated with 16.3% higher TFP overall. For Scotland, the estimated effect was approximately −12.5% for domestically owned establishments but +31% for foreign-owned establishments (Table 2, pp. 154–155).
Hegde (2005)	US public and private research universities; university patents and patent citations, 1975–2000	Public-university status is negatively associated with patent quality and generality relative to private universities, and public-university knowledge spillovers are not more likely to remain within their home states. Research quality, rather than public ownership, is positively associated with the localisation of university knowledge spillovers.	Public-university patents had lower average generality (0.42 vs 0.47) and research-quality scores (2.96 vs 3.82) than private-university patents. Controlling for research and regional characteristics, the odds of a public-university patent receiving an in-state citation were only 57% as high as for a private-university patent (Tables 4–5, pp. 380–382).
Huggins et al. (2020)	UK universities and their links with industry and other organisations	Universities that generate more spin-offs and attract more research funding tend to occupy more central positions in knowledge networks. Higher patenting, by contrast, is associated with weaker network connections in some models. The characteristics of the region in which a university is located have little relationship with its network position.	A one-standard-deviation increase in spin-off activity is associated with a 1.76-standard-deviation increase in overall network centrality. For links extending beyond the university's own region, a one-standard-deviation increase in research funding is associated with a 0.063-standard-deviation increase in network centrality, while a similar increase in patenting is associated with a 0.33-standard-deviation decrease (Tables 3–4, pp. 742–745).
Paunov et al. (2019)	36 OECD countries and China, 1992–2014; universities and public research institutes	Firms located closer to research institutions generate more patents. Instrumental-variable estimates support a positive effect of proximity to research institutions on local industry patenting, particularly in life sciences and digital technologies; no significant effect is found for environmental technologies.	The IV estimate for proximity to the nearest research institution is 0.289 ($p<0.001$), and 0.223 ($p<0.001$) for proximity to the nearest patenting research institution (Table 4, p. 26). The effects remain significant for life sciences and digital technologies (Table 5, p. 27).
Pfister et al. (2021)	Switzerland; establishment of Universities of Applied Sciences from the mid-1990s	Establishing applied-research universities increased both the quantity and quality of regional innovation. The effects emerge a few years after establishment and are not driven only by large R&D-intensive firms or already-active inventors.	Establishing a University of Applied Sciences increased regional patenting by 6.8%. Patent quality also increased, by up to 9.7% depending on the quality measure used (Table 6, pp. 9–12).

Study	Country/context	Main statistically significant finding	Illustrative empirical result (where reported)
Piergiovanni & Santarelli (2001)	21 French administrative regions; manufacturing firms	Both industrial and university R&D within a region are positively associated with manufacturing patenting. The relationship is substantially stronger for university R&D, suggesting important local knowledge spillovers from universities to firms.	A 1% increase in university R&D is associated with approximately a 0.66% increase in manufacturing patent intensity, compared with 0.08% for industrial R&D; both effects are significant at the 1% level (Table 3, p. 701).
Sedláček (2017)	European university systems, including the UK	Greater university autonomy is positively associated with research performance. Financial autonomy, autonomy over doctoral tuition fees and autonomy in recruiting senior academic staff are all positively and significantly related to research performance.	Financial autonomy has a positive coefficient of 0.0348 ($p<0.01$); autonomy over doctoral tuition fees 0.015 ($p<0.01$); and autonomy in recruiting senior academic staff 0.018 ($p<0.05$) (Table 1, p. 344).
Špurek & Rehák (2022)	294 NUTS-2 regions in 29 European countries	Academic patenting is strongly and positively associated with firms' patenting within the same region. Universities account for a relatively larger share of patenting in less innovative regions, while their share is generally smaller in regions with high levels of private-sector innovation.	The average share of academic patents in regional patenting increased from 4% in 1976–1985 to 13% in 2006–2015. A 10% increase in university patents per million inhabitants is associated with a 10.34% increase in firms' patents per million inhabitants (Table 1, p. 154; descriptive results, pp. 149–156).
Veugelers et al. (2012)	Major European and non-European national innovation systems; EPO patent data	Countries differ substantially in both the creation of university-owned technologies and their subsequent use by firms. US universities dominate the creation of university-owned patents and highly cited academic patents, while European and Asian countries show greater variation and stronger reliance on domestic university technology.	US universities accounted for 68% of university-owned patents compared with 21% for the EU-15. In the UK, 15% of university-owned patents were subsequently cited by company patents, while around 7% of UK company patents that cited earlier inventions drew on at least one university-owned patent. This indicates a measurable flow of patented university knowledge into subsequent private-sector technological development (Table 5, p. 456; Table A5, p. 471).

Section 6 Annex. Empirical evidence on universities, entrepreneurship and spinouts

Study	Country/context	Main empirical finding	Illustrative empirical result (where reported)
Audretsch et al. (2005)	Germany; 281 publicly listed high-technology and knowledge-based firms	Proximity of new high-technology firms to universities varies with both the type of university knowledge and the mechanism through which knowledge spills over. Firms tend to locate closer to universities with larger numbers of natural-science students and to universities with greater social-science research output, while the effects are not	The median firm was located 7 km from its nearest university (mean 16.75 km). In the median regression, social-science research output (−0.0303, $p<0.01$) and natural-science student numbers (−0.0005, $p<0.01$) were significantly associated with shorter firm–university distance; neither was significant at the 92nd percentile (around 50 km) (Table 2, p. 1120).

Study	Country/context	Main empirical finding	Illustrative empirical result (where reported)
		significant for firms located further away, suggesting that these spillovers are geographically bounded.	
Baptista et al. (2011)	Portuguese municipalities, 1992–2002; establishment of new higher education institutions	Establishing a new HEI increased subsequent entry of knowledge-based firms, while reducing entry in low-technology sectors, consistent with a shift in local entrepreneurial activity towards more knowledge-intensive activities. Effects varied substantially by sector.	Five years after establishment, the increase in knowledge-based firm entry was 26.7% relative to the pre-treatment period when treated municipalities were compared with both control groups, and 33.1% when compared with municipalities without an HEI; both estimates were significant at 5% (Table 5, p. 757). Knowledge-intensive services also showed an increase of about 9% after five years relative to municipalities with an unchanged number of HEIs (Table 7, p. 758).
Bonaccorsi et al. (2013)	103 Italian provinces; 80 research-active universities and 22,761 new firms established in 2010	The relationship between university scientific specialisation and local firm creation varies substantially across industries. Specialisation in applied sciences and engineering is positively associated with new firm creation across several service industries, while basic-science specialisation has a narrower but particularly large association with science-based manufacturing. No significant local firm-creation effect is found for specialisation in social sciences and humanities.	The incidence-rate ratios imply that the presence of universities specialised in applied sciences and engineering is associated with 33.8%, 33.1% and 38.9% more new firms in knowledge-intensive business services, supplier-dominated services and physical-network services, respectively. The presence of a university specialised in basic sciences is associated with 89.6% more science-based manufacturing firms (Table 5, pp. 849–851).
Bonaccorsi et al. (2014)	Italian provinces; creation of knowledge-intensive firms (KIFs)	University knowledge affects local entrepreneurship differently according to its form, geographical distance and university quality. Academic patents from high-quality universities are positively associated with KIF creation both locally and in neighbouring provinces, although the external effect declines rapidly with distance. Publications and graduates from high-quality universities have smaller local effects and no significant effects outside their home province; knowledge from lower-quality universities has little measurable effect.	For high-quality universities, a 1% increase in local academic patents is associated with a 0.23% increase in new KIFs, compared with about 0.03% for both local publications and graduates. For academic patents generated outside the province, a 1% increase is associated with approximately 0.17% more KIFs at 20 km, 0.04% at 50 km and 0.01% at 100 km; effects beyond approximately 50 km are not statistically significant (Tables 5–6, pp. 271–272, 278–279).
Fini et al. (2010)	United States; survey of 11,572 academics at Carnegie I and II universities	A substantial share of academic entrepreneurship occurs outside the formal university IP system. Academics creating patent-based businesses also differ systematically from those creating businesses outside the patent system, including by age, discipline and allocation of time to research, teaching and industry interaction.	1,266 respondents (about 11% of the full sample) had started at least one business not based on a patented invention, compared with 682 (about 5%) who had started at least one patent-based business; 138 respondents belonged to both groups. Overall, the authors conclude that approximately two-thirds of businesses started by academics were not based on disclosed and patented inventions (Fig. 1 and Table 3, pp. 1063–1065).

Study	Country/context	Main empirical finding	Illustrative empirical result (where reported)
Prokop & Kitagawa (2022)	UK; 1,033 active university spinouts from 87 universities across 12 regions	Spinout network development differs substantially across regional contexts. The authors distinguish four regional configurations: “entrepreneurial cores”, where spinouts are well connected and have access to diverse investors, talent and other actors; “rigid cores”, where firms are well connected but networks are more closed; “entrepreneurial peripheries”, where local networks are thinner but spinouts can access strategically important actors within and beyond the region; and “peripheral lock-in”, where both connectivity and access to diverse actors are limited.	The Greater South East shows the strongest overall spinout network positions and is characterised as an entrepreneurial core, while the North East illustrates peripheral lock-in. Wales provides an important contrast: despite its peripheral location, its spinouts have access to relatively diverse network opportunities, illustrating why regional spinout ecosystems cannot be understood through a simple core–periphery distinction (Table 2 and Figure 3, pp. 2109–2111).
Rossi et al. (2023)	UK; university spinouts across NUTS-2 regions	Regional conditions associated with retaining locally created spinouts differ from those associated with attracting spinouts from elsewhere. Higher urbanisation economies reduce the likelihood that a spinout remains in its home region, while spinouts that relocate are more likely to choose regions with stronger localisation economies, suggesting that movers seek proximity to firms in related sectors. University entrepreneurship support also contributes to retention.	Of 931 active or acquired spinouts, 70.4% remained in their university’s home region. Retention rates varied markedly across regions and were not positively aligned with attraction rates: some regions, including much of London and the South East, combined relatively low retention with high attraction, while several devolved and northern regions showed the reverse pattern (Tables 4–7, pp. 1102–1107).

Section 7 Annex. Empirical evidence on universities, structural change and regional resilience

Study	Country/context	Main empirical finding	Illustrative empirical result (where reported)
Jump & Scavette (2025)	United States; counties containing state flagship research universities across the 2001, 2008–09 and 2020 recessions	The presence of a flagship research university does not uniformly increase regional economic resilience. Flagship-university counties experienced greater resilience during the Great Recession, but no significant advantage during the 2001 recession and lower resilience during the Covid-19 recession. The effect therefore depends strongly on the nature of the economic shock.	During the 2008–09 recession, the increase in unemployment in flagship-university counties was more than 0.5 percentage points lower than in comparable counties without research universities. During the Covid-19 recession, the effect was almost equal and opposite in magnitude, while the 2001 effect was not statistically significant (Figure 3, pp. 7–8).
Youtie & Shapira (2008)	United States; case study of Georgia Institute of Technology and the development of Georgia's regional innovation system	Georgia Tech's evolution towards a regional “knowledge hub” involved combining research and education with industrial extension, entrepreneurship support, talent attraction and boundary-spanning networks. Programme evaluations indicate measurable benefits for participating firms, while the case illustrates universities' potential role in	Evaluations of Georgia Tech's Industrial Extension Service reported $122 million in increased sales, $23.4 million in cost savings and more than 2,500 jobs added or retained among participating manufacturers between Q2 2003 and Q1 2005. A separate survey found clients had approximately $10,000 higher value added per employee

Study	Country/context	Main empirical finding	Illustrative empirical result (where reported)
		actively building regional innovation capabilities rather than simply operating within pre-existing ones.	than non-clients after controlling for firm size, industry, location and other characteristics (p. 1200).

Section 8 Annex. Empirical evidence on institutional diversity and regional economic outcomes

Study	Country/context	Main statistically significant/empirical finding	Illustrative empirical result (where reported)
Es-Sadki & Arundel (2021)	292 universities in 17 European countries	The study tests how regional conditions and university characteristics are associated with four university knowledge-exchange outcomes: research agreements with firms, licence agreements, licence income and start-ups. A larger regional knowledge-intensive service sector is associated with more university start-ups, while metropolitan location is associated with more research agreements. The presence of other strong universities in the same region is associated with fewer research and licence agreements for most universities, but with higher licence income among the highest-ranked universities.	For most universities, being located alongside stronger universities is associated with fewer research and licence agreements. The exception is the top 13.4% of universities, for which the presence of other strong universities in the region is associated with significantly higher licence income (Table 7, pp. 19–22).
Johnston & Wells (2020)	UK; competitive public research and innovation funding in the priority sectors of the 2017 Industrial Strategy, 2007–2017	The study examines how research and innovation funding and university–industry engagement are distributed across UK regions. Funding is strongly geographically concentrated, but regions also differ in their sectoral research strengths and in the extent of university involvement in firm-led innovation projects, supporting the authors' argument against assuming a uniform regional role for universities.	London and the South East received £1.38 billion (38%) of competitive research and innovation funding in the priority sectors, compared with around £250 million (7%) for Wales, Northern Ireland and the North East combined—equivalent to about £5.50 for every £1 received by those three regions (Table 2, pp. 391–393).
Sánchez-Barrioluengo & Consoli (2016)	Spain; 47 public universities across 17 regions, 2003–2010	The study examines whether universities' orientation towards teaching, research and third-mission activities is associated with regional high-skill employment. A stronger teaching orientation is consistently associated with a greater probability of workers being employed in high-skill occupations, while the relationships with research and knowledge-exchange activities are more sensitive to regional socioeconomic conditions.	Teaching orientation remained a significant positive predictor of high-skill employment across the different model specifications. Research orientation was also positively associated with high-skill employment in the initial models, whereas the separate third-mission effect was not statistically significant (Tables 5–6).
Yanagiura & Tateishi (2024)	Japan; prefecture-level analysis of small, non-	The study examines whether expansion of small, non-research, teaching-oriented private universities affects regional economic growth. Their expansion was positively	A 10% increase in small non-research private universities per million inhabitants was associated with approximately 0.3–0.4% higher GDP per capita

Study	Country/context	Main statistically significant/empirical finding	Illustrative empirical result (where reported)
	research private universities, 1955–2015	associated with subsequent GDP per capita growth, but the effect was concentrated in Japan's rapid-growth period and disappeared as national economic growth slowed. The universities did not significantly increase local human-capital stocks or innovation; the authors attribute much of the economic effect to temporary increases in local demand and capital investment.	growth over the subsequent five-year period. The effect was concentrated in Japan's earlier rapid-growth period and was close to zero after 1990 (Table 3, p. 7; Figure 6, p. 13).
Zhang (2018)	UK; 133 universities, 2003/04–2012/13	The study examines how university type and regional competitiveness are associated with universities' knowledge-exchange income. Established universities consistently outperform new universities, but regional context matters particularly for new universities: established universities perform similarly in stronger and weaker regions, whereas new universities located in competitive regions generate significantly more knowledge-exchange income than those in less competitive regions.	Established universities generated significantly more knowledge-exchange income per academic FTE than new universities in every year from 2003/04 to 2012/13 ($p<0.01$). Regional location made no significant difference among established universities, whereas from 2004/05 onwards new universities in competitive regions consistently generated significantly more income per academic FTE than new universities in less competitive regions (Figures 2, 4 and 5, pp. 84–86).

Section 10 Annex. Empirical evidence on universities in lagging and peripheral regions

Study	Country/context	Main statistically significant/empirical finding	Illustrative empirical result (where reported)
Evers (2019)	Denmark; Aalborg University, established in 1974 in the peripheral North Denmark region	Following the establishment and expansion of Aalborg University, the regional supply and employment of graduates increased substantially. Despite rapidly growing graduate numbers, retention remained relatively stable and graduate wages developed broadly in line with other Danish urban labour markets, suggesting that the local economy was able to absorb an increasing number of highly skilled workers.	The share of university graduates in the Aalborg regional workforce increased from 1.5% in 1982 to 8.5% in 2006, a rise of 7.0 percentage points and more than a fivefold increase—the largest relative increase among the urban labour-market regions examined. However, as the study does not use a counterfactual design, the extent to which this increase can be attributed specifically to the university cannot be established (Figure 5, p. 325).
Fish & Lambert (2021)	UK; Cumbria, rural North-West England; university-led SME innovation support delivered by Lancaster University and the University of Cumbria	The CUSP programme facilitated university–SME engagement in a relatively thin rural innovation ecosystem and met or exceeded several of its business-support and innovation targets. Beneficiary evidence also indicates improvements in business networks and skills, although employment creation and	An external evaluation estimated £36.5m in net additional GVA arising from CUSP, after adjustments for deadweight, displacement/substitution and leakage and application of a multiplier. This is a modelled programme-impact estimate based on benchmark assumptions rather than an observed or causally identified university effect (Table 3, p. 7).

Study	Country/context	Main statistically significant/empirical finding	Illustrative empirical result (where reported)
		new-to-firm product outcomes remained below programme targets at the time of evaluation.	
García-Estévez & Duch-Brown (2020)	Spain; expansion of the university system following the 1983 University Reform Act	Establishing a new university or faculty had a positive effect on new-firm formation in its province, although effects varied across sectors and fields of study. Positive effects were found particularly in medium-high- and medium-low-technology manufacturing and knowledge-intensive market and financial services; establishing health faculties was also positively associated with high-tech manufacturing firm creation.	Establishing a new university had a positive coefficient of 0.099 ($p<0.10$) on new-firm formation. Robustness analysis allowing for deviations from parallel pre-treatment trends found that the positive effect remained statistically significant for up to nine years after establishment, after which it became non-significant (Table 3, p. 254; robustness analysis, p. 260).
Komorowski & Fodor (2025)	UK; 385 creative-industry firms in Wales, including participants and non-participants in the university-led Clwstwr programme	Firms participating in the university-led programme exhibited significantly stronger relationships between each of four innovation drivers—networking, skills and knowledge, training and funding—and firm innovativeness than non-participating firms. The interaction between programme participation and each innovation driver was positive and significant at the 1% level.	Among Clwstwr participants, a one-point increase on the relevant Likert scale was associated with approximately 1.2% higher innovativeness for networking, 1.3% for skills and knowledge, 1.92% for training and 1.78% for funding. As participation was not randomly assigned and the analysis is cross-sectional, these associations do not establish that university engagement caused the differences in innovativeness (Tables 1–4, pp. 6–7).
McCauley-Smith et al. (2022)	UK; university-led leadership and business-development programme for 50 SMEs in North-East England	SMEs participating in the Leading Growth programme reported improvements in leadership and management capabilities alongside subsequent business growth. The programme also exceeded its employment-creation targets, including for jobs in disadvantaged areas.	Participating businesses reported approximately £5.72m in gross turnover growth, equivalent to an estimated £1.82m in gross GVA; the programme created 17 jobs against a target of 15, including 11 in disadvantaged areas against a target of five. Participants attributed, on average, 20% of their turnover growth to Leading Growth. These are programme outcomes and participant-reported attribution rather than estimates based on a counterfactual comparison group (pp. 1127–1128).
Pereira et al. (2021)	Portugal; Polytechnic Institute of Portalegre in the low-density municipalities of Portalegre and Elvas	The Polytechnic represents a substantial economic presence in its low-density host region through institutional, staff and student expenditure and associated indirect and induced activity. It is also a major regional employer.	The estimated total economic footprint was €17.28m, equivalent to 3.68% of local GDP, with an estimated €1.85 of economic activity for each €1 of public funding. The study also estimated 471 direct and indirect jobs (2.25% of the economically active population). These estimates are derived from a spending-based impact model using a 1.7 multiplier and should therefore be interpreted as an estimated economic footprint rather than a causally identified additional effect (Table 6, p. 11).

Study	Country/context	Main statistically significant/empirical finding	Illustrative empirical result (where reported)
Prencipe & Fioretti (2026)	Italy; 655 university spin-offs across 78 provinces, with particular attention to peripheral/internal areas	Stronger regional entrepreneurial ecosystems were associated with better university spin-off performance, but the relationship differed by outcome and location. Ecosystem quality was particularly important for revenue growth among spin-offs in internal areas, suggesting that stronger wider regional ecosystems can partly compensate for local structural disadvantages.	For revenue growth, the interaction between internal-area intensity and regional ecosystem quality was positive and significant (β=0.0668, p=0.027), while the unconditional ecosystem-quality effect was not significant (β=−0.003, p=0.849) (Table 3, p. 10). For employment growth, ecosystem quality was positive overall (β=0.0261, p=0.003), but its interaction with internal-area intensity was not significant (β=0.0039, p=0.809) (Table 4, pp. 11–12).

ERC
Enterprise Research Centre

Contact Us

Centre Manager
Enterprise Research Centre
Warwick Business School
Coventry, CV4 7AL

Email: Centremanager@enterpriseresearch.ac.uk



Economic and Social Research Council



Department for Business, Innovation, Science and Trade





Intellectual Property Office