

Trippl, Michaela; Smith, Helen Lawton; Sinozic, Tanja

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The “third mission” of universities and the region: comparing the UK, Sweden and Austria

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Michaela Trippl^[1], Tanja Sinozic^[2], Helen Lawton Smith^[3]

E-mail:michaela.trippl@keg.lu.se, tanja.sinozic@wu.ac.at, h.lawton-smith@bbk.ac.uk

^[1]Department of Social and Economic Geography, Lund University,
Sölvegatan 10, 223 62 Lund, Sweden.

^[2] Institute for the Environment and Regional Development, Vienna University
of Economics and Business, Nordbergstrasse 15, 1090 Vienna, Austria.

^[3] Birkbeck, University of London, Department of Management, Malet St.
London WC1E 7HX, UK.

Abstract

The literature on university “third mission” transformations and their relationships to regional development is relatively broad and diverse. This paper reviews four approaches to university “third mission” processes and uses them as an exploratory lens for understanding the interactions between national policy imperatives, characteristics of the university population, and country attributes that have shaped university third function transformations in the UK, Sweden and Austria. In the first approach, the university third mission is seen as an entrepreneurial process of economic autonomy and knowledge transfer to industry. In the second, the university is viewed as an actor in a regional innovation system contributing to knowledge generation and regional innovation-enhancing interactions. The third approach sees the university as transforming its processes to ‘mode 2’ knowledge production, and in the fourth, as adapting to regional societal needs. This paper finds that the UK has the longest tradition of the university third mission role, but has the least well mandated regional role. In the UK national policies have resulted in all four models of the third mission. Sweden has examples of the entrepreneurial university and RIS universities. In Austria the model is primarily one of RIS universities, with some evidence of Mode 2 within the full-scale university population.

1 Introduction

There is a broad literature on the changing role of universities in regional development (Etzkowitz et al. 2000; Arbo and Benneworth 2006; Power and Malmberg 2008; Goldstein 2010). Higher education institutions (HEIs) of different kinds are expected to fulfil their traditional missions (teaching and research) and in addition undertake a third function or mission that reflects multiple contributions (economic, social and cultural ones) to society. In some countries and for some kinds of universities the regional focus of the societal role is long established, for example in the US (land grant universities) and in the UK the former polytechnics. In others it is a more recent phenomenon. Universally now, this role is explicit in public policy, in some countries articulated as the triple helix model of university-industry-government in what Etzkowitz (2008) calls ‘regional triple helix spaces’.

What is still missing in the literature, however, is a precise understanding of the “third function” of universities in regions, sometimes called ‘third stream activities’, that is, targeted engagement with external organizations, outreach, enterprise formation, and so on (PACEC 2009). The aim of this paper is to contribute to a nuanced view of the role of universities in regional development and provide some evidence from the UK, Sweden and Austria for differences in conditions, interactions and outcomes. Four different concepts are considered and used as a backdrop to the national case studies: (i) the entrepreneurial university model, (ii) the regional innovation systems concept, (iii) the “mode 2 of knowledge production” approach, and (iv) the “engaged university” model. Drawing on an analysis of the theoretical and empirical literature, the paper highlights that these approaches provide different and complementary concepts for understanding (i) increasing levels of university engagement in regional development; (ii) the specific mechanisms and activities by which universities are seen to benefit their regions; and (iii) the factors affecting these processes.

The paper is structured as follows. Section 2 presents an overview on four major approaches which conceptualize from different and complementary perspectives transformations of activities and functions of HEIs. Section 3 compares modes of university engagement in three countries, looking in particular on the relationships between the national contextual conditions and HEIs activities. Section 4 summarizes the main findings and draws some conclusions.

2 Review of Key Concepts

Over the past years many different concepts have emerged, conceptualising from various perspectives the changing role of HEIs and its relation to regional development. Depending on the concept, different and overlapping roles and activities are emphasized: some are mainly concerned with knowledge commercialization and university-industry partnerships whilst others suggest a broader perspective that also takes into account social, cultural and societal contributions of HEIs. The following section discusses four approaches to the university “third mission”: the entrepreneurial university approach, Regional Innovation Systems, Mode 2 knowledge production, and the engaged university view. The discussion focuses primarily on their complementary and competing conceptualisations, activities, factors, regional expressions, and points of critique.

2.1 University “third mission” as entrepreneurial processes

The entrepreneurial university concept is probably the most prominent account of the changing roles and functions of HEIs (Etzkowitz 1983; Clark 1998; Etzkowitz et al. 2000). In this view, universities are considered as experiencing a shift towards economic autonomy and knowledge transfer to industry which can be capitalised upon (Clark 2001). University entrepreneurship is taken up as an important reflection of academic capabilities in response to changing market demands. Within this framework, the university “third mission” is conceptualised as an additional function to teaching and research (Etzkowitz et al., 2000). Activities are expressed in the commercial exploitation of university knowledge in a variety of forms such as spin-offs, patents, and licensing (Grimaldi et al. 2011). These are often related with the creation of new incentives and rewards for technology transfer for university staff, and increased industrial funding (Geuna and Muscio 2009; Perkman et al. 2011).

University entrepreneurship has been found to have associations with a variety of characteristics of universities, industries, firms, policies, and regions. Commercialisation activities seem to be particularly prevalent in research-intensive universities that have global networks and a strong local presence (Lawton Smith and Bagchi-Sen 2012). Some universities have commercialisation embedded in their ethos and formal internal steering core (Clark 1998; Rinne and Koivvula 2005). Siegel et al. (2007) and Goldstein (2010) emphasise the importance of technology transfer offices, incentive structures for academic start-ups and a business culture within academia as key factors for university entrepreneurship. Other studies reveal an association between specific sectors (such as life sciences and computing) and the propensity of HEIs to commercialise their research (Feldman 2003; Lawton-Smith and Bagchi-Sen 2012). Firm R&D intensity, strategies and absorptive capacity also influence HEIs abilities to profit from their inventions (Agarwal and Cockburn 2003; Nightingale 2004) as well as the type of research that they engage in (Bercovitz and Feldman 2007).

University entrepreneurial activities are considered to be affected by national policy aspects, such as funding and IPRs (Agrawal 2001). In some countries commercialisation is explicit in national and regional policies. For example, in the UK “third-stream funding” is an essential indicator of university performance and has an influence on the level of future government funding (PACEC, 2009). In the US, studies have found associations between increases in university patenting and licensing activities after changes in IPR started by the Bayh-Dole Act of 1980 (Henderson et al. 1998). These findings have been challenged by Mowery and Sampat (2005) who note that the increase in patenting and licensing of US universities would have occurred without the Bayh-Dole Act, as the universities were licensing before and their licensing thereafter was focused on a few areas (life sciences and electronics).

Studies on knowledge transfer and localised ‘spillovers’ have linked these processes with the growth of industries in regions (Audretsch and Feldman 1996). Regions are found to profit from the entrepreneurial activities of universities through job creation, spin-offs, and spillovers. Universities may also emerge as ‘anchors’ for local industry by attracting new talent, providing research that can easily be translated into products and services, and maintaining regional specialisation especially in science-based industries (Feldman 2003).

Empirical evidence of university entrepreneurial activities, the association of some factors with these trends, their localisation, and policy implications derived therefrom have been heavily criticised. Several authors have argued that the entrepreneurial university concept lacks a solid micro-foundation. Recent work has found that individual scientists welcome

more indirect forms of engagement with industry (like contract research and R&D collaborations) but are rather reluctant when it comes to direct forms such as commercialisation of university research through patenting, licensing and new firm formation (Perkmann et al. 2011). Scientists are found to be more motivated by the potential to improve their research than to generate income when engaging in industry collaborations (D'Este and Perkmann 2010). Except from a few universities, there is also little evidence that third function activities have led to a substantial income generation for HEIs (Geuna and Nesta 2006). HEIs exhibit much diversity internally, from each other, and in their respective regions and nations, and the entrepreneurial university literature is often criticised for not taking into account such heterogeneity and idiosyncrasies. In particular, the notion of the global university 'isomorphic development path' towards entrepreneurial activities (Etzkowitz et al. 2001) has been criticised for downplaying the importance of context specificities and lack of direct applicability to European countries with a tradition of the Humboldtian university model (Philpott et al. 2011). There is no automatic correspondence between the university mission and the needs of the regional economy. Martinelli et al. (2008) suggest that entrepreneurial universities do not necessarily have a stronger regional impact. Such caveats on the universality of university roles for local industry are supported by Goldstein (2009), who identifies measureable effects on the impact of technology transfer of universities by distance, types of research and kinds of universities. He finds spillovers from basic research to be less localized than for applied one with spillovers from highly ranked research universities more geographically widespread.

The model of the entrepreneurial university model focuses on the direct economic dimension of regional development. In addition to this role, universities are considered to contribute to systemic and interactive conditions of knowledge generation and use in regions. These elements are addressed in the Regional Innovation Systems (RIS) approach.

2.2 University “third mission” as processes within Regional Innovation Systems

The regional innovation systems (RIS) approach conceptualizes universities as having a fundamental role in interactive learning processes, and as important actors in regional systemic interdependencies leading to innovation (Cooke et al. 2004; Asheim and Gertler 2005). The RIS concept views innovation as a collective regional learning process emerging from interactions between two regional subsystems of knowledge generation and exploitation. Universities are part of the system of knowledge generation, whose relationships with the region are systemic and manifold, for example through research-generated knowledge, interactions with firms and other local institutions, and part of the regional institutional context characterized by culture, norms, trust and established patterns of interaction (Cooke, 1998). Universities in the RIS approach are considered as important knowledge generating institutions that may play bridging roles in the innovation-production spectrum.

RIS structures and dynamics vary considerably between different types of regions (Cooke et al. 2004, Tödtling and Tripl 2005). Asheim (1998) considers different RIS types and different factors affecting relationships within RISs. For example, a 'territorially embedded RIS' is characterized by localized learning processes and local university-industry interactions. A 'networked RIS' relies on specific network of universities, firms and supporting institutions that underpin learning. 'Regionalized RIS' are more important in sustaining regional specialization and global-local links. More recent literature suggests universities as venues for 'local buzz', coordinating local networks, and increasing regional attractiveness for external R&D (Benneworth and Hospers 2007).

The RIS concept considers the “demand side” and different regional needs for universities outputs. Specific needs are seen to depend on the structural composition of the regional economy, the prevailing knowledge bases (Asheim and Gertler 2005) and the dominant regional growth path. Lester (2005) identifies four alternative innovation-led growth paths that imply very different roles and activities of HEIs (see Table 1).

Table 1: University roles in alternative regional innovation-led growth pathways

Path I: New industry formation <i>HEIs roles:</i> <ul style="list-style-type: none"> • Forefront science / engineering research • Aggressive technology licensing policies • Assist entrepreneurial business (incubation services, etc.) • Cultivate ties between academic researchers & local entrepreneurs • Create an industry identity: standard setting, convening conferences, workshops and entrepreneurs forums, etc. 	Path II: Industry transplantation <i>HEIs roles:</i> <ul style="list-style-type: none"> • Education / manpower development • Responsive curricula • Technical assistance for sub-contractors, suppliers
Path III: Diversification into technologically-related industries <i>HEIs roles:</i> <ul style="list-style-type: none"> • Bridging between disconnected actors • Filling ‘structural holes’ • Creating an industry identity 	Path IV: Upgrading of existing industries <i>HEIs roles:</i> <ul style="list-style-type: none"> • Problem-solving for industry through contract research, faculty consulting, etc. • Education / manpower development • Global best practice • Convening foresight exercises • Convening user-supplier forums

Source: Lester (2005, p. 28)

Similar to the entrepreneurial university model, the RIS approach emphasizes knowledge exchange between HEIs and the business system. In contrast to the entrepreneurial university model, the RIS concept does not only focus on commercialization activities but takes into account a much wider set of knowledge transfer mechanisms. These include contract research, consulting, and formal R&D co-operations as well as forms of knowledge transmission that do not involve financial compensations for universities. Key examples are knowledge spillovers (through the provision of graduates to the local labour market) and informal collaboration with industry. Several studies suggest that these knowledge transfer mechanisms are more common than patents and licenses (Kitson et al. 2009; Perkmann et al. 2010).

Within the RIS framework, knowledge exchange activities of universities with the business sector are not confined to larger companies. An important task of universities is seen to transfer knowledge to SMEs and clusters located in the region (Uyarra 2010). HEIs are considered to place such activities at the heart of their strategy, and transform into what Kitson et al. (2009) call “the connected university”. A key assumption of the RIS approach is that the role of HEIs does not only depend on their own strategies, activities and internal organisational characteristics. The configuration of the RIS and the innovation and absorption capacities of the knowledge application subsystem are central for specifying how university outputs are translated into regional economic development. HEIs are viewed as local network coordinators of knowledge underpinning innovation, supporting cohesion between local industry, innovation, and global knowledge.

The RIS approach has been criticised for a variety of reasons, such as overemphasising regional knowledge circulation and underplaying the importance of extra-regional knowledge for the innovation dynamics of regions. Studies that have taken the global dimension into account find support for universities as attractors of talent to the regional economy and enabling firms to access knowledge from global pipelines of international academic research networks with considerable local impact (Lawton Smith 2003, Bramwell and Wolfe 2008).

Both the entrepreneurial university model and the RIS approach focus on forms of university engagement that target the economic dimension of regional development. Thus, they reflect a technology-oriented and economic interpretation of the third mission. This narrow perspective overlooks societal activities that HEIs potentially conduct in addition to research and teaching. Various authors have argued for a broader perspective (Chatteron and Goddard 2000, Lawton Smith 2003, Breznitz und Feldman 2012). Such a more comprehensive view can be found in the mode 2 knowledge production and the engaged university models.

2.3 University “third mission” as Mode 2 processes

Mode 2 concerns a shift from traditional, linear and disciplinary forms of university research to knowledge generation that arises from interactions between different disciplines and is directly applicable to current problems (Gibbons et al. 1994; Nowotny et al. 2001). Central characteristics underpinning mode 2 are knowledge production ‘in the context of application’, transdisciplinarity, heterogeneity, reflexivity, and new types of science governance and quality assessment (Gibbons et al. 1994; Hessels and van Lente 2008). Contextual applicability suggests that universities are engaged in collaborative research with a variety of organisations. Through these processes HEIs are able to produce knowledge that is highly relevant and connected to its environment. Heterogeneity amongst actors is said to broaden accountability, transparency and quality appraisal of university activities to audiences beyond academic ‘peers’. Instead of being remote from society, universities are portrayed as contributing to the solution of economic and social problems (Nowotny et al. 2001).

A variety of drivers are considered as having shaped university shifts to mode 2. Martin (2003) suggests a co-evolutionary perspective on the emergence of mode 2 associated with increased global competition, large international disparities in labour costs and pressure to innovate, and higher complexity in products, technologies, and skills. These changes culminate in a greater demand for knowledge diversity in problem-solving and shape universities’ roles in regional and global competitiveness focussing attention to more short-term and apparent rather than long-term and hypothetical phenomena. A further set of factors is related to changes in university and science funding (Nowotny et al. 2003). Many universities are facing national funding constraints and a directing of research priorities towards research areas of direct industrial, political and social importance, such as for example issues of EU relevance through Framework Programmes, and demands of higher public accountability, user involvement (Shove and Rip, 2000) and ‘impact’ (RCUK, 2012). Another aspect concerns changes in the ability to economically exploit the fruits of research through intellectual property and direct interactions with firms and other organisations.

How do local expressions of university mode 2 activities look like? Some scholars suggest involvement of HEIs as “co-producers” of knowledge relevant to the local industrial context (Lawton Smith and de Bernardy 2000) and complex practice-based knowledge production (Geuna and Muscio 2009). Universities may engage in local research projects in the solution

of local problems such as urban planning or innovation and production processes with local firms of global impact (Lassnig et al. 2012 forthcoming). More generally, the implication of mode 2 for universities in regions may mean a wider participation in local development and responses to local social and economic demands (Tranfield and Starkey 1998).

Universities, as regions, are highly heterogeneous in their specialisations, size, institutions, policies and actors, implying that outcomes of mode 2 activities are likely to be highly context specific (Martin 2003). Factors such as the nature and specialisations of local industry, national and regional requirements for universities to raise their own funding, or the increasing numbers of students (Geuna and Muscio 2009) are considered to have implications for the local expression of university mode 2 processes. A further implication for regions is changes in types of local universities. New university ‘species’ may emerge and evolve from utilitarian functions, such as universities that are increasingly specialised in mode 2 activities, higher differentiation between some universities and convergence in others, new forms of teaching, and more ‘hybrid’ universities which encompass mode 2 functions in addition to teaching and research (Martin 2003). Other universities may remain less affected by changes in public funding, and retain their previous specialisations, disciplinary boundaries, and more traditional academic practices in which mode 2 is limited to marginal activities.

The mode 2 approach has been criticised for a variety of reasons, such as its conceptual value and its implications for university research and policy (Hessels and van Lente 2008). By focusing on mode 2 as an emergent, evolving and new process mode 2 is critiqued for missing out on a socio-political ontology (Pestre 2003) and that characteristics of these processes have already occurred in the past. More recently, the Mode 2 approach has been criticised for its lack of inclusion of institutions and systems, and for its neglect of the natural eco-system and environment. A ‘mode 3’ of knowledge production is suggested to take into account these dimensions (Carayannis and Campbell 2012).

2.4 University “third mission” as regional engagement processes

The ‘engaged university’ is a concept for understanding the adaptation of university functions to regional needs (OECD 1997; Chatterton and Goddard 2000; Uyarra 2010). Engaged universities demonstrate a localised developmental as opposed to knowledge-generative role (Gunasekara, 2006). The engaged university is perceived as focusing its activities towards local industry and society and actively shaping regional identity (Breznitz and Feldman 2012).

University engagement is expressed in direct and proximate activities and it can take a variety of forms. Universities may adjust their teaching to local needs through the provision of continuing education, regionally focused programmes, local student recruitment and retaining of graduates (Gunasekara 2006). Universities are found to engage in local communities through community outreach programmes, maintaining local libraries, museums and galleries (Goddard and Chatterton 1999). Engagement is also expressed in activities such as formal integration of regional needs in university priorities, coordination of regional networks, provision of information and analysis for decision-making, and policy advice to different local and global actors (Gunasekara 2006). Furthermore, engaged universities are considered to involve themselves directly with local businesses via forms of business assistance and research support. The discussion of apparent forms of regional usefulness is part of a new policy discourse for the inclusion of HEIs in a broad regional development agenda (Goddard and Chatterton 1999; OECD 1999). Efforts are geared at intensifying, formally recognising,

and institutionalising these activities in different organisations (for example in regional development agencies) (Goddard and Chatterton, 1999; Arbo and Benneworth, 2007).

A variety of conditions are recognised as drivers of university engagement. Industrial structures have changed into more decentralised forms at the regional level giving more importance to local processes of specialisation and network formation. Through these changes, some universities face a new local client base or clusters of local firms (Goddard and Chatterton 1999). A further effect of these changes may be a greater role for universities in the coordination of the regional network which directs a region along its developmental trajectory. This may be through, for example, maintaining ‘untraded interdependencies’ (Storper 1997) under conditions where universities play an important role in forming cultures, norms, and enabling growth of connections, and familiarity and trust between people. Changes in student population and university funding have also created new conditions for university engagement. Larger and more diverse student populations, new teaching models and more students studying locally may have directed university considerations to local environments. Modern industries have brought about fast-changing skills requirements of the labour force, creating a demand for continuing education, more vocational education and training for firms. Lifelong learning makes learning requirements more interactive and experiential, project-based and local (Goddard and Chatterton, 1999). A further set of factors is related to national and regional policy influences. Goddard and Chatterton (1999) consider UK’s Labour party governments’ (1997-2010) ‘joined up thinking’ as an important political guidance towards greater university engagement in local development and regional governance. University engagement may be influenced by a shift in policy agenda from a focus on national challenges and basic research towards orientation on local and regional contexts (Chatterton and Goddard 2000). A key actor of change has been the European policy level with its funding programmes (structural funds), animating universities to strengthen their focus on regional economic development processes. Specific characteristics of regions and universities are considered to affect the extent and degree to which HEIs engage locally. Boucher et al. (2003) find that characteristics such as the regional identity, commitment to the region and structural features of the regional economy play a role in shaping university-region relationships. Additional factors are the number and scale of universities in the region, and the type of university (for example, old, traditional, arts, or technical). Empirical work suggests that the extent and type of regional engagement of universities are influenced by the age of universities and their locations. Younger universities and those located outside metropolitan regions tend to have a stronger focus on regional engagement (Boucher et al. 2003).

The arguments advanced by the protagonists of the engaged university model have not remained unquestioned. One key issue of critique has been that the concept lacks empirical foundation. Except from a few examples, empirical evidence of successful forms of engagement is scanty (Uyarra 2010). Due to the lack of systematic evidence, the core mechanisms and effects that are related with various types of engagement in different fields (social, economic, political) are still poorly understood (May and Perry 2006). In conceptual terms, the literature about the engaged university fails to clarify how HEIs can integrate and coordinate different missions and functions in effective ways. Finally, this approach tends to overestimate the capabilities and propensity of HEIs to realign their functions and missions in response to external signals (Gunasekara 2006). The literature on the engaged university model takes for granted that HEIs have multiple opportunities for pursuing explicitly a regional mission. It downplays the fact that in many countries it is still national and not regional framework conditions (public funding, regulation of teaching programmes) and incentive structures that shape the scope of what universities can and should do.

2.5 Diversity in Modes of University Regional Engagement

To sum up, university “third mission” concepts are various and diverse. They can be understood as primarily processes of economic production as in the entrepreneurial university view, as processes of learning underpinning innovation as in the RIS view, as a new ‘mode 2’ of contextualised and interdisciplinary knowledge production, or as primarily expressed in university activities of local community engagement. Table 2 summarises the different concepts, activities, factors, regional implications and shortcomings of the four approaches.

Table 2: Key characteristics of four conceptual approaches to the third mission of HEIs

	Entrepreneurial University	Regional Innovation Systems	Mode 2	Engaged University
Concepts	Economic autonomy, knowledge transfer	nodes between subsystems of knowledge generation & exploitation, intra-regional systemic interdependencies	Transdisciplinary knowledge production in the context of application	Adaptation of university functions to regional needs
Activities	Spin-offs, patents, licensing	Diverse and interactive, depending on prevailing RIS type & growth path	Knowledge production for contextualised problem-solving	Local activities and projects directed to needs of the local population
Factors	Changing economic demands, high-tech industries, university global-local links, policy imperative, IPRs, spillovers	RIS knowledge base and other RIS components such as institutions and firms	National funding constraints, diverse student populations, diversity in partners	Changing industrial structures, life-long learning requirements, regional policy shifts
Regional expressions	Local start-ups, employment growth	Learning processes and knowledge accumulation, interaction, fostering interdependencies between regional actors	User involvement, contextualised, participatory and practice-based knowledge production that is locally relevant	Adjustment of teaching to local needs, local community outreach, engagement in local networks & governance
Shortcomings	University & national differences underplayed, risk to scientific autonomy, causal relationships difficult to determine	Overemphasis on regional level for innovation	Novelty claims unfounded, loss of objectivity in science, overly conceptual	Short on evidence, overestimation of universities in adjusting their roles due to strong national influences

In the following section, we indicate how national policies and contextual specificities at the national level are fundamental in shaping university characteristics and their processes of change (Lawton Smith 2006). Indeed, some authors suggest that for the purposes of understanding forces shaping universities, regions, industries and firms, the country may be considered as an important explanatory level at which factors and their interactions have a lower chance of being overlooked (Geuna and Muscio 2009). The following section examines the relationship between UK, Swedish and Austrian national contexts and the ways in which university third missions have been shaped and changed in these countries.

3 Seeing Universities in Context: the UK, Sweden and Austria

3.1 United Kingdom Higher Education System

(i) In England, Wales and Northern Ireland, HEIs are independent, self-governing bodies. They are established by Royal Charter or legislation and most are part-funded by government. In 1992 the Further and Higher Education Act enabled all polytechnics to become universities. This was also the era of the break-up of the federal University of Wales and the accreditation of its constituent colleges as individual universities. By 2012, the UK higher education system comprises some 115 universities and 165 colleges of Higher Education¹. Four UK universities (Oxford, Cambridge, Imperial College, and University College-London) are amongst the world's top ten research institutions. The UK has some 20 research universities. Higher Education institutes range from some kinds of universities to hybrid colleges of further education which offer degree courses. In the UK, the most research-intensive universities produce a wide variety of research outputs and hence generate a large variety of IP (Anderson and Rossi 2010). The top four UK universities have the highest number of university spin-offs and patents (HE-BCI 2010)².

(ii) The UK was the first country to develop a national university commercialisation policy (Geuna and Muscio 2009), and in effect led the way in Europe on Mode 2 mission activity, and rather later this translated into the entrepreneurial university concept being embraced to a greater or lesser extent. In 1985, the British Technology Board (BTG) lost its monopoly access to intellectual property arising from universities and public sector research institutions from Research Council-funded projects. The intention was that universities would give the fullest opportunity and scope to researchers to assume responsibility for exploiting their research findings and to provide guidance and help for those researchers (Harvey 1992).

Types of UK funding for 'third stream' activity include: (i) non-spatial research grants with conditions relating to projections of impact for example those funded under the seven UK research councils³ (ii) funding programmes specifically designed to have commercial outcomes (e.g., spin-offs), and (iii) funding that has regional/local engagement or governance built in (see Table 3).

In 2009, the government launched the framework for the future success of higher education, setting out the important role universities will play in securing the country's economic recovery and long term prosperity, in *Higher Ambitions: the Future of universities in the knowledge economy*. This emphasized the importance of research, high level skills and widening access.

Table 3 HEI programmes in the UK

Department	Initiative
OST/HEFCE	Joint Infrastructure Fund (JIF) (1998)
	Science Research Investment Fund (SRIF) (2001)

¹<http://www.universitiesuk.ac.uk/UKHESector/Pages/OverviewSector.aspx#Q1> (accessed April 29 2012)

² Websites: [1] http://www.hefce.ac.uk/media/hefce/content/pubs/2012/201207/intro_background.pdf; [2] <http://www.hefce.ac.uk/about/intro/wip/workingwithuniversitiesandcolleges>;

[3] <http://www.universitiesuk.ac.uk/Publications/Documents/MakingAnEconomicImpact-HigherEducationandtheEnglishRegions.pdf>;

[4] <http://www.universitiesuk.ac.uk/Publications/Documents/BeyondBricksAndMortarBoards.pdf>

³<http://www.rcuk.ac.uk/Pages/Home.aspx> (accessed February 21 2011)

DfEE, DTI, HefCE	1999 Higher Education Reach-Out to Business and the Community (HEROBC) <ul style="list-style-type: none"> • special funding for activities to increase universities' capability to respond to the needs of business and the wider community, where this will lead to wealth creation. • includes the promotion of spin-out companies
DTI/OST/ Engineering and the Engineering Physical Sciences Council (EPSRC).	1999 Science Enterprise Challenge (SEC) Fund <ul style="list-style-type: none"> • financed Science Enterprise Centres and the Foresight Directorate • encourages regional-level activity; • Faraday Partnerships • joint university-industry initiatives • Biotechnology Challenge Fund
OST/Treasury/Wellcome Trust and Gatsby Foundation	1999 University Challenge Fund (UCF) <ul style="list-style-type: none"> • provides seed funding to help selected universities make the most of research funding through support for early stages of commercial exploitation of new products and processes.
HEFCE	2001-2004 Higher Education Innovation Fund (HEIF) <ul style="list-style-type: none"> • £140 million to knowledge transfer • 2004-6 HEIF 2 • £187m 2006-2008 HEIF 3 £238 million HEIF4 2009-2011
TSB	2007 <ul style="list-style-type: none"> • Knowledge Transfer Networks • Collaborative research and development • Knowledge Transfer Partnerships • Micro and Nanotechnology Centres • SBRI • International programmes
CASE	Collaborative PhD level studentships designed to encourage research collaboration between industry and other non-academic organisations, funded by the research councils. Collaborating partner contributes a small proportion of the cost of the studentship to the student and the academic partner.

Source: Lawton Smith 2011

The HEIF programme provided funding for universities to support them in developing third function activities such as knowledge transfer to firms and interactions with the wider community. The SEC and the UCF were set up as separate funds under HEIF 1. The science enterprise centres provide a focus for commercialization and entrepreneurship, aimed at both staff and students. In 2001 University Innovation Centres were launched – large, regionally based research and innovation centres often focused on a collaboration between HEIs (Charles 2003). As the HEIF programme has expanded, it has become more commercially orientated and has sought to be more inclusive. Under HEIF3 it was intended that rather than the largest grants being awarded to the elite, research-led Russell Group of universities, support should be given for “less research-intensive” university departments. Similarly, in line with the Sainsbury Review recommendations that more funding be directed towards business-facing institutions, HEIF 4 rose to £150 million in 2010-11 and is intended to redistribute funding from the richer to poorer universities. For the first time money is allocated by formula rather than by competitive bidding.

The Higher Education Funding Council for England (HEFCE) covers 130 HEIs. This organisation's 'approach to the regions recognises the diversity of HEIs and of regions, and does not seek to impose any blueprint, but rather to support the relationships that are already being developed between regional and local bodies and HEIs. A range of other initiatives have been designed to facilitate university-industry interaction at the regional scale, such as

Higher Education Regional Associations, designed to encourage the ‘regional innovation system’ and ‘engaged university’ mission activity. HEFCE [2] provides funding for the nine regional associations in England that promote the role of HEIs in their areas. The associations place a particular emphasis on fostering collaboration between HEIs, and building partnerships between higher education and other organisations within their regions.

Collaboration is not confined to the regional scale. Universities also work with cities with central government funding. In 2005, the ‘science city’ initiative was launched. Six cities (Newcastle, Birmingham, Bristol, Manchester, Nottingham and York were) designated as “Science Cities”. Their objectives are to harness ‘the research power of academic institutions, the world-class quality of their scientists, engineers and technologists and the entrepreneurial skills of the business sector, as well as promoting public engagement in science’⁴.

(iii) Regional influences

One of the distinctive features of the UK compared to Austria and Sweden is that it does not have a regional structure of government – and now not even governance. The sub-national system is a mixture of counties, unitary authorities and metropolitan cities. The nine regional development agencies were abolished in 2012 and replaced by Local Economic Partnerships (LEPs). With the demise of the RDAs went financial support for regionally-focused activities involving universities. Central government influences remains strong (Pugalis 2011). The LEPs bring together private and public sector organisations in a smaller, defined economic area to support enterprise, innovation, global trade and inward investment. There are 38 LEPs in England. Universities UK (2012) finds that universities are well represented on the boards of the new LEPs, and many LEPs have defined a strategic role for universities in delivering economic growth. There is, however, a tendency to focus on universities’ contribution to skills, and to neglect other dimensions of their economic growth offering.

Quantitative evidence of the regional impact, hence beneficiaries of the drive towards entrepreneurial universities are difficult to find. For example the 2010 UK Universities report measures universities as independent businesses (additional to their role in increasing the stock of human capital). The focus is on the economic activity generated by university expenditure (the aspect of the sector’s economic contribution) which is most readily quantifiable. A further indicator is the extent of local recruitment into the labour market. UK regions vary considerably regarding the extent to which graduates remain in the same region as their university. The northern regions retain students to a far greater extent than in East Anglia, the South East and London (HESA 2009). However, national UK policy and funding have had impact on universities’ perceptions of their regional role (PACEC 2009). Charles (2003) found that in 2001, the economic development of the local region was of continuing importance for HEIs, but this was found to be higher for the post-1992 universities than the older universities and colleges. The HE-BCI survey 2009-10 provided further insights into the regional role of British HEIs. Just over 30% reported meeting regional needs, and a very small percentage identified spin-off activity as making an important regional contribution, compared to the major roles of providing access to education and supporting SMEs.

The extent to which universities are entrepreneurial, as a source of new firms, is increasing over time as more firms are formed and more survive. Overall, university start-ups represent a

⁴<http://www.timeshighereducation.co.uk/story.asp?storyCode=198532§ioncode=26> (accessed February 9 2011)

very small proportion of overall start-ups in the economy (Swinney 2011), and have tended to be concentrated in the high value-added science and technology industries (UK Universities 2012). Although student start-ups are also relatively small in number but there has been rapid growth. In 2009, institutions reported 2,045 start-ups, an 11-fold increase in nine years. Furthermore, in 2010 4.4% of graduates were self-employed six months after graduation. This is not simply an effect of the challenging graduate jobs market; the figures have been on an upward trend. Other studies have found regional differences in the relative importance of revenue from IP and university spin-offs. The South East England is one of only a few regions where income from spin-offs realization and IP is above average (Harrison and Leitch 2010; (Lawton Smith and Bagchi-Sen 2012).

3.2 The Swedish Higher Education System

(i) In 1970s and 1980s the HEI sector and the university structure in Sweden underwent major changes. A spatial decentralization and expansion of the HEI system could be observed. Throughout the country new HEIs were established (Andersson et al. 2004). Today, the Swedish HEI sector consists of about 50 HEIs, including 13 public-sector universities, 20 public-sector university colleges, three self-governed HEIs entitled to award third-cycle qualifications and a number of independent education providers entitled to award first-cycle and second cycle qualifications (Högskoleverket 2011). The national government has the responsibility for HEIs concerning a wide range of areas such as legislation, regulation, funding and granting of degree awarding powers and university status.

(ii) In the Higher Education Act of 1992 the third mission of Swedish universities is pinned down as follows: “The institutions of higher education shall ... cooperate with the surrounding community and give information about their activities”. In the Higher Education Ordinance (2009:45) “third stream activities” were emphasized: “The mandate of higher education institutions shall also include third stream activities ... as well as ensuring that benefit is derived from their research findings”⁵.

Looking at Swedish *science policy*, it can be observed that from the 1990s onwards attempts have been made to strengthen “strategic” and “Mode 2” research activities at HEIs, i.e. interdisciplinary research that is linked to industrial and societal interests (Edqvist 2003). Several new funding organisations (see Benner and Sörlin 2007) have been established to promote strategic research. However, as noted by Benner and Sörlin (2007) evidence of major changes in the structure or content of HEIs’ research activities has so far been limited. The Swedish *innovation policy* system supports HEIs to carry out third mission activities in a variety of ways. Several institutions and programmes are worth mentioning in this regard. The Swedish Agency for Innovation Systems VINNOVA (founded in 2001) provides funding for needs-driven research and intends to stimulate cooperation between firms, universities and policy actors in the Swedish innovation system. Each year around 220 million Euros are invested in new and ongoing projects. According to Pålsson et al. (2009) VINNOVA’s mandate includes promoting a change of the academic culture, fostering the rise of values such as entrepreneurialism and competitiveness within the HEIs sector. VINNOVA runs several initiatives. The national programme Key Actors (launched in 2006) aims at improving the capacity of HEIs to cooperate with firms and other actors and to diffuse and commercialize research. Another initiative is the VINN Excellence programme which

⁵ For a discussion of how the demand for Swedish HEIs to engage in third mission activities has increased over several decades, see Hudson (2000).

supports establishment of Centres of Excellence to foster collaboration between firms and HEIs. The VINNVÄXT programme (taking the form of a competition for regions) focuses on stimulation of regional development by promoting collaboration between HEIs, firms and policy actors and need-oriented research in RIS. Another key actor is NUTEK (reorganized into Tillväxtverket (Swedish Agency for Economic and Regional Growth) in 2009), providing – amongst many other initiatives – the Regional Cluster Programme that supports many clusters in which HEIs are involved as key actors. In 2005, “Innovationsbron” (Innovation Bridge) was established (reorganized in 2008) by the government, aiming at increasing commercialization and use of publicly funded R&D. Innovationsbron acts as a seed investor in the early growth phase of new businesses. Each year around 30 to 40 companies are supported. The Knowledge Foundation (KK-stiftelsen) supports research carried out at Sweden’s new universities (i.e. those established after 1977). Co-funding and active participation by industry is required in order to get funding from KK-stiftelsen. Key initiatives promoting the development of knowledge and collaboration between HEIs and companies include the programmes HÖG and KK environments. Since its establishment in 1994, KK-stiftelsen has invested around SEK 7.8 billion in more than 2,100 projects.

Whilst interaction between universities and (large) companies has a long tradition, commercialization activities (spin-offs, patenting and licensing) by HEIs are a more recent phenomenon. In Sweden’s IP regime (see Göktepe-Hultén 2008), it is individual scientists (the so called “professor’s privilege” – and not universities – who own full rights to their discoveries (irrespective of the funding source). Over the last years, Swedish universities have increased their capabilities to support entrepreneurship by establishing and strengthening support structures such as TTOs (see for instance Etzkowitz et al. 2008). Nevertheless, it is often assumed that Sweden lacks entrepreneurial spirit in science and performs poorly in academic commercialization. A recent survey of 295 Swedish academic researchers (Bourellos, Magnusson and McKelvey 2012), however, indicates the opposite. It was found that Swedish university researchers have very positive attitudes towards patenting and spin-offs and a considerable share of them is also involved in concrete commercialization activities. Furthermore, an important role of technology transfer offices, incubators and entrepreneurial courses and training in supporting academic commercialization was found.

(iii) Regional contexts

Within the Swedish government structure, regional authorities have only limited influence on economic policies when compared with the national state government and the local, i.e. municipality, authorities. Therefore, regional innovation policies are often the outcome of collaboration with national and local policy levels. Over the last decades, Swedish HEIs have faced increasing expectations to contribute to regional development and to commercialize their research results. Swedish regional policy has changed considerably, evolving from a regional distributive policy to a regional development policy and eventually a regional growth policy. The Government White Paper 1997/98: 62 “Regional tillväxt – förarbeteochvälfärd” (regional development – for employment and welfare) formulated a new policy approach, emphasizing life-long learning and ascribing a key role to HEIs (Hudson 2000). More recently, VINNOVA has stimulated university-industry-policy collaboration at the regional level (see the VINNVÄXT programme described above).

A recent study (Lindqvist et al. 2012) found that Swedish HEIs increasingly play an active role in regional development processes. Their strategies and activities as regards active participation in regional development, however, differ strongly, depending on the type of HEIs under consideration. New HEIs often have a strong focus on education, focusing on

regional needs for competence in the private or public sector, whilst traditional universities employ research-oriented third mission activities. Similar results were found in a study by Pålsson et al. (2009). The distribution of VINN Excellence Centres (one of VINNOVA's main policy programmes) among Swedish universities is extremely uneven, as only a few HEIs have successfully applied for the establishment of such centres.

3.3 The Austrian system of Higher Education

(i) The Austrian HEI sector is divided into two groups of institutions, i.e. universities and “Fachhochschulen” (universities of applied sciences). The latter group constitutes a relatively new and rather small segment. The primary role of “Fachhochschulen” is in teaching, offering practice-oriented professional education at university level. Fachhochschulen do not get basic public funding for research and, as a consequence, research-related third function activities are modest in extent. Austrian universities are „mass universities“, still strongly relying on the Humboldtian idea of unity of research and teaching. In Austria, there is no such division between elite research universities and teaching universities as in the UK. Austrian universities can be divided into “full-scale” universities (with a full range of faculties) and “specialised” universities such as technical, medical or arts universities.

(ii) National policy influences

For a long time, universities in Austria have been directly controlled and regulated by the state. A paradigm shift took place in 2002 when a new university act (UG 2002) was passed. The law was implemented in 2004, transforming universities into independent legal entities under public law and endowing them with autonomy and full legal responsibility. As a consequence the relation between universities and the state has been substantially reshaped. New forms of state control include performance agreements (negotiated between each university and the ministry of science and research) which complement control processes created through the competition between universities (profile development, knowledge balance). UG 2002 also laid some foundations for universities to become more entrepreneurial, as it involved changes in the regulation of IP, granting IPR emanating from publicly funded research to universities. Before 2002, IPR had belonged to the state which, however, had handed it over to the individual inventor. It was not until 2002 that universities could claim title to the inventions made by their employees. As a consequence, professional IPR management structures at universities are a rather recent phenomenon.

There are pronounced differences among the various types of Austrian universities as regards engagement in economic development. Technical and medical universities, although in most cases much smaller than full-scale universities, are by far more successful when it comes to collaborating with firms and to draw financial advantages from such partnerships.

UG 2002 contains a rather vague account of the third mission. In this act (§ 3), third function activities of universities are described as “promotion of the use and practical application of their research findings, and of community involvement in efforts to promote the advancement and appreciation of the arts”.

From the 1990s onwards many national policy programmes and initiatives have been launched to promote knowledge transfer from universities to firms and to stimulate university-industry partnerships. Among the most important current ones are the programmes COMET, BRIDGE and COIN as well as Christian Doppler Laboratories. COMET promotes the establishment of competence centres that are jointly run by universities and companies.

Three different types of competence centres exist: (i) “K2-centres” are the most advanced ones, carrying out excellent research; whilst (ii) K1-centres and (iii) K-projects are comparatively less ambitious in comparison. COIN promotes amongst other things R&D projects and networks between HEIs and SMEs and BRIDGE aims at enhancing translational research activities by universities. University-industry interaction is also promoted through financial support for the establishment of so called “Christian Doppler Labs” which are jointly run by HEIs and private firms. Policy measures designed to stimulate academic spin-offs are a more recent phenomenon. The most important initiative at the national level is the AplusB programme launched in 2002. It funds centres (incubators) that provide professional support for scientists in the process of turning research results into a viable business. Currently eight such centres exist in Austria. To date 334 academic spin-offs have been founded (96% of them are still active), having created about 1.600 new jobs (BMWF 2011). Whilst a plethora of programmes are in place to foster university-industry links and academic spin-offs, initiatives to promote university engagement in social development are rare in comparison.

(iii) Regional contexts

In Austria, the higher education sector is regulated by the Federal Ministry of Science and Research. The federal provinces have no direct competencies for higher education matters, but they have substantial formal competencies for developing and implementing their own regional innovation and technology policies. Vienna, the nation’s capital city and scientific centre, hosts a large number of Austrian universities (nine out of 22) and almost 60 % of all Austrian students. Until recently, however, university engagement in regional development was not an important issue, neither for universities themselves nor for policy makers. Vienna’s economic structure is characterised by a high diversity of sectors and a dominance of SMEs, resulting in low levels of university-firm linkages. Indeed, Vienna displays features of a fragmented metropolitan innovation system (Tödtling and Trippl 2005), although in a few high-tech sectors (such as biotechnology and ICT) higher levels of connectedness have emerged recently. In other Austrian regions, in contrast, particularly in Upper Austria and Styria universities have been used as an asset in a more strategic and active way. Both regions exhibit specialised economic structures (mainly in manufacturing industries) and universities have played a key role in renewing traditional industries and creating new ones, heavily supported by regional policies (Trippl and Otto 2009, Maier and Trippl 2011). Vienna as Austria’s top location of universities has also been less successful than their counterparts in Styria and Upper Austria to apply for COMET competence centres. Vienna does not host a K2 centre, only 3 (out of 16) K1 centres and 4 (out of 25) K networks. Vienna performs better as regards CD Labs. Not fewer than 27 (out of 58) labs are located in the region.

3.5 Comparing the cases

In this subsection we summarise the main features from the discussion above. In each country there are many drivers. Some similar some different, as suggested by the literature and the evidence in the cases. The country studies show that there are different ways in which the relationships between the policy imperatives, the university characteristics and the national attributes have shaped university third function processes. In each case we have highlighted the importance of national public policy in determining the main modes of regionally-focussed activity. These differences are summarised in Table 4 and explored below.

Table 4: Comparing the main features of the HEI systems, national and regional third mission funding and main modes of engagement

	Key dates	National Third mission funding	Regional third mission funding/initiatives	Main mode(s)
UK	1985 universities gained control of IP from research funded by research councils	non-spatial national funding for commercialisation projects e.g. HEIF, TSB	Current: Science Cities (2005-) HEFCE – 9 regional associations which promote collaboration e.g. London Higher Between 1999-2010, regional development agency led coordination activities e.g. Higher Education South East	Mode 2 Entrepreneurial e.g. Oxford University, Engaged Emerging RIS universities
Sweden	1992 Higher Education Act - cooperation with surrounding communities	Knowledge Foundation 1994 VINNOVA - key actors scheme (2006) - VINN Excellence programme - VINNVAXT NUTEK (Tillväxtverket) “Innovationsbron” (2005)	Limited influence, regional innovation policies outcome of regional/national collaboration	Entrepreneurial universities e.g. Chalmers RIS universities e.g. Halmstad
Austria	2002 University Act (UG 2002) – IP now belongs to HEIs not the state	COMET, BRIDGE and COIN Christian Doppler Laboratories AplusB programme 2002 - funds centres (incubators)	Fragmented system in Vienna Emerging regionally focused activity renewing traditional industries and creating new ones in two regions	RIS universities in two regions - Upper Austria and Styria

Universities scale and type

The most striking difference between the UK compared to Sweden and Austria is the sheer scale of higher education, part of which reflects the size of population (UK population 62.3 million). In the UK the number of universities increased dramatically in the 1960s, and then again since 1992. The total number of higher education institutions is around 280. At the same time the numbers of students in those universities has increased by 28% over the period 2000/1 and 2008/09 and 2009/10. It is many of the post-1992 universities as well as the universities that were not polytechnics (such as colleges of higher education, teacher training) that have expanded the most rapidly. In principle this extends the RIS type model of university engagement, where it is shown that local student recruitment is increasing, particularly in those universities that are most engaged in their local economy. Sweden with a much smaller population (9.5 million), has far fewer universities (50, HEIs, 13 public sector colleges, 20 colleges of higher education and 3 self-governed HEIs). Like the UK it has expanded the number of universities, and as in the UK, the newer universities have a strong focus on teaching, often focusing on regional needs of the private sector. Austria also with a small population of 8.2 million has 21 universities and several Fachhochschulen.

In each case there are distinctions within types of university. The UK is the most hierarchical with a very strong group of 20 research universities (the Russell Group), followed by a further set of research universities the 1994 Group. It is these that generate the most IP, university spin-offs and mode 2 engagement for example Oxford University and Imperial College. Sweden has a group of 4 research universities in the 2011 top 200 rankings of world universities and Austria two, but with the University of Vienna ranked 67 (mode 2 engagement). Unlike the UK, however, Austria makes no distinction between elite universities and teaching universities. Instead, the difference is between full-scale and specialised universities. The latter are much smaller but have a stronger third-stream impact through their higher level of collaboration with firms than the full scale universities.

Dates at which things happened

The UK was much earlier than Sweden and Austria in providing a policy imperative to its third function role. It can be dated to 1985, with the passing of the UK equivalent to the US Bayh-Dole Act of 1982. However, it was not until the late 1990s that specific national funding was directed towards commercialising university research. In Sweden, legislation was introduced later, in 1992, but unlike in the UK, there was a specific commitment to cooperation with the local community. Since 2009, universities are required to include third stream activities. Unlike in the UK where universities have asserted the rights to their academics' IP, in Sweden the 'professors' privilege' means that the academics own their IP. In the UK where universities are 'incentivised' to engage in third stream activity through a variety of national funding streams, which inevitably have spatial outcomes. The third stream role (the engaged university model) has been articulated through the former regional development agencies, and through the 1999 HEROBC scheme. It is now up to the LEPs to promote third function activities by HEIs in their regions. This difference has a profound impact on the engagement of universities with commercialisation activities, particularly with the incentive for universities to be 'engaged universities'. Austria was later still, in both devolving the ownership of IP to the universities and articulated the universities' third mission role: neither occurred until 2002. However, from the 1990s national programmes were designed to encourage Mode 2 interactions.

National and regional third mission initiatives funding

In all three countries, it is national funding programmes that dominate funding for the third mission role. This is particularly pronounced in the UK and is largely responsible for the changed (articulated at least) commitment to the regional role (RIS model and in mainly top universities, the engaged university role). In Sweden VINNOVA with its raft of programmes, has a key role in stimulating both third Mode 2, engaged, and RIS university role, in encouraging entrepreneurship and competitiveness in the HE sector.

In the UK, a small number of regionally funded programmes have developed, particularly under successive Labour governments (1997-2010). The largest is the Science Cities programme. Initiatives led by the regional development were hampered by low levels of funding and the LEPs will have even less – thus limiting the incentives for universities to collaborate. Similarly in Sweden, regional authorities have limited funds. However, the RIS model is developing through the teaching role articulated in the 1997/8 White paper. In Austria, the regions (federal provinces) have responsibilities for implementing their own regional innovation policies, but without competencies for higher education matters.

Main modes

The UK has the longest tradition of the university third mission role, but has the least well mandated regional role. The strategy has been to articulate the role through political rhetoric, especially under Conservative governments (1979-1997) and later through financial incentives beginning with the 1999 HEROBC programme. National policies have resulted in all four models of the third mission. Sweden has examples of the entrepreneurial university for example Chalmers (spin-offs, incubators) and RIS universities for example Halmstad which does have a regional mission and an incubator. In Austria the model is primarily one of RIS universities, with some evidence of Mode 2 with the full-scale universities.

4 Conclusions

This paper reviewed four approaches to studying university “third mission” activities and the factors affecting them. We showed that there a number of models operating in different countries, driven by a variety of interacting forces, and embedded in which are a raft of ‘incentives’ to universities to adopt third mission contributions to regional development. The approaches were used as an exploratory lens for understanding the interactions between national policy imperatives, characteristics of the university population, and country attributes that have shaped university third function transformations in the UK, Sweden and Austria. We demonstrated that there are different ways in which the relationship between policy imperatives, university characteristics and national specificities has shaped HEIs third function activities in regions. The UK has the longest tradition of the university third mission role, but has the least well mandated regional role. In the UK national policies have resulted in all four models of the third mission, the sheer scale of HEI activity dwarfs that of the smaller economies of Sweden and Austria, although this no guide to quality of impact. Sweden has examples of the entrepreneurial university and RIS universities. In Austria the model is primarily one of RIS universities, with some evidence of Mode 2 within the full-scale university population. All three, however, are converging in the use of universities for broader societal objectives.

The paper also has a broader function – that of providing a critique of existing assumptions about the role of universities in regional economies. Critiques of the conceptual models were used to highlight assumptions about universality of particular developments, and to illustrate how they are mediated by context specific factors (e.g. the nature of the region, the type of university, national regulation and so on). We also commented on the still paucity of evidence on the impact of universities on regional economies through whichever model or combination of models. For example, the benefit to individual universities in monetary terms for some modes of activity (particularly spin-offs and patenting), however, seems to be limited. Evaluation therefore needs to be focused on the way that student populations and university funding have created these new conditions for university engagement at the regional level.

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