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SMART SPECIALISATION, REGIONAL GROWTH AND APPLICATIONS TO EU COHESION POLICY [*]

Philip McCann, Raquel Ortega-Argilés

ABSTRACT: This paper examines the arguments underpinning the smart specialisation concept, an idea which originally emerged from the sectoral growth literature, and one which has recently been applied with to the regional policy context. The shift from a sectoral to a regional context appears prima facie to be quite straightforward but this paper explains that translating the idea to a regional policy context is rather more complex that it at first appears and implies some changes in both interpretation and implications. The outcomes of this are that in a regional policy setting the smart specialisation logic is seen to be broadly consistent with the overall reforms of EU Cohesion Policy. However, in a regional policy setting there is no reason why ICTs should be prioritised over many forms of intangible capital, and the promotion of technological diversification via entrepreneurship may need to be related to specific sectors or activities.

JEL Codes: O31, O33, R11, R58

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1. Introduction

Over the last couple of years the role of *smart specialisation* has become central to economic development and growth policy-thinking in European circles. *Smart specialisation* has been highlighted by the European Commission as a central pillar of the *Europe 2020 Strategy*, as discussed in the recent communication *Europe 2020 Flagship Initiative Innovation Union* [COM(2010)546] and the *The EU Budget Review* [COM(2010)700]. The Europe 2020 Strategy is intended to act as an umbrella organizing framework under which all EU policies will operate over the coming decade. In particular, the concept has now been highlighted as a central element in the development of a reformed European Cohesion Policy, which is based on the principles of 'smart growth', 'green growth' and 'inclusive growth'. The way in which a smart specialisation strategy is envisaged to operate as a central theme in a post-2013 reformed EU Cohesion Policy is explained in *Regional Policy Contributing to Smart Growth in Europe* [COM(2010)553]. Here, the argument is that regions will be required to identify the sectors, the technological domains, or the major arenas of likely competitive advantage, and then to focus their regional policies so as to promote innovation in these fields. In particular, the argument is crucial for the regions which are not on a major science-technology frontier.

The smart specialisation argument emerged originally out of the literature examining the transatlantic productivity gap. The concept was first sketched out by Dominique Foray and Bart van Ark, and subsequently developed along with their co-authors Paul David, Bronwyn Hall and by other members of the "Knowledge for Growth" expert group (2009)[2]. The focus here was initially on the role played by transatlantic differences in R&D intensity in explaining growth differentials, but more recently the focus of this literature has shifted somewhat also to the issue of the transatlantic differences in the dissemination of new technologies across the wider economy. Of particular importance here is the role which the adoption, dissemination, and the adaptation of new information and communications technologies (ICTs) play in this productivity gap.

However, there are two particular features of the smart specialisation approach which are distinctive from a standard economic growth model, one of which relates to the system of innovation logics and one of which relates to the system mechanisms.

The first distinctive feature of the smart specialisation approach relates to the fundamental logic of the innovation system, and assumes that context matters for the potential technological evolution of the system (*knowledge ecology)*. In other words the potential evolutionary pathways of an innovation system depend on the inherited structures and existing dynamics including the adaptation or even radical transformation of the system. The second distinctive feature of the smart specialization approach relates to the perceived mechanisms by which the strategy operates. The smart specialisation

[2] Foray, D.; P. David and B. Hall (2009) "Smart Specialisation – The Concept" Knowledge Economists Policy Brief No 9, June 2009

proposers envisage that the identification of the knowledge-intensive areas for potential growth and development are related to the role of certain classes of players (researchers, suppliers, manufacturers and service providers, entrepreneurs, users) and to the public research and industry science links. The players are regarded as being the agents who use their knowledge-acquisition facilities and resources (human capital, ideas, academic and research collaborations) to scan the available local economic and market opportunities, to identify technological and market niches for exploitation, and thereby act as the catalysts for driving the emerging transformation of the economy.

The original concept was entirely sectoral in its construction. However, as the documents listed above indicate, the concept has recently begun to be applied in a regional context. Here, the adaptation of the smart specialization logic and its application to the EU regional context largely reflects a regional innovation systems logic. The smart specialization approach explicitly acknowledges that for reasons of history and hysteresis regions vary not only in terms of their technological and industrial competences, but also in terms of their potential evolutionary trajectories.

From a regional policy perspective, the smart specialisation approach offers some potential advantages for both understanding the evolutionary nature of regional economies, and also for the design of appropriate policy-making. The idea is that regional authorities can exploit the smart specialisation logic by undertaking a rigorous self-assessment of a region's knowledge assets, capabilities and competences and the key players between whom knowledge is transferred. This militates against recommending off-the-shelf local economic policy solutions and instead requires a careful analysis of regional knowledge capabilities and research competences. However, following a regional innovation systems way of thinking, as well as technological, sectoral, and geographical features, this regional analysis would also necessarily involves a consideration of the local institutional and governance issues which foster or mitigate the diffusion of innovations.

While the smart specialisation principles appear to be clear, translating these principles to regional policy faces three major challenges, two of which are analytical and one of which is empirical.

Firstly, it requires a careful analysis of the role of the entrepreneurial agents and catalysts, the relationships between the generation, acquisition and transmission of knowledge and ideas at the geographical level, the regional systems of innovation, and the institutional and multi-level governance frameworks within which such systems operate. Moreover, it requires us to consider how each of these issues also relates to policy. These issues are not at all straightforward, because the interrelationships between institutions, geography and system dynamics vary by location, depending on history and hysteresis. As such, it is essential to clarify an analytical framework for smart specialisation which can used systematically while allowing for regional variations, thereby avoiding the problem that the strategy simply reduces to a case study approach, without anything which can be generalisable.

Secondly, the application of the smart specialisation concept to a regional rather than a national case is not simply a matter of re-drawing the cartographical boundaries. Regions are far more open than nations and this brings to the fore externality and interdependency issues. All agglomeration processes are in part the result of public investment decisions based on a lack of knowledge. As we will towards the end of the paper this has profound implications also in terms of how we avoid local rental-capture problems.

Thirdly, in terms of the empirical aspects of the smart specialization strategy, the approach is still so new that very little research has actually been undertaken regarding the relationships between the policy objectives and policy instruments. In a policy context, the major challenges here is therefore the linking inputs, to outputs and then most importantly, to outcomes. As yet there are no clear outcome indicators for the smart specialisation approach, as is made clear by the authors of the strategy themselves (*Measuring Smart Specialisation: The Concept and the Need for Indicators,* David, P., Foray, D., and Hall, B.)[3], and remedying this is an urgent issue if the policy is to be successful.

This paper therefore aims to achieve two objectives. Firstly, we examine the smart specialisation concept and explain the challenges involved in applying this fundamentally sectoral concept to an explicitly spatial regional setting. Secondly, we explain the ways in which this might be achieved so as to make the concept suitable as a building block of a reformed EU Cohesion Policy.

The paper is organised as follows. In section 2 we explain the origin of the smart specialisation logic as it was first conceptualised by its proponents and we examine the ways that this sectoral concept has developed over recent years. Having set out the fundamentally *sectoral* logic of the original concept in section 3 we then explain how the smart specialisation proponents have attempted to apply the concept in a regional setting. What becomes clear is that the proponents of the smart specialisation concept assume that translating it from a sectoral to the regional context is a fairly straightforward exercise. However, as we see in section 4, when we explicitly incorporate economic geography and spatial economics into the smart specialisation discussion it becomes evident that translating the concept to a regional context is far more complex than the sectoral arguments imply. In the light of these issues sections 5 asks the questions as to *why* the smart specialisation concept might be applied to regional policy, and in cases where it is applied, *how* this might be achieved. Section 6 provides answers. As we see in section 6.1, the answer to the 'why' question is actually reflective of a much deeper question than just smart specialisation and relates to the whole justification for regional policy. In order to answer to the 'how' question, section 6.2 explains the means by which we translate the major elements of the aspatial sectoral smart specialisation concept to their explicitly

[3] http://cemi.epfl.ch/files/content/sites/cemi/files/users/178044/public/Measuring%20smart%20specialisation.doc

spatial analogues. As we see in section 6.3, the answers to these two questions therefore clarify the policy-design challenges involved in incorporating smart specialization into regional policy. As we see in section 7, reinterpreting the smart specialisation logic in terms of economic geography leads to principles of regional policy design which are largely consistent with the principles underpinning the current reforms of EU Cohesion Policy, although the original emphasis on ICTs no longer appears to be essential.

2. The Transatlantic Productivity Gap, ICTs, and The Origins of the Smart Specialisation Concept

The smart specialisation concept originated in the literature analysing the productivity gap between the US and Europe, a gap which had become evident since 1995 (van Ark et al. 2008). This literature attempts to identify the key factors which underpin the productivity gap, and part of the explanation appears to be related to transatlantic differences in labour market performance including differences the quality of human capital (Gu *et al.*, 2002), the rigidity of the European labour markets (Gordon and Dew-Becker, 2005; Gomez-Salvador *et al.*, 2006), differences in the adoption of new managerial practices and organizational investments (Gu and Wang, 2004; Bloom *et al.*, 2005; Crespi *et al.*, 2007), or differences in the availability of venture capital. However, differences in the hours worked, the reasons why differences in the performance of human capital and labour markets should have emerged since 1995, a period when EU labour markets were increasingly deregulating, cannot be related to labour markets alone. Instead clues must be sought from observations of industrial performance, and the resulting industrial explanations fall into two broad themes. The first explanation, referred to as the 'structural effect', emphasises transatlantic differences in industrial structure. In particular, the EU industrial structure is disproportionally characterised by traditional, middle and low-tech sectors, and this implies a lower capacity to translate R&D into productivity gains (Mathieu and van Pottelsberghe de la Potterie, 2008). The second explanation, known as the 'intrinsic effect', argues that even within the same sectors, European firms exhibit a lower ability to translate R&D into productivity gains or other types of investments (Erken and van Es, 2007). Yet, whichever approach is adopted, one common theme which has emerged is the critical role which information and communications technologies (ICTs) play in explanations of this productivity gap. Part of this appears to be an ICT-related structural effect, in that ICT-producing sectors have been a key component of US productivity performance over the last two decades (Jorgenson 2001; Jorgenson et al., 2005, 2008; Stiroh 2002; Timmer and van Ark 2005). In addition, there appears to be an ICT-related intrinsic effect in that there has also emerged differences in the scale and impacts of ICT adoption, adaptation and diffusion in ICT-using sectors (O'Mahony and van Ark, 2003; Gordon, 2004; Draca et al. 2006; Wilson, 2009). Estimates of the actual contributions of these ICT-related structural and intrinsic effects to the transatlantic productivity gap vary but most evidence suggests that they both play a significant role (Oliner and Sichel 2000; O'Mahoney and Vecchi 2005). In addition, the relative importance of these effects appears to have changed over time. Jorgenson et al. (2008) argued that the US productivity growth after 1995 and up to 2000 was driven by productivity growth in ICT producing sectors and ICT-capital-deepening effects, whereas after 2000, productivity growth was driven primarily by productivity

growth in ICT-using industries. Taken together as a whole, however, these conclusions suggest that the "…European productivity slowdown is attributable to the slower emergence of the knowledge economy in Europe compared to the United States" (van Ark et al. 2008). Indeed, these ICT-related explanations imply that the revealed technological disadvantage of the EU relative to the US, which is best proxied by ICT-based R&D investment, is what ultimately constrains the demand for human capital, the diffusion of ICTs, the diffusion of innovative organizational and management practices, and the diffusion of innovation through embodied technology in new capital formation. Of course this still leaves unanswered the question as to why the differences in ICT production, adoption, diffusion and adaptation should have taken place, given that EU growth had been more than matching US growth rates over the previous decade. On this question, most explanations focus on the issue of scale and integration.

The US economy is slightly smaller than the EU economy, but US firms and labour markets enjoy greater scale advantages due to much higher levels of internal market integration. The EU Single Market was created precisely to foster such advantages, and while there has been much progress for example in goods markets, energy markets, transportation markets and some financial markets, in many service industries in particular the EU markets are still highly fragmented. As a response to this issue the European Research Area (ERA) was established as a mechanism for engendering EU-wide integration and scale advantages in activities generating and disseminating knowledge. The policy aimed at promoting European R&D and EU-wide knowledge spillovers via the development of knowledge-intensive agglomerations and cross-border network systems of researchers, universities, entrepreneurs and innovators. As such the ERA was aimed both at promoting knowledge-integration integration and also maximizing dissemination in many of the very sectors which currently lack EU-wide integration.

In order to underpin the ERA logic and the policy priorities it pointed to, the *smart specialisation* concept was developed as the leading idea of the 'Knowledge for Growth' expert group (K4G) advising to the former European Commissioner for Research, Janez Potocnik. The smart specialisation concept reflected the implicit assumptions behind the ERA, which were that different countries and regions would tend to specialise in different knowledge-related sectors, depending on their capabilities (von Tunzelmann 2009). At this point the emerging patterns of specialisation in knowledge-related activities were understood to depend primarily on the existing national, sectoral and technological innovation systems, and the interplay between soft and hard capital, as it is these which determine the long-term competitive advantages. These systems were therefore also assumed to determine the patterns of interregional and cross-border knowledge and R&D cooperation networks which emerge. If the outcome of the ERA was that a small number of countries or regions increased their domination of all knowledge-related activities, then the ERA will not have served the EU in a manner which consistent with the territorial and social cohesion principles of the Lisbon Treaty. As such, in terms of the Lisbon growth agenda, smart specialisation was conceived of as a way to reconcile

unrestricted agglomeration processes with a relatively balanced distribution of research capacities and capabilities across Europe.

The original smart specialisation concept emphasised the importance of R&D, and in particular in high technology sectors. However, as we move through the nine policy briefs produced by the Knowledge for Growth expert group between 2006 and 2009 it is possible to discern a marked shift away from the early emphasis on R&D, and in particular on multinational R&D, through to institutional and governance issues relating to science, and finally towards technological specialisation based on the adoption, dissemination and adaptation of General Purpose Technologies GPTs, primarily understood as ICTs, across a wide range of sectors. The stated intention of the architects of the concept is that the smart specialisation concept has never been conceived of as a strategy for 'picking winners' or for imposing specialisation by means of top-down government planning. Rather, it was seen as being driven by a process of discovery and learning on the part of entrepreneurs, who are the agents understood as being those who will search out the right types of knowledge-related specialisation. As such, in terms of policy logic, the smart specialisation strategy was intended to help the design of policy interventions, such as SME incentives, which promote new inventions via the adoption, dissemination and adaptation of General Purpose Technology (GPT), and specifically ICTs. The shift is from R to D.

In terms of the socio-economic context in which the smart specialisation process is understood to operate the smart specialisation argument employs the concept of a *domain*. The basic idea which drives the smart specialisation logic is that entrepreneurs will search out the smart specialisation opportunities within their domain. Therefore, policies which promote such *entreprenurial search* processes are to be encouraged. In particular, these entrepreneurial search processes are intended to play the role of identifying and exploiting the potential advantages of general purpose technologies (GPTs) to regenerate the targeted economic domain (production or services) through the co-invention of applications (David et al. 2010). Here, part of the argument also rests on the size of the domain, whereby size relates not to aggregate GDP, but to the size of the relevant sectors. What is meant by this idea of the *relevant size* concerns the size of those sectors which could potentially most benefit from the knowledge spillovers generated by the initial development of the applications (David et al. 2010). The thinking in terms of potential impacts is driven primarily by the assumption of intra-sectoral spillovers, although inter-sectoral spillovers are not ruled out. Finally, as well as the promoting the entrepreneurial search processes and identifying the relevant sectors with the requisite size, the third issue to be considered is the issue of the *connectedness* of the domain. Domains which are highly connected with other domains will offer greater possibilities for learning than less connected domains.

The concept of smart specialisation therefore emphasises issues of potential, and the mechanisms whereby such potential is most likely be realised. Within the particular domain, the entrepreneurial search process leads to: the identification of the *distribution* of potential opportunities for (ICT) technological improvements to be embodied in a range of activities and occupations; the relevant size issue relates to the potential

magnitude of the innovation outcomes associated with these opportunities, and: the connectedness issue relates to the potential for *learning* about both these opportunities and magnitudes.

3. A Non-Spatial Regional Interpretation of the Smart Specialisation Logic

In order to make the smart specialisation logic applicable to a regional context, the proponents of the concept have begun to interpret the idea of a domain in terms of that of a region. Applying the smart specialisation logic in this manner David et al. (2010) argue that one of the features of many European regions is a weak correlation between the R&D and training specialisations and the structure of their activities. A regional policy recommendation from the smart specialisation promponents is therefore that government should foster human capital formation for the new 'knowledge needs'of the region's traditional industries which are starting to adapt and apply these new GPTs. The aim of such a policy would be to promote a local skill base which can facilitate widespread local incremental improvements as well as develop specialised application technologies in the region.

Exactly how this might be achieved is also sketched out by David et al. (2010), who suggest that subsidising the follower-region's access to the problem-solving expertise from researchers in the leader-region could be fruitful way forward. Such a policy response could take the form, for example, of a network-development programme linking specialists in different regions. Obviously, inadequately designed schemes could inadvertently become in effect sources of indirect subsidies to specific industries in particular regions. Therefore, in order to avoid the types of moral hazard, adverse selection and opportunism problems which could lead to such undesired outcomes, the proponents of this regional smart specialisation approach point out that a policy of this form would need to be carefully designed (David et al. 2010).

The smart specialisation concept is a major driving force behind the new *Innovation Union* flagship programme of the European Commission, the aim of which is not only to foster EU-wide economies of scale in high technology and knowledge-intensive sectors, but to accelerate the dissemination of smart technologies throughout the EU economy. The principles embodied in the concept are therefore fundamental to the construction of the smart growth component of Europe2020, and link closely with the regional development objectives a reformed EU Cohesion Policy. However, translating the smart specilisation logic to regional policy is much less straightforward than is implied by Policy Brief No 9 of the Knowledge for Growth expert group. The original sectoral concept can indeed be adapted and adopted in the regional policy context, but there are some major issues which need to be first considered in order for this to be the case. These are the issues to which we now turn.

4. Economic Geography and the Smart Specialisation Logic

If we begin to examine the explicitly spatial and territorial aspects of this regional smart specialisation argument, as we see in the following sections it becomes clear that the

issues are rather more complex and fundamental than a matter of good policy design. The problem with the argument as it stands is that the extent to which a regional policy of any form can be well-designed in part also depends on the context (Barca 2009; OECD 2009 a,b). More specifically it depends on the interactions between economic geography and institutions, interactions which differ between different places. This is particularly so in the case of Europe where the heterogeneity of both institutional and spatial systems is so marked. In these terms Europe and the US are fundamentally different in that the US exhibits a far more homogeneous pattern of institution-geography relationships than does Europe (McCann and Acs 2011). These are issues we will discuss in more detail shortly, but it is important to note at this stage that translating a sectoral line of thinking derived from US observations to the EU regional-spatial context is rather more complex that at first it may appear.

In order to develop the argument in more detail it is necessary to begin to translate each of the key elements of the sectoral argument into an explicitly spatial argument. There are three key aspects of the smart specialisation logic, namely, the entreprenurial search process, the relevant size of the sector, and the level of connectedness. Each of these aspects has an explicitly spatial analogy with a large and longstanding literature underpinning them. Importantly for our purposes, the insights of this explicitly spatial literature are not always coincidental with, and in some cases appear to be rather contradictory to, the implied logic of the aspatial sectoral approach. As such, translating the aspatial sectoral smart specialisation concept to an explicitly spatial-regional context, and in particular a spatial-regional policy context, requires some very careful consideration.

To do this we must first note that from the urban systems literature there are more or less ubiquitous features to the patterns of all spatial distributions, best captured by Zipf's Law (Duranton 2008). Core city-regions tend to be both much fewer in number and also the largest and most densely populated regions. In addition, these core regions tend to be the most sectorally and structurally diversified regions. In contrast, smaller urban centres are not only much larger in number but also they are more specialised sectorally. This combination of scale and diversity tends to imply that the larger core-region centres continuously exhibit greater agglomeration advantages, associated with the learning, sharing and matching of agents, actors and activities (Duranton and Puga 2004). These various advantages also provide greater opportunities for the pooling of financial risk across sectors and firm types, a feature first observed by Mills (1972) who explained that the financial equivalent of an agglomeration is a portfolio problem, whereby the risk pooling takes place by means of the real estate markets. The spatial distribution of these risk-return profiles is reflected in the differing real estate investment yields between core and none core locations, spatial variations in credit ratings and the resulting spatial variations in credit availability (Dow 1982, 1987; Black et al. 1996).

This is the geographical backdrop against which entrepreneurial processes operate, given that the success or otherwise of entrepreneurial processes depends on the level of credit availability, the number and variety of emerging business opportunities, and the likelihood of success of these opportunities, and the scale of the markets to be reached.

Given each of these considerations, in terms of the vast literature covering the links between economic geography, entrepreneurship and innovation we are able to summarise broadly the overall consensus by pointing to six stylised facts. Firstly, entrepreneurship and innovation tends to be systematically higher in cities and more densely populated regions than in lower population density regions (Acs 2002; Carlino et al. 2007); secondly, entrepreneurship and innovation tends to be higher in more sectorally diversified regions (Van Oort 2004); thirdly, entrepreneurship tends to be higher in regions which are less dominated by a small number of large firms (Chinitz 1964; Duranton and Puga 2001); fourthly, entrepreneurship tends to be higher in regions with large numbers of multinational companies which are internationally-engaged (McCann and Acs 2011); and fifthly, entrepreneurship tends to be higher is regions with large market potential (Karlsson et al. 2009, 2010). Conversely, entrepreneurship tends to be lower in regions with lower population densities, lower in regions which are more sectorally specialised, lower in regions dominated by a small number of large firms, lower in regions with firms of limited international engagement, and lower in regions with low market potential.

In addition, a sixth stylized fact is that in many parts of the world including in most OECD countries, the adoption, adaptation and application of information and communications technologies ICTs across of wide range of industries appears to have *exacerbated* the differences between core and none-core regions (McCann 2008; McCann and Acs 2011). The reason for this is that ICTs are complements for knowledge-intensive activities requiring highly frequent face-to-face interactions (Gaspar and Glaeser 1998; McCann 2007), while at the same they are substitutes for routinised activities (McCann 2011). The result is that a more uneven interregional and international spatial distribution of activities has emerged according to the degrees of knowledge intensity embodied in activities (McCann 2008; McCann and Acs 2011).

Taken together, the combination and patterns of co-existence between these six stylised facts imply that entrepreneurship and innovation tends to be systematically higher in core regions and systematically lower in lagging regions (EC 2010). This is because on the input side core regions: provide a greater potential diversity for specialisation opportunities; offer greater potential home market (Krugman 1991) effects and size-related rewards to risk-taking; offer greater opportunities for local agglomeration-related learning due to higher levels of face-to-face and also ICT interactions. Moreover, on the output side the higher levels of connectedness also offer core regions greater scale advantages associated with global connections (McCann and Acs 2011; Ni and Kresl 2010).

During the current era of globalisation since the early 1990s (McCann 2008) the importance of the level of connectedness of regions has increased dramatically during the last two decades. In particular, this connectedness feature also tends to reinforce the other potential advantages associated with core regions (McCann and Acs 2011). In other words, following our earlier terminology, the economic geography literature tells us that core regions offer greater potential rewards to the entrepreneurial search process in terms

of the *distribution*, the *magnitude* and the capacity for *learning*. Moreover, while the reasons for regional disparities are complex and not specifically related to ICTs, most evidence suggests that increases in the adoption and adaptation of ICTs across a range of sectors has actually reinforced and exacerbated regional disparities over recent decades, rather than helped to narrow them (Gaspar and Glaeser 1998; McCann 2008). This observation is in contrast to the sectoral logic underpinning the smart specialization argument which assumes that international growth disparities are due to insufficient levels of adoption, adaptation and dissemination of ICTs,

5. The Regional Policy Challenges to the Smart Specialisation Logic

From economic geography it therefore becomes clear that the reasons why lagging or peripheral regions exhibit such differences in entrepreneurship and innovation are fundamental in nature and not marginal in nature and are variously: sectoral, structural, transactional, behavioural, related to resources and capabilities, related to risk and financial flows, related to externalities and issues of market failure, technological, and also related to issues of perception. Moreover, for lagging regions and geographically peripheral regions the challenges they face typically tend to reflect adverse *combinations* of two or more these different characteristics, combinations which are especially difficult to modify or rectify. For example, entrepreneurial processes tend to be less successful in lagging or less buoyant regions either because they lack the connectedness, or because they are too specialised and therefore insufficiently diversified sectorally or structurally, or both. Similarly, the levels of connectedness tend to be low because the region is highly specialised and therefore only integrated with other regions or markets via a narrow number of channels. Alternatively, the small market potential of peripheral non-core locations itself reduces the potential returns entrepreneurship.

Each of these hypothetical, but nonetheless very real and widespread, types of examples, demonstrates that if we reconsider the aspatial sectoral smart specialisation logic described above in an explicitly spatial–regional light it becomes quickly apparent that lagging or peripheral regions tend to face weaknesses in at least two of the three key elements of the smart specialisation schema. In purely statistical or microeconomic programming terms we would describe this problem as being one in which there are insufficient degrees of freedom, or alternatively too many variables and too few equations. In public policy terms, we might describe this problem as being one in which there are ‘insufficient levers to pull’ or ‘too few buttons to press’, given the regional challenges being faced. More recent terminology which is currently popular in EU policy circles refers to the ‘missing links’ which need to be connected or to the ‘bottlenecks’ which need to be unblocked. However, whichever way we may wish to characterise the challenges facing these regions, it is exactly these types of areas, namely regions facing combinations of challenges, which regional policy in all parts of the world, and in the specific case of the EU, European Cohesion Policy, tends to target.

As such, it also becomes very clear that while the proponents of the aspatial sectoral logic also see smart specialisation approach as proving a fairly direct and obvious systems for guiding the regenerating (David et al. 2010) of the targeted regional domains, the

explicitly spatial-regional logic suggest that the issue is far from being direct or obvious. The problem with translating the smart specialisation idea of a *domain* to that of a *region* is that everything that we know from economic geography tells us that the targets of regional policy are precisely those regional domains that tend to lack sufficient levels of at least two of the three key elements that the smart specialisation schema requires in order to be an operational policy. In contrast, the regions which appear to be the most conducive and favourable for the operation of smart specialisation-type processes are the buoyant core regions, and as such precisely the types of regions which EU Cohesion Policy does not prioritise. Moreover, the adoption and widespread adaptation of ICTs, which was the main catalyst for the original development of the smart specialisation concept, if anything, has worsened the problem of regional disparities in many parts of the world by favouring the core regions.

All aspects of the smart specialisation logic prima facie therefore appear to favour places which are not the primary target of regional policy. This apparent contradiction therefore raises the question as to whether employing a smart specialisation logic in the service of regional policy is internally inconsistent and likely to undermine the very policy which it is intended to serve. If it is indeed a self-contradictory and internally inconsistent approach then the outcomes of a combined smart specialisation-cohesion policy approach are at best likely to be undesirable, and at worst doomed to failure. This is a real operational and implementation problem, and as such, our first fundamental question regarding the application of smart specialisation principles to regions is:

(i) - *How* is the smart specialisation concept to be applied as a regional policy tool when the smart specialisation logic favours other types of places?

If the regions which are most favourable and conducive for the operation of smart specialisation processes are core regions, then this suggests that all of the market signals associated with the various aspects of the smart specialisation logic will favour the core regions. As price signals provide information about markets and welfare, then this fact raises doubts not only regarding the efficacy but also the rationale for the policy, in terms of whether the wrong places are being targeted. If all aspects of the smart specialisation approach naturally favour core regions rather than lagging regions, then our second question is

(ii) - *Why* should the smart specialisation concept to be applied as a regional policy tool when the smart specialisation logic favours other types of places?

In essence, the ‘how’ question is positive question in that it relates primarily to the likely outcomes of the policy, given the operational and implementation challenges to be faced. In contrast, the ‘why’ question is essentially a normative question in that it relates to the justification for the intentions and objectives of the policy.

Taken together, these two questions raise doubts about the wisdom of promoting the smart specialisation logic as a key ingredient of EU regional policy, because prima facie, the smart specialisation logic appears to discriminate against lagging regions, and to

contradict the design, if not the very rationale for regional policy itself. On the basis of the first how question and the second why question our third question is:

(iii) - Do the answers to the first two 'how' and 'why' questions imply the death-knell of smart specialisation as a regional policy tool for EU Cohesion Policy?

Somewhat surprisingly to some observers, in spite of the serious methodological and philosophical challenges posed by the first two questions, the answer to this third question is actually no, and that yes, smart specialisation can indeed be justified as a tool for Cohesion Policy.

6. The Justification for Using Smart Specialisation in Regional Policy

The justification for the defence of smart specialisation as a regional policy tool actually comes in two parts. The first part of the defence actually addresses the second 'why' question, while the second part of the defence addresses the first 'how' question. We will therefore deal with the answer to the third question by dealing with the responses to the first two questions in reverse order.

6.1 Response to the *Why* Question: Space-Neutral versus Place-Based Policies

In order to answer the second 'why' question it is necessary to understand that in actual fact, the problems raised by the second 'why' question are not specific to the smart specialization logic at all, but relate to the more general arguments regarding the case for regional policy per se. The reasons for regional disparities are very complex, and the elements included in the smart specialization concept are only a small part of the overall story, although they are important elements. More broadly, however, the why question here relates to the much wider questions raised by the debate regarding the rationale and efficacy of space-neutral and sectoral approaches versus place-based approaches to policy. This is a very complex debate and is well beyond the remit or aims of this paper (Barca et al. 2012). However, in simple terms we can characterise the main features of the debate in terms of the differences of emphasis between one the one hand the *2009 World Development Report* published by the World Bank (2009) and also to a more limited extent the 2004 Sapir Report, and on the other hand the 2009 Barca Report, two OECD reports (OECD 2009 a,b) and more recently the 2010 CAF Report on Latin America.

In essence, space-neutral approaches (World Bank 2009) emphasise the fostering of maximum interregional factor mobility in response to wage signals so as to maximize factor rewards and thereby greater aggregate welfare. If agglomeration economies operate in certain core locations, then space neutral approaches argue that factors should be encouraged to move to these locations, and any impediments to such mobility ought to be removed. Sectoral variations on this logic (Sapir 2004) also implicitly adopt a place neutral approach, although place-neutral approaches (World Bank 2009) don't advocate sector policies.

In marked contrast, place-based approaches emphasise the underdevelopment traps associated with location-specific externalities and the market failures which can inhibit the potential of certain regions to grow (Barca 2009; OECD 2009a,b). Place-based approaches highlight the heterogeneous relationships between institutions and geography, and given the differing types of development traps evident in different places, this approach advocates the provision and explicit spatial targeting of bundles of public goods which are tailored to the local context and specifically designed to foster such unrealised economic potential. Central to this approach are well-advised local governance and institutional reforms (Barca and McCann 2010) at the local and regional level which are specially designed to foster local development by encouraging the maximum engagement of all stakeholders and parties interested in local development issues (Barca 2009). The place based approaches (Barca 2009; OECD 2009a,b; CAF 2010) also emphasise the enormous potential economic gains for the nation as a whole (Garcilazo et al. 2010) which can be achieved from small growth improvements across a range of non-core regions, as these non-core regions typically account for at least half of national economic growth. The chances of realising small gains across a range of regions can be maximized with the help of a well-advised, systematic, and coordinated set of regional policy interventions.

It is this place-based approach which is the philosophical approach which underpins the current reforms of EU Cohesion Policy (European Commission 2010; Barca 2010), aimed at the new programming period beyond 2013, and now also underpins the new growth strategy of the Obama Administration in the US (White House 21.06.2010).

As we have already seen, the smart specialization concept is essentially a local knowledge and learning enhancement concept. Therefore, the justification for using a local knowledge and learning enhancement concept such as smart specialization as part of regional policy is actually already contained in the overall justification for using a local and regional territorial place-based development policy approach to Cohesion Policy, rather than employing a space neutral or sectoral approach. The reason is that the defence of the place based approach already deals explicitly with these types of questions across a much broader range of issues than smart specialisation alone. The place based approach explicitly advocates employing appropriately designed local knowledge and learning enhancement tools in regional policy, and the smart specialisation argument is one such tool. Whether it is the most appropriate regional policy tool in comparison to other alternative concepts or tools is discussed in the next section.

The important point here, however, is that the first part of the defence case for using smart specialisation as part of EU Cohesion Policy, is the basically the same as that the much broader arguments favouring a place-based approach to regional development policy over a space neutral approach.

6.2 Response to the *How* Question: Embeddedness, Relatedness, and Connectivity.

Because regions differ so much in terms of their innovation characteristics, the answer to the *how* question will depend very much on the specific regional context, exactly as the

place-based approach postulates. However, if we focus on the innovation and smart growth agenda of the Europe2020 strategy, we can sketch out here the broad outlines of a general response to the first *how* question. In order to do this we follow the OECD (2010, 2011) typology of different types of innovation regions, a typology which reflects the dominant features of the relationship between innovation and geography, and which closely mirrors the Tödtling and Trippl (2005) regional innovation classification scheme. In terms of understanding regional innovation systems, the OECD typology groups regions into three broad types, namely *knowledge regions*, *industrial production zones*, and *non-S&T-driven regions*, which typically represent the lagging regions. This classification approach is useful in demonstrating the salient and dominant features of a region's innovation system, and is also very useful in highlighting the major innovation challenges faced by the various different types of regions. For our purposes, the use of this typology also allows us to identify the key issues which need to be addressed in order to work out how a smart specialisation concept could be applied to regional policy. In economic geography terminology the key issues are *embeddedness*, *relatedness*, and *connectivity*.

The easiest way of explaining this is by using the same domain regeneration example offered by the proponents of the smart specialisation concept (David et al. 2010), namely that of the perceived mismatch between regional skills and human capital training, and the demand requirements of the region. One of the central themes in regional policy concerns the need for local human capital and skills enhancement. Yet, in addition to the general level of skills, the smart specialisation logic also suggests that there should be a close matching between supply of skills-training and the region's medium or long-term skills demand. But this raises the challenge of how to determine the appropriate pattern of provision of labour-training so as to minimise this apparent mismatch, given that we are considering the medium or long-term skills demands of the region driven by entrepreneurial search processes. Moreover, an additional challenge relates to the induced effect of such a programme, because we also know is that as people acquire more human capital they become more geographically mobile, and likelihood of such people leaving less prosperous regions and moving to buoyant regions increases (Faggian and McCann 2006, 2009a,b). In terms of the OECD (2010, 2011) classification above this implies that a local skills enhancement programme in a lagging regions, undertaken under the auspices of regional policy, actually increases the likelihood of human capital outflows from this same lagging regions. These human capital outflows from a lagging region could be primarily to either industrial production zones or, more likely, to knowledge regions, but in each case the actual pattern will depend on the interregional spatial distribution of the employment possibilities. Obviously not all recipients of local skills-training will move away; a greater local skills match reduces labour outflows whereas a greater local skills mismatch will increase outflows. However, the point remains that in terms of its intended local development objectives, the regional policy itself be undermined by the induced out-migration, unless sufficiently strong countervailing processes are also operating to ensure that enough gainful local employment opportunities are available. In other words, the relationship between skills training and regional development depends on the links between the policy and changes in the local labour supply and how these changes dovetail with the local labour demand requirements

In terms of economic geography, less prosperous non-core regions often have more specialised industry structures, dominated by a smaller range of sectors which are highly embedded in the region, in the sense that their local input-output linkages are strong and/or longstanding. As such, in order to reduce the skills mismatch problem in these types of regions, following the smart specialisation logic, one argument is that the skills enhancement programmes should be specialised and closely allied to the requirements of the existing local industries which are already highly embedded within the region, so as to also increase the overall *embeddeness* of both the local labour force and the local industries. The reason for this is that very few regions make a fundamental structural or sectoral shift in the short to medium term. Given that it is impossible to predict long-term trends, the most sensible approach is to focus on the medium term, and here we know that existing industrial structure is the best indicator of the medium-term regional industrial structure. The levels of embeddedness of different sectors can be identified via regional input-output models, computable regional general equilibrium CGE models, or more simply by means of employment patterns (McCann and Dewhurst 1998). In addition, such approaches can be bolstered with information regarding the organisational (McCann 1997) and institutional behaviour of the various sectors, including local university-industry links, and other regional evidence of knowledge spillovers, knowledge exchanges, or social and institutional participation.

Yet, this raises a problem. Emphasising the regional embeddedness priority may appear to both increase the vulnerability of the region to external shocks and also to reduce the possibilities for knowledge spillovers, precisely because it implies increasing the specialisation of the region. Therefore, in order to counter these problems, it is necessary to develop a strategy to allow the less prosperous regions actually to *diversity*, not to specialise. While this may appear prima facie to run counter to the smart specialisation logic, this is not the case. The smart original specialisation concept promotes the idea of technological diversification within a particular domain which has a realistic specialisation advantage due to its relevant scale. In a regional policy context, this implies that a labour enhancement programme should be designed to foster the *technological diversification* strategies of the major locally-embedded industries, because it is these sectors which have the relevant scale. Such a strategy is consistent with the technological relatedness argument of Frenken et al. (2007). This technological *relatedness* argument from evolutionary economics (Frenken and Boschma 2007; Boschma and Frenken 2011), for which there is now strong supporting empirical evidence (Boschma and Iammarino 2009; Neffke et al. 2011; Boschma et al. 2012), posits that the most promising pathways forward for a region to promote its growth by enhancing its technological capacity are by diversifying into technologies which are closely related to the existing dominant technologies. The argument here is that it allows regional assets to more easily shift between technologies because they are still able to build on their existing skills and capabilities. Inflows of new firms and the founding of new local firms are both systematically higher in fields which are technologically diversified but also closely related to the existing dominant fields of the region, while outflows of firms or firm failures are more likely in sectors unrelated to the existing regional technological profile (Neffke et al. 2011). As such, it is not diversification per se

which is important for growth, but the patterns of *specialised diversification* across related technologies which are important for growth. Indeed, the evidence suggests that the impact of this technological relatedness argument is more pronounced at the regional scale that at the national scale (Boschma et al. 2012). This argument is also consistent with many other findings from the regional growth literature which imply that industries which are the dominant and most relatively specialised in a region, but which also are in a region with diversified industrial structure, are likely to exhibit high growth (Henderson et al. 1995; Mameli et al. 2008).

Taken together, the combination of the *embeddedness* and *relatedness* principles in economic geography translate the aspatial smart specialisation idea of a *relevant size* domain into a realistic set of regional policy priorities.

The third element of the aspatial-sectoral smart specialisation concept which we must translate into spatial-regional terms is the issue of *connectedness*. The original connectedness idea emerged from a sectoral way of thinking, whereby the national innovation system is comprised of a set of sectoral innovation systems and inter-sectoral linkages and knowledge spillovers. Applying this sectoral approach to regions leads us to the types of networking policies suggested by David et al. (2010). However, innovation-related knowledge flows are embodied in both the face-to-face interactions (McCann 2007) between people and also mobility of human capital, and as we know from new economic geography, the Krugman shadow-effect associated with centrifugal forces (Krugman and Venables 1995; Fujita et al. 1999) mean that policies designed to reduce spatial transactions costs may actually work in the opposite direction of the ideas suggested by David et al. (2010). As such, once we move from a sectoral to an explicitly spatial argument, it becomes clear that the smart specialisation idea of connectedness does not translate so directly to a regional context, and that some additional issues need to be taken account of.

In order to consider the implications of this, we must first clarify that in economic geography the idea of connectedness is defined in terms of *connectivity*, a concept widely employed in the global cities literature (Sassen 2002) and originally borrowed from sociology, whereby connectivity relates to all of the transactions associated with trade, transportation, passenger movements, information flows, knowledge interactions, financial flows, funds management, and international decision-making capabilities, which are situated at a particular location. From hereon we will therefore use the terminology of connectivity (McCann and Acs 2011; Sassen 2002) rather than connectedness, so to clearly distinguish the spatial from the sectoral approach, respectively. On this point, if the knowledge inflows into regions are in related to the region's existing technological fields then this fosters growth (Boschma and Iammarino 2009). Setting this connectivity concept within the OECD (2010, 2011) regional-innovation typology mentioned above allows us to reconsider the role of the connectedness-connectivity element of the basic smart specialisation argument.

One aspect of regional policy, exactly as the smart specialisation argument posits, is to focus on a peripheral region's most connected industries, so that the regional industrial

base is best able to learn from the more advanced regions. In terms of the OECD (2010, 2011) regional-innovation typology, in the case of lagging regions this would imply ways of fostering learning-linkages with either industrial production zones or knowledge regions, whereas for industrial production zones it would imply fostering linkages with either knowledge regions or sometimes other industrial zones. Importantly, however, the networking effect must not lead to an adverse Krugman shadow effect (Fujita et al. 1999) whereby the networking actually promotes further outflows of knowledge of skills. Therefore, in order for a smart specialisation-type policy to work in a regional context, the analytical focus must centre on ways to maximise the knowledge spillovers and learning linkages within the regions which are the targets of the policy, as well as between regions.

6.3 The Smart Specialisation-Based Regional Policy-Design Challenge

The preceding discussion suggests that if smart specialisation is to be successfully integrated into regional policy it is necessary to develop regional policies which promote technological diversification amongst the most embedded industries which have the relevant scale to generate significant local impacts, whilst at the same time promoting the connectivity of the region without inadvertently creating an adverse Krugman shadow effect.

In response to this challenge there are four major points which we can make:

(i) In large and highly diversified urban centres and leading knowledge regions (OECD 2011) the smart specialisation argument will be less relevant as almost all sectors and technological fields will be present. Moreover, in general their buoyancy implies such centres will not be a target for regional policy funding. However, for intermediate regions with both urban and rural areas, as well as for many smaller sized regions with urban centres, the smart specialisation argument would seem to be very well-suited. A sufficiently large population base is required in order to generate agglomeration or network effects. Moreover, intermediate and smaller regions account for well over half of economic growth in OECD countries (Garcilazo et al. 2010). As such, both in terms of their growth potential and also the concentration possibilities offered by their spatial structure, these intermediate regions appear to be ideal targets for smart specialisation policies. Of these regions, industrial production zones would be particularly suited to a mix of R&D, training and networking programmes, precisely because of their scale. For very isolated regions, however, the smart specialisation argument appears to offer only very limited possibilities, because the lack of scale is likely to reduce the effectiveness of the policy approach. In these cases, rather than funding R&D, the priorities might centre on the promotion of connectivity in certain natural environmental or tourism activities, via, say for example, wireless ICT-systems, to more central core regions.

(ii) The smart specialisation logic applied in a regional context, in which the issues of embeddedness, relatedness and connectivity are explicitly discussed, puts the onus onto the policy-designers and potential funding recipients to clearly identify the perceived market failures which are being corrected, and to justify exactly how the smart specialisation approach to the tailoring and provision of public goods is to be applied,

monitored and evaluated. This model is consistent with the approach of Rodrik (2004) and Barca (2009) in which partnerships between the public and private sector are essential in order to elicit the knowledge regarding the most severe obstacles to growth, the major bottlenecks or missing links, and the optimal remedies. This form of policy-tailoring will also require appropriate outcome indicators to be carefully chosen which are amenable to being tracked through the life of the programme and projects.[4] This is not because the outcomes can be known in advance but rather as a means to facilitate and enhance the policy process (Rodrik 2004). As such, the smart specialisation logic, when it is appropriately translated to an explicitly spatial regional context, would appear to be a powerful lens through which policy makers can design and articulate local development policies.

(iii) The smart specialisation logic suggests that in a regional context the policy recommendations may be very different in different places, depending on the region's technological profile, its industrial structure and it geography. Relevant scale naturally points towards the agglomeration potential of bigger population centres, particularly in the dominant category of intermediate urban-rural regions, which will allow for comprehensive policy scenarios. At the same time, the possibilities offered by network systems point towards wireless IT-based solutions in many more remote regions. There is no 'one-size-fits-all' policy, and the smart specialisation logic forces priorities to be chosen amongst competing alternatives.

(iv) The problems of local rental-capture must be addressed head-on, and there are two aspects to this problem.

Firstly, if the original aspatial smart specialisation logic is not translated to an explicitly spatial regional context via the concepts of embeddedness, relatedness and connectivity, the policy is likely to lead to widespread problems of fragmented and localised sectoral rent-seeking which will be almost impossible to ameliorate. In addition, the policy will also systematically favour leading sectors in buoyant knowledge regions. Both outcomes would run entirely counter to the overall goals of regional policy.

Secondly, it is necessary to engage with local elites in order to extract local knowledge and to tailor the policy. However, policy-design at the regional level not only involves issues of externalities, it also involves the information asymmetries and principal-agent problems associated with engagement with local elites. The specialised diversification aspect of the smart specialisation policy logic implies newness, variation and differentiation, and these very features may undermine some of the monopoly positions of local elites. As such, even if the policy is indeed translated into explicitly spatial

[4] Barca, F., and McCann, P., (2011) *Methodological note: Outcome Indicators and Targets – Towards a Performance Oriented EU Cohesion Policy* and examples of such indicators are contained in the two complementary notes on outcome indicators for EU2020 entitled *Meeting climate change and energy objectives* and *Improving the conditions for innovation, research and development*.
See: http://ec.europa.eu/regional_policy/sources/docgener/evaluation/performance_en.htm

regional terms in the manner described here, it is necessary to ensure that the architectures of the policy-design, the policy-delivery, and the policy-evaluation systems are open and inclusive, and allow for a broad range of stakeholders and interested parties to participate. Otherwise they will be subject to rental capture by local elites who will subvert the process by *limiting* openness and by *restricting* the pursuit of the novelties and variations to arenas over which they maintain control. The way this can be achieved is by the use of both conditionalities and also outcome indicators, as promoted by the World Bank, the European Commission, and the OECD, and also discussed in detail by the Barca (2009) report.

7. Smart Specialisation and EU Cohesion Policy

In the light of the regional policy-design challenge just described, we can now examine the major elements of the smart specialisation logic and reconsider how they might best be incorporated into a reformed EU Cohesion Policy. The major aim here is to design policies which will foster maximum learning linkages both within the target regions as well as between regions. In order to do this we must first translate the smart specialisation logic from a sectoral innovation system approach to a regional innovation system viewpoint. In addition it is necessary to think in terms of a national innovation system as being comprised not only of a set of distinct regional innovation systems, but also of an overarching *inter*-regional innovation system. This inter-regional element highlights the issue of how knowledge does, or does not flow, between regions, and the ways in which such flows might best be fostered and regions better connected.

Adopting a regional and interregional innovations systems logic, if we now reconsider both the technological aspects of diversification and also the issue of connectivity, as we have already seen, the original sectoral smart specialisation logic, which initially emerged from the sectoral literature on the transatlantic productivity gap, emphasised the importance of the adoption, adaptation and diffusion of ICTs. In many cases, skills training or actor networking related to ICTs may well be a sensible regional policy priority. However, on the basis of the arguments in this paper, in a regional policy setting the local adoption of ICTs may not necessarily be the priority, given that EU interregional disparities are not primarily due to ICT issues. Moreover, focusing exclusively on this ICT issue raises the risk of inadvertently subsidising a sector across regions, which as noted by the proponents of the concept is a danger which must be avoided (David et al. 2010). As such, instead of, or in addition to, the ICT-related networking suggestions discussed earlier (David et al. 2010), other approaches may be more appropriate, including the upgrading of local supply chains, the redesign of local labour-training systems, the promotion of university-industry linkages, or other local institutional reforms, exactly as recommended by the Barca (2009) report. As such, there is no reason why the appropriate policy solutions should necessarily centre on ICT-related issues per se, although this is not ruled out..

The final issue relates to the role of entrepreneurship. In the original smart specialisation logic it is the entrepreneurial search processes which are assumed to identify the medium-term smart specialisation opportunities in the region. The emphasis in the smart

specialisation concept on promoting entrepreneurial search processes is in no way inconsistent with EU Cohesion Policy (Barca 2009; European Commission 2010) which is the largest source of credit to SMEs within the EU policy portfolio. However, the fact that in the original policy concept it is the entrepreneurs and not the regional policy-makers who are assumed to be best equipped for identifying the smart specialisation opportunities therefore also poses an additional policy-design challenge. In particular, designing smart specialisation regional policies which link local SMEs and technological diversification to regional embeddedness and connectivity means that there may need to be place-specific criteria for credit availability. In particular, SME credit may need to be prioritised for firms whose entrepreneurial goals are to promote technological diversification amongst the region's most embedded industries and activities. At the same time, ironically, in order to ensure that such a policy is successful, aggregate R&D funding in its early stages would need to be explicitly space-neutral in the sense that it is *not* applied primarily to the dominant knowledge centres, but spread evenly, or at least randomly, across all places, in response to funding applications. Indeed, in the USA there are National Research Council policies which work exactly according to this logic (NRC 2008). Only after a peer-review performance evaluation process which takes place after a pre-defined period of time after the seed-funding has been granted, is the continuation of funding ensured. This is both genuinely place-neutral and also explicitly not a capital-city policy, and as such, provides a powerful counter-argument to the logic of the Word Development Report (World Bank 2009).

These arguments, however, appears to run counter to the concerns regarding 'picking winners' (David et al. 2009). However, the smart specialisation proponents concede that the logic of the concept implies there may well indeed need to be some sort of policy prioritisation, based broadly on a fledgling-industry type of argument. Yet, the problem with these fledgling-industry arguments in general is that the medium to long-term outcomes of the policy are by definition unknown. In contrast, however, if we apply the explicitly spatial economic geography logic to smart specialisation concept, emphasising the principles of embeddedness, relatedness and connectivity in a regional context, then the policy prioritisation is built on a much sounder footing than the usual fledgling industry arguments. This is a powerful argument in favour of regional smart specialisation concept and also a profound twist on the efficacy of the standard agglomeration arguments.

These examples regarding both the adoption of ICTs and the role of entrepreneurship demonstrate that the development of regional smart specialisation policies will therefore require a great deal of careful thought and will require the engagement of a range of local actors and institutions (Barca 2009). The issues raised in this paper all point to the importance of including in any regional smart specialisation strategy all matters relating to local intangible capital, including capabilities and competences, and institutional issues (Foray 2008), exactly as argued by Barca (2009). The fact that embeddedness, relevant scale and connectivity are the three critical elements of a regional smart specialisation strategy means that there is no simple one-size-fits-all policy blueprint. Different policies will be appropriate for different regions, and the call by the proponents of a smart

specialisation for test cases and outcome indicators to be developed is also consistent with the proposals made by Barca (2009) and the European Commission (2010).

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