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Institutions, Smart Specialisation Dynamics and Policy

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Keywords: Regional policy; smart specialisation; institutions; regional innovation systems; system failures

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Smart specialisation features prominently in the European regional policy context. This paper discusses how the configuration of the regional institutional framework affects smart specialisation dynamics and policy. It elaborates why and how institutional diversity and integration promote entrepreneurial discovery processes, spillovers and agglomeration effects, and thereby structural change in regions. Policy challenges arising from the regional institutional framework are identified, discussed and related to well-research system failures of regional innovation systems.

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1 Introduction

The objective of this paper is to investigate conceptually the interdependencies between institutions and smart specialisation. Smart specialisation is a highly important policy concept in the European context because European regions are required by the European Commission (EC) to develop smart specialisation strategies as a precondition for accessing significant amounts of funding. However, there are still open questions as regards the theoretical foundation of smart specialisation. Despite increasing research interest, the breakthrough of this concept on the policy agenda is an example for "policy running ahead of theory" (Foray et al., 2011).

One open question relates to the role of institutions for smart specialisation. McCann and Ortega-Argilés (2014) show that characteristics of the national institutional framework, including the degree of centralisation, or the responsibilities and funding available at the different levels of government, have important implications for smart specialisation policy practices. Also, institutions are thought to contribute to or restrain problems, like picking winners, rent-seeking behaviour, corruption and lock-ins, which are typically associated with place-based policies, such as smart specialisation (Boschma, 2014a; Ederveen et al., 2006; McCann and Ortega-Argilés, 2013; Rodríguez-Pose et al., 2014).

Moreover, there is wide recognition in economic geography that institutions play a fundamental role enabling or constraining innovation and economic development as argued for instance in the literature on national innovation systems (Edquist, 2005; Freeman, 1995; Lundvall, 1988, 1992; Nelson, 1993), sectoral innovation systems (Breschi, 2000; Malerba, 2002, 2005), or regional innovation systems (Asheim and Coenen, 2006; Asheim and Isaksen, 2002; Cooke, 2001; Cooke et al., 1997; Tödtling and Trippl, 2005). However, the search continues for a generalizable framework that allows us to say something about regularities as

regards the relationship between institutions and economic growth in a spatial context (Farole et al., 2011, p. 60).

Furthermore, it remains difficult to appropriately capture institutions and develop policy guidance at the regional level. According to Rodríguez-Pose (2013) this has to do with the abstract nature of institutional theory, and in particular i) the difficulty of measuring institutions, ii) the context and geography specific nature of institutions, and iii) the dynamic dimension of institutions. Rodríguez-Pose (2013, p. 1042) concludes that ”the problems of measuring institutions, their space and time variability, the difficulties for defining the right mix of formal and informal institutions, and the endogeneity between institutions and development, on the one hand, and between institutions and other constituent factors of development, on the other hand, makes establishing overarching guidelines for institutional intervention nigh to impossible.”

Hence, regional policy makers face a dilemma where, on one hand, institutions appear to be highly relevant for economic growth while, on the other hand, institutions are arguably hard to measure and policy interventions difficult. This dilemma suggests that further research is required developing concepts and identifying relevant dimensions that can be captured in empirical contexts and applied to guide policy making.

The aim of this paper, therefore, is to contribute to the development of a more generalizable framework that informs about why and how institutions, from a regional perspective, relate to smart specialisation. The paper develops two generic institutional dimensions, namely the diversity and integration of the regional institutional framework. Institutional integration captures the extent to which institutions promote or constrain interactions between different social groups. Diversity relates to the number of distinct social groups and associated institutions represented within a region and the extent to which these institutions differ from

each other. It is argued that these two dimensions, institutional diversity and integration, have important implications for key processes promoted by smart specialisation, including entrepreneurial discovery processes, priority setting to develop critical mass in selected niches, and participatory approaches involving a wide range of stakeholder groups. Furthermore, the paper elaborates on why and how these institutional dimensions relate to major challenges in designing smart specialisation strategies.

The paper proceeds as follows: Section 2 introduces smart specialisation as a strategic approach to an innovation-driven regional development policy and identifies key policy challenges. Section 3 develops the institutional perspective by elaborating on the two key concepts, institutional variety and integration, by discussing what these concepts have to say about smart specialisation dynamics and policy, and by elaborating how the identified policy challenges relate to well-researched system failures in regional innovation systems. Section 4 presents the conclusions and limitations.

2 Smart specialisation

Smart specialisation (RIS3) is a strategic approach to an innovation-driven regional development policy. Mikel Landabaso, Head of Unit in the EC responsible for smart specialisation, describes it as "a process of priority-setting in national and regional research and innovation strategies in order to build "place-based" competitive advantages and help regions and countries develop an innovation-driven economic transformation agenda." (Landabaso, 2014, p. 378). By creating an ex-ante conditionality framework for accessing structural funds, which requires from regions to develop RIS3 strategies, this strategic approach is extremely relevant in the European context.

RIS3 is a placed-based approach. It follows a tradition in economic geography recognising that regions have very different characteristics, that competitiveness can be based on different types of innovation (Jensen et al., 2007) and different types of knowledge (Asheim and Gertler, 2005), and that different institutional configurations promote different economic activities. The argument is that regional differences and the resulting challenges need to be duly taken into account when developing regional development policies (Barca et al., 2012; Camagni and Capello, 2013; Tödtling and Trippl, 2005).

However, regions cannot excel in all fields of economic activity, which is why priority setting is deemed – according to the RIS3 approach – necessary. In order to compete globally, it is argued that European regions should specialise in niches, thus create sufficient scale and critical mass, instead of replicating similar activities dispersed all over Europe. Foray (2009, p. 20) criticises that "the uniformisation of priorities leave Europe with a collection of subcritical systems, all doing more or less the same thing, systems which are unattractive and thus cannot play in the arena of the world localisation tournament." Furthermore, the pursuit of the political goal of social and economic cohesion, where also weak regions receive support to upgrade their capabilities, increase economic performance, and generate income and jobs, requires priority setting as especially small regions can only succeed in few selected niches. Accordingly, place-based policies have gained legitimacy among development organisations and international organisations such as the EU (Barca *et al.*, 2012).

Identifying and choosing priorities creates important policy challenges. Setting policy priorities, linked to funding and allocation decisions, implies that some regional actors might gain while others might lose, thus triggering political challenges related to rent-seeking behaviour, protection of vested interests, information asymmetries, principal agent problems, corruption, etc. (Boschma, 2014a; Ederveen et al., 2006; McCann and Ortega-Argilés, 2013; Rodríguez-Pose et al., 2014). Another challenge is related to ignorance. How should policy

makers know, which emerging fields are most promising as regards future growth potential? Typical problems associated with this challenge concern wrong choices, picking winners and consequently market distortions (Foray *et al.*, 2011).

As a remedy to these challenges, RIS3 promotes entrepreneurial discovery processes as a mechanism to a) identify the most promising emerging fields of economic activity and b) hold powerful players at bay by emphasising a participatory approach. According to the EC guide for designing RIS3 strategies (EC, 2012), such efforts are highly collaborative and require the involvement of a variety of stakeholder groups including different ministries, regional administrations, universities, industry associations, businesses, and ideally civil society organisations. This is a highly complex process involving the risk that the consultations are biased due to the selection of participants (Georghiou et al., 2014). Hence, this process poses important methodological challenges.

The RIS3 policy approach is tied to a logic about structural economic change in regions. Foray (2014) distinguishes in this regard between smart specialisation policy and smart specialisation dynamics. According to Foray, smart specialisation dynamics unfold along three processes, entrepreneurial discovery, entry and agglomeration, and structural change. He defines entrepreneurial discovery as a process of "deployment and variation of innovative ideas in a specialised area that generate knowledge about the future economic value of a possible change." (Foray, p. 495). This process usually requires the combination of different types of knowledge concerning technology, market opportunities, and the management and organisational aspects required to introduce a new product or service. An entrepreneurial discovery signals economically interesting opportunities and thus attracts other entrepreneurs. With the entry of new entrepreneurs, the typical spillovers and agglomeration effects are set in motion, which create a favourable business environment for spin-offs, further firm entries and firm growth. With the accumulation of resources and capabilities, and the reallocation of

resources from lower value economic activities to the newly discovered niche, a structural change in the regional economy unfolds.

This logic, of course, is not specific to smart specialisation but underpins classical work on industrial dynamics and cluster life cycles (e.g. Marshall, 1920; Maskell and Malmberg, 2007; Menzel and Fornahl, 2010; Pouder and St. John, 1996; Storper and Walker, 1989; Ter Wal and Boschma, 2011). The RIS3 approach emphasises the role of the entrepreneur, broadly understood, in the emergence of a new growth path. This implies that entrepreneurial discoveries are not only the making of individuals and firms but potentially also of universities, agencies such as technology transfer offices or regional development agencies, public administration, or the civil society broadly speaking. From this perspective, entrepreneurial discovery processes open up for different forms of emergence related not only to firm innovation but also for instance to developing new research areas that may lead to university spin-offs, or to policy initiatives seizing opportunities to attract external investment[1].

3 Developing the institutional perspective

Institutions are "the rules of the game in a society or, more formally, […] the humanly devised constraints that shape human interaction" (North, 1990 p. 3). As such they "reduce uncertainty, about the likely behaviour of others, and in doing so, facilitate commitments and hence make possible investment and interdependence" (Farole et al., 2011, p. 62). Bathelt and Glückler (2014, p. 346) emphasise the behavioural and relational aspect of institutions and define them as "forms of ongoing and relatively stable patterns of social practice". In this

[1] The RIS3 approach also emphasises other aspects such as social innovation and policy learning through sound monitoring and evaluation systems, which are, however, not focus of this paper.

paper, however, I define institutions not as behaviour or social practice but emphasise the structuring character of institutions for social interactions. While this is in line with North's perspective, the nuanced view of Hodgson is preferred defining institutions as "systems of established and embedded social rules that structure social interactions. *Rules* in this context are understood as socially transmitted and customary normative injunctions or immanently normative dispositions, that in circumstances X do Y." (Hodgson, 2006, p. 18)

At the regional level, institutions of different types and erected at different geographical scales intersect (Gertler, 2010; Grillitsch, 2015; Strambach, 2010). This refers to regional, national and supra-national institutions (Hassink, 2010), as well as institutions that are not territorially defined e.g. specific to industries (Boschma and Frenken, 2009), nationalities, professions, or religions. From a regional perspective, institutions erected at different spatial scales meet and create the specific regional institutional framework (for an overview on related concepts, see e.g. Grillitsch, 2015).

Using the recently developed quality of governance index of the University of Gothenburg, Rodríguez-Pose and di Cataldo (2014) find that regional institutions have a prevailing impact on regional innovation performance and that regions with low index scores benefit most from improving their regional institutional framework. As regards regional policy, institutions substantially contribute to or restrain problems like picking winners, rent-seeking behaviour, corruption and lock-ins (Boschma, 2014a; Ederveen et al., 2006; McCann and Ortega-Argilés, 2013; Rodríguez-Pose and Di Cataldo, 2014). Ederveen, de Groot and Nahuis (2006) investigate the effect of EU structural funds on average national growth rates between 1960 and 1995. Using different measures for institutions (e.g. trust, regional openness to competition, corruption, etc.), they conclude that the effect of EU structural funds is mediated by the quality of the institutional framework.

While institutions can be studies with different analytical lenses, it is proposed here that two structural dimensions, namely institutional diversity and integration, are of particular relevance from a regional perspective. These dimensions, as shown below, are able to capture different types of institutions that are erected at different geographical scales. Institutional diversity and integration are two generic and complementary dimensions, which can contribute to our understanding of how institutions, from a regional perspective, are related to RIS3 dynamics and policy. First, the concepts of institutional variety and integration are defined before the theoretical arguments are discussed that underpin their relevance.

The concept of institutional integration captures the extent to which institutions promote or constrain interactions between different social groups. A lack of institutional integration can exist in small villages and cities alike. For instance, a small tourism region with 300 inhabitants can be dominated by two rivalling families where collaboration and the level of trust within the two families are high whereas mistrust exists between the two[2]. The institutions would consist therefore of rules such as "Support family members and hinder members of the other family" or "Collaborate with family members and compete with members of the other family" or "For members of family A, be member of the local church and for members of family B, be active in the football club." etc. What becomes apparent when looking at institutions in regions is that institutions usually relate to groups of individuals associated with for instance kinship, social class, education, professions, organisations, industry, nationality, or religion. The extent to which institutions associated with the different social groups collide, i.e. oppose or hinder networks and collaboration between the groups, defines the fragmentation within a regional institutional framework. Following Hodgson's understanding, institutions do not only constrain behaviour but can also

[2] The author has worked on designing and evaluating regional policies in developed, transition and developing countries, including several tourism regions. While this example is of pure illustrative nature, it reflects the experience of the author.

be an enabling force; this is to say that the relevant institutions for the respective social groups represented within a region can also foster networks and collaboration and thereby promote institutional integration. Usually this is associated with values such as tolerance, openness to diversity, and equality between individuals belonging to different groups.

Besides the degree of integration, it is suggested here that the degree of diversity of a regional institutional environment plays an important role. Diversity relates to the number of distinct social groups and associated institutions represented within a region and the extent to which these institutions differ from each other. While diversity will be strongly correlated with the size of an agglomeration, the degree of diversity can also differ within regions of the same size, even within small regions. To refer again to the illustrative example of the small tourism village with 300 inhabitants, the degree of diversity of the institutional environment would increase if the inhabitants and local firms would not only operate in tourism but also in another sector, e.g. agriculture. Tourism and agricultural firms are subject to different institutions, which are erected at the European, national and also regional scale. This relates to formal institutions such as laws and regulations but potentially also to informal ones such as norms and values.

Different industries are only one potential source for institutional diversity. Institutional diversity results also from the presence of different types of firms, professions, occupations, nationalities, or educational backgrounds within a region. Moreover, institutional diversity relates to different types of actors such as firms, research institutes, educational facilities, public administration and civil society actors. Each of these types of actors is subject to different formal and informal institutions, which lead to different rationales for individual behaviour and influences the willingness to engage and collaborate across the boundaries of the own social group.

The definition of institutional diversity, which delineates institutions by social structures, allows capturing institutions erected at different geographical scales. Some institutions relate to territorially bound social structures like regional administrations, nation states or the European Union. Other institutions relate to social structures, which are not territorially bound such as industries, professions, occupations, or nationalities. Hence, the diversity of a regional institutional framework does not only capture regional institutions but all those that intersect in a region, regardless whether they are regionally confined or not. A high institutional diversity has, therefore, also an effect on learning from extra-regional sources as institutional proximity, which exists within social structures, facilitates knowledge exchange and learning (Boschma, 2005).

3.1 Institutions and smart specialisation dynamics

The RIS3 approach emphasises entrepreneurial discovery processes that have the potential to trigger spillovers and agglomeration effects, which consequently are a source for structural change in the economy. In this section, I will argue that institutional diversity and integration play together in enabling entrepreneurial discovery and agglomeration processes that consequently lead to different potentials for regional structural change towards higher value added activities.

There are several theoretical arguments why entrepreneurial discovery processes should benefit from institutional diversity. Strambach (2010) argues that firms venture into new business fields by exploiting institutional variety. She illustrates this with the success of the German business software industry, which utilised existing strengths, i.e. strong user-producer collaborations with leading manufacturers, and combined these with a new institutional form of temporary employment providing the required flexibility for the success in the software

industry. Another argument is provided by the nature of entrepreneurial discovery processes which rely on different types of often dispersed knowledge (Foray, 2014). This is in line with the emergent literature on combinatorial knowledge dynamics (Crevoisier and Jeannerat, 2009; Grillitsch and Trippl, 2014; Manniche, 2012; Moodysson et al., 2008; Strambach and Klement, 2012). Accordingly, more radical innovations and branching out into new fields require the combination of different types of knowledge, which often are located in different institutional fields. Also, the related variety concept suggests that the highest likelihood for branching into new market or technological niches arises from combining knowledge that is neither too similar nor too distant (Boschma and Iammarino, 2009; Frenken et al., 2007; Neffke and Henning, 2013; Nooteboom, 2000). The process of combining knowledge from different industries involves institutional variety because institutions and industries co-evolve, thereby creating industry-specific institutions (Murmann, 2003; Nelson, 1994; Schamp, 2010).

However, in order to benefit from institutional variety, a certain degree of institutional integration is required in order to enable and stimulate the exchange of knowledge and interactive learning processes across institutional boundaries (Sotarauta, 2015; Strambach and Klement, 2012). Etzkowitz (2012), for instance, shows that innovativeness and entrepreneurship is promoted in regions where mobility and networks between the university and business sectors is allowed and encouraged. Boschma (2014b) argues that it will be easier to recombine institutions to develop new growth paths, if a certain degree of institutional overlap, i.e. similar institutional requirements of co-located industries, exist. This resonates with the idea of institutional complementarities, which implies that synergies between institutions exist (Amable et al., 2005; Aoki, 1994; Hall and Gingerich, 2009; Hall and Soskice, 2001).

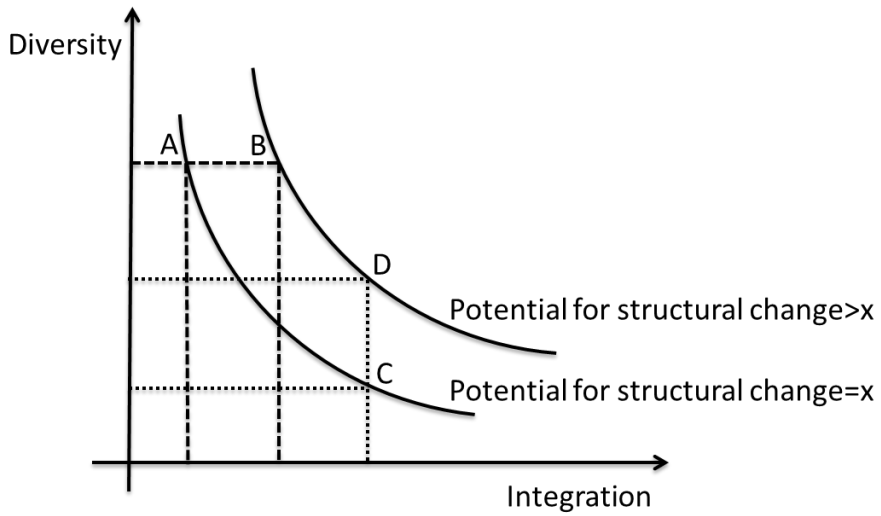
Also, several theoretical arguments can be identified, why institutional diversity and integration relate to spillovers and agglomeration processes. On the one hand, it has been argued that in diversified regions, it is more difficult for powerful agents to dominate the design of regional policy, to protect vested interests, and to create political-institutional lock-ins (Boschma, 2014b; Grabher, 1993; Neffke et al., 2010). On the other hand, institutional integration facilitates the coordination between different types of actors and thereby the provision of specialised and collective resources like training and education, research, lobbying and promotion for the emerging economic activity (Bergman, 2008; Martin and Sunley, 2011; Maskell and Malmberg, 2007; Porter, 2000; Ter Wal and Boschma, 2011). For instance, Sotarauta and Mustikkamäki (2014) show that the coordination across institutional boundaries, facilitated mainly by local and regional development agencies, was essential to create legitimacy and to mobilise the long-term funding and patient capital required to develop the regenerative medicine cluster in Tampere.

Overall, a synergetic relationship between institutional diversity and integration is therefore expected as regards the extent to which these two dimensions stimulate entrepreneurial discovery and agglomeration processes. This will consequently lead to different potentials for structural change towards more value added activities as shown in figure 1. The y-axis depicts institutional diversity and the x-axis institutional integration. Certain combinations of diversity and integration, holding everything else constant, result in certain potentials for structural change as illustrated in the figure. The figure depicts a non-linear relationship because, as elaborated above, especially the combination of institutional diversity and integration is expected to be conducive for a region's potential for structural change, and because it can be expected that regions with a high degree of diversity (or integration) will gain less from a further increase of diversity (or integration) than regions with a low degree of the respective institutional dimension. More technically speaking, the arguments proposed

above suggest that there are i) positive interaction effects between institutional diversity and integration, and ii) diminishing marginal returns.

This implies that in regions with a high degree of institutional diversity but low integration, it will be possible to move to a higher potential for structural change by increasing the level of integration (i.e. moving from point A to point B), while an increase in institutional diversity will have a small or no effect. For instance, a metropolitan region with a high degree of diversity and fragmentation is expected to benefit from emphasising the integration of institutions associated with different social structures like industries, firms and universities, different nationalities, etc. In contrast, regions that are characterised by a high degree of institutional integration but low diversity will reach a higher potential for structural change by increasing the level of diversity (i.e. moving from point C to point D), while further increasing integration will have a limited effect. For instance, a peripheral region dominated by one industry is expected to benefit from an increase in institutional diversity. Institutional diversity may be created by labour mobility, extra-regional collaborations, or new social structures such as research or educational facilities.

Figure 2: Institutional diversity and integration and the potential for structural change



Smart specialisation dynamics are not only affected by institutional diversity and integration but are also moments of change in the regional institutional framework. As mentioned above, the process of entrepreneurial discovery requires the combination of different types of knowledge and resources, which are often held by actors belonging to different social groups and who are subject to different institutions. Hence, the process of entrepreneurial discovery is one that integrates across institutional boundaries, or in other words increases institutional integration. An entrepreneurial discovery that then triggers agglomeration effects is a moment of creating institutional diversity because the growth of a new cluster or industry triggers the adaptation of institutions for the needs of the emerging industry (Maskell and Malmberg, 2007; Murmann, 2003; Nelson, 1994; Schamp, 2010).

3.2 Institutions and smart specialisation policy challenges

RIS3 policy is supposed to be informed by and create momentum to the processes described above. Entrepreneurial discoveries signal opportunities for new growth paths and inform which areas to prioritise in RIS3 strategies. The aim is to create critical mass and international competitiveness in the emerging niche. Possible rationales justifying policy interventions comprise a too low level of entrepenreurial discovery activities because benefits cannot be fully privatized; insufficient capabilities of actors; or financial bottlenecks. Agglomeration processes may be constrained by coordination failures, which implies that public intervention is needed to develop collective resources such as education and training facilities in the new area of specialisation or research infrastructure. (Foray, 2014; Foray et al., 2011)

The first stage of the policy process is the design of RIS3 strategies. This section focusses on the policy challenges in this first stage as identified in section 2, namely methodological,

political and ignorance challenges, and how these challenges are affected by different degrees of institutional diversity and integration.

First, methodological challenges relate to questions such as how to implement participatory processes, how to select the participants, how to mediate the discussions and how to synthesise the views into potential new market and technological niches. As shown by Georghiou et al. (2014), this is complicated enough in small economies like Malta. The methodological challenges are expected to multiply with institutional diversity as this means that more social groups with divergent expectations, views and priorities will need to be considered. Institutional integration, in contrast, is expected to facilitate this process as it promotes networks and learning between different social groups and creates a better awareness and understanding between groups. Institutional integration in diverse regions can also be the result of policy learning and be manifested in arrangements such as advisory boards, working groups, or associations with broad participation from different groups[3].

Second, political challenges arise because RIS3 strategies have implications on the priorities and consequently incentives and disincentives set for regional actors. According to the RIS3 approach, priorities-setting should be informed by entrepreneurial discovery processes and emerge from participatory consultation processes that ideally lead to a consensus. However, RIS3 aims at stimulating structural change, which implies that new actor constellations, networks, and capabilities may arise resulting in potential conflicts between e.g. currently dominating actors, entrepreneurs who seek support for their initiatives, different research groups and the society as a whole. Institutional diversity is expected to reduce the risk that dominant players monopolise the process and protect vested interest (Boschma, 2014b; Neffke et al., 2010). However, a high degree of diversity implies a large variety of stakeholder

[3] I thank an anonymous referee for this insight.

groups with partly conflicting interests. Thus, it will be a political challenge to mediate between these different groups.

Also, a lack of institutional integration is expected to increase the political challenge. Colliding institutions associated with different social groups impede the development of social networks, trust, participatory processes, and the coordination of different interests. In such institutional environments, the policy outcomes will depend on the relative importance, influence and power of the different social groups. If there is a balance of power between the social groups, the most likely outcomes are either a compromise between the groups whereby both engage in rent seeking behaviour or, if a compromise is not possible, deadlocks where the competing social groups block progress. If one social group dominates, the most likely outcome will be that the stakeholders of this group safeguard their interests and seek rents while the dominated groups loose out. In contrast, if the degree of integration is high, conflicting interests can be better mediated and a consensus built supporting the development of a shared vision for the development of the region. Furthermore, institutional integration is supported by values such as tolerance, openness to diversity and equality of all members of society, which are considered to be also conducive for accepting and building legitimacy for new ideas and new business endeavours that may initiate new branches in the regional economy.

Third, the design of RIS3 strategies may be negatively affected by the challenge of ignorance. Ignorance relates to a lack of awareness about potential new market or technological niches, or in other words insufficient momentum in the entrepreneurial discovery processes, which, as discussed in the preceding section, is affected by both institutional diversity and integration. Kirzner (1997), investigating the role of entrepreneurial discovery in the competitive market process, points to an important difference between ignorance and imperfect information. Imperfect information assumes that the information is somewhere out there but it is too costly

or for some reason not feasible or possible to attain the information. Ignorance, however, relates to knowledge, which has not been thought before. Entrepreneurial discovery pushes out the boundary of ignorance and always includes a moment of surprise. Accordingly, the policy challenge of ignorance is not only a problem of imperfect information but concerns also the momentum in entrepreneurial discovery processes.

Summarising the various effects of institutional diversity and integration, table 1 presents the policy context for different types of regions. First, a general description is provided here before, in the next section, this conceptualisation is discussed in relation to concrete examples and well-researched system failures in the literature on regional innovation systems (RIS).

In regions with a high degree of diversity and integration, the methodological challenge is medium as the difficulty associated with involving a large variety of social groups in participatory processes is mediated by the connectedness between the groups. The political challenge is also medium as the diversity reduces the risk that certain individuals or social groups monopolise the process, however, it still remains a challenge to navigate between diverse stakeholder interests. The ignorance challenge is low because both diversity and integration stimulate entrepreneurial discovery processes and the signalling to policy makers.

If integration in diverse regions is low, policy makers will face a combination of high methodological and political challenges. As typical in highly diverse regions, the large number of different social groups leads to the methodological challenge of how to design and implement participatory processes. However, in contrast to integrated regions, collaboration across social groups is more difficult. In such environments, it will be likely that the most dominant groups will exercise pressure to protect vested interests. Policy makers will need to balance these interests. Mediating between the various social groups that have limited incentives or even disincentives to collaborate for the common good is mainly a political

challenge. In addition, if policy makers do not succeed in involving the less powerful social groups in the participatory process, they even face the risk of ignorance. Ignorance results in this case not from the lack of diversity but rather from the lack of willingness to acknowledge the interests, opinions and experiences of individuals and organisations belonging to less powerful social groups. Hence, in an institutional environment characterised both by high diversity and low integration, policy makers are confronted with the highest degree of complexity as they have to cope with challenges related to politics, methodology and ignorance.

Regions with low institutional diversity are characterised by low methodological and high ignorance challenges. As few social groups exist in the region, it will be less of a challenge to involve them in participatory processes and understand the institutions governing the behaviour in and between these groups, especially for policy makers rooted in the region. On the other hand, the potential for entrepreneurial discovery is relatively low within the region because of the lack of opportunities to combine complementary knowledge and resources. Regions with low institutional diversity differ, however, as regards the political challenge depending on the level of institutional integration. If integration is low, if colliding institutions are deeply rooted, and conflicts of interests large, the political challenge of mediating between the social groups and engage them in participatory processes will be substantial. Institutional integration, as described above, reduces these region-internal struggles. However, due to the low diversity of institutional layers, a risk remains that powerful players monopolise the policy process.

Table 1. Regional policy context depending on the degree of institutional diversity and integration

	Integration	
Diversity	**High**	**Low**
High	Medium methodological challenge Medium political challenge Low ignorance challenge	High methodological challenge High political challenge Medium ignorance challenge
Low	Low methodological challenge Medium political challenge High ignorance challenge	Low methodological challenge High political challenge High ignorance challenge

3.3 Relating policy challenges to system failures in regional innovation systems

The above conceptualisation resonates well with the literature on system failures in regional innovation systems (RIS), such as fragmentation, organisational thinness, and lock-ins (Isaksen, 2001; Tödtling and Trippl, 2005). Fragmentation is typically associated with large agglomerations. Even though large agglomerations may be well endowed with organisations fulfilling all functions of a RIS and even though these organisations may have strong competencies, innovation performance may remain below expectations because of fragmentation. Fragmentation is usually discussed from a network perspective and describes a lack of networks across social groups. Due to this deficiency, knowledge exchange and learning is impeded. Institutions, on the other hand, provide incentives or disincentives to engage in networks and coordinated action. The durability of institutions, which usually extends the lifespan of specific network linkages, justifies considering institutions as causal explanation for networks and interaction patterns. Hence, in order to change network patterns, it is valuable to understand and address underlying institutions associated with specific social groups. However, this does not imply a one-way relationship because interactions between individuals through networks constantly influence institutions. Fragmentation, relating to networks and institutions, deprives the region from economic development potential because

radical innovations and new development paths, as claimed for instance in the literature on related variety and combinatorial knowledge bases, are thought to frequently originate from combining different knowledge types (Asheim et al., 2011; Boschma and Iammarino, 2009; Crevoisier and Jeannerat, 2009; Frenken et al., 2007; Manniche, 2012; Neffke and Henning, 2013; Strambach and Klement, 2012). As discussed in the previous section, regional policy making in such regions is highly complex as both methodological and political challenges are mounting, which frequently trigger also challenges of ignorance.

In such regions the main leverage for improving the regional institutional framework is to increase integration. The biggest political challenge is posed by dominating social groups, which will often aim at protecting their interests and seeking rents. Hence, a stakeholder analysis will need to identify the power and influence of the social groups as well as the potential of less dominant groups to contribute to entrepreneurial discovery and participatory processes. A priority will be to work with the dominant social groups in order to understand the institutions that cause the low levels of collaboration and trust between these groups, based on which interventions can be derived to reinterpret or change these institutions. Furthermore, the inclusion of less dominant groups in participatory processes, and especially the moderation of these processes in a way that provides these groups with a platform to express their perspectives, will foster regional integration. Other measures to increase the integration of regional institutional frameworks are to support initiatives, activities and organisations that cut across several social groups, such as collaborative funding schemes, inclusive regional associations, inclusive sports, leisure and cultural activities, inclusive schools and educational facilities, as well as the development of a regional identity and related public awareness campaigns. Champenois (2012), for instance, shows how the BioRegio initiative, funded by a federal ministry in Germany, promoted institutional integration. As response to the call for proposals, a wide range of local actors in different regions participated

in collective actions, which consequently led to a convergence of individual interests, the establishment of formal boundary-spanning organisations, and the development of mechanisms to enhance capacity and ensure sustainability of these organisations. Such initiatives will help regions to overcome political challenges, to avoid ignorance and to fully exploit the regional potential arising from diversity.

Organisational thinness exists if important components of RIS are missing, e.g. if there is a lack of research or educational organisations or a lack of firms. Organisational thinness has a quantitative and qualitative dimension. The quantitative dimension relates to the number of organisations while the qualitative dimension relates to their competencies. While these dimensions are related, the quality dimension is arguable more important. Having few organisations with high competencies, being competitive on a global scale, should be more important than having many organisations with low competencies. Organisational thinness is usually associated with peripheral regions, which lack a critical mass of organisations overall; lack important types of organisations, e.g. such that undertake research and development, or higher education, or lack concentration in specific industries (Isaksen, 2001; Tödtling and Trippl, 2005). This will lead to low local learning dynamics (Maskell and Malmberg, 1999) as well as rather limited capacities to absorb knowledge from outside the region (Cohen and Levinthal, 1990; Zahra and George, 2002). Hence, the problem of organisational thinness is similar to the challenge of being ignorant in regional policy making. One way of overcoming ignorance in the policy process is therefore to invite external experts in the participatory processes, engage in peer review processes such as implemented in the context of developing RIS3 strategies in Europe, and foster interregional and global networks.

The third RIS system failure discussed in this paper refers to lock-ins (Grabher, 1993). Lock-ins are typical problems for specialised regions and have been researched intensively in the context of old industrial regions (Hassink, 2010; Hassink and Shin, 2005; Tödtling and Trippl,

2004; Trippl and Otto, 2009). Old industrial regions are trapped in formerly successful development paths. As industries mature, products and production technologies become increasingly standardised and this implies a shift of innovation activities from radical product innovations to more incremental process innovations as well as increased cost pressures on firms. Such industries are frequently dominated by large players and stable input-output networks. Due to the often increasing industry specificity of technologies, competencies, routines, networks and physical investments, firms become more vulnerable to changes in markets and technologies. As a result of this specialisation, firms may find it more difficult to identify global changes in markets and technologies, and in particular to interpret and react to these changes. Moreover, political support and subsidies to protect vested interests, leveraged by the established firms' historically grown networks and power may further reduce the adaptability of the regional economy. Hence, over time, different forms of lock-ins may occur that reduce the innovativeness and competitiveness of firms and the adaptability of regions.

Lock-in is a multi-dimensional phenomenon, which relates both to institutional diversity and integration. As discussed earlier, high institutional diversity reduces the risk that powerful players are able to protect vested interests and monopolise the policy process (Boschma, 2014b; Neffke et al., 2010). In addition, a low degree of integration can be a source for lock-ins. Take a small peripheral region as an example where two social groups are associated with colliding institutions. The struggle for influence and power between actors belonging to the two separate groups may paralyse the region, negatively affect regional knowledge dynamics and hinder the formation and growth of clusters. High integration, on the other hand, fosters the development of social capital, trust and collective action, which in itself does not contribute to lock-ins. This resonates well with the work on innovative milieus, where collective action and learning processes help adapting to changes in markets or technologies. In order to sustain innovative milieus, this literature also points to the importance of

integrative processes (Camagni, 1995; Crevoisier, 2004; Maillat, 1998). Accordingly, maintaining a high degree of integration within the regional institutional environment is an important policy objective.

4 Conclusions

This paper discusses theoretical arguments why institutional diversity and integration are expected to affect smart specialisation dynamics and policy. Smart specialisation dynamics are driven by entrepreneurial discovery processes, spillovers and agglomeration processes, which are considered to be a source for structural change. The paper suggests that there are synergetic effects between institutional diversity and integration as regards promoting smart specialisation dynamics. In other words, diverse regions will benefit most from increasing institutional integration, while integrated regions will benefit most from increasing diversity.

Also the paper investigates, which political challenges are to be expected given the introduced conceptualisation of institutional diversity and integration. Three policy challenges relating to methodology, politics, and ignorance are identified. Building on existing theories in economic geography, arguments are presented why and how these challenges relate to institutional diversity and integration. Regions can accordingly be plotted against these the two dimensions and expectations derived as regards the importance of the respective political challenges. This discussion links to well-researched system failures in regional innovation systems such as fragmentation, organisational thinness and lock-ins, thus complementing existing research and policy recommendations.

To conclude the paper, some limitations need to be stressed. This paper distinguishes between two dimensions of regional institutional environments, which are considered fundamental for smart specialisation dynamics and policy. Quantitative studies will be needed testing the expectations and hypotheses that can be derived from the paper as regards the relation

between institutional diversity and integration on one hand, and smart specialisation dynamics on the other. The two institutional dimensions have helped to identify key policy challenges, which are associated with specific types of regions. Future work needs to go into detail about the nature of the three policy challenges. In-depth qualitative studies are required to investigate these challenges in practice as well as the strategies of how policy makers address them. Another limitation is that the analytical lens proposed in this paper, which mainly looks at structural characteristics of the regional institutional framework, i.e. institutional diversity and integration, does not cover (nor exclude) other institutional issues that may be relevant in a regional policy context. The paper discusses the idea that smart specialisation dynamics are not only affected by but also introduce change to the regional institutional framework. This dynamic perspective also deserves attention in further conceptual as well as empirical work.

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