

PART II
REGIONAL DEVELOPMENT ISSUES

REGIONAL DIVERSIFICATION AND POLICY INTERVENTION

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Abstract. This paper focuses attention on the process of regional branching in which new industries branch out of existing industries at the regional level. There is increasing evidence that the entry and growth of a new industry in a region depends on the local presence of industries to which it is technologically related. We explore how technological relatedness across industries may serve as underpinning for policy to stimulate regional branching. We claim that policy should take the industrial history of the region as a point of departure, and focus on spinoff activity, labour mobility and collaborative networks to connect technologically related industries at the regional level.

Key words: regional branching, regional diversification, related variety, regional innovation policy

1. INTRODUCTION

Every region, no matter which type of region, will be confronted with processes of decline and stagnation in their economic structure. In fact, there is increasing awareness that failure is at the heart of any regional economy. Sooner or later, organizations will fail and cease to exist. It is a well-known fact that the majority of new firms goes out of business not long after they entered the economic system. According to Ormerod (2005), 99 per cent of the firms once active in the American car industry did not survive, and more than 10 per cent of all businesses in the US cease to exist every year.

This is not just because economic crises happen now and then. As Schumpeter (1939) once said, economic growth is not so much about quantitative change as it is about qualitative change. In order to secure long-term economic growth, it is crucial that regional economies develop new economic activities, in order to compensate for processes of failure that are inevitable in every region in the end. How this process of structural change really works, and how it might be activated by public policy intervention is a fundamental question for economists and geographers alike. In economic geography, many cases of old industrial regions have been documented that experienced problems to restructure their economies, and no such region has been capable of restoring their regional economies to previous levels. This implies we need more understanding of how regions diversify successfully. Again

and again, geographers have raised the question of how regions develop new growth paths (see e.g. Scott, 1988; Storper and Walker, 1989; Feldman et al., 2005; Hassink, 2005; Martin and Sunley, 2006; Simmie and Carpenter, 2007; Cooke, 2010; Fornahl et al., 2010), but it is fair to say that not much progress has been made in that literature so far.

This paper focuses attention on the notion of technological relatedness to explain regional diversification. Recently, a number of studies (Klepper and Simons, 2000; Boschma and Wenting 2007; Hausmann and Klinger 2007; Klepper, 2007; Bishop and Gripaos 2010; Buenstorf et al. 2010; Hausmann and Hidalgo 2010; Boschma et al., 2011; Buerger and Cantner 2011; Meyer et al., 2011; Neffke et al. 2011; Tanner 2011) have highlighted the process of regional branching in which new industries branch out of existing industries at the regional level (Boschma and Frenken 2011). Some scholars have claimed that the entry and growth of a new industry in a region depends on the local presence of (a variety of) industries to which it is technologically related. This paper aims to discuss a set of policy implications.

Section 2 briefly presents recent insights concerning the importance of technological relatedness for regional development (Boschma and Frenken, 2010). Section 3 discusses some implications for regional policy, and explains how technological relatedness across industries may be used as an input for effective policy making. In Section 4, we discuss a number of options for policy makers to move regions into new but related directions, in order to secure long-term economic development. In this respect, we direct attention to various mechanisms through which new industries may be stimulated when connecting technologically related industries at the regional level. Section 5 concludes.

2. TECHNOLOGICAL RELATEDNESS AND REGIONAL BRANCHING

In every textbook in economics, knowledge is presented as a non-rival good. This means that the use of knowledge by one firm does not preclude its use by other firms. This implies that other firms may benefit from the creation and accumulation of knowledge elsewhere. Of course, this is true to some extent, but we also know there are strong limits to the diffusion of knowledge in an economy. One fundamental reason is that knowledge is not reduced when used (as is true with other production factors), but knowledge accumulates through learning-by-doing, as Arrow (1962) once described it. Knowledge is also often tacit and complex of nature, and therefore difficult to articulate and codify (Polyani 1966). For these very reasons, knowledge is actor-specific and embodied in individuals and organizations. As a consequence, imitation and diffusion of knowledge across agents are problematic processes that are prone to failure (Nelson and Winter, 1982; Antonelli, 1995; Saviotti, 1996).

For the purpose of this paper, we limit our attention to two constraining factors that have drawn much attention in the literature lately, that is geographical and cognitive distance. For decades, geographers claim that knowledge does not spill over easily between agents that are at a great geographical distance. There are a lot of studies that have demonstrated empirically that knowledge spillovers are indeed often geographically localized (Audretsch and Feldman, 1996; Paci and Usai, 1999). This might suggest that geographical proximity is a prerequisite for the diffusion of knowledge across firms. However, there are strong reasons to believe that geographical proximity is neither a necessary nor a sufficient condition for this to happen (Boschma, 2005). There is increasing awareness that other barriers of knowledge diffusion need to be overcome first, such as cognitive and social distance, in order to connect agents and to enable transfer of knowledge (Breschi and Lissoni, 2003; Lagendijk and Oinas, 2005; Torre and Rallet, 2005; Balland, 2009). In the last decade, the notion of cognitive proximity has attracted a lot of attention in this respect. Cohen and Levinthal (1990) made the point

that agents require absorptive capacity to understand, absorb and implement new external knowledge into their organizations. In addition to that, scholars have argued that actors need to share similar knowledge and expertise to enable effective communication and knowledge diffusion, that is, they need to be proximate in the cognitive dimension.

Having said that, there is increasing awareness that cognitive proximity between agents is not necessarily a good thing (Grabher, 1993; Nooteboom, 2000; Boschma, 2005; Broekel and Boschma, 2011). When two actors know exactly the same, they can perfectly communicate with each other, but one agent would not add much to what the other agent already knows. Even worse, they would run the risk of not being exposed anymore to external knowledge that is new to the both of them. This might lead to a situation of cognitive lock-in, when agents become inward looking and unaware of what is going on around them. In this respect, Nooteboom (2000) claimed that some degree of cognitive distance between agents is more likely to lead to real learning. In that sense, there is a trade-off between cognitive proximity enabling communication on the one hand, and cognitive distance sparking off real learning on the other hand. As a consequence, effective knowledge transfer is likely to be facilitated when an optimal degree of cognitive proximity exists. This means that actors require some cognitive proximity to enable effective communication, but not too much of that, to avoid cognitive lock-in (Nooteboom, 2000). In other words, when two agents share different but related competences, there is potential for real interactive learning, new re-combinations of existing pieces of knowledge, and true innovations.

The literature on technological systems developed in the 1990s applied this idea to underline technological complementarities across industries that boost economic development for a considerable period of time (e.g. Carlsson and Stankiewicz, 1991; Robertson and Langlois 1995). In fact, they argued that diversity in complementary sets of competences is advantageous when interdependent pieces of knowledge have to be integrated and recombined to sustain processes of innovation (Arora and Gambardella 1994; Feldman 1999).

These insights have been applied quite recently in economic geography. In this respect, the notion of related variety has drawn a lot of attention. Instead of emphasizing the economic blessings of a high degree of variety in a region, as covered by the notion of Jacobs' externalities, scholars have started to emphasize regional variety in technologically related industries, because it may provide many learning opportunities for local firms. This is not necessarily true for regional variety *per se*, because too much cognitive distance between sectors may be involved. Accordingly, a high number of technologically related industries in a region is likely to enhance knowledge spillovers, with positive effects on regional development. Empirical studies have been conducted in countries like the Netherlands (Frenken et al., 2007), Italy (Boschma and Iammarino, 2009), Germany (Brachart et al., 2011) and Spain (Boschma et al., 2011) using different types of methodologies, and they all tend to confirm that related variety has a positive impact on regional growth.

These studies investigated related variety from a static perspective, looking at the composition of the industrial structure in a region, and identifying the degree of relatedness between the local industries. Saviotti and Frenken (2008) took a more dynamic perspective on related variety when examining the evolution of export variety in countries over time. Neffke et al. (2011) analyzed the evolution of the degree of technological coherence of the industrial structure in Swedish regions over 30 years, and came to the conclusion that this degree of coherence is persistent even though industries come and go. One reason for this persistency is that regions are more likely to diversify into related industries and to lose industries that are unrelated to their existing activities. Consequently, new industries do not start from scratch but branch out of existing industries from which they exploit

relevant knowledge and skills. In other words, relatedness becomes a crucial ingredient for the process of regional diversification. Boschma and Frenken (2011) have termed this process by which new industries arise from new recombinations of technologically related industries at the regional level as regional branching.

There is increasing evidence that this branching process is indeed a key feature of regional diversification. Case studies have shown that new industries are deeply rooted in related economic activities in their region (see e.g. Bathelt and Boggs 2003; Glaeser, 2005; Best, 2006; Boschma and Wenting, 2007; Klepper, 2007). Studies focusing on the evolution of export portfolios of countries show that countries expand and diversify into new but closely related export products (Hausmann and Klinger, 2007; Hidalgo et al., 2007; Hidalgo, 2009). That is, countries tend to move into new export products that are related to their current export portfolio, and the wider the range of related export products available at the country level, the more opportunities countries have to diversify into new related export products. Boschma et al. (2011) have shown in a study on Spanish regions that this process of export diversification in related products is indeed important, but more so at the regional scale (i.e. the sub-national scale), as compared to the national level.

Neffke et al. investigated the probability of new industries to enter a region and the probability of existing industries to disappear from a region. Their study followed the evolution of the industrial structure in 70 Swedish regions during the period 1969-2002. They analyzed more than 2,500 events of a new industry entering a region. They found that an industry had a higher probability to enter a region when it is technologically related to other industries in that region. Neffke et al. (2011) also analyzed more than 3,500 events of an industry exiting a region. Their study showed that an industry was more likely to exit a region when that industry was not, or very weakly technologically related to other industries in the region.

The aforementioned studies have collected substantial evidence for the occurrence of regional branching, but the question remains how new and existing industries are connected, and through which channels related knowledge is transferred across those industries. This requires a comprehensive study of the types of entries that are involved in the process of regional branching, among other things. No such study (yet) exists, as far as we know. Boschma and Frenken (2011) discussed a number of mechanisms that might be responsible for this process of regional branching. An obvious candidate is entrepreneurship, and there is quite substantial evidence from studies on the life cycle of industries that entrepreneurship might indeed be one of the driving forces. What these studies tend to show is that existing industries give birth to new industries, in which the entrepreneurs have a previous background in related industries (e.g. as former employee), which they fully exploit and which enhances the performance of their firms in terms of survival (Boschma and Wenting, 2007; Klepper, 2007; Wenting, 2008; Buenstorf and Klepper, 2009; Buenstorf et al., 2010; Klepper, 2010; Buenstorf and Geissler, 2011; Buenstorf and Guenther, 2011; Frenken et al., 2011; Heebels and Boschma, 2011). In other words, through this spinoff process, knowledge (as embodied in these experienced entrepreneurs) is transferred from existing to new industries at the regional level, where it is reshaped and recombined with other knowledge.

The same line of reasoning may apply to labour mobility. Studies have shown that labour mobility is a crucial mechanism through which knowledge and experience are transferred from one company to the other at the regional level (Angel, 1991; Almeida and Kogut, 1999; Pinch and Henry, 1999; Saxenian, 1994; Rodríguez-Pose and Vilalta-Bufi, 2005; Eriksson, 2011). But the question is whether this applies to all types of labour mobility, and how important labour flows between related industries are in this respect. Boschma et al. (2009) demonstrated that labour mobility per se does not impact on

plant performance, but the recruitment of new employees with related skills (i.e. employees coming from related industries) did increase the performance of plants. This might be attributed to the fact that these related skills are new but also related to the existing set of skills at the plant level, and can therefore be integrated and recombined effectively. This is a promising avenue for further research but this has not yet been taken up in the context of the industry life cycle. In that respect, research should focus on the extent to which firms in newly emerging industries rely on labour recruited from related industries (like entrepreneurs have their origin in related industries), and whether that positively affects their survival rate in the long run.

But there might be other channels through which this process of regional branching occurs. Collaboration networks, like R&D networks, may bring related activities together out of which new economic activities may branch. There is some evidence that technological alliances that connect organizations with different but related capabilities lead to more innovative output (Nooteboom et al., 2007). But, like labour mobility, there is no systematic evidence yet that collaborations across borders of related industries have given birth to new industries where these were fruitfully recombined.

3. OPPORTUNITIES TO INTERVENE PUBLICLY TO ACTIVATE REGIONAL DIVERSIFICATION

One finding of the previous discussion was that new industries are more likely to emerge and develop in a region where that industry can connect locally to other industries to which it is technologically related. The question now is where to intervene in order to enhance a successful regional diversification process. Is it possible to think of any policy actions that might boost this process of regional branching?

To start with, we have to account for a number of limitations in this respect. First, we have to acknowledge that it is unpredictable which new industries will become the engines of economic growth in the next five to ten years. This means there might be serious limits to picking-the-winners policy approaches. And secondly, we hardly can build on successful cases where public policy was fully responsible for giving the decisive boost to the successful development of new industries in particular areas (Lambooy and Boschma, 2001; Pack and Saggi, 2006). Policy makers often refer to success stories like Silicon Valley, but forget to make a proper analysis of how public policy contributed to that success. What we have learned though is a lot from studies that have investigated policies that failed to achieve regional diversification. According to Howells (2005), 'best practice policies' are often hard to adapt to local situations and difficult to implement (Hassink and Lagendijk, 2001).

When thinking about the policy implications of this process of regional branching, it is a prerequisite to take the existing industrial structure in a region as a point of departure. The industrial history of regions provides the context and defines the opportunities but also sets the limits to what can be achieved by public policy (Lambooy and Boschma, 2001). This requires a thorough analysis of the industrial structure of a region, in which the degree of technological relatedness between industries is identified (see e.g. Neffke et al., 2011), because this determines the opportunities for regions to diversify into related activities. One should be cautious to support so-called very promising industries (like nanotech) that take a very peripheral position in the regional industrial structure. When that is the case, new industries will not connect easily to other industries in the region, because there are no other regional industries to which they are technologically related. In that sense, new industries cannot draw on local resources (like knowledge and skills) that might support their further development. In these circumstances, new industries are also not very likely to contribute to the development

of other local industries (e.g. in terms of knowledge spillovers) from which they are very distant in a cognitive sense.

As public money is scarce, policy makers have to pursue a risk-averse policy strategy. This implies that regional policy should better focus on those new industries that can more easily connect to the existing industrial structure, because that will increase the probability of policy success. This is in line with the scientific literature stating that it is wrong to follow a 'one-size-fits-all' policy, which is still, however, common practice in regional policy in many countries (Todtling and Trippel, 2005; Raspe and Van Oort, 2006; Asheim et al., 2011). Consequently, policy strategies should be tailor-made, in order to capitalise better on region-specific assets that come from technologically related industries in the region.

Another possible policy implication that has drawn little attention in the literature is that backing declining industries in a region is not necessarily bad. So far, we claimed that it is a waste of public money to support declining industries that take a peripheral position in the industrial portfolio of a region, because they already have a high probability to exit the region sooner or later, because of their low degree of embeddedness. This stands in contrast to those industries that have strong technological ties with many other industries in a region. When such industries are confronted with a temporary demand fall, their disappearance would threaten the existence and development of other regional industries to which they are technologically related, especially when these industries form a hub in the network of local industries and act as a bridge through which related assets are transferred and diffused further down into the regional industry space. In that case, their loss would seriously lower opportunities in regions to diversify into related activities.

But what is most crucial when enhancing the process of regional branching is that policy should aim to make connections between local industries that are technologically related. The main objective of such policy is not to make strong sectors even stronger and to secure local vested interests, but to enhance interaction and exchange between complementary activities in a region, and to support the process of regional branching. How that might be achieved through concrete policy actions is the topic of the next section.

4. POSSIBLE POLICY ACTIONS TO ENHANCE REGIONAL BRANCHING

To an increasing extent, one can identify policy efforts that come close to the idea of regional branching, as discussed earlier. These have been labeled platform policies that aim to connect industries and establish re-combinations in order to enhance regional development (Asheim, Boschma and Cooke, 2011; Cooke, 2011; Harmaakorpi et al., 2011). We briefly discuss three knowledge transfer mechanisms (i.e. entrepreneurship, labour mobility and collaborative networks) through which industries may be connected at the regional level, and through which policy intervention might encourage regional branching.

As pointed out earlier, experienced entrepreneurs make a difference during the first stage of the life cycle of an industry, because they create new industries in which they can exploit the experiences they acquired in related industries (Boschma and Wenting, 2007; Klepper, 2007). As these types of spinoffs tend to locate in the same region as their parent organizations, they represent an effective mechanism through which knowledge is transferred from a related industry to a new industry at the regional level. Policy could play a role here by targeting and supporting experienced entrepreneurs that set up new companies in a different industry than they were active in before, but to which it is

still related in a cognitive sense. This would mean a very different approach to entrepreneurial policy as it is practised now.

Another mechanism through which knowledge and skills are transferred across related industries is labour mobility (Boschma et al., 2009). Policy could certainly play a role here, by informing both job seekers and companies about opportunities in related industries. Job seekers should be encouraged to apply their experience in other industries they worked previously for, but where their skills are still highly relevant and can be used effectively. Companies should be informed not to go for new employees with a background in the same industry the company is active in, but select employees from related industries, because employees with related skills and knowledge may boost innovation in firms. Such policy intervention would not harm too much the incentive of firms to invest in their own personnel, because if their employees would leave, they would not go to their competitors but instead to organizations in different industries. In this respect, encouraging labour mobility between related industries (both within the same region as well from other regions and even other countries) could contribute to the process of regional branching.

Collaborative networks could also be an effective vehicle through which knowledge is exchanged across related industries (Nooteboom et al., 2007). Public policy could play a role by means of the establishment of platforms in which knowledge spills over and diffuses across related industries. This means competition policy should enable the creation of networks in which organizations in related industries come together, because it might be an effective way of diversifying regions into new but complementary fields of activity. What is crucial is that policy should be designed in such a way that it avoids vested interests of established players to take over and dominate these networks, and newcomers and smaller players are denied access. This type of network policy should include extra-regional actors, as they might bring in new related knowledge into the region (Boschma and Iammarino, 2009).

5. CONCLUSIONS

This paper has focused attention on the process of regional branching in which new industries branch out of existing industries at the regional level. There is increasing evidence that the entry and growth of a new industry in a region depends on the local presence of (a variety of) industries to which it is technologically related. We discussed some implications for regional policy, and explored how technological relatedness across industries may be used as an input for effective policy making that encourages regional branching. We claimed that public policy should not support declining industries that take a peripheral position in the industry structure of a region, nor should it pick winners that are not embedded in the regional industrial space. More in particular, we claimed that flows between related industries should be activated by policy through entrepreneurship, labour mobility and networks, because that might lead to new re-combinations and make regions branch into new directions.

Having said that, we need to know more about the various transfer mechanisms that connect existing industries with new industries. How important are these mechanisms when new industries emerge and develop in regions? And did public policy play any major role in this respect? And if so, can this be replicated in other regional contexts? In addition, we did not discuss other factors that might be considered crucial in this process of regional branching, such as institutional restructuring (Maskell and Malmberg, 2007; Hassink, 2010; Strambach 2010). There is a strong need to understand better what roles public policy played in the process of regional branching at various spatial scales

(regional, national, international), and whether and how institutions can be changed. These questions need to be taken up in future research, in order to increase our understanding of this process of regional branching.

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