Abstract

This paper develops a theoretical framework, and a set of testable propositions, on how collaboration with non-academic partners located abroad might affect businesses’ absorptive capacity (Cohen & Levinthal, 1989, 1990; Zahra & George, 2002), and businesses’ propensity to engage in collaboration with universities, depending on the characteristics of the region. It is hypothesized that businesses in peripheral regions will be able to develop their absorptive capacity to a greater extent, if they are engaged in collaboration with foreign non-academic partners, and that these improvements in absorptive capacity will help businesses engaging in university-industry collaboration. It is also hypothesized that businesses in metropolitan regions will not increase their absorptive capacity as a result of collaborating with foreign non-academic partners, and that these collaborations will not increase the likelihood that businesses in metropolitan regions engage in university-industry collaboration.

It is assumed that peripheral regions will provide access to a small variety of potential non-academic partners (such as suppliers, customers, competitors or technical centres) (Autio, 1998; T?dtling & Trippl, 2005). Because of this limitation, firms might have a harder time in finding non-academic partners from which they can learn (that is, partners that can provide access to novel knowledge, but similar enough to facilitate learning) (Fitjar et al., 2016; Lane & Lubatkin, 1998). Those firms that collaborate with foreign non-academic partners, however, can have an easier time in contacting partners from which they can learn (Fitjar & Rodríguez-Pose, 2011), because international collaboration will help broadening the range of potential collaboration partners. These engagements, in turn, can incentivise that businesses develop their absorptive capacity (Cohen & Levinthal, 1989, 1990). In metropolitan regions, on the other hand, it is assumed that businesses will not have to opt for international collaboration, in order to find non-academic partners from which they can learn, and that can stimulate the development of absorptive capacity. Because of the broader variety of organisations available in metropolitan regions (Autio, 1998; T?dtling & Trippl, 2005), businesses will be able to contact in their regional vicinity with non-academic partners whose knowledge base is different (and similar) enough to stimulate learning.

In order to uncover the roles of proximity for university-industry collaboration in metropolitan and peripheral regions, this paper relies on quantitative research methods. The research
follows an approach similar to that of Drejer & Østergaard (2017), combining two datasets from Statistics Denmark: the Integrated Database for Labour Market Research (abbreviated in Danish as IDA) and the Danish Innovation Survey, a compulsory innovation survey on Danish firms. These datasets are merged for a peripheral region, North Denmark, and a metropolitan region (a merger of the Capital Region, and the region of Zealand). With this merged dataset, I plan to run logistic regressions on the likelihood that businesses engage in university-industry collaboration with higher education institutions located in Denmark or in other countries. The following results are expected: firms in the peripheral should have a stronger propensity to engage in university-industry collaboration, if they collaborate with foreign non-academic partners. However, for firms located in metropolitan regions, collaborating with foreign non-academic partners should increase the likelihood of engaging in university-industry collaboration.

References


Finding your ideal (foreign) non-academic partner: Implications for university-industry collaboration, in peripheral and metropolitan regions?

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Role of Universities in Innovation and regional development (RUNIN) training network
Abstract

This paper develops a theoretical framework, and a set of testable propositions, on how collaboration with non-academic partners located abroad might affect businesses’ absorptive capacity, and businesses’ propensity to engage in collaboration with universities, depending on the characteristics of the region. The present document also includes a research agenda with the goal of testing the propositions, in a further developed version of the paper. It is hypothesized that businesses in peripheral regions will be able to develop their absorptive capacity to a greater extent, if they are engaged in collaboration with foreign non-academic partners, and that these improvements in absorptive capacity will increase the ability of businesses to engage in university-industry collaboration. It is assumed that peripheral regions will provide access to a small variety of potential non-academic partners (such as suppliers, customers, competitors or technical centres). Because of this limitation, firms might have a harder time in finding non-academic partners from which they can learn (that is, partners that can provide access to novel knowledge, but similar enough to facilitate learning). Those firms that collaborate with foreign non-academic partners, however, can have an easier time in contacting partners from which they can learn, and these engagements can incentivise that businesses develop their absorptive capacity, and their propensity to engage in university-industry collaboration. It is also hypothesized that businesses in metropolitan regions will not increase their absorptive capacity as a result of collaborating with foreign non-academic partners, and that these collaborations will not increase the likelihood that businesses in metropolitan regions engage in university-industry collaboration. It is assumed that due to the broader variety of organisations available in metropolitan regions, businesses will not have to opt for international collaboration, in order to contact non-academic partners from which they can learn.
Introduction

Universities are expected to support the firms of their regions in their efforts to become more competitive (Charles, 2016; Drucker & Goldstein, 2007; Nilsson, 2006; Pinheiro, 2013; Power & Malmberg, 2008; Tödtling & Trippl, 2005; Youtie & Shapira, 2008), but university-industry collaboration might produce different results, depending on the characteristics of the region. Apart from universities, businesses in metropolitan regions are co-located with a large variety of organisations, such as other businesses (suppliers, customers and competitors), technical institutes or R&D centres, and the knowledge gained from collaborating with these organisations can help businesses being more innovative. Peripheral regions, on the other hand, do not count with non-academic organisations as diverse as those of their metropolitan counterparts. This lack of diversity is perceived as an obstacle to interorganisational learning (Storper & Venables, 2004; Tödtling & Trippl, 2005), and it could have implications for firms’ ability to collaborate with universities.

However, the call for building knowledge pipelines beyond the region (Fitjar & Rodriguez-Pose, 2011; Rodriguez-Pose & Fitjar, 2013) suggests that extra-regional collaboration can help businesses overcoming the limitations of their regional location. By collaborating with non-academic partners located abroad, businesses can gain access to knowledge not available in their home region. Such exchanges could, in turn, help businesses engage in collaboration with universities, taking into account that firms with higher absorptive capacity, and a stronger propensity to interact with external partners have been found to be more likely to engage in university-industry collaboration (Drejer & Østergaard, 2017; Laursen, Reichstein, & Salter, 2011; Laursen & Salter, 2004). Hence the main research question guiding this paper: What roles does collaboration with non-academic, foreign partners play for university-industry collaboration, in peripheral and metropolitan regions?

The current version of this paper does not provide a direct answer to the research question. Instead, it is a first step towards an empirical paper. I develop a theoretical framework, leading to a set of propositions, which will be converted into hypotheses to be empirically tested in a further developed version of the paper. In order to fulfil these goals, I explore the role of absorptive capacity (Cohen & Levinthal, 1989, 1990) as a driver of university-industry collaboration (Drejer & Østergaard, 2017; Drejer & Vinding, 2007; Laursen & Salter, 2004), in metropolitan and peripheral regions (Autoio, 1998; Storper & Venables, 2004; Tödtling & Trippl, 2005). The argument of this paper is double: firstly, I suggest that businesses in peripheral regions will be more able to find non-academic partners from which they can learn (that is, organisations that can offer access to new knowledge, but knowledge similar enough to make learning possible (Fitjar et al., 2016; Lane & Lubatkin, 1998)), if they engage in collaboration with international non-academic partners. As a result of these collaborations, firms will develop to a greater extent their absorptive capacity. However, collaboration with foreign non-academic partners will not stimulate the development of absorptive capacity, in the case of firms located in metropolitan regions. Secondly, I suggest that the more firms develop their absorptive capacity out of collaborating with foreign non-academic partners, the higher will be their propensity to collaborate with universities.

These arguments imply an understanding of absorptive capacity that focuses on how the role of absorptive capacity in acquiring, assimilating, integrating and exploiting the knowledge generated elsewhere (Cohen & Levinthal, 1989, 1990) co-evolves with businesses’ collaborations. Firms have to possess a certain absorptive capacity in order to be able to cooperate and learn from other organisations (Drejer & Vinding, 2007; Laursen & Salter, 2004). However, absorptive capacity is also conceived as a capability that can evolve from previous engagements. In this sense, Cohen & Levinthal (1989, 1990) hypothesize that businesses will invest more resources in developing this capability, in environments where there is higher technological opportunity (that is, more extra-industry knowledge, and a higher payoff for acquiring this knowledge), and where they can benefit from other firms’ knowledge spillovers. If these arguments are applied to study how businesses develop their absorptive capacity out of collaboration with non-academic partners, a consequence could be that businesses will have an incentive to develop their absorptive capacity, in order to bridge the cognitive gap with their partners (Balland, Boschma, & Frenken, 2015; Boschma, 2005), and absorb the knowledge obtained from these collaborations.
I assume that businesses in metropolitan and peripheral regions will be able to collaborate with a variety of non-academic partners, including organisations generating and diffusing knowledge (organisations such as public research institutions and technological service providers) and organisations applying and exploiting knowledge (such as supplying and customer firms, as well as competitors\(^1\)) (Autio, 1998; Tödtling & Trippl, 2005). In the case of peripheral regions, nevertheless, there will be less variety of non-academic partners, and businesses will have a harder time finding partners from which they can learn (that is, partners that can provide access to novel knowledge, but knowledge similar enough to make learning possible) (Fitjar et al., 2016; Lane & Lubatkin, 1998). However, businesses collaborating with non-academic partners located abroad will be better able to interact with organisations with which there is some, but not too much similarity in the knowledge that they possess. These firms, in turn, will have a stronger incentive to develop their absorptive capacity, in order to reap the benefits of collaborating with foreign non-academic partners, and because of these increases in absorptive capacity firms will be more prepared to engage in university-industry collaboration. As a result of their engagements with international non-academic partners, these companies will have also developed a stronger preference to look for external knowledge sources, opting for open search strategies. Consequently, these firms will have a stronger propensity to engage in university-industry collaboration (Laursen et al., 2011; Laursen & Salter, 2004).

The opposite is expected to hold for businesses in metropolitan regions. Because these regions count with a larger number of organisations generating and diffusing knowledge, as well as exploiting and applying knowledge (Autio, 1998; Storper & Venables, 2004; Tödtling & Trippl, 2005), I do not expect collaboration with foreign non-academic partners to make a difference in the development of businesses’ absorptive capacity, and in their propensity to engage in university-industry collaboration. Regional organisations will already provide access to a wide variety of knowledge sources and, because of this, it will be easier for businesses to find non-academic partners that are neither too similar, nor too different, in the knowledge they possess (Fitjar et al., 2016; Lane & Lubatkin, 1998). Hence, firms will be more likely to learn from their regional collaboration, develop their absorptive capacity, and have a stronger propensity to collaborate with universities.

In developing these arguments, I assume that geographical proximity (Balland et al., 2015; Boschma, 2005) will play a role in facilitating (or not) university-industry collaboration. More specifically, I assume that geographical proximity with non-academic partners will help firms in developing their absorptive capacity in metropolitan regions, but not in peripheral regions. In metropolitan regions, firms are co-located with a broad variety of potential non-academic partners. Hence, it is easier for these businesses to contact non-academic partners from which they can learn, and that can incentivise the development of their absorptive capacity. In peripheral regions, on the other hand, firms will be co-located with a narrower variety of potential non-academic partners, and it will be more difficult for firms to contact non-academic partners that can stimulate the development of their absorptive capacity. Increasing the geographical distance of the collaboration portfolio through international engagements, nevertheless, will help these firms find collaboration partners from which they can learn.

The paper is structured as follows. The next section will review relevant literature. This discussion will lead to the elaboration of a conceptual model on the role of absorptive capacity and non-academic partners for university-industry collaboration in metropolitan and peripheral regions, and the development of a set of testable propositions. Another section will outline how the propositions can be tested empirically. Finally, a last section will summarise the main arguments of this paper.

\(^1\) In this paper, I consider the organisations operating in the knowledge application and exploitation subsystem of a regional innovation subsystem (RIS), and the knowledge generation and diffusion subsystem (Autio, 1998; Tödtling & Trippl, 2005) as sources of knowledge that can stimulate learning in businesses. This way of conceiving organisations relates to the concepts of the Science and Technology mode of innovation, and the Doing, Using and Interacting mode of innovation (Jensen, Johnson, Lorenz, & Lundvall, 2007), because organisations corresponding to the knowledge application and exploitation subsystem (such as supplier and customer firms, or competitors) are also considered as potential sources of knowledge.
Literature review

Aside from universities, metropolitan regions count with a wide variety of organisations aimed at the generation and diffusion of knowledge, including public research institutions and technological service providers. These regions also count with a wide variety of organisations applying and exploiting knowledge, including supplier and customer firms, as well as competitors. Peripheral regions, on the other hand, count with a smaller variety of organisations aimed at the generation and diffusion of knowledge, and the application and exploitation of knowledge (Autio, 1998; Storper & Venables, 2004; Tödtling & Trippl, 2005). These regional differences might have implications for businesses’ absorptive capacity, or the ability to acquire, assimilate, integrate and exploit the knowledge generated elsewhere (Cohen & Levinthal, 1989, 1990). Two assumptions suggest a link between the differences in metropolitan and peripheral regions, and the development of absorptive capacity.

First, a minimal level of absorptive capacity is required for firms to absorb external knowledge on first place (Cohen & Levinthal, 1989, 1990), or to be able to collaborate with other organisations (Drejer & Vinding, 2007; Lane & Lubatkin, 1998). Nevertheless, Cohen & Levinthal (1989, 1990) also hypothesize that businesses will invest more resources in developing absorptive capacity, in environments where there is higher technological opportunity (that is, more extra-industry knowledge, and a higher payoff for acquiring this knowledge), and a higher likelihood of benefiting from competitors’ knowledge spillovers. Going a step further, it can be argued that businesses will have an interest in developing their absorptive capacity, as a consequence of collaborating with other organisations: firms will have incentives to invest in their absorptive capacity, in order to bridge the cognitive distance between them and their partners, and be able to access the knowledge that their partners possess. This assumption relates to the notion of cognitive proximity, in the sense that the development of absorptive capacity is seen as an instrument that helps bridging the cognitive gap between a firm and its collaboration partners, thus stimulating learning on the part of the firm (Balland et al., 2015; Boschma, 2005).

Second, the greater the variety of potential non-academic partners available, the easier it will be for firms to develop absorptive capacity through collaboration. I argue that a greater variety of potential partners will provide businesses with more opportunities to find organisations from which they can learn: that is, partners that can offer access to novel knowledge, but knowledge similar enough to allow learning (Fitjar et al., 2016; Lane & Lubatkin, 1998). If, on the contrary, companies have only access to a smaller variety of potential partners, it will be more difficult for them to find partners from which they can absorb and incorporate new knowledge. Those businesses that find the appropriate non-academic partners, in turn, will have a stronger incentive to develop their absorptive capacity, in order to bridge any cognitive gap with their partners (Balland et al., 2015; Boschma, 2005), and learn from them as much as possible.

If these assumptions are applied to collaboration patterns in metropolitan and peripheral regions, a picture emerges. Because it is assumed that businesses in peripheral regions will have access to a smaller variety of potential non-academic partners (Autio, 1998; Storper & Venables, 2004; Tödtling & Trippl, 2005), these firms will have less opportunities to find organisations from which they can learn (Fitjar et al., 2016; Lane & Lubatkin, 1998), within the region. Hence, intra-regional collaboration will provide little incentives for the development of businesses’ absorptive capacity. Meanwhile, businesses in metropolitan regions will have access to a broader variety of potential non-academic partners, and thus firms will have an easier time in finding non-academic partners from which they can learn, within the region. Consequently, businesses engaged in these collaborative relationships will have stronger incentives to develop their absorptive capacity, in order to maximise the absorption of knowledge from their collaborating partners. Therefore, geographical proximity (here, the co-location of firms with potential non-academic partners, in the same region) will facilitate the establishment of collaborative relationships that can stimulate the development of absorptive capacity in metropolitan regions, but not in peripheral regions (Boschma, 2005). This assumption also relates to the notion that regions with a poorly-endowed knowledge infrastructure will force businesses to look for learning sources outside the region, due to the scarcity of knowledge inputs available in the region (Drejer & Vinding, 2007).
However, businesses in peripheral regions might have stronger incentives to develop their absorptive capacity, if they collaborate with foreign non-academic partners. Boschma (2005, pp. 69–72) suggests that a combination of local and supra-local relationships can help organisations remain open to new knowledge, and previous research points as well towards this direction: extra-regional interaction has helped bringing new knowledge to regional collaborative networks (James, Vissers, Larsson, & Dahlström, 2016), and companies engaged in international collaboration appear more likely to innovate (Fitjar & Rodríguez-Pose, 2011; Rodríguez-Pose & Fitjar, 2013). Hence, I suggest that for firms in peripheral regions, collaborating with foreign non-academic partners will provide further opportunities for the development of absorptive capacity. This is because international collaboration will provide businesses with opportunities to collaborate with a wider variety of non-academic partners, thus increasing the chances that businesses can find organisations from which they can learn. Engaging in international collaboration will entail increasing the geographical distance between a firm and its non-academic partners, yet it will be more likely to that firms can learn from these partners (Boschma, 2005; Fitjar et al., 2016). In this sense, previous research (Fitjar & Rodríguez-Pose, 2011) has identified an association between business managers’ open-mindedness to foreign ideas, and firms’ propensity to engage in collaboration with international partners. The same paper, in addition, found a positive association between international collaboration and product innovation, radical or not; unlike collaboration with regional or national partners.

However, I also suggest that the same dynamics will not be seen for firms in metropolitan regions, because businesses in these regions count already with a broad variety of non-academic partners in their regional vicinity (Autio, 1998; Storper & Venables, 2004; Tödtling & Trippl, 2005). Under these conditions, firms will have an easier time in finding regional non-academic partners with which there is some, but not too much similarity in the knowledge that they possess (Fitjar et al., 2016; Lane & Lubatkin, 1998), and collaborating with foreign non-academic partners will not add to the development of absorptive capacity.

Following this line of reasoning, it can also be argued that firms in peripheral regions will be more prepared to engage in university-industry collaboration, if they collaborate with foreign non-academic partners. These firms will have developed to a greater extent their absorptive capacity, compared to other businesses located in the same type of region, but not engaged in collaboration with foreign non-academic partners. Having increased their absorptive capacity, the former firms will be more prepared to engage in university-industry collaboration. In addition, it can also be argued that the experience of collaborating with foreign non-academic partners will increase businesses’ openness to interact with different types of organisations, in order to gain access to external knowledge. And the more firms are open to interact with other organisations to search for new knowledge, the more firms should be inclined to engage in collaboration with universities. In this sense, previous research points to a positive association between firms’ absorptive capacity and the likelihood of engaging in university-industry collaboration, as well as a positive association between businesses’ propensity to look for external, non-academic knowledge sources, and university-industry collaboration (Drejer & Østergaard, 2017; Laursen et al., 2011; Laursen & Salter, 2004).

In metropolitan regions, on the other hand, collaboration with international partners should not lead to differences in the propensity to engage in university-industry collaboration. The wider diversity of non-academic partners available in these regions will already facilitate that businesses collaborate with partners from which businesses can learn, thereby providing an stimulus for the development of their absorptive capacity, and firms’ openness to interact with other organisations in order to search for new knowledge. Two propositions summarise the arguments developed so far:

**Proposition 1:** In peripheral regions, businesses that collaborate with foreign non-academic partners will be more inclined to engage in university-industry collaboration than businesses that do not collaborate with foreign non-academic partners.

**Proposition 2:** In metropolitan regions, businesses that collaborate with foreign non-academic partners will be as inclined to collaborate with universities as businesses that do not collaborate with foreign non-academic partners.
In order to illustrate the relationship between access to non-academic partners, absorptive capacity development and university-industry collaboration in metropolitan and peripheral regions, a conceptual model (figure 1) is devised. The following section will outline how the propositions can be tested empirically.

**Figure 1: Conceptual model on the role of non-academic partners and absorptive capacity development for university-industry collaboration, in peripheral and metropolitan regions**
Testing the propositions: a research agenda

In further stages of the development of this paper, I plan to test the propositions developed above by comparing university-industry collaboration patterns between two Danish regions: North Denmark, which will be treated as a peripheral region; and a combination of the Capital Region and the region of Zealand, which will be treated as a metropolitan region. More specifically, I plan to combine data from the Danish Integrated Labour Market database (IDA, in Danish), and data from the Danish Innovation Survey, in order to run binomial logistic regression analyses on the likelihood that businesses engage in collaboration with universities in collaboration with universities. At the time of writing this paper, the dataset is in preparation. The data sources, and methods, are discussed below.

Data sources

The propositions formulated in the previous section can be tested by relying on a combination of data from the IDA database, and data from the Danish Innovation Survey. The IDA database contains data on the entire Danish population, as well as the entire population of Danish firms. Moreover, it is possible to use identification numbers to connect personal-level data (e.g. degree of education), employee-level data (e.g. whether the individual is employed in a full or part-time basis) and establishment-level data (e.g. number of employees, industry code, municipality code) with firm based databases, broadening the range of variables that can be included in quantitative analyses (Timmermans, 2010). In order to obtain data on the international collaboration patterns of firms, the IDA database can be combined with the Danish Innovation Survey, which is a compulsory survey on the innovation activities of Danish firms. The survey includes questions on whether firms collaborate with other organisations in Denmark, the European Union, and beyond, as part of their innovation activities. The inclusion, or exclusion, of businesses with no declared collaboration with non-academic partners is currently under consideration.

Methods

In order to test the propositions I plan to run logistic regressions on the likelihood that businesses engage in collaboration with any university, whether Danish or located abroad, during the 2012-2013 period (the data is available until 2013). The regressions will be run separately for the peripheral region and the metropolitan region. In this point, I am inspired by Drejer & Østergaard (2017), who used as a dependent variable the likelihood that firms engaged in collaboration with each one of the Danish universities, for the 2011-2013 period. However, in this case the outcome of interest is not whether businesses collaborate with a specific universities, but rather collaboration with higher education institutions in general, Danish or not. In addition, the period of interest for the dependent variable is shorter, in order to minimise the loss of observations: as will be seen below, the logistic regressions will include variables for which the data refers to an earlier period of time, and prolonging the period for which the variable’s data is collected might entail a loss of observations.

As an independent variable, I will use an indicator capturing the number of types of non-academic partners that are collaborating with the company, as part of its innovation activities, outside Denmark. The Danish Innovation Survey includes indicators on whether firms have collaborated with different types of non-academic partners located abroad, including organisations involved in the application and exploitation of knowledge, such as suppliers, customers or competitors; and organisations involved in the generation and diffusion of knowledge, such as public research institutions and technological service providers. Hence, it is possible to construct an indicator capturing the number of types of foreign non-academic partners, and relate this indicator to firms’ propensity to develop their absorptive capacity. The approach followed here is inspired by Drejer & Østergaard (2017, p. 6), who construct an indicator capturing the diversity of collaboration partners, yet they do so in order to capture businesses’ openness to include external collaboration partners in their innovation processes. Another influence is Fitjar & Rodríguez-Pose (2011), who test the association between the variety of collaboration partners at different geographical scales (regional, national, international) and firm innovation activities, in Norway. In the first proposition (In peripheral regions, businesses that collaborate with foreign non-academic partners will be more inclined to engage in university-industry collaboration than businesses that do not collaborate with foreign non-academic partners), I expect collaboration with foreign non-
academic partners to be associated to a higher likelihood of engaging in university-industry collaboration, for the sample of firms located in the peripheral region. In the second proposition (in metropolitan regions, businesses that collaborate with foreign non-academic partners will be as inclined to collaborate with universities as businesses that do not collaborate with foreign non-academic partners), I do not expect this association to be statistically significant, for the sample of firms located in the metropolitan region.

However, the first and second propositions entail a temporal sequence. In the peripheral region, firms are expected to react to an external stimulus (collaboration with foreign non-academic partners), by increasing their absorptive capacity (Cohen & Levinthal, 1989, 1990). Due to this enhancement in absorptive capacity, firms should be more prepared to collaborate with universities (and more inclined to do so, because of a stronger preference for broadening the range of sources from which firms draw knowledge (Drejer & Østergaard, 2017; Laursen & Salter, 2004)). In the metropolitan region, this reaction is not expected to take place. In order to express these relationships, the logistic regression model will include a two-year lag between the dependent variable (operationalised for the 2012-2013 period) and the independent variable (operationalised as the average number of types of international collaboration partners, INTPARTNERS, during the 2010-2011 period).

The control variables are also for the 2010-2011 period, in order to take into account their effect on the dependent variable. I will include control variables for firms’ average spending on R&D, as a proportion of sales; and firm’s average proportion of graduates over full-time staff. Both indicators have been used as proxies for firms’ absorptive capacity: the former is seen as an indicator of companies’ investment in absorptive capacity (Cohen & Levinthal, 1989, 1990; Drejer & Vinding, 2007; Laursen et al., 2011; Laursen & Salter, 2004); and Drejer & Østergaard (2017, p.6) use the latter as an expression of a firm’s “general absorptive capacity”. In addition, another indicator on the average number of types of national collaboration partners will be included, in relation to firms’ absorptive capacity (Fitjar & Rodríguez-Pose, 2011). The goal, here, is to control as much as possible for other factors related to the absorptive capacity that firms already possess during the measurement period, and focus on the relationship between collaboration with foreign non-academic partners, the development of absorptive capacity, and the likelihood of engaging in university-industry collaboration. Finally, the logistic regressions will include controls for other variables considered relevant in the literature on university-industry collaboration: the average company size, measured by a firm’s number of employees, and industry classification (Drejer & Østergaard, 2017; Laursen & Salter, 2004). The regression model is specified below:

\[ y_{it} = \alpha + \beta_1 \text{INTPARTNERS}_{it-2} + \beta_2 \text{CONTROL}_{it-2} + \epsilon_{it} \]

The approach followed in this paper presents some inconveniences. Firstly, the indicator on the number of types of foreign non-academic partners does not include information on how many organisations are included in each type. Secondly, the data available prevents studying directly how collaboration with foreign non-academic partners stimulates the development of absorptive capacity, and university-industry collaboration, in metropolitan and peripheral regions. Absorptive capacity is a multifaceted capability: it encompasses aspects such as spending in R&D; the extent to which the staff qualifications are suited to absorb knowledge of interest for the firm; or the extent to which the organisational form of the firm, as well as its internal communication and coordination routines support the integration and exploitation of the new knowledge (Cohen & Levinthal, 1989, 1990; Lane, Koka, & Pathak, 2006; Van den Bosch, Volberda, & de Boer, 1999). Such complexity, however, cannot be completely captured through the independent variable used in this paper. Instead, the association between the independent and the dependent variable is used as a proxy for the development of absorptive capacity. Nevertheless, the research conducted as part of this paper could be improved with more fine-grained measures in the future.

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2 The analysis is restricted to persons in full-time employment: those individuals that are employed on a full-time basis are more likely to develop their career within the boundaries of firms and contribute to their potential absorptive capacity, whilst part-time employment might respond to short-term needs (Tilly, 1991).
Summary

This paper has developed a conceptual model and a set of propositions that can contribute to a deeper understanding on university-industry collaboration, in metropolitan and peripheral regions. These propositions will be converted into hypotheses, to be empirically tested in a further developed version of this paper. For this reason, a research methodology has been advanced, outlining how the propositions could be tested empirically.

The propositions and conceptual model devised in this paper suggest a relationship between businesses’ regional location in metropolitan or peripheral regions, their choice of non-academic collaboration partners and the development of absorptive capacity that results from this choice, and university-industry collaboration. Firms in peripheral regions will be co-located in their region with a narrower variety of possible non-academic partners (Autio, 1998; Tödtling & Trippl, 2005). Hence, it will be more difficult for them to find partners from which they can learn, if they opt to collaborate with co-located partners (Boschma, 2005): the likelihood that businesses collaborate with partners that can provide access to novel knowledge, but knowledge similar enough to facilitate learning, will be lower (Fitjar et al., 2016; Lane & Lubatkin, 1998). As a result, firms will have less incentives to develop their absorptive capacity, since it will be more difficult to learn from the regional collaborating organisations (Cohen & Levinthal, 1989, 1990). However, firms in peripheral regions will be better able to find partners from which they can learn, if they engage in collaboration with foreign non-academic partners (Fitjar & Rodríguez-Pose, 2011; Rodríguez-Pose & Fitjar, 2013). These businesses will be more able, in turn, to develop their absorptive capacity, and engage in university-industry collaboration, than firms in peripheral regions that do not collaborate with foreign non-academic partners. The same firms will, in addition, develop a stronger interest to look for external knowledge sources, including universities (Drejer & Østergaard, 2017; Laursen et al., 2011; Laursen & Salter, 2004). Meanwhile, collaboration with international non-academic partners will not make a difference in the development of absorptive capacity, and the likelihood of engaging in university-industry collaboration, for businesses located in metropolitan regions. This is because these firms have already access to a wide variety of non-academic partners in their regional vicinity, including those from which they can learn.

In order to test the propositions advanced in this paper, a quantitative research methodology is proposed. If this research methodology is applied, it will entail combining the Danish IDA database with the Danish Innovation Survey, a compulsory survey on firms’ innovation activities. With this combined dataset, I plan to run binomial logistic regression analyses on the likelihood that businesses collaborate with universities (Danish or international). These regression analyses will be conducted separately for a sample of firms in a peripheral region (North Denmark), and a sample of firms in a metropolitan region (the merger of the Capital Region and Zealand). The independent variable will be an indicator on the number of types of foreign non-academic partners (Drejer & Østergaard, 2017; Fitjar & Rodríguez-Pose, 2011). If the first proposition is confirmed, I expect that businesses’ engaged in collaboration with international non-academic partners will engage in university-industry collaboration to a greater extent than businesses not engaged in collaboration with these partners, in peripheral regions. If the second proposition is confirmed, I do not expect collaboration with foreign non-academic partners to stimulate university-industry collaboration, in metropolitan regions.

Unfortunately, the data available prevents studying directly how collaboration with international non-academic partners stimulates the development of absorptive capacity and university-industry collaboration, in metropolitan and peripheral regions. Instead, it is assumed that if the propositions are confirmed, collaboration with foreign non-academic partners will provide firms in peripheral regions with an opportunity to develop their absorptive capacity, and engage in university-industry collaboration; but not in metropolitan regions.
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