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Are firms in diverse regions more diverse and does it really matter

Christian Richter Østergaard
Aalborg University
Department of Business and Management
cro@business.aau.dk

Bram Timmermans
Aalborg University
Dept. of Business and Management
bram@business.aau.dk

Abstract

Within the field of management studies and organizational behavior there is a wide spread interest on the link between workplace diversity and firm performance. Simultaneously, research in economic geography has investigated the role of diversity for regional growth and innovative capabilities. These studies often assume that diversity in the regional industry structure create externalities that increase the innovativeness of the firms in the region. However, despite several hints in existing studies; hardly any research has been conducted that links regional differences in diversity and employee diversity and how the combination of these two factors influence firm performance.

This paper combined these perspectives by analyzing whether firms in diverse regions are diverse and how this regional diversity influences the composition of firms and their innovative performance.

Using detailed matched employer-employee register data and innovation survey data we find that regional diversity do have an impact on firm?s likelihood of product innovation, but the effect of employee diversity in the firm has a higher impact. Therefore, firms with low employee diversity can compensate somewhat for their low internal diversity if they are located in a region with high diversity on the labor market. In any case internal employee diversity has a positive effect on the firms? innovative performance also in regions with low diversity.

Jelcodes:O31,J24

Are firms in diverse regions more diverse and does it really matter?

An empirical investigation on the link between regional labor market characteristics, firm's employee diversity and their innovative capabilities

Keywords: *innovation output, workplace diversity, regional diversity, education*

1. Introduction

For decades the diversity in labor market has increased greatly. There has been an increase in: labor market participation and educational level of women; diversity in cultural and ethnic backgrounds as a result of globalization; varied work experience due to higher job mobility rates; educational levels due to easier access to higher education; the demand for new skills as a result of changes in the organization of work; diversity in education programs. Consequently, firms are confronted with a potential labor force that is becoming increasingly diverse. Some firms make use of this diversity by actively establishing a diverse workforce in the believe that the cognitive diversity as a result of this recruitment policy will help in dealing with competitive pressures by giving the firms' better problem solving abilities, better opportunity recognition skills, and creativity. Other firms seek, despite the availability of a diverse labor force, stabilizing work environments by recruiting employees that are similar.

Theoretically, there are sound arguments to choose for any of these recruitment strategies. Within management and organizational behavior many studies have investigated the effect of a diverse workplace on firm performance (Williams and O'Reilly, 1998; Jackson et al., 2003; Horwitz, 2005; Horwitz and Horwitz, 2007; Harrison and Klein, 2007) and the ambiguous effect of workplace diversity remains, although diversity in skills seem to have a positive impact on firm performance (Jackson et al., 2003). This positive relation has also been observed when investigating the effect of employee diversity on innovation (Bantel and Jackson, 1989; Pitcher and Smith, 2001; Van der Vegt and Janssen, 2003; Østergaard et al., 2011; Parrotta et al., 2011).

As a result of the "business case" for diversity, policy makers, consultants and academics argue in favor for a recruitment strategy that stimulates diversity. However, neither the experts nor the majority of studies on workplace diversity take into account the diversity of the local labor market. Creating a diverse work place is contingent on the availability of diversity on the local labor market since geographical mobility of employees is limited (Dahl and Sorenson, 2010). Therefore, firms located in areas that are less diverse in their labor force are challenged in creating employee diversity. Consequently, urban areas will have a higher level of diversity compared to more rural areas. This puts natural restrictions to firms in peripheral regions. The importance of regional factors in supporting innovative behavior of firm is widely analyzed by economic geographers. Many studies in this field have focused on the diversity that is present in the region and how this affects regional economic performance and technological change (Audretsch and Feldman, 1996; Feldman and Audretsch, 1999; Essletzbichler, 2007; Frenken et al., 2007; Boschma and Frenken, 2011).

The contribution of this paper is effort to link workplace diversity with regional diversity and then firms' innovative activities. Several hypotheses on the complex mechanisms associated with the relation between diversity in the region and diversity in firms could be formulated based on the existing literature. However, strong arguments can be provided for a positive, negative and no relationship. Therefore, we will refrain from this and instead implement an inductive empirical approach relying on robust large sample of firms where the literature will form a theoretical point of departure in a similar fashion as Dahl et al. (2012). The analyses will address the overall question on whether firms in diverse regions are diverse and how this affects their innovative capabilities.

The analyses will be based on data from Statistics Denmark's research and innovation survey 2007 containing information on more than 4,500 firms. These data will be merged with matched employer-employee register data that allows a detailed investigation of the composition of the Danish labor force at the regional level as well as firm level. As the data set contains information on the location of residence and the location of work, it is possible to identify commuting patterns and determine local labor market regions. The data also include information on demographics and educational background for the entire Danish labor force on individual level. Therefore it is possible to create a diversity measure that can serve as a proxy for skill diversity both on the level of the firm and the region. The other demographic characteristics are used to create firm level employee composition variables.

The paper will take several steps: next section provides a theoretical overview on the literature on workplace diversity and regional diversity. In particular, the focus will be on the various empirical contributions in the literature on workplace diversity that address the impact of workplace diversity on firms. Similarly, the focus in the overview of regional diversity literature will be on studies that address the role of individuals. Then, follow the empirical part of the paper with descriptions of database and the creation of the main constructs of the paper and analysis. The paper will finish with a conclusion.

2. Theories of firm diversity, regional diversity and firms' innovative performance

2.1. Workplace diversity and firm performance

For decades, researchers in management studies and organizational behavior have investigated the effect on performance of a diverse human resource composition of various types of work units ranging from small organizational teams within organization, e.g. top management teams[1] (e.g. Murray, 1989; Bantel and Jackson, 1989; Wiersema and Bantel, 1992), to the workplace as a whole (e.g. Laursen et al., 2005; Østergaard et al., 2011;). The underlying rationale for the importance of employee diversity in firms can be traced back to the seminal work by Penrose (1959), where she stated that the heterogeneity of resources, including human resources that are available to the organization provide a firm with their unique character.

Studies investigating workplace diversity have been around since the 1950s (Williams and O'Reilly, 1998), but the number increased greatly in the 1980s as the business case for diversity was made (Konrad, 2003). This business case emerged simultaneously with increased level of diversity in organizations. The underlying mechanism for this increased diversity can be contributed to drastic changes on the labor market, which among other things include higher degree of labor market participation of women, a higher education level, increased cultural differences due to globalization of labor markets, and the more diverse skill set of individuals. In addition, as diversity is proclaimed to have a positive impact on performance, some organization, mainly larger firms, started to implement diversity strategies thereby actively engaging in establishing

[1] These studies are inspired by Hambrick and Mason (1984) whose upper echelon framework analyses how background factors of top management team members that affect organizational outcomes.

diverse work groups. The increased diversity in these organizations then spurred the interest of researchers to investigate the impact of workplace diversity in more detail.

The large amount of studies has led to a number of academic reviews on workplace diversity (see e.g.: Williams and O'Reilly, 1998; Jackson et al., 2003; Horwitz, 2005; Harrison and Klein, 2007; Horwitz and Horwitz, 2007). These reviews generally find an ambiguous relationship between workplace diversity and performance, which varies from member turnover to firm productivity and innovation. The reviews report a variety of diversity measures, but most common are demographic characteristics like age, gender, and race-ethnicity and task-related diversity measures like functional background, education and tenure.

The diversity characteristics are linked to various indicators to establish the impact of this diversity on the work unit. Based on a review of the literature that covers the period 1997-2002, Jackson et al. (2003) divides these topics in three overall categories: (i) firm performance, which is most often measured using financial indicators; (ii) behavioral processes, which include self-reported issues like communication, conflict and use of information; and (iii) affective reactions, which includes measures for cohesion, satisfaction and commitment. However, the vast majority of studies focused on firm performance.

There are various approaches to the analysis of the impact of diversity on firms. The first approach is the cognitive resource diversity theory. Researchers in favor of this approach argue that diversity has a positive impact on performance as a result of the unique cognitive resources, i.e. skills, ability, information, and knowledge that are brought into the team (Cox and Blake, 1991; Hambrick et al., 1996; Williams and O'Reilly, 1998; Nooteboom, 2000; Horwitz, 2005; Østergaard et al., 2011). This line of argument is similar to other approaches within management theory, in particular the resource-based view of the firm (Barney, 1991).

A different approach is followed by researchers that focus on the negative impact of diversity. They believe strongly in social categorization and the subsequent process of social identity (Tajfel, 1981; Turner, 1987) and similarity-attraction (Byrne, 1971). Contrary to the beliefs of cognitive resource diversity approach these processes fail to capture the information that is present in different groups (Horwitz, 2005). Social categorization occurs because group members place themselves and others in categories rather than treating them as separate individuals; process that often occurs in heterogeneous groups (Williams and O'Reilly 1998; Joshi and Jackson 2003; Horwitz and Horwitz 2007). Categorization is by itself not a problem, but it creates adverse interaction effects. Social identity has a negative impact, because it creates in-group and out-group membership; consequently, a positive bias towards in-group members is developed and out-group members are regarded as less attractive, trustworthy, honest, cooperative which ultimately will lead to conflict (Joshi and Jackson, 2003). The process of similarity attraction argues that interpersonal attraction arises due to the similarities that exist between the different members within a group. This attraction is a result of shared experiences and values. These shared experiences and values ease the communication and interaction between members and enhances their cohesiveness. However, in addition to the stronger connection within the group this might lead to a dislike of members in other groups, just as in social identity theory (Horwitz, 2005).

These theoretical perspectives provide sound but contradictory arguments on the potential effect of workplace diversity. It is therefore not surprising that studies have argued and found positive, negative, non-significant and even curvilinear effects of diversity (Laursen et al., 2005; Østergaard et al., 2011). Similarly, Jackson et al. (2003) argues that diversity is a double edge sword as there are no clear patterns between the majority of diversity measures and the impact on firms. However, one of the exceptions is the link between diversity in skills and firm performance. Studies indicate that this type of workplace diversity has a positive impact on performance indicators (Jackson et al., 2003).

This is also the case for innovation as many studies have shown that there is a positive relation between employee diversity and innovation (Bantel and Jackson, 1989; Pitcher and Smith, 2001; Van der Vegt and Janssen, 2003; Østergaard et al., 2011; Parrotta et al., 2011). The main arguments are that workplace diversity increases the absorptive capacity (Cohen and Levinthal, 1990) and broaden the search space of the organization, which makes the firm more receptive towards new ideas (Østergaard et al., 2011). This is valid for small units within the organization, e.g. top management teams (Bantel and Jackson, 1989; Pitcher and Smith, 2001; Van der Vegt and Janssen, 2003), but also the organization as a whole (Østergaard et al., 2011; Parrotta et al., 2011). The latter is the case as innovation involves communication and interaction between employees in all levels of the organization in a firm and draws on their different qualities from all levels of the organization (Lundvall, 1985; Lundvall,1992; Laursen et al., 2005; Østergaard et al., 2011).

So far, we have only discussed the ways in which diversity affects firm performance, however, this effect is contingent on many other processes within firms, such as organizational culture, strategic context, team climate and team processes, and temporal factors (Jackson et al., 2003). These contextual factors focus on internal processes of the firm leaving external factors untouched. Furthermore, the ability of a firm to be diverse is also contingent on a number of factors, e.g. the openness to diversity (Østergaard et al., 2011), but also the ability to attract diversity from the labor market.

The role of geography has been overlooked in the current discussion on workplace diversity. Geography plays an important role for the diversity of firms as they are embedded in a particular geographical environment that creates opportunities, but also restraints firms in the search for skilled employees. There are two main reasons for including geography in the discussion on workplace diversity: (i) the issue of recruitment: the availability and diversity in potential employees in the local labor market, because employees have only limited mobility (Dahl and Sorensen, 2010); (ii) the ability to benefit from intra-regional knowledge flows: the level of diversity on the local labor market might influence to what extent a particular firm needs to be diverse. One might argue that when a region is characterized by diversity, firms can benefit from this diversity without recruiting for diversity; on the other hand, if regions are not very diverse, then firms need to create the diversity in-house.

2.2. Regional diversity and firm performance

Several studies have shown that regional factors influence firms' innovative processes (Sternberg and Arndt, 2001). However, there is disagreement about which geographic

configuration is most desirable for promoting innovation (Audretsch and Feldman, 1996; Feldman and Audretsch, 1999; Desrochers, 2001; Essletzbichler, 2007; Van Oort, 2002). On the one hand there is the perspective that local diversity promotes technological change and economic growth as a result of Jacob's externalities, where diversity creates possibilities new combinations through knowledge spill-overs between different industries (Jacobs, 1970). On the other hand there is the perspective that regional specialization, i.e. Marshall-Romer-Arrow externalities, is a better configuration as it allows for specialized suppliers, labor pooling and technological spill-overs. Others argue on the importance of related variety, since too much specialization can led to a cognitive lock-in, while too much diversity reduce the potential knowledge spill-overs between different knowledge bases and increase the costs of communication (Frenken et al., 2007; Boschma and Frenken, 2010; Asheim et al., 2011). Furthermore, these studies argue that simply being neighbors might not be enough to generate knowledge spillovers (Boschma et al., 2012). Therefore, knowledge spillovers are more likely to take place between firms in related industries (Boschma and Frenken, 2011).

In our perspective on the role of diversity to enhance firms' innovative capabilities, the focus is mainly on the issue of Jacob's externalities and related variety. This perspective is driven by the idea that a diversified economy brings the benefits that are needed to trigger and generate new ideas and creativity. Within a region, there are several factors that can be considered to have an important impact on firm's innovative performance, e.g.: infrastructure, labor market and amenities (Sternberg and Arndt, 2001). Particular important are the proper industry mix, the size and structure of the regional economy, a local infrastructure conducive to innovation, and the presence of a local pool of qualified labor (Sternberg and Arndt, 2001).

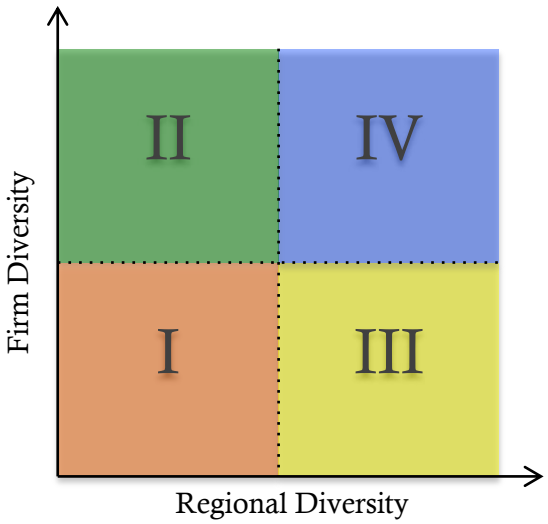
From a human capital or labor pool perspective, many theories have emerged that explain how the presence of people with a certain set of "creative" talents, often measured in the level of education, are important for regions' economic development (e.g. Desrochers, 2001, Florida, 2003). The diversity of human capital in these areas has also been highlighted and the issue of regional diversity in talent is often associated with the growth of urban areas, where diversity is a self-reinforcing process as diversity also attracts more diversity (Desrochers, 2001; Florida, 2003). Labor mobility is an important source of learning and knowledge transfer between firms, but the extent of knowledge transfer depends on the closeness of the knowledge base between firms (Almeida and Kogut, 1999; Nooteboom, 2000; Song et al., 2003; Boschma and Frenken, 2011). However, the availability of labor depends on the local labor market, because the geographical job mobility is limited (Dahl and Sorenson, 2010)

Many studies that stress the importance of regional diversity on innovation focus on core and urbanized regions, which due to their size are in general better to attract the largest share of 'talented' and higher educated labor (Audretsch and Feldman, 1996; Beardsell and Henderson, 1996; Florida 2002). Consequently, smaller and peripheral areas generally lack this innovation-supporting environment (McAdam et al., 2004), which limit the regional firms' access to the skills, talents and markets that are necessary to create innovative capabilities (Doloreux, 2003). Despite these challenges, there are still firms in peripheral regions that are successful and innovative (Fitjar and Rodríguez-Pose, 2010) and even in unsuccessful peripheral regions there are firms, both large firms and

small, that are regarded as national champions (Vaessen and Wever, 1993) also in terms of innovative output (Doloreux, 2003; Fitjar and Rodríguez-Pose, 2010). Thus, given the regional constraints like human resource availability and market proximity some firms manage to overcome these barriers to innovate. Therefore, the focus shifts from the perspective of the region to the innovative practices within these firms, which include focusing on human resource practices (McAdam et al., 2004). This is an exercise that is true in any case, as it is firms, or to be more precise individuals within firms, that are the agents that create innovations. This is consistent with the findings of Sternberg and Arndt (2001) that firms are the main drivers of innovation, but regional factors provide important supporting functions.

Thus, the topics of workplace diversity and innovative performance of firms and the link between the regional characteristics and innovation have received lots of attention. However, hardly any work has been conducted that tries to combine these two levels of diversity; consequently the link between regional diversity and firm diversity is not clear. It would be contributing to both the field of economic geography and the field of management and organizational behavior to test whether there is relation between these diversity constructs. Conceptually, based on these two diversity constructs each observation (firm or region) can be plotted on a two dimensional landscape with a continuum of firm diversity on one axis and a continuum of regional diversity on the other. Figure 1 shows the a firm diversity and regional diversity spectrum divided into four fields of crude diversity characteristics: (i) low diversity firms in low diversity regions, (ii) high diversity firms in low diversity regions, (iii) low diversity firms in high diversity regions and (iv) high diversity firms in high diversity regions.

Figure 1: Firm Diversity and Regional Diversity Spectrum



To investigate this issue of link between regional labor market characteristics, firm's employee diversity and their innovative capabilities three related research questions needs to be answered:

- First, have firms that are located in regions with a more diverse labor structure a higher level of workplace diversity, in terms of higher educated employees?

- Second, has this workplace diversity a similar impact on innovative performance for all regions in Denmark or do we identify some regional differences?
- Third, can we identify a link between workplace diversity in firms and regional diversity on the one hand and innovation output on the other?

3. Method

3.1. Data and Sample

To conduct the analysis on the link between firm diversity and regional diversity, and how the combination of the firm and regional diversity constructs affects the performance of firms it is necessary to: (i) identify the diversity of the firm, (ii) identify the diversity in the region, and (iii) compare these two diversity constructs.

To operationalize these constructs we rely on the Danish Integrated database for Labor Market Research (IDA). IDA is a longitudinal and universal employer-employee dataset that is created from government registers and is maintained by Statistics Denmark. This database contains detailed information on *all* individuals and *all* plants in Denmark since1980.[2] The unique firm, plant and individual identifiers create the opportunity to identify employer-employee relationships in consecutive years[3]. Therefore it is possible to create yearly employee composition indicators on the plant level, based on the demographic and human capital characteristics of individuals. Information on the geographic location of these plants makes it possible to place these plants and also their employees in a particular geographic context. Therefore it is also possible to measure the level of diversity in a particular region. Given the nationwide character of this database, it is possible to link diversity of firms with diversity in a broad set of regions, varying from highly urbanized areas like Copenhagen to those areas that are classified as peripheral.

The analysis in this paper are focused on the diversity in more highly educated employees, which is motivated by Østergaard et al. (2011) who found that diversity in higher educated employees was the type of employee diversity that had the strongest impact on the likelihood of Danish firms to innovate. In addition, the analysis is limited to firms that are active in industries where firms have a relative higher number of highly educated individuals, i.e. firms in high-tech, medium high-tech and knowledge intensive industries.

3.2. Employee Diversity in Firms

Following Harrison and Klein (2007) and Jackson et al. (2003) diversity is considered a unit-level compositional construct and employee diversity is treated as the distribution of differences among the employees of the firm with respect to a common attribute. The emphasis is on diversity based on the educational background; in particular diversity in higher education. The level of education information is the employees' highest achieved level of education.

[2] See Timmermans (2010) for a more detailed description of IDA.
[3] Statistics Denmark provides only yearly observations on employer-employee relationships in November that year.

Various measures are available when calculating diversity in teams. One of the most common approaches is to use the Shannon Entropy index (Stirling, 2001; Harrison and Sin, 2006; Harrison and Klein, 2007):

$$\sum_{i=1}^{n} p_i \left(ln \frac{1}{p_i} \right) = \left(p_1 \left(ln \frac{1}{p_1} \right) + p_2 \left(ln \frac{1}{p_2} \right) + \cdots + p_n \left(ln \frac{1}{p_n} \right) \right)$$

Diversity has three dimensions: types (number of different groups), balance (balance shares of these different groups) and disparity (distance between the different groups). Therefore, it is important to define the groups (p_i). The values for p_i are calculated based on the eight-digit highest fulfilled education code for all individuals in IDA. This eight-digit education code has a logical sequence where the first two digits indicate the level (e.g. high school, undergraduate, postgraduate, etc.), digits three and four the discipline (e.g. engineering, social sciences, humanistic, etc.) and the remaining four digits is a more detailed classification within each discipline (e.g. economics, business administration, computer science, civil engineering, etc.). As indicated earlier, the main interest is in diversity among employees with higher level of education, i.e. short cycle education and above. This means that all educations below this level are classified as one group. The education that are short-cycle or above are categorized based on the first four digit of the education variable, but Academic Bachelor, Master and PhD degrees are merged to reduce complexity by adding an extra dimension of disparity. In total 48 education categories are identified.

3.3. Identifying labor market regions

In the Danish context, several ready-made regional demarcations are available, e.g. the level of counties, the larger administrative regions, or the labor market region classification created by Andersen (2002). The latter is most suitable for this analysis as these labor market areas are based on the commuting patterns of workers. However, labor market regions are dynamic over time and vary depending on the type of worker (education, age, industry). In addition, Denmark has gone through a municipality and regional reform in 2007, which resulted in a decrease from 270 to 98 municipalities. As commuting patterns are based on commuting within and between municipalities this reform will affect the local labor market. Consequently, it is necessary to specify a labor market demarcation based on a more narrow industry and time frame using the algorithm from Andersen (2002).

As a starting point the focus will be on the labor market regions that can be associated with the industries that are classified as knowledge intensive. Therefore all the employees that work in these industry and the municipalities where they work and live are identified for the period 2003-10. Then the centers are identified with the following equation:

$$\frac{b}{a} > k_1$$

where a are the number of employees living in the municipality; b are the number of employees both living and working in the municipality; and k_1 is a parameter indicating the when a municipality is considered a center, which is set to 0.5 (i.e. 50 percent or more of the employees that live in the municipality also work in the municipality).

Afterwards all non-center municipalities will be assigned to a center based on their two-way interaction that is, incoming and outgoing commuting flows. A second criterion has also to be fulfilled:

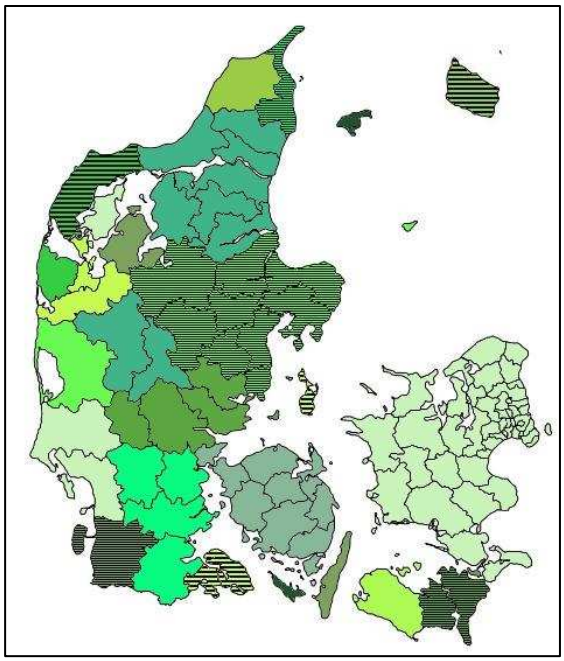
$$c > k_2\,(d + e)$$

where c are the number of employees living and working in the municipality group; d are the number of employees commuting out from the municipality group; e are the number of employees commuting into the municipality group; and k_2 is the parameter that indicates how closed area is in terms of incoming and outgoing commuters. The value of this parameter can be determined as follows:

$$k_2 = \frac{c}{d + e}$$

The higher the level of k_2 the more closed an area is. To make the labor market classification a series of steps is necessary: (i) the municipality group with the lowest k_2 are split up (ii) these municipalities are assigned to the municipality groups with the highest interaction (iii) step one and two are repeated until the k_2 criteria is fulfilled for all areas. 25 labor market areas are created by choosing a k_2 value of 1.5[5]. These are presented in Figure 3. An overview on municipalities and labor market regions can be found in Table A1 in the Appendix.

Figure 2: labor market k_1=0.5, k_2=1.5



3.4. Regional Diversity

A common method to measure regional diversity is by focusing on the industry composition of each region (e.g. Audretsch and Feldmann 1996). However, as Audretsch et *al.* (2010: 67) mention: "*for knowledge spillovers to occur and entrepreneurial opportunities to be perceived and put into practice what really matters is the diversity of people rather than the*

[5] A k_2 value of 2 would reduce the number of labor markets to 15 with five very large regions.

diversity of aggregates such as firms or sectors." Therefore, regional diversity is based on the diversity in educational background of the individuals that work in a particular labor market area.

However, despite that labor market areas are based on the closeness of commuting patterns it does not demarcate an area where there is interaction between all individuals. The underlying argument is that not all individuals on the labor market are equal attractive to particular employers nor are all forms of employment attractive for all employees; as a result, knowledge transfers are less likely to occur between individuals that are active in complete different segments of the labor market. Thus, by measuring regional diversity by including at all individuals in the labor market area we would obtain a poor match between relevant regional diversity and firm level diversity.

Neffke and Henning (2013) argues that it is necessary to focus on skill-relatedness based on labor mobility flows, because employees will move to industries in which their skills are valued; not doing so might lead to the destruction of their skills. A high rate of mobility of employees between specific industries would indicate a higher valuation of skills, less human capital destruction, and thus a high degree of skill-relatedness.

Therefore, the regional diversity measure is based on the skill-relatedness that is, the diversity in educational backgrounds of individuals that work in the skill related industries. Skill-relatedness is measured using the method by Neffke et *al.* (2012), which is strongly correlated to the method in Neffke and Henning (2013). Skill-relatedness SR_{ij} is measured as follows:

$$SR_{ij} = \frac{F_{ij}/F}{(F_i/F)\,(F_j/F)} = F_{ij}\frac{F}{F_i F_j}$$

Where F_{ij} is the number of individuals moving from industry i to industry j; F is the total number of people that move in any given year; F_i are the number of individuals that move away from industry i; and F_j are the number of individuals that enter industry j.

Skill-relatedness is based on all individuals between the age of 18 and 65 whose primary form of income is obtained from a job where they work at least 20 hours a week on average that moved to a new plant in the period 2006-10. In total 587 different industries are identified based on 4-digit NACE codes, which will give us a total of 344,569 industry pairs in the period[6]. To control for the noise that can occur in individual years, we take the yearly average of SR_{ij} over the period 2006-10. If it has a value above 1 the industries are related. Of all the industry pairs, 13.80 percent turn out to be related; the vast majority of industry pairs, i.e. 74.39, have no mobility in the period. Furthermore, as this distribution is highly skewed the transformation proposed by Neffke et *al.* (2012) is used to map the skill-relatedness on an interval between -1 and1:

[6] This time period is chosen because Statistics Denmark made a change in the industry code in 2007, i.e. from NACE rev1.1 to NACE rev2. The break in the data is too large to make an accurate comparison between these two industry code versions; however, for the year 2007 we have information on both NACE rev1.1 and NACE rev2. Thus without losing too much information we can, if the plant did not change NACE codes in the period 2006-2007 correctly impute the NACE rev.2 industry code for the plant.

$$\widehat{SR}_{ij}^{t} = \frac{SR_{ij} - 1}{SR_{ij} + 1}$$

3.5. Selecting the sample of firms

The sample of firms is limited to those firms that participate in the Danish R&D and Innovation survey (FUI). FUI is a large survey that is distributed to a representative sample of Danish firms with the purpose to examine the scope, nature and the effect of R&D activities and innovation in the business sector. The data enables comparison over time and the survey is conducted according to the guidelines set in the Oslo Manual making the data comparable with innovation data gathered in other EU countries. Compared to the Community Innovation Survey (CIS), these data are gathered yearly by Statistics Denmark since 2007. Furthermore, participation in the survey is compulsory. This is a large advantage compared to other EU innovation surveys, as they tend to have a non-response bias towards non-innovators.

This study uses data from FUI in 2007 which covers 4,534 Danish firms, with a response rate of 90 percent. This sample is narrowed to firms that are active in private, non-primary sectors.[8] Furthermore, we remove firms with a non-private ownership form and firms that have a non-Danish municipality code. To investigate the composition of employees at the start of 2007, we use the employer-employee relationship reported at the end of 2006; as a result, firms that could not be identified in 2006 are removed. Finally, to reduce complexity, the sample is reduced to one-plant firm, because multi-plant firms might be located at different locations and it is not possible to perfectly assess, which plant generated the innovation. Based on these selection criteria, sample consists of 2,728 firms that in the start of 2007 employed approximately 120,000 individuals.

3.6. Variables

Dependent variables

From the FUI2007 there are various innovation output measures that are relevant for the analysis. First, the firms are asked if they had a *product innovation* during 2007. The survey follows the Oslo manual and thus defines product innovation as the introduction of a new or significantly improved good or service to the market. Second, the survey asked whether the firm had a *process innovation* during 2007. This innovation is defined as the implementation of a new or significantly improved production process, distribution method, or support activity for goods or services. The third form of innovation is *marketing innovation,* which is the implementation of a new marketing concept or strategy that differs significantly from your enterprises existing marketing methods and which has not been used before. This innovation covers significant changes in product design or packaging, product placement, product promotion or pricing. The number of firms for each type of organization is shown in Table 1.

[8] We remove all firms that have a two digit NACE rev 2.0 code below 10, which covers agriculture forestry fishing and mining, and above NACE code 84 that includes public administration education and health. In addition, firms active in electricity, gas and water supply (NACE 35-39) are also removed as they are heavily influenced by public regulation.

Table 1: Types of Innovation

Product innovation		Process innovation		Product and Process innovation		Marketing innovation	
734	26.91%	517	18.95%	316	11.58%	769	28.19%

Diversity in skills

The main variable of interest is the diversity in higher level educational background. The entropy index is used for both the diversity in the region and diversity in the firm. However, a firm can lack diversity because they do not have any highly educated employees employed or because all higher educated employees have the same education. To control for that factor a dummy variable is included indicating whether the firm has at least one higher educated employee.

Educational diversity on the level of the labor market is measured by using the entropy index to construct a diversity measure of highly educated within similar and related industries for each labor market region based on where the individuals live; consequently, there is a unique regional diversity measure for each four digit NACE rev 2.0 industry code for each labor market region.

Other diversity constructs

For the analysis, we also include other diversity measures that may explain the innovativeness of firms. In their analysis on the relation between employee diversity and innovation, Østergaard et al. (2011) have created other demographic diversity measures, i.e. gender, age and cultural background. Both gender and age turned out to have a respectively positive and negative impact on innovation while cultural background was insignificant. These diversity constructs are used as control variables in this analysis. The diversity measure for gender is based on the entropy measure. Diversity in age is measured as the standard deviation of the age of the employees (Harrison and Sin, 2006). Diversity in cultural background is measured by the entropy index as differences in country of origin divided into six categories, i.e. Danish, Nordic, EU15 and Swiss, other Europeans, other western countries, and the rest of the world. [9]

Other control variables

Both from FUI2007 and IDA, it is possible to create other variables that can be used as predictors for innovation. From FUI2007, we control for *organizational innovation,* which covers the implementation of new organizational methods that is the result of a strategic decision taken by management (merger and acquisition are not included). The motivation for creating a dummy variable for this firm characteristic is that earlier studies have indicated that organizational change has a positive impact on the likelihood of firms to innovate (Lundvall, 2002; Østergaard et al., 2011). A second control variable is a dummy variable that indicates whether the organization had innovation activities during 2007. Finally, based on the survey, a dummy variable is created indicating that the firm has collaborated with external partners.

[9] The citizens in the different ethnicity groups are: **Danish**: Danish, Greenlandic, Faeroe; **Nordic**: Norwegian, Swedish, Finnish, and Icelandic. **EU15 and Swiss**: All EU15 citizens excluding the ones mentioned above and including citizens from Liechtenstein, Monaco, Andorra, San Marino, and Switzerland. **Other Europeans**: All European citizens excluding the ones mentioned above. **Other Western Countries**: United States, Canada, Australia, New Zealand, Japan. **Other World**: Citizens not included elsewhere.

From IDA, we create a final set of control variables that have been listed in other studies investigating the link between firm characteristics and the likelihood to innovate (e.g. Leiponen and Helfat, 2010; Østergaard et al., 2011). These variables are: a measure of size, which is measured as the log of number of employees; firm age; the share of higher educated employees; the industry in which the firm is active based on the high-tech and knowledge intensive aggregation[10]; the openness of trade, which is measure as the share of exports on total turnover.

Model

The analysis combines both firm level characteristics with contextual information on the level of the local labor market. A common econometric technique in such a case is cluster robust standard errors or multilevel analysis. However, the context variable in this study is the educational diversity for all the individuals in the region that work in the same or related industries. Because this measure includes relatedness on the four-digit NACE rev 2.0 level there are approximately 1,100 unique industry/labor market pairs. Considering that the entire sample consists of 2,728 firms, this contextual information is nearly firm specific. Consequently, the models that will be estimated are logit models with dependent variables being *product innovation*, *process innovation* and *marketing innovation*.

3.7. Descriptive Statistics

Table 2 and Table 3 present respectively some overall descriptive statistics of the sample and the correlation between the different variables that will be included in the analysis. In addition to the different measures of innovation output listed above, Table 2 indicates that a large share of the firms can be found in the labor market area that covers almost the entire island of Zealand including the Capital (CMLA=47.8 percent). This is a general pattern in the Danish economy as nearly half of the entire labor force is located in this rather densely populated area. It can also be observed that approximately 30.5 percent of the firms have reported an organizational innovation or change. Furthermore, the average size of firms in our sample is around 44 employees, but this variable will be transformed to log values when incorporated into the logit model. Average firm age is 14 years while the oldest firm in the sample was founded in 1911. The share of highly educated overall is 31.1 percent per firm. It should be noted that 16.6 percent of all firms do not have one single highly educated employee. Approximately 38 percent have reported innovation activities in 2007 and 16 percent have reported to collaborate on innovation during that year. The remaining variables report the different diversity measures that will be included in our analysis. The correlation matrix reveals that there is no statistically significant correlation between the educational diversity in firms and the education diversity at the regional labor market.

[10] Following industries are used: high-tech manufacturing, medium high-tech manufacturing, medium low-tech manufacturing, low-tech manufacturing, knowledge intensive market services, high-tech knowledge intensive services, other knowledge intensive services, and construction. A document with a more detailed description on this classification can be found here:
http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/htec_esms_an3.pdf

Table 2: Descriptive Statistics

Variables	N	Mean	Std. Dev.	Minimum	Maximum
CLMA	2,728	0.478	0.500	0	1
Organizational innovation	2,728	0.305	0.460	0	1
Employment size	2,728	43.982	104.572	1	3,180
Export ratio	2,662	0.182	0.306	0	1
Firm Age	2,706	14.331	12.900	0	96
Share of highly educated	2,728	0.311	0.301	0	1
Cooperation for innovation	2,728	0.160	0.367	0	1
Innovation activities	2,728	0.384	0.486	0	1
Education diversity - labor market	2,728	2.456	0.233	0.805	2.878
Education diversity - firm	2,728	0.822	0.709	0	2.600
Gender diversity	2,728	0.471	0.222	0	0.693
Age diversity	2,689	10.484	3.404	0	24.668
Cultural diversity	2,728	0.210	0.256	0	1.395

Table 3: Pearson Correlation Matrix

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Product innovation	1.00														
2	Process innovation	**0.37**	1.00													
3	Marketing innovation	**0.48**	**0.30**	1.00												
4	CLMA	0.02	0.01	0.04	1.00											
5	Organizational innovation	**0.39**	**0.37**	**0.53**	**0.07**	1.00										
6	Employment size (log)	**0.12**	**0.14**	**0.09**	**-0.07**	**0.17**	1.00									
7	Export ratio	**0.25**	**0.14**	**0.14**	-0.04	**0.11**	**0.32**	1.00								
8	Firm Age	0.03	0.02	0.00	**-0.05**	0.03	**0.36**	**0.16**	1.00							
9	Share of highly educated	**0.21**	**0.09**	**0.12**	**0.23**	**0.16**	**-0.20**	**0.05**	**-0.20**	1.00						
10	Cooperation for innovation	**0.41**	**0.36**	**0.38**	0.03	**0.40**	**0.12**	**0.17**	0.02	**0.18**	1.00					
11	Innovation activities	**0.57**	**0.49**	**0.52**	**0.05**	**0.52**	**0.15**	**0.24**	0.01	**0.28**	**0.46**	1.00				
12	Education diversity labor market	**0.28**	**0.21**	**0.21**	**0.07**	**0.25**	**0.63**	**0.36**	**0.20**	**0.33**	**0.22**	**0.32**	1.00			
13	Education diversity firm	**0.06**	0.02	**0.05**	**0.20**	0.03	-0.01	**0.05**	**0.05**	**-0.06**	**0.05**	**0.04**	0.02	1.00		
14	Gender diversity	**0.08**	**0.06**	**0.09**	**0.05**	**0.11**	**0.24**	**0.08**	**0.10**	**0.07**	**0.09**	**0.12**	**0.29**	**0.13**	1.00	
15	Age diversity	**-0.11**	**-0.08**	**-0.09**	**-0.20**	**-0.10**	**0.19**	-0.02	**0.22**	**-0.34**	**-0.11**	**-0.14**	**-0.08**	-0.04	0.02	1.00
16	Cultural diversity	**0.08**	**0.09**	**0.05**	**0.18**	**0.08**	**0.28**	**0.19**	0.02	0.01	**0.09**	**0.11**	**0.27**	**0.04**	**0.18**	-0.01

Values indicated in bold are significant on the 5 percent confidence interval

Tables 4 and 5 show the distribution of firms with relation to product and process innovation based on the conceptual Figure 1. The divide between high and low is rather crude based on the averages values of firm level diversity and regional diversity. This provides the first indication on the link between firm diversity, regional diversity and firm's innovation. In all cases, firms with high level of employee diversity show higher innovation output performance regardless of the regional diversity. However, the effect of being located in a region characterized by high or low diversity does not seem to have an effect on the share of innovative firms.

Table 4: Regional Diversity, Firm Diversity and Product Innovation

		Regional diversity			
		Low		High	
		Product innovation		Product innovation	
		No	Yes	No	Yes
Firm Diversity	High	357	213	470	293
		62.63%	*37.37%*	*61.60%*	*38.40%*
	Low	452	77	715	151
		85.44%	*14.56%*	*82.56%*	*17.44%*

Table 5: Regional Diversity, Firm Diversity and Process Innovation

		Regional diversity			
		Low		High	
		Process innovation		Process innovation	
		No	Yes	No	Yes
Firm Diversity	High	422	148	571	192
		74.04%	*25.96%*	*74.84%*	*25.16%*
	Low	459	70	759	107
		86.77%	*13.23%*	*87.64%*	*12.36%*

4. Regression analysis on the link between regional differences in employee diversity and firms' innovative capabilities

Table 6, Table 7 and Table 8 present the coefficients of logit models on product innovation, process innovation and marketing innovation respectively. All models first investigate the link between diversity on the local related labor market, followed by a model investigating only the impact of educational diversity and afterwards adding the two variables in the model at once. In the last models of each table the remaining diversity indicators are included.

When focusing on product innovation, it can be observed that the usual predictors of innovation, i.e. organizational change, size, export ratio, presence of innovation

activities, innovation collaboration and the share of higher educated employees have a positive impact on the likelihood of a firm to innovate. The main dependent variables show that diversity on the related labor market region has a positive impact on the likelihood to innovative. When the entropy index value increases by one the likelihood to introduce a product innovation doubles; however, it should be noted that the standard deviation of regional diversity is only 0.233 on an average of 2.456 (See Table 2). Nevertheless, the diversity of the region has a significant and positive impact on the likelihood of a firm to introduce a product innovation. When introducing the employee diversity measure and after controlling for all the usual predictors, it shows a positive relation between employee diversity and the likelihood to innovate (the variable measuring the share of highly educated loses the significance, but this is a result of the entropy measure that is both a measure of balance and variety). This result is consistent with Østergaard et al. (2011) that investigated the issue on an earlier conducted innovation survey in Denmark. The likelihood to innovate is 1.5 times higher with an increase of entropy by one.

The next model includes both regional educational diversity and employee diversity in education into the model and both values remain significant and positive. Indicating that both regional diversity and firm diversity increases the likelihood to be innovative by respectively 1.9 and 1.5 times with an increase of one in the entropy value. The remaining diversity measures show not to have a significant impact on the likelihood to innovate, contrary to Østergaard et al. (2011) that found a positive impact of gender diversity and a negative impact of age diversity.

The tables on the link between diversity and process innovation, and diversity and marketing innovation respectively show that educational diversity has a positive impact (although this impact is weak for process innovation). In any case, regional labor market diversity appears not having a significant effect on these innovation performance indicators.

Table 6:Logistic Regression Analysis Product Innovation

Variable	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio
Intercept	-2.842	***	0.853		-0.719	***	0.255		-2.328	***	0.862		-2.200	**	0.899	
CLMA	-0.085		0.062	0.844	-0.052		0.060	0.902	-0.085		0.062	0.844	-0.088		0.065	0.839
Organizational innovation	0.362	***	0.063	2.064	0.358	***	0.063	2.047	0.359	***	0.063	2.050	0.348	***	0.064	2.004
Employment size (log)	-0.023		0.058	0.977	-0.219	***	0.082	0.804	-0.206	**	0.083	0.814	-0.210	**	0.085	0.811
Export ratio	0.794	***	0.195	2.213	0.738	***	0.197	2.091	0.724	***	0.197	2.062	0.755	***	0.199	2.127
Firm Age	0.001		0.005	1.001	0.001		0.005	1.001	0.001		0.005	1.001	0.001		0.005	1.001
Share of highly educated	0.905	***	0.262	2.472	0.468		0.289	1.597	0.502	*	0.290	1.651	0.502	*	0.301	1.652
Cooperation for innovation	0.449	***	0.072	2.455	0.453	***	0.072	2.476	0.444	***	0.072	2.432	0.461	***	0.073	2.513
Innovation activities	1.035	***	0.068	7.928	1.028	***	0.068	7.816	1.025	***	0.068	7.767	1.030	***	0.069	7.846
Education diversity labor market	0.713	**	0.331	2.039					0.645	**	0.329	1.905	0.637	*	0.333	1.890
Education diversity firm					0.434	***	0.133	1.544	0.418	***	0.133	1.518	0.409	***	0.136	1.506
Gender diversity													0.003		0.299	1.003
Age diversity													-0.007		0.019	0.993
Cultural diversity													-0.033		0.240	0.967
Industry	Yes				Yes				yes				yes			
N	2,662				2,662				2,662				2,625			
Max Rescaled R2	0.488				0.491				0.492				0.494			
Log Likelihood	1092.311				1098.119				1102.219				1094.793			

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 7:Logistic Regression Analysis Process Innovation

Variable	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio
Intercept	-2.026	***	0.845		-1.495	***	0.260		-1.736	**	0.857		-1.317		0.892	
CLMA	-0.055		0.065	0.896	-0.050		0.063	0.905	-0.055		0.065	0.897	-0.079		0.068	0.854
Organizational innovation	0.347	***	0.066	2.000	0.345	***	0.066	1.995	0.345	***	0.066	1.995	0.352	***	0.066	2.022
Employment size (log)	0.112	*	0.061	1.119	0.002		0.085	1.002	0.005		0.085	1.005	-0.014		0.088	0.986
Export ratio	0.075		0.208	1.078	0.035		0.209	1.036	0.033		0.209	1.033	0.018		0.211	1.018
Firm Age	-0.003		0.005	0.997	-0.004		0.005	0.996	-0.004		0.005	0.996	-0.002		0.005	0.998
Share of highly educated	-0.742	***	0.279	0.476	-0.979	***	0.307	0.376	-0.975	***	0.307	0.377	-0.993	***	0.315	0.371
Cooperation for innovation	0.356	***	0.069	2.040	0.354	***	0.069	2.030	0.353	***	0.069	2.024	0.341	***	0.069	1.979
Innovation activities	1.261	***	0.086	12.459	1.251	***	0.086	12.210	1.251	***	0.086	12.199	1.242	***	0.086	11.984
Education diversity labor market	0.137		0.328	1.147					0.097		0.328	1.292	0.078		0.329	1.281
Education diversity firm					0.259	*	0.140	1.296	0.256	*	0.140	1.101	0.248	*	0.143	1.081
Gender diversity													-0.092		0.323	0.912
Age diversity													-0.035	*	0.021	0.965
Cultural diversity													0.347		0.254	1.414
Industry	Yes				yes				yes				yes			
N	2,662				2,662				2,662				2,625			
Max Rescaled R2	0.409				0.410				0.410				0.410			
Log Likelihood	776.915				780.176				780.263				772.767			

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 8:Logistic Regression Analysis Marketing Innovation

Variable	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio	Coefficient		SE	Odds Ratio
Intercept	0.044		0.694		0.338		0.247		0.560		0.708		0.826		0.757	
CLMA	0.029		0.060	1.060	0.026		0.058	1.052	0.030		0.060	1.063	0.042		0.062	1.087
Organizational innovation	0.905	***	0.060	6.107	0.901	***	0.060	6.066	0.901	***	0.060	6.065	0.900	***	0.060	6.048
Employment size (log)	-0.138	**	0.058	0.872	-0.330	***	0.080	0.719	-0.331	***	0.080	0.718	-0.312	***	0.082	0.732
Export ratio	0.243		0.198	1.274	0.153		0.200	1.165	0.155		0.200	1.167	0.183		0.203	1.201
Firm Age	-0.007		0.005	0.993	-0.008	*	0.005	0.992	-0.008	*	0.005	0.992	-0.009	*	0.005	0.992
Share of highly educated	-0.021		0.258	0.980	-0.467		0.287	0.627	-0.472		0.288	0.624	-0.455		0.297	0.635
Cooperation for innovation	0.357	***	0.071	2.042	0.352	***	0.072	2.023	0.353	***	0.072	2.027	0.360	***	0.072	2.053
Innovation activities	0.876	***	0.066	5.770	0.862	***	0.066	5.605	0.863	***	0.066	5.613	0.854	***	0.066	5.516
Education diversity labor market	-0.027		0.267	0.973					-0.090		0.268	0.914	-0.125		0.273	0.882
Education diversity firm					0.456	***	0.130	1.577	0.459	***	0.130	1.582	0.459	***	0.133	1.582
Gender diversity													0.023		0.289	1.023
Age diversity													-0.015		0.019	0.985
Cultural diversity													-0.407	*	0.239	0.666
Industry	yes				yes				yes				yes			
N	2,662				2,662				2,662				2,625			
Max Rescaled R2	0.468				0.473				0.473				0.472			
Log Likelihood	1047.500				1059.960				1060.071				1047.286			

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

5. Conclusion

Within the field of management studies and organizational behavior there is a wide spread interest on the link between workplace diversity and firm performance. Simultaneously, research in economic geography has investigated the role of diversity for regional growth and innovative capabilities. These studies often assume that diversity in the regional industry structure create externalities that increase the innovativeness of the firms in the region. However, despite several hints in existing studies; hardly any research has been conducted that links regional differences in diversity and employee diversity and how the combination of these two factors influence firm performance.

This paper combined these perspectives by analyzing whether firms in diverse regions are diverse and how this regional diversity influences the composition of firms and their innovative performance. However, while it is easy to conceptualize the two diversity constructs as two continuums along two dimensions (see Figure 1) it proved quite difficult to analyze the link empirically, because diversity always should be seen in context. Firstly, it was necessary to create labor market regions based on labor commuting patterns, since geographical job mobility is limited. Secondly, it was necessary to calculate regional diversity based on skill-related industries, because employees will move to industries in which their skills are valued. Therefore, regional diversity is operationalized as diversity among highly educated people working in skill-related industries living in the local labor market region. Since, firms in the same local labor market, but different industries differs in terms of skill-related industries then the regional diversity differs more than just calculating a generic regional industry diversity regardless of context.

Using detailed matched employer-employee register data and innovation survey data we find that regional diversity do have an impact on firm's likelihood of product innovation, but the effect of employee diversity in the firm has a higher impact. Therefore, firms with low employee diversity can compensate somewhat for their low internal diversity if they are located in a region with high diversity on the labor market. This effect has not been considered in the management literature on workplace diversity and organizational behavior. The regional characteristics in terms of educational diversity in skill-related industries create opportunities for firms' to hire diverse highly educated people that have experience from a skill-related industry and also benefit from spillovers related to the local labor market diversity. In any case internal employee diversity has a positive effect on the firms' innovative performance also in regions with low diversity. However, there was not a significant correlation between diversity in regions and employee diversity in firms.

6. References

Almeida, P. and Kogut, B. (1999) Localization of Knowledge and the Mobility of Engineers in Regional Networks. *Management Science*, 45(7):905-917.

Andersen, A.K. (2002) Are Commuting Areas Relevant for the Delimitation of Administrative Regions in Denmark, *Regional Studies,* 36(8): pp. 833-844

Audretsch, D., Dohse, D. and Nieburh, A. (2010) Cultural diversity and entrepreneurship: a regional analysis for Germany, *The Annals of Regional Science*, 45(1): pp. 55-85.

Audretsch, D. B. and Feldman, M. P. (1996) Innovative clusters and the industry life cycle. *Review of Industrial Organization*, 11(2): 253–273.

Asheim, B. T., Boschma, R., and Cooke, P. (2011). Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases. *Regional Studies*, *45*(7), 893-904.

Bantel, K. and Jackson, S. (1989) Top management and innovations in banking: does the composition of the top team make a difference? *Strategic Management Journal* 10: pp. 107–124.

Barney, J. (1991) Firm resources and sustained competitive advantage. *Journal of Management, 17*(1): pp. 99–120.

Beardsell, M. and Henderson, V. (1999) Spatial evolution of the computer industry in the USA. *European Economic Review*, 43(2): 431-456.

Boschma, R. and Frenken, K. (2010) Technological relatedness and regional branching, in Bathelt H., Feldman M.P. and Kogler D.F. (Eds.), *Dynamic Geographies of Knowledge Creation and Innovation*, Routledge, Taylor and Francis.

Boschma, R. and Frenken, K. (2011) The emerging empirics of evolutionary economic geography. *Journal of Economic Geography*, 11 (2): 295-307

Boschma, R., Minondo, A., and Navarro, M. (2012). Related variety and regional growth in Spain. *Papers in Regional Science*, *91*(2), 241-256.

Byrne, D. (1971*) The Attraction Paradigm*. Academic Press: New York.

Cohen, W.M., Levinthal, D.A., 1990. Absorptive capacity: a new perspective of learning and innovation. *Administrative Science Quarterly* 35 (1), 128–152.

Cox, T. H. and Blake, S. (1991) Managing cultural diversity: Implications for organizational competitiveness, *The Executive*, 5(3): pp. 45–56.

Dahl, M.S. and Sorenson, O. (2010) The migration of technical workers, *Journal of Urban Economics* 67(1): pp. 33-45.

Dahl, M. S., Dezső, C. L., and Ross, D. G. (2012). Fatherhood and Managerial Style How a Male CEO's Children Affect the Wages of His Employees. *Administrative Science Quarterly*, *57*(4), 669-693.

Desrochers, P. (2001). Local diversity, human creativity, and technological innovation. *Growth and change*, *32*(3), 369-394.

Doloreux, D. (2003). Regional innovation systems in the periphery: the case of the Beauce in Québec (Canada). *International Journal of innovation management*, *7*(01), 67-94.

Essletzbichler, J. (2007) Diversity, stability and regional growth in the United States (1975-2002). In Frenken, K. (ed): *Applied Evolutionary Economics and Economic Geography*, pp. 203-229. Edward Edgar, Cheltenham.

Feldman, M. P. and Audretsch, D. B. (1999) Innovation in cities: Science-based diversity, specialization and localized competition. *European Economic Review*, 43(2):409-429.

Florida, R. (2002) *The Rise of the Creative Class.* New York: Basic Books.

Florida, R. (2003) Cities and the creative class. *City & Community*, *2*(1), 3-19.

Fitjar, R. D., and Rodríguez-Pose, A. (2011). Innovating in the periphery: Firms, values and innovation in Southwest Norway. *European Planning Studies*, *19*(4), 555-574.

Frenken, K., Van Oort, F., and Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional studies*, *41*(5), 685-697

Hambrick, D. and Mason, P. (1984) Upper echelon: the organization as a reflection of its top managers, *The Academy of Management Review* 9: pp. 193–206.

Harrison, D. and Klein, K. (2007) What's the difference? Diversity constructs as separation, variety, or disparity in organizations, *The Academy of Management Review* 32(4): pp. 1199–1228.

Harrison, D. and Sin, H. P. (2006) What is diversity and how should it be measured? In A.M.Konrad, Prasad, P., and Pringle, J. K., eds, *Handbook of Work Place Diversity*, pages 191–216. SAGE publications ltd, London.

Horwitz, S. (2005) The compositional impact of team diversity on performance: theoretical considerations, *Human Resource Development Review* 4(2): pp. 219–245.

Horwitz, S. and Horwitz, I. (2007) The effects of team diversity on team outcomes: a meta analytic review of team demography, *Journal of Management* 6: pp. 987–1015.

Jacobs, J. (1970). The economy of cities. *The economy of cities.*

Jackson, S.E., Joshi, A. and Erhardt, N.L. (2003) Recent Research on team and Organizational Diversity: SWOT analysis and implications. *Journal of Management*, 29(6): pp. 801-830.

Joshi, A. and Jackson, S. (2003) Managing workforce diversity to enhance cooperation in organizations, in West, M., Tjosvold, D., and Smith, K. (eds.) *International Handbook of Organizational Teamwork and Cooperative Working.* John Willey & Sons, Ltd.

Konrad A.M. (2003) Special Issue Introduction: defining the domain of workplace diversity scholarship, *Group & Organization Management* 28(1): pp. 4-17.

Laursen, K., Mahnke, V. and Vejrup-Hansen, P. (2005) Do differences make a difference? The impact of human capital diversity, experience and compensation on firm performance in engineering. *Druid Working Paper Series* 5(4).

Lundvall, B.-Å. (1985) Product innovation and user–producer interaction. Serie om Industriel Udvikling, 31.

Lundvall, B.-Å. (Ed.) (1992) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter Publishers, London.

Lundvall, B.-Å. (Ed.) (2002) *Growth, Innovation and Social Cohesion: The Danish Model*. Elgar Publisher.

Leiponen, A., and Helfat, C. E. (2009). Innovation objectives, knowledge sources, and the benefits of breadth. *Strategic Management Journal*, *31*(2), 224-236.

Murray, A. (1989) Top management heterogeneity and firm performance, *Strategic Management Journal* 10: pp. 125–141.

McAdam, R., McConvery, T., and Armstrong, G. (2004). Barriers to innovation within small firms in a peripheral location. *International Journal of Entrepreneurial Behaviour & Research*, *10*(3), 206-221.

Neffke, F., and Henning, M. (2013) Skill-relatedness and firm diversification, *Strategic Management Journal*, 34 (3):297-316

Neffke, F., Otto, A. and Weyh, A. (2012) Spot the Differences! The invariable nature of skill-relatedness in Germany. Paper presented at DRUID Society Conference 2012, Copenhagen

Nooteboom, B. (2000) *Learning and Innovation in Organizations and Economies*. Oxford: Oxford University Press

Timmermans, B. (2010) The Danish Integrated Database for Labor Market Research: Towards demystification for the English speaking audience, *DRUID WP 10.16.*

Tajfel, H. (1981) *Human Groups and Social Categories*, Cambridge University Press. Cambridge, U.K.

Turner, J. (1987) *Rediscovering the Social Group: A Self-Categorization Theory*, Basil Blackwell: Oxford.

Østergaard, C. R., Timmermans, B. and Kristinsson, K. (2011) Does a different view create something new? The effect of employee diversity on innovation, *Research Policy*, 40(3): pp. 500-509.

Parrotta, P., Pozzoli, D., and Pytlikova, M. (2011) *The Nexus between Labor Diversity and Firm's Innovation* (No. 2011005). Norface Research Programme on Migration, Department of Economics, University College London.

Song, J., Almeida, P. and Wu, G. (2003) Learning-by-hiring: When is mobility more likely to facilitate interfirm knowledge transfer?. *Management Science*, 49 (4): 351-365.

Sternberg, R., and Arndt, O. (2001) The firm or the region: what determines the innovation behavior of European firms? *Economic Geography*, *77*(4), 364-382.

Van der Vegt, G., and Janssen, O., (2003). Joint impact of interdependence and group diversity on innovation. *Journal of Management* 29(5): pp729–751.

Van Oort, F. (2002). Innovation and agglomeration economies in the Netherlands. *Tijdschrift voor Economische en Sociale Geografie*, *93*(3), 344-360.

Vaessen, P. and Wever, E. (1993). Spatial responsiveness of small firms. *Tijdschrift voor Economische en Sociale Geografie*, *84*(2), 119-131.

Wiersema, M. and Bantel, K. (1992) Top management team demography and corporate strategic change. The Academy of Management Journal 35 (1), 91–121.

Williams, K. and O'Reilly, C. (1998) Demography and diversity in organizations: a review of 40 years of research. In: Staw, B., and Cummings, L. (Eds.), *Research in Organizational Behavior*. JAI Press, Greenwich: pp. 77–140.

7. Appendix

Table A1:Labor market regions, K_1=1.5 K_2=1.5

#	Labor Market	*Municipalities*
1	Copenhagen	*Copenhagen, Frederiksberg, Tårnby, Dragør, Hvidøvre, Brøndby, Rødovre, Herlev, Gladsaxe, Gentofte, Lungby-Taarbæk, Rudersdal, Hørsholm, Allerød, Furesø, Ballerup, Glosturp, Albertslund, Høje Taastrup, Vallensbæk, Ishøj, Frederiksborg, Helsingør, Gribskov, Halsnæs, Hillerød, Frederikssund, Egedal, Roskilde, Greve, Solrød, Køge, Stevns, Faxe, Næstved, Slagelse, Sorø, Ringsted, Holbæk, Lejre, Odsherred, Kalundborg, Vordingborg*
2	Guldborgsund	*Guldborgsund*
3	Lolland	*Lolland*
4	Bornholm	*Bornholm*
5	Ærø	*Ærø*
6	Langeland	*Langeland*
7	Odense	*Fredericia, Odense, Middelfart, Assens, Nordfyn, Faaborg-Midtfyn, Kerteminde, Nyborg, Svendborg*
8	Sønderborg	*Sønderborg*
9	Tønder	*Tønder*
10	Kolding	*Vejen, Kolding, Haderslev, Aabenraa*
11	Esbjerg	*Esbjerg, Varde*
12	Vejle	*Vejle, Billund, Hedensted, Horsens*
13	Samsø	*Samsø*
14	Aarhus-Viborg	*Viborg, Silkeborg, Skanderborg, Århus, Favrskov, Randers, Norddjurs, Syddjurs, Odder*
15	Ringkøbing-Skjern	*Ringkøbing Skjern*
16	Herning	*Herning, Ikast-Brande*
17	Struer-Holstebro	*Stuer, Holstebro*
18	Lemvig	*Lemvig*
19	Skive	*Skive*
20	Morsø	*Morsø*
21	Thisted	*Thisted*
22	Aalborg	*Aalborg, Brønderslev, Jammerbugt, Vesthimmerland, Rebild, Mariagerfjord*
23	Hjørring	*Hjørring*
24	Frederikshavn	*Frederikshavn*
25	Læsø	*Læsø*