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# Social proximity and firm performance: the importance of family member ties in workplaces

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**ABSTRACT**

This study empirically assesses the role of social proximity, defined as the concentration of family members (FM) in firms, on firm performance. Based on longitudinal micro-data for the period 1995–2010 connecting information on workers and their workplaces in the Swedish labour market, the effects of FM (parents, children, siblings and grandparents) on per capita productivity in 15,359 firms were analysed. The results indicate that FM positively affect firm performance. In particular, the results suggest that in specialized regions (mainly small regions) FM have a positive influence on performance and can thus compensate for relative shortage of regional agglomeration economies.

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social proximity; family members; agglomeration; regional size; specialization; firm performance

## INTRODUCTION

In the regional science literature it is widely recognized that proximity is essential for understanding spatial differences in economic performance. Following Boschma's (2005) critical overview it is argued that there is more than geographical proximity that influences the performance of firms. Whereas much attention recently has been paid to the role of cognitive proximity in the literature on related variety (e.g., Boschma, Eriksson, & Lindgren, 2009, 2014; Frenken, van Oort, & Verburg, 2007) and how this interacts with geographical proximity (e.g., Eriksson, 2011), less attention has been paid to how social proximity may influence firm performance. Social proximity of different kinds (e.g., family members (FM), co-workers, friends, etc.) can affect economic outcomes in many ways. For instance, firm performance is affected by socially embedded relationships present in the firm (Boschma, 2005). Maskell and Malmberg (1999) posit that for firms to learn they may require some kind of social ties because trust-laden social relationships facilitate the exchange of tacit knowledge, which is more difficult to transfer through the market mechanism.[1].

To further increase our understanding of how social proximity influences spatial variations of firm performance, this paper assesses the importance of the concentration of FM on firm performance. The choice of using FM as a proxy for social proximity is justified by the fact that

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family relations are characterized by strong social capital, reduced transaction costs and a high degree of perpetuity compared with co-worker ties (McPherson, Smith-Lovin, & Cook, 2001; Nahapiet & Ghoshal, 1998). By the increase of both cognitive and social proximity within a workplace the family makes an important resource in terms of human capital and social capital (e.g., Sirmon & Hitt, 2003; Olson et al., 2003), which is something Storper and Venables (2004) argue is imperative for sustaining firm performance. Due to these potentials, as compared with co-worker ties, the family may be considered to be a straightforward and very enduring proxy for social proximity. This is expected to influence firm performance because the presence of FM in an organization can alter organizational objectives and incentives (especially in family firms), and increase the thickness and quality of regional linkages (Basco, 2015).

Based on this line of argument, we first identify the in-house stock of FM across regions and broadly defined industrial sectors in the Swedish economy from 1995 to 2010. This identifies the geographies of family ties where FM is over- or underrepresented. We then examine how FM influences firm performance using longitudinal micro-data that allow us to control for various firm- and region-specific features that are known to influence firm performance. To our knowledge, the relation between family linkages and regional differences in firm productivity has not previously been addressed in a more systematic way (i.e., Basco, 2015), despite contributions claiming that family contacts are crucial for understanding the long-term success of certain industrial districts (e.g., Johannisson et al., 2007). In this respect, the paper advances previous studies on the role of social proximity and agglomeration in regional science (e.g., Gordon & McCann, 2000) by showing that the impact of social proximity on firm performance actually differ depending on the spatial context and the access to agglomeration externalities. In this way we are able to identify growth potentials among firms outside the largest urban agglomerations.

The paper is organized as follows. The second section briefly discusses the role of FM in relation to the literature on agglomeration. The third and fourth sections present the data, variables and the empirical analyses. The fifth section concludes.

## FAMILY MEMBERS AND FIRM PERFORMANCE

It is frequently claimed in the regional learning and agglomeration literature that geographical proximity or geographical concentration of economic activities and people is important for growth (Marshall, 1920; Jacobs, 1969). After Marshall and Jacobs, recent contributions have paid particular attention to the role of cognitive proximity in the literature on related variety (Frenken et al., 2007). Further contributions have also focused on the effects and how cognitive proximity in regards to skills variety is crucial for bolstering firm learning and growth (e.g., Boschma et al., 2009, 2014; Timmermans & Boschma, 2014). In all, less focus has been put on how social proximity can bolster knowledge diffusion and firm performance. Even though the literature on regional learning has given less attention to social proximity (e.g., family relations), Granovetter (1985) made it clear that social proximity indeed has an influence on economic outcomes. However, Gordon and McCann (2000) argue that social proximity is probably less important in regions where localization economies are present, since access to regional externalities reduces the need of social proximity. Nevertheless, social proximity could be of different kinds, e.g., friendship, kinship (FM), co-workers etc., but it is still regarded important for the exchange of tacit knowledge which is relevant for firm performance. For example, Breschi and Lissoni (2001) argue that interactions among former co-workers facilitate regional growth through knowledge spillovers. In a similar vein, Reagans and McEvily (2003) stress that family relationships in the firm facilitate the diffusion of work-related experiences, which are not easily transferable to more socially distant actors.

It is also worth stating that social proximity is different from institutional proximity. In the former case, people build trust through continual interactions and deeper understanding throughout daily life (Boschma, 2005), while in the latter case, common sets of values (informal) and

recognized set of rules (formal) facilitate daily collaborations. Family relations offer greater chances for interaction and knowledge spillovers because of higher interpersonal trust (Arregle, Hitt, Sirmon, & Very, 2007). In this sense, family ties could be argued to not only facilitate interactions in a firm, but also to enhance effective knowledge transfers and spillovers. For example, while knowledge transfer may be a discretionary activity (Levinthal & March, 1993; Reagans & McEvily, 2003), trust-laden family ties present the motivation to share tacit knowledge, which by nature is difficult to transfer through the market mechanism (e.g., Kogut & Zander, 1992; Maskell & Malmberg, 1999). In other words, family relationships can develop into an internal capacity of trustful relations, which is a precondition for knowledge exchange among local actors.

Since socially embedded relations between agents at the micro level is a major factor for collaborative learning and knowledge exchange within and across firms (Boschma, 2005; Granovetter, 1985), it is reasonable to assume that FM is likely to represent an effective setting for interactive learning and knowledge exchange. For example, Granovetter (2005) argues that group norms and culture shape skills and productivity in cases where groups attach great value to skills. Family relations may thus create an ideal environment to create social capital through modelling trust as a foundation for cooperation and reciprocity (Coleman, 1988). Compared with co-worker relations, this makes the family a direct source, and a builder and user of social capital (Bubolz, 2001). Trust is an important element in all socially embedded relationships and in economic transactions at large (Uzzi, 1997). From the family perspective, trust-laden family relationships can be regarded as path-dependent because FM always strive to avoid ruining the established culture of trust, supportive behaviours and reciprocity. This tends to preserve family ties over other social groups and further make family relationships more durable over time (e.g., McPherson et al., 2001; Nahapiet & Ghoshal, 1998). Generally speaking, trust-based relationships among FM permit others to act heuristically, hence speeding up knowledge circulation and also conserving cognitive resources. In this respect, trust and reciprocity in family relations increase access to each other and willingness to incur or invest in transferring, acquiring, and absorbing knowledge (Quigley, Tesluk, Locke, & Bartol, 2007). Like the argument in organizational learning (e.g., Lane & Lubatkin, 1998), shared absorptive capacity among FM in the form of experiences, shared language etc. function as an enabler to recognize the value of new information, assimilate it, and apply it to commercial ends.

However, whereas family ties indeed may be beneficial for firm performance, it may also adversely impact firm performance and growth due to a number of reasons highlighted in the proximity literature (e.g., Boschma, 2005; Uzzi, 1997). In family relationships where much loyalty is involved, there may be an underestimation of the risk of opportunism and uncertainty. Moreover, long-term relationships or too much commitment may lock FM into established ways of doing things at the expense of their own learning capacity. Thus, closed network systems may incur opportunity costs because non-kin may be denied entry, which in turn impede exchange of important information (Boschma, 2005). In addition, closed FM relations only yield the accumulation of similar cognitive resources that may cause lock-in and slower growth (Bentolila, Michelacci, & Suarez, 2010; Grabher, 1993; Jensen, Johnson, Lorenz, & Lundvall, 2004). This might be especially evident in firms or regions with high concentrations of FM because FM hired through family contacts tend to be less skilled and also stay longer in their jobs (Kramarz & Nordström-Skans, 2010). The findings by Kramarz and Nordström-Skans (2010) on Swedish data even suggest that hiring kin is a suboptimal strategy for firms since children that perform well find jobs elsewhere, or quickly move to other employers, while underperforming children tend to stay much longer in the same firm as their parents. This may create undesirable spillovers and cause a lack of flexibility, which restricts novelty and hampers openness to potential knowledge sources outside the network (Gordon & McCann, 2000).

We argue that the potential varying outcomes of social proximity depends on the spatial context in which the firm operates. Gordon and McCann (2000), for example, argue that social

proximity is less relevant in large and specialized regions where there is access to agglomeration economies. Moreover, there is evidence that agglomerations are not homogenous, but vary along several dimensions, hence different firm internal resources influence performance (Knoben, Arikan, van Oort, & Raspe, 2016). While scholars have tried to understand firm performance through firm-level heterogeneity, Basco (2015) argues that the role of FM within firms have been understudied despite the claims that such social relations create positive externalities. To fill this gap, our claim on FM is similar to the argument by Marshall (1920) on spatial concentration of economic activities that 'the mysteries of the trade become no mysteries; but are as it were in the air' (p. 271). Under these circumstances, children or other relatives interact and exchange knowledge (un)consciously, which according to Storper and Walker (1989) can be sustained by generations of workers, creating a distinctive fabric of local communities of practice. Chevalier (2001), for example, argues that children in the same occupation as their fathers are the result of the transmission of specific forms of human capital rather than pure nepotism. Because family ties are highly durable, it is even argued that, all other things equal, people would prefer to cooperate with kin rather than non-kin (Alvard, 2003). Such cooperation may results in spillovers of important forms of knowledge by reducing transaction costs, facilitate information exchange and knowledge creation (Nahapiet & Ghoshal, 1998).

Thus, we expect the impacts of FM on performance to vary across space and type of firms. This is because, first, studies indicate that firms operating in larger regions benefit from knowledge spillovers from large pools of skilled labour and increased efficiency in labour market matching (e.g., Duranton & Puga, 2003; Glaeser, 1999; Puga, 2010). Large labour market regions are like collectors and repositories of knowledge and ideas (Florida, 1995) and give rise to positive externalities primarily by creating opportunities for firms (people) in different industries to exchange ideas and knowledge in an effort to explore and exploit complementarities (Glaeser, 1999). It is therefore reasonable to expect that the low influence of social networks in specialized regions that Gordon and McCann (2000) report of, mainly is relevant in large regions. Secondly, in smaller and often more specialized regions where the access to agglomeration externalities might be scarcer, exchange of knowledge is facilitated by established norms through continual interactions. Moreover, in small and specialized regions that rely on MAR-related externalities, family ties may be enhanced by the fact that people unconsciously learn from each other (Bathelt, Malmberg, & Maskell, 2004; Storper & Venables, 2004). Whereas the probability of finding FM in small and specialized labour markets is likely to be higher due to matching deficiencies and lack of variety, we can also expect FM to play a more prominent role for firm performance. Finally, firm size is important for firms' combinative capability (Kogut & Zander, 1992). Unlike in large firms where the combination of internal and external knowledge is increasingly achieved through standard operating procedures and routines, in very small firms the responsibility to combine knowledge resides fully with the owner or the manager of the firm (Knoben et al., 2016). On the one hand, this can affect the hiring procedures and standards or rates of information exchanges especially where FM are involved. We can expect the daily face-to-face interactions between FM in small firms to facilitate exchanges of work related tacit knowledge. In other words, we can expect positive impact of FM in small firms.

## DATA AND VARIABLES

The data used in this study is from matched longitudinal register data that record linkages between the total population of workers (including attributes displaying who the FM are, gender, age, education, etc.) and firms (including attributes connected to sectors, spatial coordinates, value added, etc.). The high spatial resolution of data allows us to perform detailed analyses of firm dynamics and to include regional characteristics of the Swedish economy. Data on firms from 1995 to 2010 were used in the analysis to create a window between a deep recession in 1993 and

the latest financial crisis that started hitting Sweden in 2010. The industrial sectors for the firms were defined by the Swedish Standard Industrial Classification 2002 (SNI02).

The geographical reference points of the analysis are based on two regional levels; 72 functional labour market regions (FA regions) and five regional families (Regfam) created by the Swedish Agency for Economic and Regional Growth. The FA regions are constructed on the basis of labour commuting patterns between municipalities, representing where people can live and work without long commuting distances. The Regfam (i.e., large metropolitan regions – LMR; large regional centres – LRC; small regional centres – SRC; small regional centres with a high share of private employment – SRPr; and small regional centres with a high share of public employment – SRPu) are produced by aggregating the FA regions with similar functions in the regional hierarchy, and with similar production and development characteristics.

The analysis is contextualized in the Swedish labour market. Single-plant firms with a maximum of 50 employees in 1995 (small and medium-sized enterprises – SMEs) are used in the analysis. The major reasons for this selection are: (1) we can easily identify the firm owner; and (2) it is in SMEs that we can expect extensive interactions among FM because of the daily face-to-face contacts. We do not play down the possible face-to-face contacts among FM in large firms, but we believe, however, that the impacts of two or three FM will not be as influential as compared with in smaller firms. Therefore, we anticipate slightly different estimates for larger firms.

SMEs have played an important role in the Swedish economy during the past decades, especially the service sectors. Fournier and Axelsson (1993) argue that the increasing importance of the service sectors in the Swedish economy is attributed to the increased intermediate use of services across most Swedish manufacturing industries. The transition is skewed with high-wage services in large regions with low-wage services in small regions. These have contributed to the restructuring of the economic landscape by changing the supply and demand of human capital. In addition, the Swedish economy like many other advanced economies has experienced rising unemployment rates over recent decades, making it harder for people with weak labour market attachments. Moreover, family and social contacts are still seen as prominent recruitment practices (e.g., Korpi, 2001; Kramarz & Nordström-Skans, 2010), though the Swedish economy is commonly viewed as a meritocracy with considerable transparency implying a subordinate role for social contacts in connection to the engagement of new employees. However, this is mainly true for the public sector for which legislation prohibits employers to discriminate on the basis of family relations.

## Dependent variable: labour productivity

The dependent variable used in the study is the firm's average labour productivity defined as per capita value-added. Value-added is a straightforward measure of economic output since it reflects the magnitude of a firm's contribution to the entire economy (e.g., Rigby & Essletzbichler, 2002). Other indicators like patents and innovation indices cannot necessarily provide this information. Whereas productivity may be biased in the sense that it better reflects performance in manufacturing industries, it is still covering more firms in the economy than innovation or patent data do. We calculated average labour productivity by dividing firm value-added (deflated) by the total number of employees in the firm. Log of the values were used to reduce the effect of skewness.

## Independent variable

The main independent variable is a proxy for social proximity. To capture this effect on firm performance, we used the yearly absolute size, or concentration, of FM in SMEs between 1995 and 2010.[2] Since the database contains information on FM and their respective workplaces it is possible to create FM by means of the information linked to each worker indicating who his/her

parents, grandparents, children and siblings are. This information makes it possible to summarize the number of FM present in each firm.

## Control variables

Following previous studies we include a number of firm-level characteristics that are known to co-determine productivity, specifically high education (human capital), firm size (employment) and capital were included in the analysis as controllers (e.g., Rigby & Essletzbichler, 2002). We measured human capital as the share of employees with an education equivalent to a university degree or higher to account for the skills levels and experience of employees (Becker, 1962). We expect high education to be positively correlated with productivity. To reduce the influence of skewness in data, firm size is defined as the log of the total number of employees in a firm. We expect larger firms to be more productive than their smaller counterparts due to internal division of labour (Eriksson & Lindgren, 2009). Although capital is considered to be an important determinant of productivity, it is often ignored when estimating firm productivity because of lack of data. We used the depreciation on fixed assets as a proxy for capital, which we collected from the income statement of the firms. In the models, log per capita of the values were used to reduce skewness. We also controlled for the effects of agglomeration economies with two measures. Firstly, given the claim by Gordon and McCann (2000) that the presence of localization economies in large regions reduces the need for social proximity by offering greater local opportunities to access knowledge and skills, we included a variable reflecting localization economies. One methodology often used in the regional science literature to capture this effect is the location quotient (LQ). In equation (1), $SP_{ir}$ is the degree of specialization in industry $i$ in region $r$; $e_{ir}$ is the number of employees in two-digit industry $i$ in region $r$; $e_r$ is the total number of employees in region $r$; $e_i$ is the number of employees in two-digit industry $i$; and $e$ is the total employees in Sweden. LQ is a relative measure of the regional share of workers relative to the national in a specific industry. If LQ > 1, it implies that the region is more specialized in that industry than the average. We chose LQ for specialization because the absolute measures are correlated.

$$SP_{ir} = \frac{e_{ir}/e_r}{e_i/e} \tag{1}$$

Secondly, we also controlled for general urbanization economies by using log regional employment size. While this indicator measures the size of the region and not density it may be regarded to be a rather poor proxy for urbanization. However, as argued by Andersson and Klaesson (2009) and Wixe (2015), population density tends to be a bad proxy for urbanization due to the generally sparsely populated structure of the Swedish economy. Since Swedish regions are defined on the basis of commuting distances between urban dwellings and municipalities and not administrative borders (e.g., municipalities), we argue that size captures the regional potential for interaction.

## Empirical model

The impact of FM on firm performance was tested by analysing 15,359 Swedish SMEs over the period 1995–2010. We used pooled ordinary least square (OLS) models with fixed effects (FE) for year, three-digit industry and region (see equation 2) to control for unobserved heterogeneity (e.g., time-specific shocks, technological differences across sectors and institutional differences across regions). Considering the panel structure of the data, a panel model would be suitable but we decided only to include a FE model as a robustness check based on two reasons. First, the within variation of the variables (see Table A1 in Appendix A) is rather moderate which would yield imprecise estimations since the FE model stresses the within changes of each observation. Second, an alternative model would be a random effects (RE) model that uses both panel- and

**Table 1.** Summary and definitions of variables.

| Variables | Definition |
|---|---|
| *Dependent variable* | |
| Average labour productivity (log) | Per capita value added |
| | |
| *Independent variable* | |
| Family member (FM) | Sum of FM in the same firm |
| | |
| *Control variables* | |
| Firm size (log) | Number of workers in a firm |
| High education | Share of employees with a university degree or higher |
| Capital (log) | Depreciation on fixed assets (per capita) |
| Regional size (log) | Total number of employees by region and year (***N***/100) |
| Specialization (log) | Location quotient (LQ): relative share of workers in an industry compared with the national share |

cross-sectional information. A subsequent Hausman test comparing the FE and RE models revealed, however, that the RE model was inconsistent, which indicates that the FE model is preferable. All models are weighted by firm size (employment) to play down the influence of very small firms, with potentially greater variation that may cause inconsistent estimates, since the sample contains a large share of much smaller firms (over 70% of the firms have fewer than five employees). FM is measured in time $t_{-1}$ to reduce reverse causality. The model is simplified as:

$$lnY_i = \beta_0 + \sum_{i=1}^{n} \beta_1 X_i + \sum_{i=1}^{n} \delta_2 A_i + \varepsilon, \quad (2)$$

where $lnY_i$ represents average labour productivity in firm $i$; $\sum_{i=1}^{n} \beta_1 X_i$ is the sum of different family ties and $\sum_{i=1}^{n} \delta_2 A_i$ represents the sum of the control variables (firm and regional factors). $\beta_0$; and $\varepsilon$ are the intercept and error term, respectively.

Table 1 presents the definitions of all the variables while Table A1 in Appendix A presents descriptive statistics. Table A2 displays the correlation matrix and the scores for the variance inflation factor (VIF) for all the variables in the analysis. The VIF for all the variables are below the generally accepted threshold of 10. Therefore, the scores indicate moderate correlation between the variables, hence we are quite confident that our results are not flawed by any serious multicollinearity.

## EMPIRICAL ANALYSIS

### Geographies and industrial sector representation of FM

Table 2 shows the geographies and industrial sector representations of FM in the Swedish economy between 1995 and 2010. Based on the total number of firms analysed, FM constitutes slightly over 18% of the total employment (most of the firms have no FM and about 25% of firms in the sample have two or three FM). This finding points to the fact that family contacts may be an important medium for finding jobs in the Swedish labour market (e.g., Korpi, 2001) for reasons such as: (1) compensating for relative shortage of regional agglomeration economies and variety of skills (e.g., Glaeser, 1999; Puga, 2010); and (2) conscious effort for human capital transmission (e.g., Chevalier, 2001; Riggio & Saggi, 2015).

As expected, FM is less common in the largest and more diverse regions (LMR), whereas FM is more likely to be found in SRPr and even so in SRPu as compared with the average. Since this pattern to some extent could be triggered by the spatial sorting of individuals and families across

**Table 2.** Relative distribution of FM by type of region and sector, 1995–2010.

| | FM employment | Total employment | Pool | 1995 | 2005 | 2010 |
|---|---|---|---|---|---|---|
| *Region* | | | | | | |
| Large metropolitan regions (LMR) | 20,455 | 134,553 | .152 | .182 | .143 | .122 |
| Large regional centres (LRC) | 20,863 | 109,507 | .191 | .197 | .179 | .152 |
| Small regional centres (SRC) | 6847 | 35,945 | .190 | .252 | .183 | .148 |
| SRC with private employment (SRPr) | 2116 | 8995 | .235 | .183 | .247 | .189 |
| SRC with public employment (SRPu) | 1433 | 6297 | .228 | .266 | .192 | .200 |
| Total | 51,714 | 295,297 | .175 | .201 | .166 | .138 |
| *Sector* | | | | | | |
| High-technology sector (HT) | 208 | 1562 | .133 | .200 | .105 | .136 |
| Medium-technology sector (MT) | 7327 | 33,188 | .221 | .265 | .214 | .174 |
| Low-technology sector (LT) | 9274 | 42,447 | .218 | .222 | .213 | .171 |
| Knowledge-intensive business services (KIBS) | 5493 | 44,971 | .122 | .125 | .108 | .087 |
| Finance and insurance (FIN) | 45 | 622 | .072 | .073a | .053 | .055b |
| Sectors classified as experience, e.g., tourism (EXP) | 1340 | 12,745 | .105 | .242 | .076 | .090 |
| Primary (PR) | 4699 | 19,415 | .242 | .265 | .215 | .221 |
| Other services (OS) | 23,328 | 140,347 | .166 | .188 | .160 | .134 |
| Total | 51,714 | 295,297 | .175 | .201 | .166 | .138 |

*Notes*.
[a] for 1997 due to no observations in 1995.
[b] for 2008 due to no observations in 2010.

regions (more migrants in the large metropolitan regions), this indicates that the proportion of FM is more related to the spatial setup but not necessarily to whether the firm operates in a region dominated by public (SRPu) or private (SRPr) employment. The descriptive statistics thus support our notion of large regions being associated with high concentrations of people and better matching opportunities as well as greater diversity of backgrounds. In comparison with small regions the FM share of total employment in large regions is less predominant, which is associated with less diversity and higher levels of interpersonal relationships contributing to higher embeddedness compensating labour market diseconomies. In addition, the descriptive statistics indicates a gradual diminishing in the proportion of FM across all Swedish labour market regions over time.

Regarding the variation across industrial sectors, FM is most common in the manufacturing sectors (medium-technology sector (MT) and low-technology sector (LT)) and the primary sector (i.e., agriculture, forestry etc.). The high share of FM in MT, LT and primary sectors reveals that in general sectors with lower entry requirements are often based on social contacts because they are cheap, fast and more likely to result in the hiring of competent employees, as well as a certain degree of inheritance (e.g., Ponzo & Scoppa, 2010). While most Swedish manufacturing firms are

often located in small and large regional centres (SRC and LRC), our results indicate that they are associated with high shares of FM. As expected, FM is less frequent in Finance and insurance (FIN), Knowledge-intensive business services (KIBS) and High-technology sector (HT), which all are group of sectors with generally high formal entry requirements. When comparing time trends across sectors it is clear that the proportion of FM is diminishing over time, although less so in primary sectors compared to, for example, HT and sectors classified as experience (EXP) where the decline was much steeper.

We can thereby conclude that FM shows relatively high representation in relatively smaller labour market regions although the correlation between regional size and FM is rather moderate (–0.06 and significant at the 1% level according to Table A2 in Appendix A). Hiring of FM may be assumed to be cheaper, quicker and commonly prevalent in small regions to compensate for labour market diseconomies. For example, small regions dominated by traditional manufacturing are often characterized by strong local institutional support, which compensates for agglomeration and matching diseconomies. Unlike in small regions, large regions attract skills typically characterized by higher levels of formal education and greater diversity forming a diverse set of pools of skilled labour (Florida, 1995; Glaeser, 1999; Puga, 2010). Therefore it is not surprising that FM is more frequently occurring in small regions and traditional manufacturing industrial sectors (i.e., MT, LT and Primary – PR).

## Model results and discussion

To assess how FM impacts firm performance we present the results of the model estimates in Table 3. This is carried out in a stepwise manner as we start estimating FM only (model 1), the control variables only (model 2), FM and the controllers jointly (model 3), followed by models with interaction terms (models 4–8) and ending up with a FE model (model 9). In model 1, when only the influence of FM is estimated, it is shown that FM is positively associated with firm performance. Moreover, in model 3, where both controllers and FM are jointly regressed, the picture remains unchanged. In all, this suggests that FM produces positive externalities that facilitate firm performance, even when regressed with firm- and region-specific characteristics. The controllers are also largely unaffected by the introduction of FM as is shown when comparing models 2 and 3.

To assess the fact that FM is influenced by regional- and firm-specific characteristics, we estimate another four models that introduce interaction terms between FM and regional size (model 4), specialization (model 5), firm size (model 6) and high education (model 7), respectively. When estimating the interaction terms alone only FM × specialization was positive and significant and it remains so when all interactions are jointly regressed in model 8. Thus, these findings demonstrate that while FM in general is positively correlated with firm performance, it is mainly so in specialized regions. FM is, however, largely unaffected by the size of region or firm, or human capital levels as noted from models 4, 6 and 7. Building on Gordon and McCann's (2000) claim that social proximity is less relevant in the presence of localization economies, our results indicate that social proximity measured as family ties is indeed associated with higher performance in specialized regions. It remained robust when all interaction terms are jointly regressed (model 8). This is not surprising because most specialized regions in Sweden are also small regions characterized by relatively high shares of FM.

Finally, when estimating the FE panel model (model 9) the findings remain largely the same. Two differences should be noted. First, human capital is no longer significant and it is so in any specification of the FE model as opposed to the OLS models 2–7. This is likely attributable to the low within variation of this variable (see Table A1 in Appendix A). However, the interaction term of human capital and FM turns significantly negative, which indicates that an increase of the number of FM in a firm with high human capital concentrations is not beneficial for performance. Secondly, whereas both FM and specialization remain positively significant, the interaction term is no longer significant.

**Table 3.** Pooled-ordinary least squares (OLS) and fixed effects (FE) model estimates on average labour productivity.

| | Model 1(OLS) | Model 2(OLS) | Model 3(OLS) | Model 4(OLS) | Model 5(OLS) | Model 6(OLS) | Model 7(OLS) | Model 8(OLS) | Model 9(FE) |
|---|---|---|---|---|---|---|---|---|---|
| FM | .0083** | | .0073*** | .0141** | .0104*** | .0033 | .0075*** | .0197* | .0226** |
| | (.0037) | | (.0026) | (.0068) | (.0031) | (.0082) | (.0026) | (.0114) | (.0107) |
| Firm size | | −.1333*** | −.1361*** | −.1362*** | −.1364*** | −.1372*** | −.1361*** | −.1345*** | −.2381*** |
| | | (.0071) | (.0071) | (.0071) | (.0071) | (.0074) | (.0071) | (.0074) | (.0086) |
| High education | | .0641*** | .0647*** | .0646*** | .0649*** | .0647*** | .0772*** | .0769*** | .0313 |
| | | (.0241) | (.0241) | (.0240) | (.0240) | (.0240) | (.0261) | (.0261) | (.0259) |
| Capital | | .5808*** | .5802*** | .5802*** | .5800*** | .5802*** | .5802*** | .5799*** | .5451*** |
| | | (.0097) | (.0097) | (.0097) | (.0097) | (.0097) | (.0097) | (.0097) | (.0105) |
| Regional size | | .0374*** | .0371*** | .0380*** | .0369*** | .0372*** | .0370*** | .0368*** | .0241*** |
| | | (.0046) | (.0046) | (.0047) | (.0046) | (.0046) | (.0046) | (.0047) | (.0046) |
| Specialization | | .0128*** | .0132*** | .0130*** | .0103*** | .0129*** | .0132*** | .0101*** | .0087** |
| | | (.0037) | (.0037) | (.0037) | (.0038) | (.0037) | (.0037) | (.0038) | (.0041) |
| FM × Regional size | | | | −.0018 | | | | −.0004 | −.0008 |
| | | | | (.0017) | | | | (.0017) | (.0017) |
| FM × Specialization | | | | | .0040* | | | .0048** | −.0025 |
| | | | | | (.0021) | | | (.0022) | (.0021) |
| FM × Firm size | | | | | | .0034 | | −.0059 | −.0031 |
| | | | | | | (.0068) | | (.0069) | (.0062) |
| FM × High education | | | | | | | −.0294 | −.0282 | −.0367* |
| | | | | | | | (.0229) | (.0229) | (.0208) |
| Constant | 5.9161*** | 2.6323*** | 2.6340*** | 2.6305*** | 2.6341*** | 2.6343*** | 2.6337*** | 2.6325*** | 3.0517*** |
| | (.0331) | (.0675) | (.0676) | (.0677) | (.0676) | (.0675) | (.0676) | (.0676) | (.1214) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | .199 | .587 | .587 | .587 | .587 | .587 | .587 | .587 | .486 |
| *n* | 15,359 | 15,359 | 15,359 | 15,359 | 15,359 | 15,359 | 15,359 | 15,359 | 15,359 |
| *N* | 65,783 | 65,783 | 65,783 | 65,783 | 65,783 | 65,783 | 65,783 | 65,783 | 65,783 |

*Notes*. Values reported are coefficient and firm-clustered robust standard errors (in parentheses).
*$p < 0.1$; **$p < 0.05$; and ***$p < 0.01$.

**Table 4.** Marginal effects of the variables.

| | Model 1(OLS) | Model 2(OLS) | Model 3(OLS) | Model 4(FE) |
|---|---|---|---|---|
| FM | .0008* | .0011*** | .0036*** | .0040*** |
| | (.0004) | (.0003) | (.0013) | (.0012) |
| Firm size | | −.0254*** | −.0251*** | −.0482*** |
| | | (.0013) | (.0013) | (.0016) |
| High education | | .0002*** | .0002*** | .0000 |
| | | (.0000) | (.0000) | (.0000) |
| Capital | | .5240*** | .5238*** | .4403*** |
| | | (.0082) | (.0082) | (.0101) |
| Regional size | | −.0031* | −.0015 | −.0181*** |
| | | (.0017) | (.0018) | (.0035) |
| Specialization | | .0008** | .0011*** | .0025*** |
| | | (.0004) | (.0004) | (.0006) |
| FM × Regional size | | | −.0016** | −.0008 |
| | | | (.0007) | (.0008) |
| FM × Specialization | | | −.0002 | −.0000 |
| | | | (.0002) | (.0002) |
| FM × Firm size | | | −.0007 | −.0010 |
| | | | (.0009) | (.0008) |
| FM × High education | | | −.0000 | −.0000 |
| | | | (.0000) | (.0000) |
| | | | | |
| *N* | 65,783 | 65,783 | 65,783 | 65,783 |

*Notes*. Values reported are effect size and firm-clustered standard errors (in parentheses).
*$p < 0.1$; **$p < 0.05$; and ***$p < 0.01$.

The control variables confirm previous findings on Swedish data (e.g., Eriksson & Lindgren, 2009). As expected, capital is positive and significant and so is human capital. Moreover, the regional variables indicate that specialization and regional size enhance firm performance. The effect of firm size on performance is, however, negative and significant, which runs counter to previous findings. Splitting the data into two groups – one with fewer than 10 employees and one with 10 employees or more – we find that the negative correlation is only valid for the smallest firms in our sample, whereas size is positive for the larger ones.

To verify the sensitivity of our results, we performed four main robustness checks. First, due to the large number of observations, variables can be significant without having any real effect on the goal variable, which consequently makes it difficult to disentangle the relative effect of each variable. Therefore, we estimated the marginal effects for each variable at the mean of the other variables on model 1 (FM only), model 3 (FM + controllers), model 8 (OLS with all interactions) and model 9 (FE with all interactions). The results (shown in Table 4) indicate that there is indeed a significant effect of FM on productivity, which is relatively larger than high education and specialization. Capital is the most influential variable whereas regional size has a weak moderating effect, contrary to the findings in Table 3. Moreover, neither the interaction effects of FM and specialization (OLS) nor FM and human capital (FE) are significant. Model 3 (in Table 4) indicates that regional size has a moderating influence on the impact of FM. Thus, as shown in Table 2 family bonds may play an important role in finding jobs especially in small regions, and the marginal effects presented in Table 4 indicate that FM also positively influences firm performance in small regions. Whereas the supply of highly skilled persons is more scarce in small regions compared with large regions having a more diverse labour pool and better matching potentials (e.g., Glaeser, 1999; Puga, 2010), labour matching and knowledge diffusion in small regions can thus be compensated for by family–social contacts and interpersonal trustful relationships.

Second, to rule out the possibility that our results are influenced by the family businesses, we estimated separate models on family firms and non-family firms. For the purpose of testing the sensitivity of our results, we defined family firms similar to Bird and Wennberg (2014) as firms (1) having two or more employees who belong to the same family as the firm owner, (2) that have FM in management positions, and (3) that the FM earn their main source of income from the firm. The results were almost identical and FM is even positive and significant in non-family firms but with weaker significance level.

Third, as argued in previous sections, the influence of FM on firm performance may be due to variations across groups of industrial sectors depending on the types of skills required and the hiring thresholds. We therefore estimated 8 different industry-group models (i.e., HT, MT, LT, KIBS, FIN, EXP, PR and Other services – OS). The results (Table A3 in Appendix A) indicate that in sectors where the formal hiring thresholds are lower, the influence of FM on firm performance is important (e.g., MT and OS), but also moderately so for services like KIBS. A striking pattern is that FM influences performance in LT firms (low technology manufacturing firms) in large regions while having a positive correlation with performance in small services firms (OS) in small regions. In the services, one can assume that knowledge spillovers rely heavily on social interactions and trustful interpersonal relationships between people. This makes the significance of working with people you know and trust (e.g., FM) as important as formal knowledge in low hiring threshold firms. In the Swedish context we can conclude that the effect of FM in manufacturing can be attributed to the increasing importance of intermediate use of service in the manufacturing industries (Fournier & Axelsson, 1993).

Finally, we estimated models including the entire population of firms to assess whether the findings are driven by the fact that we only included firms with fewer than 50 employees. While the general findings remain (it is still small firms that constitute the broad majority of observations), FM has no significant correlation with performance in firms with more than 100 employees. Thus, FM is mainly an attribute influencing performance in smaller firms.

## CONCLUSIONS

The aim of the paper was to contribute to the discussion in economic geography and regional science on how social proximity facilitates firm performance in different regional contexts. Using longitudinal register data, our results indicate that in-house concentration of FM positively affect performance even when jointly regressed with both firm- and regional level factors. In other words, our results indicate that FM ties facilitate firm performance. However, this seems to be of particular importance for smaller firms in small and specialized regions, where we on the one hand can expect the concentration of FM to be higher and on the other hand where the access to regional externalities are scarcer. Moreover, the results reveal that FM significantly influences performance in low technological manufacturing firms with a relatively low educated workforce. While FM may be crucial for getting a job in a small region, FM also facilitates and boosts firm performance in these types of spatial settings as compared with larger and more diverse regions. The results therefore partly build on Gordon and McCann (2000) who argue that social proximity should be less important in large specialized regions (for their case the London conurbation) because of the presence of specialized skills. While we do find that specialization actually increases the relevance of FM, the results also show that this is mainly a reflection of regional size as the marginal effect of FM decreases the larger the region gets.

Based on the analysis, we conclude that FM generates increasing returns for learning and knowledge production through shared social capital and trustful relationships, but this relationship is intertwined with factors related to industry as well as region. As also argued by Basco (2015), our results pave the way for further investigations into the importance of family ties on firm learning processes. In regional science scholars have studied how factors like labour

characteristics, entrepreneurship etc. drive economic performance, and our study contributes to this literature by showing that family ties enhance knowledge spillovers and performance. This may be of prominent importance for smaller and more peripheral regions struggling to maintain their competitive advantage.

While the current study has focused on the internal dynamics of firms, future studies may focus on the individual productivity levels on different scales. It should also be stressed that FM may not always provide the required dynamics for collective learning. Therefore, future studies could elaborate on how the interaction between FM and other proximity dimensions can enhance performance and promote regional development. Since we know that the role of FM is multi-faceted (accessibility to jobs, learning processes, reducing transactions costs, etc.), it may also be beneficial to take a more detailed look at how this influences the uneven geography of regional growth. For example, previous studies have shown that different dimensions of cognitive proximity in terms of labour market flows influence regional growth differently (cf., Boschma et al., 2014), which makes it reasonable to argue that the degree of social proximity within a region may also influence whether FM enhances employment growth or productivity growth, and to what extent it can withstand asymmetric shocks (e.g., Johannisson et al., 2007).

## NOTES

1. For instance, according to Gertler (2003), tacit knowledge does not easily travel between people. This is because the transmission of tacit knowledge thrives on face-to-face interactions between actors who share basic similarities in language, values, codes of communication and personal knowledge of each other based on past informal interactions
2. We also used a relative measure for FM (i.e., FM/firm size) on the same dependent variable. In all, the same results were obtained

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## APPENDIX A

**Table A1.** Descriptive statistics of the variables.

| Variable | | Mean | SD | Minimum | Maximum | Observations |
|---|---|---|---|---|---|---|
| Average productivity | Overall | 5.82 | .71 | –1.91 | 10.67 | $N$ = 93,657 |
| | Between | | .67 | –1.22 | 10.67 | $n$ = 21,213 |
| | Within | | .43 | –.21 | 10.42 | $T$ = 4.415 |
| FM | Overall | .55 | .98 | .00 | 6.00 | $N$ = 66,031 |
| | Between | | .85 | .00 | 5.00 | $n$ = 15,389 |
| | Within | | .54 | –2.45 | 4.01 | $T$ = 4.291 |
| Firm size | Overall | .99 | .55 | .00 | 3.91 | $N$ = 93,657 |
| | Between | | .57 | .00 | 3.91 | $n$ = 21,213 |
| | Within | | .37 | –.87 | 4.29 | $T$ = 4.415 |
| High education | Overall | .01 | .11 | .00 | 1.00 | $N$ = 93,657 |
| | Between | | .09 | .00 | 1.00 | $n$ = 21,213 |
| | Within | | .08 | –.82 | .95 | $T$ = 4.415 |
| Capital | Overall | 5.26 | .87 | –2.20 | 10.37 | $N$ = 93,120 |
| | Between | | .80 | –2.20 | 9.98 | $n$ = 21,160 |
| | Within | | .50 | –.35 | 8.96 | $T$ = 4.401 |
| Regional size | Overall | 3.94 | 1.59 | .00 | 6.44 | $N$ = 93,657 |
| | Between | | 1.66 | .00 | 6.44 | $n$ = 21,213 |
| | Within | | .55 | –1.22 | 7.91 | $T$ = 4.415 |
| Specialization | Overall | –.79 | 1.45 | –7.73 | 9.63 | $N$ = 93,657 |
| | Between | | 1.84 | –6.80 | 9.63 | $n$ = 21,213 |
| | Within | | .66 | –7.13 | 7.40 | $T$ = 4.415 |

**Table A2.** Correlation matrix (all correlations are significant at the 1% level) and variance inflation factor (VIF).

| | Variables | VIF | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1 | FM | 1.07 | 1 | | | | | |
| 2 | Firm size | 1.15 | .17 | 1 | | | | |
| 3 | High education | 1.01 | –.02 | –.03 | 1 | | | |
| 4 | Capital | 1.05 | .01 | –.11 | .01 | 1 | | |
| 5 | Regional size | 5.45 | –.06 | –.19 | .02 | .10 | 1 | |
| 6 | Specialization | 1.33 | .00 | .37 | –.02 | –.07 | –.35 | 1 |

**Table A3.** Pooled-ordinary least squares (OLS) estimates across industry groups.

| | HT | MT | LT | KIBS | FIN | EXP | PR | OS |
|---|---|---|---|---|---|---|---|---|
| FM | −.0180 | .0565** | −.0218 | .0773* | −8.3455 | −.0163 | −.0002 | .0325* |
| | (.1546) | (.0246) | (.0214) | (.0418) | (15.3183) | (.0949) | (.0368) | (.0170) |
| FM × Regional size | .0606 | −.0057 | .0071** | −.0062 | .4884 | .0081 | .0095 | −.0056** |
| | (.0411) | (.0037) | (.0034) | (.0053) | (2.0387) | (.0155) | (.0076) | (.0027) |
| FM × Specialization | .0087 | .0021 | .0008 | .0078 | −.9237 | −.0042 | .0119* | .0039 |
| | (.0427) | (.0038) | (.0039) | (.0072) | (1.2557) | (.0252) | (.0071) | (.0048) |
| FM × Firm size | −.1263 | −.0204 | .0039 | −.0313 | .7618 | −.0008 | −.0354* | .0026 |
| | (.0808) | (.0146) | (.0131) | (.0229) | (3.5686) | (.0404) | (.0203) | (.0111) |
| FM × High education | | .0299 | −.1280** | −.0299 | 1.0862 | −.1009 | −.2855*** | −.0080 |
| | | (.0801) | (.0629) | (.0303) | (3.3955) | (.1306) | (.0890) | (.0453) |
| Firm size | −.0740 | −.1024*** | −.0998*** | −.1030*** | −1.8381** | −.2106*** | −.1549*** | −.1554*** |
| | (.0808) | (.0196) | (.0178) | (.0190) | (.7107) | (.0356) | (.0269) | (.0112) |
| High education | −.4366** | .1396 | .1631 | .0761* | .6158 | −.2078 | .3235** | .0903** |
| | (.1894) | (.0969) | (.1161) | (.0414) | (.5937) | (.1447) | (.1385) | (.0419) |
| Capital | .7340*** | .5779*** | .6175*** | .6595*** | .8750*** | .4851*** | .5370*** | .5684*** |
| | (.1159) | (.0252) | (.0179) | (.0213) | (.1233) | (.0355) | (.0176) | (.0164) |
| Regional size | .0257 | .0310*** | .0181 | .0394*** | .1525 | .0022 | .0177 | .0479*** |
| | (.0962) | (.0103) | (.0113) | (.0137) | (.3140) | (.0203) | (.0172) | (.0074) |
| Specialization | .0689* | .0123 | .0024 | .0048 | .6777 | −.0254 | .0042 | .0156** |
| | (.0408) | (.0085) | (.0097) | (.0116) | (.4350) | (.0180) | (.0119) | (.0066) |
| Constant | 1.5062 | 2.7689*** | 2.6303*** | 2.2867*** | 7.9453 | 3.3202*** | 2.9156*** | 2.7510*** |
| | (.9093) | (.1455) | (.1332) | (.1467) | (10.3092) | (.2265) | (.1432) | (.1203) |
| | | | | | | | | |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | .626 | .546 | .583 | .558 | .869 | .585 | .525 | .607 |
| *N* | 356 | 7520 | 9483 | 9717 | 51 | 2983 | 5089 | 30,584 |

*Notes*. Values reported are coefficient and firm-clustered robust standard errors.
*$p < 0.1$; **$p < 0.05$; and ***$p < 0.01$.