Inter-industry differences in local banks’ effect on new firm formation

A regional study of entrepreneurship in Sweden

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Programme of study: Civilekonom
Author: Johannes Eliasson
Tutor: Mikaela Backman
Department: Economics, Finance and Statistics
Jönköping May 2016
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Johannes Eliasson
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Author: Johannes Eliasson

Tutor: Mikaela Backman

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Abstract

Formation of new firms is important, since new firms create jobs and economic growth. When entrepreneurs lack the financial resources which are needed to start a firm, they often turn to banks to borrow money. Previous research has shown that relationships between banks and new business borrowers most often are local and that the dependence on banks differs across industries. In light of this, the purpose of this paper is to investigate if local access to banks has a stronger relationship with the rate of new firm formation in some industries than in others. Based on cross-sectional data on all Swedish municipalities in 2009, a series of OLS regressions are estimated to test if variables used to describe the bank market in a municipality are related with the new firm formation rate, both in total and in different industry categories. The results show that the number of bank branches per capita is positively related with the total new firm formation rate. In regards to the inter-industry differences, the findings indicate that local access to banks is more important for new firm formation in some industries than in others.
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I INTRODUCTION

Financial intermediaries have an important role in the society since they distribute financial funds from those who do not use them now to those who want to invest and are in need of financing. Instead of lending directly to individuals or firms that need financing, people can deposit their money at financial institutions and let them handle the screening and monitoring associated with lending. Financial institutions are specialised within these activities and therefore financial intermediation helps the society to distribute financial funds to the most efficient projects and in that way promotes entrepreneurship and economic growth (Levine, 1997). One group which often acquires financial funds is individuals who want to start new firms, i.e. entrepreneurs. Financial funds are most often needed to start a business and potential firm founders do not seldom lack these funds (Evans & Jovanovic, 1989; Cassar, 2004; Harding & Cowling, 2006). There are various ways in which an entrepreneur can obtain external financing; funds can be obtained from financiers such as family and friends, industrial partners, venture capitalists, business angels and/or banks. Empirical research has shown that Swedish firms to a large extent rely on bank financing rather than equity financing and, therefore, Sweden is often said to be a bank-based country (Cressy & Olofsson, 1997; Berggren, Lindström, & Olofsson, 2001; Berggren & Silver, 2010).

New firms generate growth in employment, productivity and innovation, and they have higher employee satisfaction than other firms (van Praag & Versloot, 2007). Therefore, the society should try to optimise the conditions for entrepreneurs to be able to start new firms and develop them successfully. However, it has been shown that the rate of new firm formation varies considerably across regions in Sweden (Davidsson, Lindmark, & Olofsson, 1994). Previous literature has identified various factors which influence the regional rate of new firm formation and several of these studies mention access to financial capital as an important determinant (Davidsson et al, 1994; Bonaccorsi di Patti & Dell’Ariccia, 2004; Sutaria & Hicks, 2004; Rogers, 2012; Backman, 2015). This is backed by findings showing that small firms are largely dependent on their local banks when they apply for loans and other financial services (Kwast, 1999; Dermine, 2000; Bonaccorsi di Patti & Gobbi, 2001). Spatial proximity to banks seems to be of greatest importance for small firms, and particularly new firms, because they do not have the same financial statements and other standardised information as more mature firms have and they therefore have to rely more on relationships (Petersen & Rajan, 2002; Backman, 2015). Thus, having access to local banks, which could be contacted in person, should improve the possibilities for entrepreneurs to obtain financing and start businesses. This is backed by Backman (2015), who shows that there is a positive relationship between local access to banks and new firm formation in Sweden.

Even though it is clear that access to financial capital is important for new firm formation and regional development, financial funds are not evenly spread out across the Swedish regions and there are regional variations in how easy it is to receive different types of financing. A large majority of the business angels and venture capitalists are located in the two largest cities, Stockholm and Gothenburg, and they mostly finance firms in those regions (Berggren & Silver, 2010). In contrast to private investors, banks have a more even distribution across the country and since most bank branches are subsidiaries of large bank corporations, they do not lack financial resources (Berggren & Silver, 2010; Backman, 2015). However, the total number of bank branches in Sweden has decreased by 8.3 per cent

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1 A bank branch is the same as a bank office, i.e. a location where a bank offers its services to its customers. It can be either a headquarter or a facility away from the headquarter.
between 2004 and 2014 and the decrease has been substantially larger in regions where other sources of financing are already limited, i.e. in rural regions (Swedish Bankers’ Association, 2005 & 2015a; Backman, 2015).

There are not only variations in the rate of new firm formation and access to banks across regions. Also, industries vary in how capital-intensive they are and to what extent they rely on different sources of financing (Myers, 1984; Harris & Raviv, 1991; Berger & Udell, 1998; Berggren et al., 2001; Berggren & Silver, 2010). Even though banks are confirmed to play an important role for all types of firms in Sweden, private investors more often invest in growing firms within high-tech industries and business services, whereas manufacturing firms are heavily reliant on bank financing (Berggren et al., 2001; Berggren & Silver, 2010). This could be a consequence of that manufacturing firms have more tangible assets which can serve as collateral for bank loans and that firms within high-tech industries and business services are more open for external owners, such as business angels and venture capitalists (Berggren et al., 2001; Berger & Udell, 2002; Cassar, 2004; Berggren & Silver, 2010).

It has been shown that there are inter-industry differences in how reliant on bank financing firms are and that local access to banks affects the rate of new firm formation. However, as far as the author of this paper knows, these two findings have not yet been combined to deepen the understanding of how the local access to banks influences new firm formation in different industries. The purpose of this paper is to investigate if local access to banks, measured on a municipal level, has a stronger relationship with the rate of new firm formation in some industries than in others. In light of this, the research question this study aims to answer is: If there is a relationship between local access to banks and the rate of new firm formation on a municipal level, does it differ across industries?

This paper shows that there is a positive relationship between number of bank branches per capita and the total new firm formation rate. Though, average bank branch size and concentration level are not found to have any significant effect. When the new establishments are divided into industry categories, the results show that the relationship between local access to banks and the rate of new firm formation differs significantly across industries. Thus, the findings in this study indicate that local banks are more important for new firms in some industries than in others.

Having discussed what this paper investigates, it is also important to clarify which related questions it does not try to answer. This study does not aim to investigate any variations between banks, for example whether access to certain bank companies or certain types of banks is more important for new firm formation. Neither does it try to answer which types of financing new firms in certain industries use or why entrepreneurs within different industries prefer different sources of funds. Furthermore, it does not capture changes over time, i.e. if the new firm formation rate and its relationship with local access to banks has changed within municipalities over time.

This paper is organised as follows. Section 2 gives an overview of the banking market in Sweden. Section 3 presents the theoretical framework and highlights the importance of banks for new firms as well as how industries differ in their financing behaviour. The data, variables and method are presented in Section 4. Section 5 presents the empirical results and the analysis. Conclusions and suggestions for future research are presented in Section 6.
2 THE SWEDISH BANKING MARKET

There are several ways in which firm founders can obtain external financing when they do not have enough own funds (Parker, 2004). In some cases, entrepreneurs turn to family and friends and borrow money from them. However, if these informal sources of funds do not suffice to start the firm, the potential firm founder has to try to obtain financing from professional investors or lenders. Two such sources of external financing are equity from private investors and bank loans. Private equity is often provided by venture capitalists or business angels and their investment in a firm gives them partial or full ownership and control. However, private equity is not evenly distributed across Sweden. It is largely concentrated to the two largest cities, Stockholm and Gothenburg, as more than 80 per cent of the members of the Swedish Venture Capital Association have their headquarters there and they most often finance firms in those regions (Berggren & Silver, 2010). Hence, entrepreneurs outside the largest cities in Sweden have difficulties attracting private equity (Berggren & Silver, 2010).

Compared to private investors, banks are more evenly spread out through Sweden (Berggren & Silver, 2010). In 2016, there are bank branches in all Swedish municipalities and since most branches belong to large bank corporations, financial funds can be distributed from one region to another through the banks (Backman, 2015). Sweden is often said to be a bank-based country. In contrast to countries where equity financing is more prevalent, Swedish firms rely on bank financing to a large extent (Cressy & Olofsson, 1997; Berggren et al., 2001; Sjögren & Zackrisson, 2005; Berggren & Silver, 2010). Of the small and medium-sized enterprises in Berggren and Silver’s (2010) study, 72 per cent have bank loans. Furthermore, banks are the largest actors in the Swedish financial market in terms of balance sheet amount and bank accounts are the most common way of saving for Swedish households (Swedish Bankers’ Association, 2015d). Therefore, a well-functioning bank market is crucial for the Swedish economy.

In 2014, there were 117 banks in Sweden (The Riksbank, 2014). These can be grouped into four main categories: Swedish commercial banks, foreign banks, savings banks and co-operative banks (Swedish Bankers’ Association, 2015b). Co-operative banks only play a minor role in the Swedish banking system, as there are only two such banks and none of them have a substantial market share (Swedish Bankers’ Association, 2015c). Despite a relatively large number of banks, the Swedish banking market can be described as an oligopoly, since four banks have a dominant position. These four are the Swedish commercial banks Handelsbanken, Nordea, SEB and Swedbank. They are universal banks implying that they offer all types of financial services (Swedish Bankers’ Association, 2015b). Together, the four largest banks account for 73.6 per cent of the total assets in the Swedish banking market (The Riksbank, 2014). In 2014, there were 1,774 bank branches in Sweden and 1,206 of those belonged to one of the four largest banks (Swedish Bankers’ Association, 2015a). These figures demonstrate the strong position that Handelsbanken, Nordea, SEB and Swedbank have in the Swedish banking market.

Since 1990, foreign banks have been allowed to open branches in Sweden, and in 2014, there were 29 active foreign banks in the Swedish market (Swedish Bankers’ Association, 2015b).

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2 Sweden consists of 290 municipalities, which are self-governing local authorities with a considerable degree of autonomy, independent powers of taxation and their own municipal assemblies (Swedish Association of Local Authorities and Regions, 2016a, b).

3 Oligopoly is defined as “a market supplied by a small number of firms in which the choice of one firm affects the profits of the other firms” (Black, Hashimzade, & Myles, 2012, p. 290).
However, foreign banks have had difficulties to gain large market shares. In terms of total assets, only two foreign banks are among the ten largest banks in Sweden. The foreign bank with the largest market share is Danske Bank with 10.9 per cent of total assets in 2014 (The Riksbank, 2014). Most of the foreign banks have not offered as many different services as universal banks do, but have rather been focused on lending to existing firms and on the securities market (Swedish Bankers’ Association, 2015b). In 2014, the 29 foreign banks together had 65 branches in Sweden (Swedish Bankers’ Association, 2015a). However, only Danske Bank had more than three branches and all except two had one single branch in Sweden. This demonstrates that most foreign banks do not have the same local presence as Swedish banks have, but rather handle all their operations from their offices in Stockholm.

A special characteristic of the Swedish banking market is the presence of savings banks. In 2014, there were 48 savings banks in Sweden and together they had 145 branches (Swedish Bankers’ Association, 2015a). A savings bank does not have any shareholders and, therefore, the profits are either kept in the bank or used to strengthen the community in which it is located (Sparbankernas Riksförbund, 2016). Another special feature of savings banks is that they do not operate on a national level, but are focused on regional or local markets (The Riksbank, 2014; Swedish Bankers’ Association, 2015b). The focus on a limited geographical area is specified in the law which regulates savings banks. Furthermore, they have the objective to strengthen the regions where they are present. As a consequence of their local agenda, there are no big savings banks. In 2014, the largest savings bank had 13 branches (Swedish Bankers’ Association, 2015a). Even though the savings banks are small on a national level, they have dominant positions in many local markets. Savings banks are often present in local areas where there are not many other banks and in some municipalities a savings bank is the only bank present (Backman, 2015).

There are bank branches in all 290 municipalities in Sweden and a large majority of all municipalities have multiple branches. Between 2004 and 2014, the total number of bank branches in Sweden decreased by 8.3 per cent (Swedish Bankers’ Association, 2005 & 2015a). Another trend in the Swedish banking market is the reduction in the use of cash. As the use of digital payment methods has increased, many banks have reduced their holdings of cash and the number of bank branches without cash has increased dramatically (The Riksbank, 2016). At the same time as the total number of bank branches has decreased, the number of branches without cash has increased by more than 400 per cent between 2010 and 2014 (Swedish Bankers’ Association, 2011 & 2015a). In Sweden, there is no law compelling banks to hold cash and, therefore, many banks have instead focused on more profitable operations (The Riksbank, 2016).

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4 The name of the law is Sparbankslag (1987:619).
3 NEW FIRM FORMATION AND FINANCIAL CAPITAL

The rate of new firm formation, i.e. how many new firms that are started, is a measure of the level of entrepreneurial activity in a country or region. Comparing rates in different regions gives an indication of which types of regions that have the best conditions for starting new firms and experiencing economic growth, since new firm formation has a positive impact on economic development (Carree & Thurik, 2003; Denis, 2004; Fritsch & Mueller, 2004; van Praag & Versloot, 2007). An extensive body of research has investigated regional differences in the rate of new firm formation and it can be concluded that the new firm formation rate does not vary greatly over time, but substantially across regions (Armington & Acs, 2002; Johnson, 2004; Fritsch & Mueller, 2007; Andersson & Koster, 2011). The pattern of regional differences in the rate of new firm formation is present also in Sweden (Davidsson et al., 1994; Andersson & Koster, 2011; Karlsson & Backman, 2011; Backman, 2015).

Since new firm formation is important for economic growth and there are regional differences in the rate of new firm formation, a logical consequence has been that many studies have focused on the regional determinants of the new firm formation rate. In other words, empirical research has thoroughly investigated why the rate of new firm formation is higher in some regions than in others (Davidsson et al., 1994; Keeble & Walker, 1994; Armington & Acs, 2002; Acs & Armington, 2004; Johnson, 2004; Fritsch & Mueller, 2007; Renski, 2014). One factor which in previous research is highlighted as an important determinant of new firm formation is access to financial capital (Evans & Jovanovic, 1989; Black & Strahan, 2002; Parker, 2004; Sutaria & Hicks, 2004; Berggren & Silver, 2010; Rogers, 2012; Robb & Robinson, 2014; Backman, 2015). This is logical, because financial resources are most often needed to start a firm, for example for buying machinery, renting or buying a shop, factory or office, or hiring employees. However, many potential firm founders do not have the financial funds they need to be able to launch their business ideas successfully (Evans & Jovanovic, 1989; Holtz-Eakin, Joulfaian, & Rosen, 1994; Cassar, 2004; Harding & Cowling, 2006). When internal funds are missing, entrepreneurs can try to obtain external financing, i.e. borrow money or attract investors who want to take an ownership position in the firm. Thus, it is reasonable that more firms are started in regions where entrepreneurs have better access to financial capital.

When a potential firm founder does not have the financial resources which are needed to start a business, a natural initial source of financing for many is family and friends, who can either supply funds by investing in shares of the firm or, more commonly, lend money to the entrepreneur (Parker, 2004). Studies in several countries show that loans from family and friends are an important source of start-up finance for many entrepreneurs (Bates, 1997; Cressy & Olofsson, 1997; Berger & Udell, 1998; Basu & Parker, 2001). In some cases, family members and friends may lend money to the entrepreneur because they are altruistic (Basu & Parker, 2001). Other reasons why they may be willing to lend money even when professional external lenders, such as banks, say no are that they may have private information about the entrepreneur which banks do not have and they may be able to monitor the entrepreneur more closely (Casson, 2003; Parker, 2004). Despite family finance being relatively common for new firms, evidence suggests that it is correlated with unsuccessful entrepreneurship, such as low profitability and high failure rates (Yoon, 1991; Bates, 1997; Basu, 1998). Even though financing from family and friends may be desirable for many entrepreneurs, it is also a limited source of funds. Family loans are on average smaller than bank loans (Parker, 2004). Furthermore, family members and friends may, just as the entrepreneur, lack the financial resources which are needed. Therefore, if an
entrepreneur wants to obtain the financial resources needed to start a firm, he or she may need to turn to professional investors or lenders.

A more formal source of external financing is private equity, i.e. to attract external owners, such as venture capitalists and business angels. The supply of private equity is often concentrated to one or a few spatial clusters in a country (Sorenson & Stuart, 2001; Mason & Harrison, 2002; Klage & Martin, 2005; Martin, Berndt, Klage, & Sunley, 2005; Berggren & Silver, 2010; Chen, Gompers, Kovner, & Lerner, 2010). Also, private investors tend to be more likely to finance firms in their own immediate region (Klage & Martin, 2005; Martin et al., 2005; Berggren & Silver, 2010). This could be a consequence of that investing in a firm requires close contact, management and monitoring of the firm and that is easier for a private investor if the firm in which he or she has invested is spatially close (Martin et al., 2005; Chen et al., 2010). Even though firm founders may be willing to travel frequently to meet the investors and technological progress has made virtual meetings easier, spatial proximity is still important for investors’ knowledge of the market in which the entrepreneur operates (Agarwal & Hauswald, 2010b). Evidence of private investors’ preference of financing firms in metropolitan regions is given by Berggren and Silver (2010), who show that firms outside those regions which apply for private equity financing are more often denied. As a consequence, it is difficult for firm founders in peripheral regions to obtain financing in the form of private equity (Klage & Martin, 2005; Martin et al., 2005; Berggren & Silver, 2010). Furthermore, relatively few firms obtain private equity financing as a result of private investors’ tough investment requirements, since they most frequently invest in firms which are innovative and have chances of strong growth (Hall & Hofer, 1993; Berggren et al., 2001; Romano, Tanewski, & Smyrnios, 2001; Berger & Udell, 2002; Winton & Yerramilli, 2008; Berggren & Silver, 2010).

Though, limited use of private equity financing is not only due to insufficient supply of funds. It is also due to entrepreneurs’ unwillingness to give up some of the control of the firm and let new owners in, so called control aversion (Cressy & Olofsson, 1997; Berggren, Olofsson, & Silver, 2000; Silver, Lundahl, & Berggren, 2015). The feeling of being in control is a reason why many entrepreneurs start their businesses in the first place (Cressy & Olofsson, 1997; van Gelderen & Jansen, 2006; Parry, 2010; Silver et al., 2015). However, outsider assistance and expertise can often help new firms to perform better (Sapienza, 1992; Chrisman & McMullan, 2000 & 2004; West & Noel, 2009). Despite acknowledging the positive effects associated with attracting private investors, most entrepreneurs do not actively search for new owners, since it results in a loss of control (Cressy & Olofsson, 1997). In other words, limited demand by firm founders is also a reason why private equity is not widely used.

### 3.1 Banks’ importance for new firm formation

In contrast to private investors, banks often have a widespread presence across regions (Bonaccorsi di Patti & Gobbi, 2001; Black & Strahan, 2002; Klage & Zimmermann, 2004; Klage & Martin, 2005; Berggren & Silver, 2010; Backman, 2015). Furthermore, banks lend money to firms; they do not take an ownership position. Therefore, the firm founder’s loss of control and independence associated with bank financing is often not as substantial as the loss when new owners are attracted (Cressy & Olofsson, 1997). Their widespread distribution and the limited loss of control may be two reasons why banks play a vital role in providing funds for new firms.

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5 Control aversion is defined as “aversion to equity stake holding by outsiders” (Cressy & Olofsson, 1997, p. 193).
Since banks are important for financing of new firms, it is worth mentioning the role as financial intermediaries which banks play. Asymmetric information, the concept introduced by Akerlof (1970), is an important reason for the existence of banks. A firm founder most often knows more about his or her firm’s potential profitability and solvency than potential investors and lenders do (Stiglitz & Weiss, 1981; Parker, 2004). This is especially true for new firms, as they by nature have limited history and financial records (Cassar, 2004; Parker, 2004). Given the issue of asymmetric information, it can be very risky for private persons to invest directly in new firms. However, banks are specialists in screening and monitoring prospective borrowers and can therefore reduce the transaction costs associated with lending and borrowing (Levine, 1997). Thus, people with savings can deposit them in an interest-bearing bank account and let the bank decide in which projects the deposits should be invested.

Even though banks are specialists, assessing loan requests from new firms is a challenging task given the limited information available. Because of the lack of historical records and financial statements, the screening of new firms has to be carried out in a different way than the screening of existing firms (Berger & Udell, 1998; Cassar, 2004). Rather than relying on standardised information such as financial statements, banks have to rely more on relationships and soft information when they assess whether new firms are worth lending to (Petersen & Rajan, 2002; Backman, 2015). In other words, knowing the entrepreneur and his or her chances of succeeding with the new firm becomes more important than only relying on financial figures. Even though the rapid increase of online banking services has reduced the need for banks and their customers to meet in person for some services, other services, such as business loan applications, still require face-to-face contact (Petersen & Rajan, 2002; Findahl, 2014; Backman, 2015). When information is imperfect, which is the case when new firms apply for loans, face-to-face contact is particularly important (Storper & Venables, 2004). Also, studies show that close relationships are important for the likelihood of a small or new firm to obtain financing from a bank (Cole, 1998; Boot, 2000; Cassar, 2004; Elyasiani & Goldberg, 2004; Agarwal & Hauswald, 2010b).

The importance of face-to-face contact and relationships in new firm financing indicates that there is a need for spatial proximity between banks and borrowers. Meeting in person is costly, as it requires time, both for the meeting and for travelling there (Storper & Venables, 2004). Therefore, if firm founders can travel a shorter distance to the bank, the costs of face-to-face contact are reduced. It should be noted that when a new firm borrows money from a bank, it does not only require one single meeting. Rather, it is often a long-term relationship (Cole, 1998; Elyasiani & Goldberg, 2004; Agarwal & Hauswald, 2010b). Spatial proximity is not only important for face-to-face contact. Even more importantly, it is crucial for a bank to have knowledge about the local conditions where the firm operates, such as other entrepreneurs, market conditions and trends, in order to make the right lending decisions (Pollard, 2003). Acquiring that knowledge and information about the potential borrower is easier for a bank which is spatially close to its customers and operates in the same local conditions (Michelacci & Silva, 2007; Agarwal & Hauswald, 2010b). In fact, being close to its potential customers is a vital competitive advantage, since it gives soft information which cannot be acquired in other ways, and technological progress can only partially substitute for that advantage (Agarwal & Hauswald, 2010b). The importance of spatial proximity is highlighted by Agarwal and Hauswald (2010b, p. 2783), who state that “our results reveal that firm-bank distance is an excellent proxy for a lender’s informational advantage”. Also,

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6 Soft information is defined as “information that is hard to communicate to others, let alone capture in written documents” (Petersen & Rajan, 2002, p. 2533).
from the borrowers’ point of view, firms located close to the bank are more likely to receive financing (Michelacci & Silva, 2007). Hence, spatial proximity between entrepreneurs and banks reduces the degree of asymmetric information and increases the chances that they will develop a fruitful relationship in which the bank can profitably finance the new firm.

Furthermore, banking markets for small firms are very local. 88 per cent of small firms in the United States have a bank located within 30 miles from their headquarters as their primary financial institution and they tend to cluster their services, both on the asset and liability side, to that local bank (Kwast, Starr-McCluer, & Wolken, 1997; Kwast, 1999). Similar results have been found in Canada, Australia and the United Kingdom (Dermine, 2000). Also, banks in Germany invest more than 75 per cent of their deposits within a distance of 100 kilometres and 80 per cent of credit to small and medium-sized enterprises in Italy is granted by a bank branch in the same province as the firm (Bonaccorsi di Patti & Gobbi, 2001; Fritsch & Schilder, 2008). Even though the studies mentioned above cover financing of small firms, the same conclusions are considered to hold also for new firms, as most new firms are small.

Several studies show that banks are the most important external financiers of small firms in Sweden (Cressy & Olofsson, 1997; Berggren et al., 2000; Berggren et al., 2001; Sjögren & Zackrisson, 2005; Berggren & Silver, 2010). The same pattern has been found for new firms in other countries (Bates, 1997; Basu & Parker, 2001; Parker, 2004). Furthermore, international evidence shows that firms’ dependence on debt financing decreases with firm age, indicating that banks should be especially important when a firm is new (Chittenden, Hall, & Hutchinson, 1996; Michaelas, Chittenden, & Poutziouris, 1999; Johnsen & McMahon, 2005). Based on the empirical findings put forward above, there are strong reasons to believe that local banks in Sweden are important for the likelihood of potential firm founders to obtain financing and hence be able to start new firms. Backman (2015) shows that there is a positive relationship between local access to banks and the new firm formation rate in Sweden. More specifically, the empirical findings show that average bank branch size, bank branches per capita, independent banks per capita and bank competition positively affect the local rate of new firm formation. In other words, municipalities with more well-developed bank markets and hence better access to bank capital tend to have more new firms per capita. Furthermore, Backman’s (2015) study shows that access to banks has a positive relationship with the rate of new firm formation on a local level, but not on a regional level. This finding further supports the view that banking markets for small and new firms are local and that spatial proximity matters for firms’ chances to obtain financing (Kwast et al., 1997; Kwast, 1999; Dermine, 2000; Pollard, 2003; Michelacci & Silva, 2007).

### 3.2 Indicators of the local bank sector

It has been shown that the local bank sector affects new firm formation; however, there is no universal measure of a local bank sector. Rather, there are various characteristics of a municipality’s bank market. In this section, three factors which are considered to describe different aspects of local access to banks are discussed. First, an interesting issue is whether large or small bank branches are better for new firm formation. The size of a branch indicates its structure and available services (Backman, 2015). Since there is imperfect information when new firms apply for loans, how knowledgeable and experienced in assessing that type of loan request the bank branch’s employees are is important for the likelihood of the request to be accepted (Parker, 2004).

One way for employees to become more knowledgeable and productive is to specialise in only a few tasks (Smith, 1960; Rosen, 1983; Bolton & Dewatripont, 1994; Duranton & Puga, 2004; Boh, Slaughter, & Espinosa, 2007; Argote, 2012). According to Smith (1960),
specialisation is beneficial because it leads to innovation, increased skill level and reduced costs. Rosen (1983) claims that specialised skills should be utilised as intensively as possible, because the utilisation increases the returns to human capital. Furthermore, by specialising in processing particular types of information, the time employees spend processing that information can be reduced (Bolton & Dewatripont, 1994). In other words, if bank employees can specialise in certain types of loan requests, they will most likely be better able to assess them. Specialisation is possible when there is division of labour, i.e. when the employees perform different tasks. This view is supported by research showing that loan officers at banks use better decision strategies when they are faced with similar loan requests (Biggs, Bedard, Gaber, & Linsmeier, 1985). When firms grow, it results in a higher level of specialisation (Francois, 1990). Therefore, assuming that the same holds for bank branches implies that large bank branches have employees which are more specialised. Given the benefits of specialisation put forward above, it is also assumed that large bank branches with many employees have valuable expertise within many different fields, for instance different industries, and can therefore assess various types of loan requests more efficiently. That expertise should reduce the degree of asymmetric information and enable the bank branch to lend to more projects with positive net present values.

A characteristic positively related to specialisation is authority to grant loans (Benvenuti, Casolaro, Del Prete, & Mistrulli, 2010). If a bank branch has few employees and lacks the expertise needed to assess a loan request, it is less likely that the lending decision will be made at that branch (Agarwal & Hauswald, 2010a; Backman, 2015). Since most bank branches in Sweden are part of a large bank company, the decision whether to accept a loan request may not be made at the branch, but rather at another office with more in-depth expertise. Because of the importance of spatial proximity and relationships discussed above, if lending decisions are made further away from the firm which applies for the loan, the chances for new firms to receive bank loans may be reduced. Both specialisation and authority to grant loans are proposed to increase with bank branch size and both are important for new firms’ possibilities to obtain financing (Backman, 2015).

Another indicator of a municipality’s banking market is the number of bank branches which are located there. As firm founders can apply for loans from different bank branches, more local branches imply more possible sources of financial funds (Backman, 2015). Thakor (1996) has studied the advantages and disadvantages for borrowers of approaching multiple lenders. As discussed above, asymmetric information is a central issue when banks screen potential borrowers. On the one hand, applying for a loan from many banks increases the probability that at least one bank will accept the loan request and lend money. Also, it should increase the competition between the potential lenders and hence result in a lower interest rate (Thakor, 1996). Thus, more branches should be beneficial for credit availability and new firm formation. On the other hand, as a borrower approaches more banks and competition increases, the chance for a potential lender that it will be able to profitably screen the borrower and lend money at the competitive interest rate is smaller. Thus, the probability that a bank will screen a loan request and lend money decreases with the number of banks a borrower approaches (Thakor, 1996). However, even though there is a risk of being rationed by all of them, Thakor (1996) concludes that in equilibrium a borrower approaches multiple banks. Hence, access to more bank branches should increase the chances for potential firm founders to obtain financing and start new firms.

Previous empirical findings support the view that the number of bank branches in a region has a positive effect on credit to small firms in general and new firm formation in particular. Bonaccorsi di Patti and Gobbi (2001) show that branch density, i.e. the number of bank
branches per capita, has a positive effect on the amount of credit granted to small firms in Italian provinces. Rogers (2012) presents evidence of that the number of bank branches per capita in the United States has a positive relationship with the new firm formation rate on a state level. The explanation to this relationship put forward by Rogers (2012) is increased accessibility and diversification for entrepreneurs who want to apply for loans. A similar relationship has been found in Sweden. Backman (2015) shows that the number of bank branches per capita positively affects the rate of new firm formation in Swedish municipalities.

An indicator of a local banking market related to the number of branches is the level of concentration, i.e. the structure of the market. Whether concentrated or fragmented banking markets are better for small firm financing and new firm formation has been thoroughly researched. Though, there is no consensus in the academic literature. That bank concentration is a hot topic is demonstrated by the fact that several conferences on its role have been organised (Cetorelli & Strahan, 2006). One view on bank concentration builds on the conventional economic theory suggesting that competition results in efficiency, lower prices and the optimal output, whereas market power results in higher prices and less-than-optimal output. Thus, competition between banks should stimulate small firm financing and new firm formation. Hannan (1991) shows that the interest rates on loans to small businesses are higher in more concentrated local banking markets. Higher interest rates should make it more difficult for firm founders to finance their ventures profitably. This is supported by several studies suggesting that bank competition is good for new firms (Black & Strahan, 2002; Cetorelli, 2003; Cetorelli & Strahan, 2006; Backman, 2015). It has been shown that deregulation of banking markets in the United States resulting in more competition has a positive effect on new firm formation on a state level (Black & Strahan, 2002). Similarly, Cetorelli (2003) finds evidence of that bank competition positively affects how many jobs that are created by new firms. Cetorelli and Strahan (2006) argue that new firms have a harder time gaining access to credit in local areas where the banking market is more concentrated. Backman (2015) shows that there is a positive relationship between new firm formation rate and bank competition on a local level in Sweden. Hence, these studies indicate that concentration makes it more difficult for new firms to obtain financing and new firms should therefore be less prevalent in municipalities with more concentrated bank markets.

On the other hand, several studies present evidence of the opposite; that a concentrated bank market results in more credit to small firms and more new firms (Jackson & Thomas, 1995; Petersen & Rajan, 1995; Boot & Thakor, 2000; Bonaccorsi di Patti & Gobbi, 2001; Bonaccorsi di Patti & Dell’Ariccia, 2004). A widely cited explanation to this relationship, which contradicts conventional wisdom about competition, is Petersen and Rajan’s (1995) theory of how lending relationships develop over time. When a bank decides whether to lend to a borrower, it should take all future profits into account. A bank can accept to lend to a new firm even if it does not make much money in the start, because the bank can extract rents from the firm if it becomes successful and keeps the bank relationship in the future (Petersen & Rajan, 1995). However, that is only possible in a concentrated and non-competitive bank market, because in a competitive market, the lender cannot expect to be able to extract rents in the future. In other words, banks are more likely to finance new firms in concentrated markets, because they expect to benefit from the lending relationship in the long run. Therefore, competition results in that banks become less likely to take the risks associated with lending to new firms (Petersen & Rajan, 1995). This view is supported by Jackson and Thomas’ (1995) finding that concentration is beneficial for new firms, while more well-established firms benefit from a competitive bank market. Hence, multiple studies argue that bank concentration results in better possibilities for potential firm founders to
obtain financing and start businesses. This argument indicates that the rate of new firm formation should be higher in municipalities where the bank market is concentrated. The ambiguous effect bank concentration has on lending to small firms and new firm formation is further demonstrated by DeYoung, Goldberg and White (1999). They find that concentration has a positive effect on small business lending in urban areas, but a negative effect in rural areas. Conclusively, existing literature has not been able to give a harmonised view of how bank concentration affects the formation of new firms.

### 3.3 Inter-industry differences in financing

Capital structure is a firm’s mix of different types of debt and equity, i.e. how it finances its assets. Early research on capital structure recommends firms to have a capital structure target and adjust it to their industry mean (Gordon, 1964; Foulke, 1968; Lev, 1969) However, Myers (1984) rejects the view that firms have a capital structure target which they gradually move towards in favour of his so called pecking order theory, which states that a firm’s share of external financing should be determined by its cumulative need for funds. Also, the theory implies that firms prefer the sources of finance with lowest degree of asymmetric information between managers and financiers, i.e. they prefer internal funds to external funds, and debt to outside equity if external financing is required. This is in line with the concept of control aversion. Subsequent research shows that the pecking order theory holds also for small firms, both in Sweden and in other countries (Chittenden et al., 1996; Reid, 1996; Cressy & Olofsson, 1997; Jordan, Lowe, & Taylor, 1998; Berggren et al., 2000; Cassar & Holmes, 2003; Berggren & Silver, 2010; Degryse, de Goeij, & Kappert, 2012).

Even though Myers (1984) states that firms’ individual needs should determine their capital structure, he does not reject that there are general differences across industries. Rather, he acknowledges that since firms within the same industry often are similar in terms of types of assets, risk and need for external funds, they often have similar capital structure. Hence, the individual needs are the reason why there are inter-industry differences. According to Harris and Raviv (1991), it is clear that in terms of capital structure, firms in the same industry are more similar than firms in different industries and the relative ranking of industries tends to be stable over time. Although it is widely accepted that there are inter-industry differences in capital structure, it is less clear whether there is an industry-specific effect or whether industry only is a proxy for other firm-specific determinants of capital structure.

Some studies on small firms’ capital structure find that industry has a significant effect even when controlling for other important factors (Michaelas et al., 1999; Johnsen & McMahon, 2005). Hence, they suggest that industry is not a proxy for other factors, but that which industry a firm is in influences its capital structure. However, other studies acknowledge that industry-specific effects do exist, but claim that they only play a minor role in determining capital structure. Balakrishnan and Fox (1993) find that inter-industry differences account for ten per cent of the total variation in capital structure, whereas firm-specific effects account for 52 per cent of the total variation. Similarly, MacKay and Phillips (2005) find that industry-fixed effects explain 13 per cent of total variation in capital structure, in contrast to firm-fixed effects, which explain 54 per cent of the variation. Cassar and Holmes (2003) find that controlling for industry increases the explanatory power of their model explaining capital structure, but only by a limited extent.

Regardless of the extent to which industry-specific effects determine capital structure, previous studies seem to accept that firm-specific effects are more important in explaining capital structure. At the same time, since firms within an industry often are similar in these firm-specific factors, there are differences in capital structure between industries (Myers,
An extensive body of research has investigated which factors that have the most significant effect on small firms’ capital structure. The studies do not cover new firms, but it is predicted that similar patterns would be found for those, since a majority of all new firms are small. Based on these studies, it is concluded that three factors which are important in explaining capital structure are asset structure, profitability and size. Firms with a larger share of fixed assets are more likely to use debt financing, as fixed assets can better serve as collateral (Harris & Raviv, 1991; Rajan & Zingales, 1995; Chittenden et al., 1996; Jordan et al., 1998; Michaelas et al., 1999; Hall, Hutchinson, & Michaelas, 2000; Cassar & Holmes, 2003; Johnsen & McMahon, 2005; Degryse et al., 2012). The use of debt is negatively related to profitability, since firms which generate large profits can use internal sources of funds instead of borrowing money (Harris & Raviv, 1991; Rajan & Zingales, 1995; Chittenden et al., 1996; Michaelas et al., 1999; Hall et al., 2000; Cassar & Holmes, 2003; Degryse et al., 2012). This is consistent with the pecking order theory in that firms prefer internal funds to external funds. Furthermore, larger firms tend to use debt financing more than smaller firms do (Harris & Raviv, 1991; Rajan & Zingales, 1995; Chittenden et al., 1996; Michaelas et al., 1999; Johnsen & McMahon, 2005).

Profitability of new firms is not assumed to differ systematically across industries, but rather across firms. Regardless, profitability cannot be a determinant of capital structure for new firms, since a firm does not make any profits before it is started. Hence, there are no retained earnings in new firms and all entirely new firms have by definition the same profitability; namely zero. Size tends to increase with age and is therefore generally smaller for new firms (Michaelas et al., 1999). However, most of the studies which mention size as a determinant of capital structure measure size in terms of total assets. Therefore, the largest new firms in terms of total assets should most often be those which need to make the largest investments in assets in order to be able to start, i.e. those which are most capital-intensive.

Capital intensity differs considerably across industries (Lee & Xiao, 2011). As discussed above, capital-intensive firms, i.e. firms which need large investments in fixed assets, tend to use more debt financing. Previous research has given at least two related reasons for this. First, in line with the pecking order theory, if large investments are needed, internal funds are less likely to be sufficient and the firm needs to obtain external financing. Second, since fixed assets are safer collateral for banks, firms which invest in fixed assets are more likely to obtain bank financing. Two types of industries which generally require large investments in fixed assets, such as land and machines, and have good collateral are agriculture and manufacturing (Berggren et al., 2001; Johnsen & McMahon, 2005; Berggren & Silver, 2010; Federation of Swedish Farmers, 2014). Therefore, new firm formation in those industries should be more dependent on local banks than new firm formation in other less capital-intensive industries is. In contrast, high-tech firms normally have few fixed assets. They are therefore riskier to lend to and less likely to obtain bank financing (Berger & Udell, 2002; Carpenter & Petersen, 2002).

Several studies highlight differences in how small firms within various industries are financed. In general, firms within manufacturing are most heavily reliant on bank financing, whereas small firms within business services and high-tech industries are more open for letting outside owners in and obtaining external equity financing (Berggren et al., 2001; Johnsen & McMahon, 2005; Berggren & Silver, 2010). This is in line with differences in control aversion and growth ambitions. Entrepreneurs within manufacturing are generally more control-averse than entrepreneurs within business services (Berggren et al., 2000; Berggren et al., 2001; Berggren & Silver, 2010). Since attracting new owners results in a larger reduction in control than borrowing money from a bank, it is logical that control-averse manufacturing
firms are more dependent on bank financing. Furthermore, small business service firms and high-tech firms generally have higher growth ambitions than manufacturing firms (Berggren et al., 2001). According to Rajan and Zingales (1995), firms which expect high future growth rates are recommended to use more equity finance. Also, private investors most often invest in firms which can experience strong growth (Berger & Udell, 1998 & 2002; Winton & Yerramilli, 2008; Berggren & Silver, 2010). Therefore, it is reasonable that business service firms and high-tech firms are more open for private investors who take an ownership position and that private investors are more likely to invest in those firms. Even though there are significant inter-industry differences in financing, the importance of banks should not be understated. In Sweden, banks are the most important source of external finance for small firms across all industries and the same pattern is assumed to hold for new firms (Cressy & Olofsson, 1997; Berggren et al., 2001; Berggren & Silver, 2010).

Based on previous research, it is predicted that there will be differences in the relationship between local access to banks and the rate of new firm formation when the new firms are split into industry categories. The relationship is expected to be stronger for those industries which are more capital-intensive and are generally more inclined to apply for bank loans rather than other sources of financing. Thus, the following hypothesis is proposed:

**H1:** The relationship between local access to banks and the rate of new firm formation differs across industries and is stronger for industries which are more capital-intensive.
4 DATA, VARIABLES AND METHOD

4.1 Choice of method and data

In order to fulfil the purpose and answer the research question, an ordinary least squares (OLS) is used. Thus, the study utilises a quantitative method to analyse secondary data from 2009 and draw conclusions about the issue at hand. A quantitative method is considered to be the most appropriate because the paper seeks to investigate if, rather than why, certain patterns exist. When analysing large data sets to investigate whether statistical relationships are present, which is the purpose of this paper, a quantitative method is the most useful method. Additionally, several previous studies analysing regional differences in the rate of new firm formation have used similar quantitative methods (Davidsson et al., 1994; Armington & Acs, 2002; Acs & Armington, 2004; Rogers, 2012; Backman, 2015). For the OLS regression utilised in this study, new firm formation rate is the dependent variable, while variables considered to describe local access to banks are used as independent variables. In order to account for other factors which in previous research have been shown to determine regional differences in the rate of new firm formation, several control variables are included.

The study is carried out on a municipal level in Sweden, which consists of 290 municipalities (Swedish Association of Local Authorities and Regions, 2016a). A municipal division is used because banking markets for small firms have been shown to be largely local (Kwast et al., 1997; Kwast, 1999; Dermine, 2000; Bonaccorsi di Patti & Gobbi, 2001). Even though previous research on local banking markets covers small firms, these findings are considered to hold also for new firms, since the majority of all new firms are small. It should be noted that a municipality does not have to be the same as an economic region or a labour market region. Many Swedes commute to other municipalities than the one they live in to work or to buy goods or services (Johansson, Klaesson, & Olsson, 2003). However, since municipalities are the smallest local authorities in Sweden, they are deemed to be the most appropriate measure of a local market for this study. Because of their considerable degree of autonomy, there can be significant differences across municipalities in the same region (Swedish Association of Local Authorities and Regions, 2016c). Furthermore, in Backman’s (2015) study, the relationship between new firm formation and access to banks was investigated both on a municipal level and on a functional regional level. While several of the variables related to bank access were statistically significant on the municipal level, none of them were shown to affect new firm formation on the functional regional level. These findings further motivate the use of a municipal division.

All data refers to 2009; thus a cross-sectional approach is used. 2009 is the most recent year for which the data set on bank branches is available. A disadvantage of using this year is that it was in the midst of a financial crisis. Even though the crisis did not cause any Swedish banks to fail or the direct closure of bank branches, it most likely had a dampening effect on the rate of new firm formation in many Swedish municipalities as a result of worse market conditions. It may be more difficult to start a successful business during a recession, since potential customers have less money to spend. Also, it may be more difficult to obtain financing, since financiers are less likely to lend (King & Plosser, 1984; Bernanke, Gertler, & Gilchrist, 1999). Therefore, the use of 2009 as the year of study may affect the results in the sense that the rates of new firm formation are unusually low. Though, Swedish data does not show any clear indication of 2009 being a bad year in terms of new firms. The total number

\[ \text{A functional region can be described as a local labour market with a common market for housing and firm services and it usually consists of several municipalities. The majority of face-to-face contacts take place within a functional region. There are 81 functional regions in Sweden (Johansson et al., 2003).} \]
of new firms in Sweden in 2009 was the highest ever during a year until that point in time (Growth Analysis, 2009 & 2010). Between 2009 and 2010, the number of new firms increased by 17.2 per cent and has since then been on a stable level (Growth Analysis, 2011, 2014 & 2016). Most of the sharp increase after 2009 is due to improved market conditions, but it is also due to a change in the registration criteria (Nannesson, 2015).8

Since the purpose of this paper is to investigate inter-industry differences, what is most important is not if the total new firm formation rate in Sweden was affected, but rather whether some industries were more severely affected by the recession than others. If that was the case, the choice of 2009 as the year of study may cause flawed results, since then the rate of new firm formation in some industries would be determined by an exogenous variable, namely the business cycle. According to Deelersnyder, Dekimpe, Sarvary and Parker (2004), not much research has focused on how business-cycle fluctuations affect different industries. Nevertheless, a sector which has been shown to be especially sensitive to economic downturns is that of durable goods, such as cars (Petersen & Strongin, 1996; Cook, 1999; Deelersnyder et al., 2004; Lööv, 2014). A logical explanation to this is that even during hard times, consumers continue to buy what they purchase most frequently, such as food and clothes, but they cut down on goods which they have a less pressing need for (Cook, 1999; Deelersnyder et al., 2004). In fact, since Sweden is an export-dependent country, the manufacturing industry was most severely affected during the recent crisis (Lööv, 2014). On the contrary, agriculture as well as wholesale and retail firms associated with food and clothing should not be equally sensitive to recessions. The fact that there is some variation in how different industries are affected by a recession is taken into account in the analysis. However, when using a cross-sectional approach for investigating inter-industry differences, it is not possible to pick a year when all industries are equally affected by the business cycle. Therefore, even though 2009 was in the midst of a financial crisis, the study is still considered to give valuable findings.

The cost of using cross-sectional data is the problem of unobserved heterogeneity, i.e. that it is not possible to control for that the units of study may differ considerably (Gujarati & Porter, 2009). For this study, it implies that the possibility that some municipalities may have many new firms while others have very few cannot be controlled for. Also, there may be an endogeneity problem, since the new firm formation rate may be high because of exogenous reasons, i.e. other factors than access to banks, and that may result in more banks choosing to open branches there (Backman, 2015). Hence, the direction of causality may be ambiguous. Most importantly, the decision to use cross-sectional data rather than panel data, and hence omit to study variations over time, is motivated by evidence showing that the rate of new firm formation varies considerably across regions, but much less over time (Armington & Acs, 2002; Fritsch & Mueller, 2007; Andersson & Koster, 2011).

In order to test for spatial autocorrelation, i.e. if the values in municipalities located close to each other are more or less correlated than what would be the case if they were randomly distributed, two different approaches are used. First, the Durbin-Watson $d$ statistic is used. In order to be able to determine whether autocorrelation is present or not when using the Durbin-Watson $d$ statistic for a cross-sectional analysis, the ordering of data must follow some economic logic (Gujarati & Porter, 2009). Therefore, in this paper the Swedish municipalities are ordered according to their municipal codes. These codes depend on in

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8 Since 2010, Growth Analysis, the responsible government authority, uses other criteria to determine what should be considered as a new firm. Approximately 30 per cent of the increase between 2009 and 2010 was due to the change in registration criteria (Nannesson, 2015).
which county and where in that county a municipality is located (Statistics Sweden, 2016). Thus, municipalities which are spatially close to each other have similar codes and are near also in the utilised list of municipalities. This ordering improves the chances to detect if the error terms are correlated, i.e. if there is spatial autocorrelation, since the correlation between geographically neighbouring municipalities is measured.

A limitation of the Durbin Watson $d$ statistic is that it only tests for first-order autocorrelation, i.e. if values right above or below each other in the list are correlated (Gujarati & Porter, 2009). It does not test if values close to each other, but still not right above or below, are correlated. This shortcoming is overcome by also using the Global Moran’s I. It uses geographic coordinates to test whether values within a specified geographic distance are correlated (Getis & Ord, 1992). In this study, the Global Moran’s I is used to test whether values within the same region are correlated. Both the Durbin-Watson $d$ statistic and the Global Moran’s I show that the variables employed in this paper experience positive spatial autocorrelation. The results of the two spatial autocorrelation tests are presented and analysed in the empirical analysis section.

This paper predicts that local access to banks affects new firm formation. However, only because there is a statistical relationship, one cannot simply conclude that there is causality. Rather, one has to rely on economic theory in order to be able to claim causality (Gujarati & Porter, 2009). It is therefore important whether banks stimulate entrepreneurship or whether entrepreneurial activity attracts banks. This is an issue which has been extensively researched. One point of view is that economic development creates a demand for financial services and, therefore, banks are established to respond to this demand. This view is held by Robinson (1952, p. 86), who claims that “where enterprise leads, finance follows”. Other researchers do not believe that there is an important relationship between finance and growth. For example, Lucas Jr (1988, p. 6) claims that financial matters’ role in economic development is “very badly over-stressed”. In contrast, many studies provide empirical evidence of Schumpeter’s (1911) view; that there is a causal relationship from well-developed financial markets to future economic growth (King & Levine, 1993a, b; Levine, 1997; Demirguc-Kunt & Maksimovic, 1998; Levine & Zervos, 1998; Rajan & Zingales, 1998; Levine, Loayza, & Beck, 2000; Claessens & Laeven, 2005). According to King and Levine (1993b), better financial systems lead to economic growth because they improve the probability of successful innovation. Furthermore, some studies state that financial development is particularly important for growth of small firms and creation of new firms (Rajan & Zingales, 1998; Guiso, Sapienza, & Zingales, 2004; Beck, Demirguc-Kunt, Laeven, & Levine, 2008). Even though most studies investigate the relationship between financial development and economic growth on a national level, some studies provide evidence of the same causal relationship on a regional and local level (Jayaratne & Strahan, 1996; Guiso et al., 2004). Based on a large amount of empirical evidence, it is clear that there is a statistical relationship between financial development and entrepreneurial activity, such as new firm formation.

9 Sweden consists of 20 counties and each municipality is part of one county (Swedish Association of Local Authorities and Regions, 2016d). To which county a municipality belongs depends on its geographical location.

10 The utilised distance threshold is 120 kilometres. The rationale for this threshold is that it has been found that the average time distance for extra-regional interaction is longer than 60 minutes (Johansson, Klaessson, & Olsson, 2002). 120 kilometres is considered as an appropriate distance to account for this time. The implication of the distance threshold is that the Global Moran’s I tests how correlated the value in a municipality is with the values in the municipalities within a distance of 120 kilometres.
The data set on new firms per municipality and industry has been obtained from the combined database by Statistics Sweden, Swedish Agency for Economic and Regional Growth and Growth Analysis. Another data set comprising detailed information about each bank branch in Sweden has been acquired from Statistics Sweden. The fact that it contains information about, among others, location, number of employees and to which bank company a branch belongs allows for an extensive analysis. For this study, all bank branches are treated equally, regardless of whether they are Swedish or foreign, or belong to commercial banks or savings banks. Other utilised municipal data, such as education, population and income, is publically available on Statistics Sweden’s website. Consequently, all data used for this study has been supplied by Swedish government agencies and can be deemed trustworthy.

The following equation is used for the estimated OLS regression:

\[ NFF_{m,c} = \alpha + \beta X'_m + \gamma Z'_m + \varepsilon_m \]  

where \( NFF_{m,c} \) is the new firm formation rate in municipality \( m \) within industry category \( c \), \( X'_m \) is a vector of independent variables describing the local access to banks, \( Z'_m \) is a vector of the control variables, \( \beta \) and \( \gamma \) are vectors of the parameters to be estimated, and \( \varepsilon_m \) is the error term.

4.2 Variables

4.2.1 New firm formation rate

The dependent variable measures the new firm formation rate (NFF). More specifically, it relates to new establishments. All active firms have at least one establishment, but a firm can have several establishments if it is located at multiple addresses (Statistics Sweden, 2014). Thus, an establishment is new when a firm, new or already existing, starts activities at a new address. For an establishment to be counted as new, the majority of the employees have to be new (Statistics Sweden, 2014). Therefore, firms which are only reorganised and started with a new name and organisation number are not considered as new. Furthermore, only firms which report value-added taxes and/or payroll taxes are included, implying that new establishments without economic activity are not considered (Statistics Sweden, 2014). Hence, the applied measure of new firm formation includes both entirely new firms and new branches opened by existing firms. This implies that all types of new jobs, both in new firms and in new branches, are treated equally. This is considered to be the most appropriate definition, because the goal of entrepreneurship is not a large amount of new firms per se, but rather employment and economic growth, which can be obtained both by entirely new firms and by new branches. Several previous studies, both in Sweden and internationally, have also used new establishments to measure the rate of new firm formation (Davidsson et al., 1994; Armington & Acs, 2002; Acs & Armington, 2004; Fritsch & Falck, 2007; Andersson & Koster, 2011).

The advantage of using new establishments instead of new firms is that it accounts for the fact that existing firms can open new establishments, both in the municipality where they are headquartered and in other municipalities. From the utilised data set, it is not possible to distinguish between the two types of new establishments, i.e. new firms and new branches. It does not contain municipality-level data on the number of new firms in each industry. However, municipality-level data on the number of new establishments in each industry is available. A disadvantage of this limitation is that firms which are headquartered elsewhere may more easily obtain financing from a bank located in another municipality and may
therefore not be dependent on the local bank sector for its possibilities to open a new branch. Thus, there is a risk that the use of new establishments instead of new firms results in an underestimation of how local access to banks affects new firm formation. This limitation of the available data is mitigated by a robustness test; the same analysis is performed using both new firms (F) and new establishments (E). The robustness test is done for the total rate of new firm formation but not within specific industries because of the lack of data. Furthermore, the use of establishments can affect how inter-industry differences should be treated. If a large proportion of the new establishments in certain industries are new branches opened by existing firms, these industries may seem less dependent on local bank capital. Hereafter, the terms new firms and new establishments will be used interchangeably, unless otherwise stated.

The number of new establishments in a municipality is divided by the number of 1,000 inhabitants between 15 and 64 years old, similarly to Davidsson et al.’s (1994) approach. This age group is used as a proxy for the labour force, because this is the age when most people work and are most likely to start firms. The way of standardising the number of new firms by the labour force is called the labour market approach. It is based on Evans and Jovanovic’s (1989) theory of entrepreneurial choice, stating that new firms are most often started by individuals, not by existing firms (Audretsch & Fritsch, 1994a). Furthermore, the theory is built on the assumption that entrepreneurs generally start firms in the labour market where they live (Audretsch & Fritsch, 1994a; Michelacci & Silva, 2007). This is backed by findings showing that residence, family and friends are important determinants of where entrepreneurs choose to start their businesses and that they often do not make active location decisions (Mueller & Morgan, 1962; Kangasharju, 2000; Figueiredo, Guimarães, & Woodward, 2002; Dahl & Sorensen, 2009). The alternative to the labour market approach is called the ecological approach, which is to standardise the number of new firms by the number of existing firms (Audretsch & Fritsch, 1994a). Audretsch and Fritsch’s (1994a) study shows that the decision about which approach to use has to be handled with care, because the labour market approach and the ecological approach can give considerably different results and lead to that opposite conclusions are drawn.\textsuperscript{11} The use of the labour market approach for this study is motivated by two factors. First, several similar studies have used this approach (Davidsson et al., 1994; Armington & Acs, 2002; Fritsch & Falck, 2007; Andersson & Koster, 2011; Backman, 2015). Second, Armington and Acs (2002) stress that the ecological approach gives higher rates where the mean establishment size is large, because the new firms are standardised by large, but fewer, firms. In contrast, as pointed out by Backman (2015), the labour market approach is insensitive to the firm density in a municipality. Nevertheless, as a robustness test, the analysis is performed with both the labour market approach (LMA) and the ecological approach (EA).

Since the purpose of this study is to investigate if there are inter-industry differences in how local access to banks affects the rate of new firm formation, several regressions with the new firm formation rate in various industry categories as dependent variable are estimated. Hence, an industrial division is made. The original data set is based on Statistics Sweden’s Swedish Standard Industrial Classification (SIC), which categorises all firms into one of 15 industry categories. Though, for this study the 15 categories are grouped into five broader categories. The decision to reduce the number of categories to five can carry the cost of pooling industries which are not exactly the same and drawing conclusions which are only true for

\textsuperscript{11} In their study, Audretsch and Fritsch (1994a) use both approaches to test the relationship between the unemployment rate and the rate of new firm formation. Using the labour market approach, they find a negative relationship. In contrast, the ecological approach shows a positive relationship.
some industries within a category. However, in several municipalities there were no new firms in some of the industries during 2009, so using too many industry categories would result in statistical issues. Also, in order to be able to draw more general conclusions, the potential costs are considered to be outweighed by the benefits. The categories which are used are relatively similar, although fewer, to those which have been used in previous studies investigating inter-industry differences within other areas of entrepreneurship research (Michaelas et al., 1999; Hall et al., 2000; Johnsen & McMahon, 2005; Drever & Hutchinson, 2007).

The different industries are grouped into categories based on the previous studies mentioned above and the main business activities the industries handle, because it is predicted that firms which perform relatively similar activities also are similar in the way they are financed. A firm’s activities determine many other aspects, such as what is needed to start the firm and how risky and capital-intensive it is. The first category (Primary sector) includes industries which make direct use of natural resources, such as crops, forests and fish. They have historically been very important for Sweden, but have gradually been replaced by other industries. In 2014, this category accounted for 1.4 per cent of the Swedish GDP (The World Bank, 2016a). Many of the activities in this category require substantial areas of land, which, unless inherited, can be costly. Despite subsidies for some farmers and other firms within these industries, bank loans seem to be an important source of financing. 93 per cent of the lending to farmers and foresters is in the form of bank loans, while venture capital only plays a minor role (Federation of Swedish Farmers, 2014). This is partly explained by that farmers and foresters have good collateral in the form of land (Federation of Swedish Farmers, 2014).

The second category (Manufacturing) consists of industries which often require large investments in properties and factories, machinery or other equipment, such as lorries or tools, in order to be able to perform their business activities. Therefore, many of the firms in this category are relatively capital-intensive. Furthermore, the fixed assets can serve as collateral, which increases the possibilities to obtain bank financing (Rajan & Zingales, 1995; Berger & Udell, 1998; Berggren et al., 2001; Degryse et al., 2012). Firms within this category have been shown to be more dependent on banks than firms within other industries (Berggren et al., 2001; Johnsen & McMahon, 2005; Berggren & Silver, 2010). Therefore, new firm formation within Manufacturing is predicted to be affected by local access to banks.

The third category (Trade, hotels and restaurants) includes hotels, restaurants and firms which are active within wholesale and retail. Thus, most firms within this category target consumers with their products and services. Shops, hotels and restaurants are often connected to bigger chains, but regardless of whether a famous brand is used or not, most investments need to be made by a local entrepreneur, because franchising is common in this industry category (Caves & Murphy, 1976; Norton, 1988; Blair & Lafontaine, 2005; Hamilton & Webster, 2009). Restaurants and particularly hotels are in need of fixed assets, such as buildings and furniture, to accommodate their guests and are therefore relatively capital-intensive (Andrew, Damitio, & Schmidgall, 2007). Though, it is assumed that small shops can be opened without large amounts of capital. It is therefore predicted that the local bank sector is important for the new firm formation rate within Trade, hotels and restaurants; however, not as important as for the industry categories described above.

The fourth category (Business services) consists of service firms and many of these firms need well-educated employees since they often perform knowledge-intensive and niched activities
which require high levels of human capital. Previous research has shown that firms within business services are more inclined to target private investors and less dependent on bank financing than other industries are, partly because they have fewer tangible assets which can be pledged as collateral (Berggren et al., 2001; Berger & Udell, 2002; Berggren & Silver, 2010). Furthermore, since these industries are focused on services, many firms do not need to make large investments and are not in need of large amounts of capital. Therefore, it is predicted that new firm formation within Business services is not as dependent on access to local banks as new firm formation within some other categories.

The fifth and final category (Public and personal services) includes many establishments which are only or primarily opened by the national, regional or local government, for instance police offices, health centres, schools and libraries. However, at least some of these types of establishments are not only opened by the government, but can also be opened by private firms. Furthermore, this category includes some types of establishments which are only started by private firms, such as hairdressers, funeral companies and fitness centres. Nevertheless, given that the government opens many of the new establishments within this category and that the government does not borrow money from local bank branches, local access to banks is predicted to have a small impact on new firm formation in Public and personal services. The categories which are used and the industries they include are shown in Table 1.

Table 1. The industry categories used in this paper

<table>
<thead>
<tr>
<th>Category</th>
<th>Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary sector</td>
<td>Agriculture, forestry and fishing</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Manufacturing and quarrying</td>
</tr>
<tr>
<td></td>
<td>Energy supply and remediation activities</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Transportation and storage</td>
</tr>
<tr>
<td></td>
<td>Real estate activities</td>
</tr>
<tr>
<td>Trade, hotels and restaurants</td>
<td>Wholesale and retail trade</td>
</tr>
<tr>
<td></td>
<td>Hotels and restaurants</td>
</tr>
<tr>
<td>Business services</td>
<td>Information and communication</td>
</tr>
<tr>
<td></td>
<td>Financial and insurance activities</td>
</tr>
<tr>
<td></td>
<td>Business services</td>
</tr>
<tr>
<td>Public and personal services</td>
<td>Public administration and defence</td>
</tr>
<tr>
<td></td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Human health and social work activities</td>
</tr>
<tr>
<td></td>
<td>Arts, entertainment and recreation</td>
</tr>
</tbody>
</table>

4.2.2 Bank variables

For this study, three independent variables which are seen as indicators of the local access to banks are used. The first (Average bank branch size) is used as an indicator of specialisation and authority to grant loans (Francois, 1990; Backman, 2015). If a bank branch is small, the same employee has to handle many different types of loan requests and will not have the same
expertise within one specific area as an employee at a larger branch with more division of labour can have. This reduces the potential to assess loan requests efficiently and correctly. Also, limited authority to grant loans at the branch, which correlates with the size of the branch, reduces the opportunities to make use of face-to-face contact and soft information, which are important for new firms to obtain funds. Average bank branch size is measured by the number of employees and is calculated as the number of people working in banks in a municipality divided by the number of bank branches. Based on previous research, it is predicted that municipalities with larger bank branches will have higher rates of new firm formation.

The second independent variable (Number of bank branches per capita) is used as an indicator of how many sources of funds there are. Many banks in the municipality increase the chances that at least one lender will accept the loan request and finance the new firm (Thakor, 1996). The total number of bank branches in a municipality is considered to say more about the potential sources of funds than the number of bank companies in the municipality does. Since soft information is important for the screening process of potential new firms, different branches belonging to the same bank company can assess the same loan request differently. Number of bank branches per capita is measured as the number of bank branches divided by the total population in the municipality. Since previous research indicates that the number of potential sources of funds, measured by bank branches per capita, has a positive effect on new firm formation, it is predicted that there will be a positive relationship.

Another central factor when analysing a local bank market is the level of concentration, i.e. the structure of the market. This is captured by the third independent variable (Concentration level). In this paper, concentration is measured by the Herfindahl-Hirschman index (HHI). The HHI is widely used to measure the level of concentration in the financial industry (Rhoades, 1993; Lapteacru, 2014; The Federal Reserve, 2014; Backman, 2015). Normally when analysing bank markets with use of the HHI, the size of a bank branch is measured in terms of deposits (Rhoades, 1993). Though, since the utilised data set does not include information about deposits, this paper uses the number of employees for measuring the HHI. A similar approach has previously been used by Backman (2015). A disadvantage of using number of employees instead of deposits is that it does not fully capture each branch’s market share. Small branches may be able to attract large shares of deposits if they are part of a large bank company and may therefore have larger market shares than their numbers of employees indicate. However, since this paper focuses on credit to new firms, neither would deposits give a perfect view of the branches’ market shares. Loans to new firms would be the best measure of market shares; however, since that data is not available, number of employees is used as a proxy.

The utilised data set does not contain information about the exact number of employees at each branch. Rather, it reveals in which of eleven size classes each branch belongs. Therefore, the average in the size class a branch belongs to is used as an estimation of the number of employees at each bank branch. Even though the average of these size classes may seem like very rough estimations, the small classes have smaller ranges than the large classes and a large majority of all bank branches in Sweden are small. In fact, 94.3 per cent of the branches have less than 50 employees and 81.1 per cent have less than 20 employees. Thus, the estimations are relatively precise for most bank branches. For this variable, the sum of the estimations of employees in each bank branch in a municipality is used as the total number of employees. An advantageous feature of the HHI is that it accounts for both

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12 The eleven employment size classes are the following: 1-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999, 1000-1499, 1500-1999 and 2000-2999 employees.
the number of bank branches in a municipality and their market shares, in terms of employees. The index is calculated by the following equation:

\[
HHI_m = \sum_{i=1}^{n} \left( \frac{e_{im}}{e_m} \right)^2
\]

where \( m \) is the municipality, \( e_{im} \) is the number of employees in bank branch \( i \) in municipality \( m \), \( e_m \) is the total number of employees in the bank sector in municipality \( m \), and \( n \) is the number of bank branches. The index is measured in percentage terms, i.e. if there are for example five branches with equal market shares, 20 per cent each, the HHI will be the following:

\[
HHI_m = (20)^2 + (20)^2 + (20)^2 + (20)^2 + (20)^2 = 2000.
\]

The HHI ranges from a very small value, theoretically approaching zero, to 10,000 (Rhoades, 1993). A small value indicates competition, i.e. many branches with small market shares, while the HHI is 10,000 if there is a monopoly. Competition is measured between all bank branches, not between bank companies. This choice of definition relies on the same argument as the choice of the variable number of bank branches per capita; since different branches belonging to the same bank company may have different connections and information about the entrepreneur applying for a loan, they may assess the request differently and can be seen as multiple potential sources of funds. It has to be noted that several studies have questioned whether concentration and competition actually are contraries. Actors in highly concentrated markets can still behave competitively if they face a threat of potential entrants (Baumol, 1982; Claessens & Laeven, 2004 & 2005; Claessens, 2009). Therefore, one cannot conclude that concentration gives a perfect indication of competition or that municipalities with few bank branches have very uncompetitive bank markets. Since previous studies show different results of how bank concentration affects small business lending and new firm formation, it is not predicted whether Concentration level will have a positive or negative effect on the rate of new firm formation.

### 4.2.3 Control variables

From previous research on regional differences in the rate of new firm formation, it is clear that access to banks is not the only determinant. Therefore, four factors which have been shown to play an important role are included as control variables. First, new firms are more common in regions with many small firms rather than a few large firms and this relationship has been shown to be consistent across industries (Mason, 1991; Davidsson et al., 1994; Kangasharju, 2000; Armington & Acs, 2002; Rogers, 2012). It has been explained by that availability of role models, people with relevant work experience and informational spill overs are important for new firm formation and that employees in small firms are more likely to start their own businesses, partly because they work closer to the customers and the owners and in that way gain useful experience (Cooper, 1973; Mason, 1991; Davidsson et al., 1994; Boden, 1996; Armington & Acs, 2002). Hence, industry structure is thought to affect new firm formation. In this paper, industry structure is measured by average establishment size in terms of number of employees (Mean establishment size). This variable has been employed in previous studies (Fritsch, 1992; Audretsch & Fritsch, 1994b; Rogers, 2012; Backman, 2015). It is defined as the average number of people employed in each establishment, i.e. a municipality’s labour force divided by the number of establishments. Since regions with many small firms have been shown to foster more new firms, it is hypothesised that new firm formation is negatively related with Mean establishment size.
Another factor which has been shown to affect the rate of new firm formation rate is the level of human capital (Human capital level). Well-educated individuals can generally earn a high income as employed. Therefore, the opportunity cost of starting a new firm is high for people with a high level of human capital (Parker, 2004). However, empirical evidence indicates that the high opportunity cost often is offset by the chances associated with starting new firms. Regions with a higher proportion of well-educated inhabitants generally have higher rates of new firm formation (Audretsch & Fritsch, 1994b; Armington & Acs, 2002; Acs & Armington, 2004; Karlsson & Backman, 2011; Bishop & Brand, 2014). This is in line with findings suggesting that individuals with greater skills and knowledge are more likely to start new firms (Anselin, Varga, & Acs, 1997 & 2000; Sevilir, 2010). It can be explained by that human capital stimulates entrepreneurial absorptive capacity, openness and ability to spot new ideas and knowledge spill overs through communication, which implies that skilled individuals can more easily turn knowledge and ideas into entrepreneurial activity (Malmberg, Sölvell, & Zander, 1996; Acs & Armington, 2004; Qian, Acs, & Stough, 2013). Human capital levels, just as rates of new firm formation, are generally higher in urban areas with many inhabitants than in less densely populated rural areas (Davidsson et al., 1994; Reynolds, Storey, & Westhead, 1994; Johnson, 2004; Renski, 2008; Berggren & Silver, 2010; Eliasson & Westlund, 2013). In Sweden, the level of human capital is strongly correlated with population density and whether the municipality is classified as urban or rural. Therefore, this control variable does not only capture how well-educated the inhabitants are, but also to a large extent the differences which exist between more and less densely populated areas. In this paper, human capital level is measured as the proportion of inhabitants in the age group 15-64 years who have at least three years of university education. This definition is in line with several previous studies (Acs & Armington, 2004; Andersson & Hellerstedt, 2009; Karlsson & Backman, 2011; Backman, 2015). It is predicted that Human capital level has a positive effect on the new firm formation rate and that this effect is stronger in the more knowledge-intensive service industries.

Furthermore, many small firms, especially start-ups, primarily serve the local market (Davidsson et al, 1994; Kangasharju, 2000). Therefore, firms should more likely be started in municipalities which experience positive market conditions and growth in demand. In this paper, change in demand is captured by growth in income (Income growth). This variable has been shown to have a significant impact in some previous studies (Armington & Acs, 2002; Acs & Armington, 2004), whereas others have not found any significance (Reynolds et al., 1994; Sutaria & Hicks, 2004). Income growth is calculated as the 2009 median income divided by the 2007 median income and taking the square root of the two-year change to get the average change during the last two years. This is consistent with Armington and Acs’ (2002) and Acs and Armington’s (2004) approach. Since all municipalities are in the same country, there is no need to account for inflation and measure growth in income in real terms. Income growth is predicted to be positively related with the total new firm formation rate. However, the dependence on the local market seems to differ across industries (Armington & Acs, 2002). Manufacturing firms have steadily become more dependent on the regional and

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13 The correlation between human capital level and population density is 0.529. To test correlation between human capital level and an urban-rural classification in this study, the urban-rural classification is captured by a dummy variable, which builds on the Swedish Board of Agriculture’s (2015) definition with four categories based on mainly population density, but also commuting patterns. The categories are metropolitan areas, urban areas, rural areas/countryside and sparsely populated rural areas (Rader Olsson, Westlund, & Larsson, 2015). To test correlation in this study, the four categories are grouped into two categories, one urban and one rural. Municipalities in metropolitan areas and urban areas are classified as urban, whereas municipalities in rural areas/countryside and sparsely populated rural areas are classified as rural. The correlation between human capital level and the urban-rural classification is 0.637.
national markets rather than the local dynamics (Sutaria & Hicks, 2004). Therefore, it is predicted that the rate of new firm formation within those industries which target a more widespread market will not be affected by growth in local demand. In contrast, service firms, with their special inseparability characteristics, are predicted to be more sensitive to local market conditions and income growth.

One variable which has been included in many similar studies but has not been shown to have a clear effect on new firm formation is the rate of unemployment (Unemployment rate). High unemployment could have two opposite effects on new firm formation (Fritsch & Falck, 2007). On the one hand, unemployed people should have stronger incentives to start their own businesses, since they have less to lose and more to gain than those who already have a job. On the other hand, high unemployment is most likely a sign of an unattractive market and smaller chances to start a successful business. The rate of unemployment is also an indicator of wealth, as it has strong negative correlation with median income. Empirically, some studies have found a significant relationship between new firm formation and the rate of unemployment, but whether this has been positive or negative has been mixed (Storey, 1991; Davidsson et al., 1994; Karlsson & Backman, 2011). Nevertheless, many studies have not found any significant relationship between the regional rate of new firm formation and the rate of unemployment (Reynolds et al., 1994; Armington & Acs, 2002; Acs & Armington, 2004; Sutaria & Hicks, 2004; Fritsch & Falck, 2007; Backman, 2015). In this paper, Unemployment rate is defined as the percentage of the labour force that is unemployed. It is ambiguous whether the rate of unemployment will have a positive or negative influence on new firm formation. The variables which are used in this paper are presented in Table 2.

Table 2. Description of the variables employed in this paper

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Exp. sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>New firm formation rate</td>
<td>Number of new establishments divided by the labour force (in 1,000s)</td>
<td>Dependent variable</td>
</tr>
<tr>
<td>Average bank branch size</td>
<td>Average number of employees per capita</td>
<td>+</td>
</tr>
<tr>
<td>Number of bank branches</td>
<td>Number of bank branches divided by the population (in 1,000s)</td>
<td>+</td>
</tr>
<tr>
<td>Concentration level</td>
<td>Herfindahl-Hirschman index based on employees per bank branch (Equation 2)</td>
<td>+/-</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>Labour force divided by the number of establishments</td>
<td>-</td>
</tr>
<tr>
<td>Human capital level</td>
<td>Proportion of the labour force with at least three years of university education</td>
<td>+</td>
</tr>
<tr>
<td>Income growth</td>
<td>Average change in median income between 2007 and 2009</td>
<td>+</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>Proportion of the labour force that is unemployed</td>
<td>+/-</td>
</tr>
</tbody>
</table>
5 EMPIRICAL ANALYSIS

5.1 Descriptive statistics

Table 3 shows descriptive statistics for the entire 2009 sample using the primary approach, i.e. new establishments and the labour market approach.

Table 3. Descriptive statistics with new establishments and the labour market approach

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFF Primary sector</td>
<td>2.601</td>
<td>2.120</td>
<td>2.007</td>
<td>10.684</td>
<td>0.000</td>
</tr>
<tr>
<td>NFF Manufacturing</td>
<td>2.960</td>
<td>2.773</td>
<td>0.946</td>
<td>6.030</td>
<td>0.637</td>
</tr>
<tr>
<td>NFF Trade, hotels and restaurants</td>
<td>2.322</td>
<td>2.185</td>
<td>0.856</td>
<td>8.287</td>
<td>0.457</td>
</tr>
<tr>
<td>NFF Business services</td>
<td>2.354</td>
<td>2.085</td>
<td>1.308</td>
<td>9.465</td>
<td>0.394</td>
</tr>
<tr>
<td>NFF Public and personal services</td>
<td>1.992</td>
<td>1.908</td>
<td>0.668</td>
<td>4.573</td>
<td>0.699</td>
</tr>
<tr>
<td>Average bank branch size</td>
<td>12.458</td>
<td>8.733</td>
<td>20.680</td>
<td>332.143</td>
<td>0.000</td>
</tr>
<tr>
<td>Number of bank branches</td>
<td>6.338</td>
<td>4.000</td>
<td>14.026</td>
<td>212.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>0.255</td>
<td>0.225</td>
<td>0.129</td>
<td>0.800</td>
<td>0.000</td>
</tr>
<tr>
<td>Concentration level</td>
<td>4.216</td>
<td>3.785</td>
<td>2.248</td>
<td>10.000</td>
<td>548</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>11.098</td>
<td>10.931</td>
<td>2.433</td>
<td>20.994</td>
<td>5.385</td>
</tr>
<tr>
<td>Human capital level</td>
<td>0.127</td>
<td>0.114</td>
<td>0.052</td>
<td>0.391</td>
<td>0.067</td>
</tr>
<tr>
<td>Income growth</td>
<td>0.028</td>
<td>0.029</td>
<td>0.006</td>
<td>0.044</td>
<td>0.011</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.078</td>
<td>0.079</td>
<td>0.024</td>
<td>0.188</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Note: The following abbreviations are used: E - establishments, LMA - labour market approach.

The implication of an average total new firm formation rate of 13.755 is that a labour force containing 1,000 people on average starts approximately 14 new establishments. Also, this implies that approximately one out of 73 people in the labour force starts a new establishment during a year. The five industry categories used in this paper have relatively similar average rates of new firm formation (between 1.992 and 2.960). This indicates that, on a national level, a similar number of new firms are started in each category. Considering local access to banks, the bank branches in a municipality have on average 12.458 employees. The large standard deviation is due to that one municipality, Sundbyberg, has a much larger average bank branch size than all other municipalities. The reason is that it only has seven bank branches but one of these is a large bank’s main office with more than 2,000 employees. Most municipalities have several bank branches. How many branches there are in a municipality naturally depends on how many people that live there. On average, there are 0.255 bank branches per 1,000 inhabitants, implying that there is on average one bank branch per approximately 4,000 inhabitants. The average concentration level is 4,216. Since the concentration level is a function of both the number of bank branches and their market shares, municipalities without exactly the same market structure could still have similar levels of concentration. Nevertheless, by studying the municipalities which have a concentration level similar to the average, it can be concluded that they have three to five bank branches of differing size and almost all branches in these municipalities have less than 50 employees.

A mean establishment size of 11.098 implies that there are on average approximately eleven people working in each establishment. Thus, there are approximately 90 existing establishments per 1,000 members of the labour force. On average, 12.7 per cent of the labour force have at least three years of university education. The minimum and maximum
values indicate that there are large differences between the municipalities with highest human capital levels and those with lowest. The average income growth rate implies that median incomes have grown by on average 2.8 per cent per year between 2007 and 2009. All Swedish municipalities have experienced a positive growth in median income during this period. On average, 7.8 per cent of the labour force are unemployed. However, there are large differences between the minimum and maximum values, indicating that people in some municipalities are considerably more likely to get a job than people in other municipalities.

5.1.1 Spatial patterns of new firm formation

Figure 1 shows how the Swedish municipalities differ in the total new firm formation rate. As all other descriptive maps in this paper, it shows the results using establishments and the labour market approach, since that is the primary approach. Figure 2 shows the industry category with the highest rate of new firm formation in each municipality.

Figure 1 demonstrates that the total new firm formation rate varies substantially across municipalities. It also indicates that there are clear regional differences, because municipalities which are located close to each other tend to have similar rather than differing new firm formation rates. Thus, the pattern gives an indication of spatial autocorrelation, an issue which will be discussed more thoroughly below. Interestingly, the general pattern is that municipalities in the north-west part of Sweden which borders to Norway have a higher rate of new firm formation than most municipalities in other parts of the country. Another smaller cluster which has a higher-than-average new firm formation rate is Stockholm and its closest neighbouring municipalities. A third group of municipalities which are relatively
widespread but still have similar characteristics are some municipalities in the south of Sweden which are located by the coast and have high rates of new firm formation.

These three regions do not only differ in terms of area and location. It is also likely that there are different reasons why they have high new firm formation rates. Like many other countries, Sweden is experiencing urbanisation and the capital city of Stockholm with its surrounding municipalities has been growing rapidly the last decade (The World Bank, 2016b). In fact, seven out of the ten municipalities with the highest population growth between 2007 and 2009 are located in the Stockholm county. Also, Stockholm primarily tends to attract well-educated people. Just as for population growth, seven out the ten municipalities with highest proportion of inhabitants with at least three years of university education are in the Stockholm county. Hence, since Stockholm is the economic capital of Sweden and perhaps to some extent of the Nordic region, it is logical that many skilled persons move there and that many new firms are started. This is similar to London’s dominance in the United Kingdom (Johnson, 2004). Thus, the high new firm formation rate in Stockholm is in line with theory predicting that regions with high levels of human capital and growth in demand are more entrepreneurial (Armington & Acs, 2002; Acs & Armington, 2004; Karlsson & Backman, 2011).

A likely reason why some municipalities by the coast have high rates of new firm formation is tourism. All these municipalities are among the most popular among tourists during the summer. The large number of tourists creates many business opportunities which can be exploited by entrepreneurs. Also, it is important to bear in mind that in this paper the number of new establishments is standardised by the labour force. In many municipalities by the coast, the number of visitors during the summer is substantially larger than the number of all-year residents who are part of the labour force (Swedish Association of Local Authorities and Regions, 2016b). Thus, the few residents can start many new establishments to satisfy the many tourists. Furthermore, the high rates of new firm formation could be biased by the seasonal effects. Since the business opportunities are better during the summer, some establishments may close down when the autumn comes. A new establishment may then open in the beginning of the next summer. Hence, the high entry rates are probably to some extent offset by high exit rates (Sutaria & Hicks, 2004).

The consistently above-average rates of new firm formation in the rural north-west part of Sweden were less expected, since previous studies have shown that cities often are most entrepreneurial (Davidsson et al., 1994; Reynolds et al., 1994; Renski, 2008). There is a clear pattern of sparsely populated rural municipalities having higher rates of new firm formation than populous urban municipalities. In fact, out of the ten largest municipalities in terms of population size, Stockholm and Malmö are the only two which have a new firm formation rate above average. In contrast, all of the eight smallest municipalities have above-average new firm formation rates and are located in the north-west part of Sweden. This is surprising, because many of the municipalities in this large rural region experience negative population growth and have low levels of human capital. There is significant negative correlation between population growth and total new firm formation rate (-0.264), indicating that less attractive municipalities which inhabitants move away from have more new establishments. Rather than being due to good market conditions or unusually entrepreneurial inhabitants, the high rates of new firm formation in this region are most likely partly due to the definition of new firm formation rate. Since these rural municipalities have relatively few inhabitants, the new establishments are standardised by a smaller labour force; thus boosting the new firm formation rate.
Given that new firm formation rate is negatively correlated with population growth and that rates of new firm formation are strikingly high in a region which is generally seen as relatively unattractive and is less wealthy than other regions, a cautious note has to be made about how well the new firm formation rate actually describes which are the most entrepreneurially flourishing regions. One reason why rates of new firm formation in the north-west part of Sweden are high could be that the inhabitants are forced to start new firms as a result of the difficulties to get a job, so called necessity-based entrepreneurship. Thus, some firms may not be started because the entrepreneur spots great opportunities, but rather the opposite; because there are no other opportunities. High rates of new firm formation could sometimes also partly be due to that other firms exit the market and leave room for new firms, as previous research in the United States has suggested (Sutaria & Hicks, 2004). Consequently, even though there is no doubt that the new firm formation rate measures how many new firms that are started and that new firms are important for the local economy, this paper stresses that the new firm formation rate should not be used as the only indicator of how well a municipality is doing, neither economically nor in terms of conditions for successful entrepreneurship.

As Figure 2 illustrates, the importance of the various industries differs considerably across municipalities. It demonstrates that in a majority of the municipalities (199 of 290), most new establishments are started within the primary sector or manufacturing. Also, there are clear regional patterns in the most common industry. The primary sector is the industry in which most new firms are started in most municipalities in the north and in the inland of south Sweden. Municipalities where manufacturing is most common are relatively spread out, but seem to be outside the bigger cities in the south and central parts of the country. It is evident that business service firms to a large extent are established in and around big cities. In fact, eight of the ten most populous municipalities have new establishments within business services as the most common. Only in a few municipalities (21 and twelve, respectively) are new establishments within trade, hotels and restaurants or public and personal services most common. These municipalities do not exhibit any clear spatial pattern, but are relatively widespread.

Next, the spatial patterns of the new firm formation rate in each industry category are presented and analysed. Figure 3 shows the new firm formation rate in the primary sector in each municipality and Figure 4 presents the equivalent rate within manufacturing.

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14 In contrast to opportunity-based entrepreneurship.
There is a clear urban-rural division and large differences exist between the municipalities with most and least new establishments within the primary sector, as Figure 3 shows. For example, whereas some municipalities around Stockholm do not have any new primary sector establishments, one municipality, Bjurholm, has more than ten per 1,000 members of the labour force. It is reasonable that more new primary sector firms are started in rural regions, since sparsely populated municipalities have land which is needed for agriculture and forestry. Figure 4 does not show that the same clear spatial pattern is present for the new firm formation rate within manufacturing. Municipalities with many new manufacturing firms are relatively widespread across the country and are located both in urban and rural areas.

Figure 5 displays the new firm formation rate in trade, hotels and restaurants, whereas Figure 6 shows the new firm formation rate in business services across the Swedish municipalities.
Figure 5 clearly demonstrates that firms within trade, hotels and restaurants are most affected by tourism. Many of the municipalities in which the new firm formation rate in this category is highest either host ski resorts or are popular destinations during the summer. The high rate of new firm formation within trade, hotels and restaurants in these municipalities is logical, because while on holiday, tourists often want to shop, eat and have a place to stay.

As Figure 6 illustrates, the new firm formation rate within business services has a different pattern than the new firm formation rate within other industry categories. Despite some rural municipalities in north Sweden having high rates, most business service firms are started in and around the largest cities, especially Stockholm. This is in line with Berggren and Silver’s (2010) findings, which show that the largest cities have a higher proportion of business service firms than other parts of Sweden. It is also consistent with international evidence (Palmer, Friedland, Roussel, & Jennings, 1990; Fischer, Revilla Diez, & Snickars, 2001; Wiig Aslesen & Isaksen, 2007; Renski, 2008). There could be several reasons why business services are most prevalent in large cities. First, as mentioned above, people are generally more well-educated there. Since business service firms require well-educated employees with the right knowledge, they are more likely to find workers with those competencies in the large cities. Similarly, this supports the evidence of that those individuals who are more knowledgeable and skilled are more likely to start new firms (Anselin et al., 1997 & 2000; Sevilir, 2010). Second, it seems like the demand for these services is most prevalent in urban areas. Wiig Aslesen and Isaksen (2007) show that firms in urban regions are the most frequent users of business services. Then, because many of the projects which business service firms undertake require close cooperation and face-to-face contact with customers, it is reasonable that these firms choose to be established where most of their customers are (Wiig and Aslesen, 2007).
Third, that new business service firms choose to establish themselves in the largest cities can be a consequence of the availability of financing. Since business service firms often have few fixed assets which can be pledged as collateral, have higher ambitions for growth and are less control-averse, they more often than other firms turn to private investors for financing (Berggren et al., 2001; Johnsen & McMahon, 2005). Thus, as the private investors are largely concentrated to Stockholm and Gothenburg and tend to finance firms in those regions while not providing financing to firms in other regions, it is reasonable that new firms within the industry which is most likely to obtain private equity financing to a large extent decide to be established there (Berggren & Silver, 2010). However, it is important to not draw too far-reaching conclusions but to consider the direction of causality. Even though Figure 6 clearly shows that the formation rate of new business service firms is high in those regions where previous research has shown that most private investors are located, it cannot show whether business service firms are started there because of the access to appropriate financing, whether private investors choose to be located there because most interesting firms are established there or whether they are both due to other reasons.

Figure 7 shows how the new firm formation rate differs across the Swedish municipalities in the fifth and final industry category, public and personal services.

As Figure 7 shows, the new firm formation rate in public and personal services does not exhibit any clear spatial pattern or urban-rural division. However, there is a cluster of municipalities in the Stockholm county which have high rates. This is reasonable, since Stockholm is Sweden’s capital and most new establishments started by the government or national authorities should be started there.
5.1.2 Spatial patterns of local access to banks

Figure 8 shows the average bank branch size and Figure 9 presents the number of bank branches per capita in each of the Swedish municipalities.

As Figure 8 illustrates, there is an evident difference between urban and rural municipalities in terms of average bank branch size. As expected, the largest bank branches are located in larger cities. This is logical, because banks often have regional headquarters to which they cluster some of their services and administration. It is then reasonable that this extended service is available in larger cities where more people live. On the other hand, almost all municipalities in the rural north-west part of Sweden have small bank branches. Considering the absolute number of bank branches, most municipalities have several branches, indicating that the inhabitants in most municipalities have good access to banks. The widespread presence of banks across regions is in line with international evidence (Bonaccorsi di Patti & Gobbi, 2001; Black & Strahan, 2002; Klagge & Martin, 2005). However, there are large differences across municipalities. While Stockholm has more than 200 bank branches, one municipality, Storfors, did not have a single branch in 2009.15

Interestingly, Figure 8 and 9 illustrate that the number of bank branches per capita shows almost the opposite urban-rural pattern as average bank branch size. The number of bank branches per capita is generally highest in rural municipalities, especially in the north-west part of Sweden. Conversely, in the cities with most inhabitants, there are few bank branches

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15 In 2012, a new bank branch was opened in Storfors, so in 2016 there are bank branches in all Swedish municipalities (Staake, 2012).
per capita. The view that average bank branch size and number of bank branches per capita show very different geographical patterns is also supported by the fact that the two variables have significant negative bivariate correlation (-0.201). Thus, in general, rural municipalities which have many bank branches per capita have small branches, whereas urban municipalities with few bank branches per capita have large branches. The negative relationship between size and branches per capita most likely has two connected reasons; one related to population density and one related to exploitation of business opportunities. First, many rural municipalities in Sweden are very large in terms of area, but have few inhabitants. Because of the large spatial distances, more bank branches than the population size indicates could be necessary to satisfy the widely spread out customers. That is most likely a reason why the number of branches per capita is high in many rural municipalities. However, since these municipalities have few inhabitants and potential customers, the bank branches often do not need many employees to serve all customers. In contrast, in densely populated cities, many employees are needed to serve the large number of customers; however, these employees can be clustered in a few branches which are within spatial reach for all inhabitants. Second, since bank markets have been shown to be largely local, the number of customers whom the bank branches in a municipality can possibly serve is relatively fixed (Kwast, 1999; Bonaccorsi di Patti & Gobbi, 2001). Thus, opposite to average bank branch size and number of bank branches per capita, the proportion of the population employed in the bank sector should be relatively stable across municipalities. This is supported by strong positive correlation between the number of people working in banks and population size in the Swedish municipalities (0.843). Therefore, it is logical that if there are few bank branches in a municipality, those branches which exist are able to hire many employees to serve the local customers. On the contrary, if there are many bank branches, each branch cannot have many employees in order to keep the costs down and compete efficiently. Consequently, based on these two aspects, it seems logical that average bank branch size and number of bank branches per capita are negatively correlated. It is also consistent with previous findings (Backman, 2015).

Figure 10 displays the concentration level in each municipality’s bank market.
The municipalities with the highest concentration level are those which only have one bank branch. As Figure 10 shows, these are primarily small municipalities located in the central part of Sweden. It is also evident that the lowest levels of concentration are found in the larger cities. This was expected, as both previous studies and this paper find that the absolute number of bank branches is highest in the most populous municipalities (Backman, 2015).

### 5.1.3 Spatial autocorrelation

Table 4 shows the results of the Global Moran’s I test of spatial autocorrelation.
Table 4. Results of the Global Moran’s I test for spatial autocorrelation

<table>
<thead>
<tr>
<th></th>
<th>Moran's index</th>
<th>Expected index</th>
<th>z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFF Total E LMA</td>
<td>0.146</td>
<td>-0.003</td>
<td>8.948***</td>
</tr>
<tr>
<td>NFF Total F LMA</td>
<td>0.583</td>
<td>-0.003</td>
<td>35.164***</td>
</tr>
<tr>
<td>NFF Total E EA</td>
<td>0.341</td>
<td>-0.003</td>
<td>20.639***</td>
</tr>
<tr>
<td>NFF Primary sector LMA</td>
<td>0.390</td>
<td>-0.003</td>
<td>23.620***</td>
</tr>
<tr>
<td>NFF Manufacturing LMA</td>
<td>0.074</td>
<td>-0.003</td>
<td>4.673***</td>
</tr>
<tr>
<td>NFF Trade, hotels and restaurants LMA</td>
<td>0.054</td>
<td>-0.003</td>
<td>3.489***</td>
</tr>
<tr>
<td>NFF Business services LMA</td>
<td>0.863</td>
<td>-0.003</td>
<td>52.442***</td>
</tr>
<tr>
<td>NFF Public and personal services LMA</td>
<td>0.220</td>
<td>-0.003</td>
<td>13.424***</td>
</tr>
<tr>
<td>Average bank branch size</td>
<td>0.190</td>
<td>-0.003</td>
<td>19.470***</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>0.175</td>
<td>-0.003</td>
<td>10.691***</td>
</tr>
<tr>
<td>Concentration level</td>
<td>0.090</td>
<td>-0.003</td>
<td>5.572***</td>
</tr>
</tbody>
</table>

Note: *** indicates significance at the 1 per cent level.

The following abbreviations are used: E - establishments, F - firms, LMA - labour market approach, EA - ecological approach.

As Table 4 shows, all the tested variables have a positive Moran’s index and a significant z-score. This indicates that both the rate of new firm formation, in total and in each industry category, and the bank variables experience positive spatial autocorrelation. This was expected and further supports what Figure 1-10 show; that there are regional patterns. Table 7-9, which present the regression results, also show the Durbin-Watson d statistic for each of the regressions. All d statistics are below 2, indicating that all regressions to a varying extent suffer from positive autocorrelation. Thus, both the Global Moran’s I and the Durbin-Watson d statistic show that municipalities spatially close to each other tend to have values which are more similar than what would be the case if they would have been totally random. Also, both tests show that the primary sector and business services are the two industries with the most significant spatial autocorrelation. This is logical, as those are the industries with the clearest differences between urban and rural regions. Municipalities located close to each other should therefore be most similar within those industries.

The consequence of autocorrelation is that the standard errors are larger than they would otherwise be; thus leading to that some coefficients which may otherwise have been declared significant are deemed insignificant (Gujarati & Porter, 2009). However, none of the variables in this study, except the new firm formation rate in business services, are considered to suffer from severe spatial autocorrelation and the results are therefore not deemed to be too affected by its presence. Neither do the variables suffer from heteroscedasticity and the regression coefficients presented in Table 7-9 are therefore deemed efficient (see Appendix F for the heteroscedasticity tests). Because of the limited extent, it is considered that no remedial measures need to be undertaken to reduce the effects of spatial autocorrelation or heteroscedasticity.

5.2 Correlation analysis

The correlation matrix in Table 5 shows how the total new firm formation rate using each of the three approaches and the independent variables are correlated.
### Table 5. Correlation between total new firm formation rate and the independent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>NFF Total E LMA</th>
<th>NFF Total F LMA</th>
<th>NFF Total E EA</th>
<th>Average bank branch size</th>
<th>Number of bank branches per capita</th>
<th>Concentration level</th>
<th>Mean establishment size</th>
<th>Human capital level</th>
<th>Income growth</th>
<th>Unemployment rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFF Total E LMA</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NFF Total F LMA</td>
<td>0.452**</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NFF Total E EA</td>
<td>0.472**</td>
<td>0.427**</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Average bank branch size</td>
<td>-0.069</td>
<td>0.160**</td>
<td>0.081</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>0.506**</td>
<td>-0.074</td>
<td>-0.021</td>
<td>-0.201**</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Concentration level</td>
<td>0.018</td>
<td>-0.239**</td>
<td>-0.139*</td>
<td>0.046</td>
<td>-0.040</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>-0.812**</td>
<td>-0.265**</td>
<td>0.059</td>
<td>0.108</td>
<td>-0.569**</td>
<td>-0.075</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.017</td>
<td>0.513**</td>
<td>0.335**</td>
<td>0.298**</td>
<td>-0.384**</td>
<td>-0.382**</td>
<td>0.187**</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Income growth</td>
<td>-0.006</td>
<td>0.167**</td>
<td>-0.059</td>
<td>0.078</td>
<td>-0.171**</td>
<td>-0.060</td>
<td>-0.026</td>
<td>0.392**</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-0.109</td>
<td>-0.499**</td>
<td>-0.059</td>
<td>-0.080</td>
<td>0.121*</td>
<td>0.042</td>
<td>0.119*</td>
<td>-0.450**</td>
<td>-0.470**</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note:* * and ** indicate significance at the 5 and 1 per cent levels, respectively.

The following abbreviations are used: E - establishments, F - firms, LMA - labour market approach, EA - ecological approach.
There is strikingly weak correlation between each of the three different definitions of total new firm formation rate. This is due to both the numerators and the denominators. The two definitions which use the labour market approach are both standardised by the labour force. However, they differ in that one uses new establishments and one uses new firms as numerator. Thus, the weak correlation indicates that the relationship between the number of new establishments and the number of new firms differs considerably across municipalities. The indication is also confirmed when studying the data more thoroughly. Whereas some municipalities have equally many new establishments and new firms, others have more than three times as many new establishments as new firms. There is also a clear regional pattern in the relationship between new establishments and new firms (see Appendix B). The rural municipalities in the north-west part of Sweden have substantially more new establishments than new firms. On the contrary, in and around the largest cities, there are almost as many new firms as new establishments. Hence, new establishments per new firms shows a similar pattern as the total new firm formation rate using new establishments; it is high in the rural north-west part of Sweden. Consequently, new establishments per new firms and total new firm formation rate also have strong bivariate correlation (0.445). This is a considerable disadvantage of the primary definition using new establishments and the labour market approach, because many of the municipalities which seem most entrepreneurial with this definition do in fact not have many new firms, only many new establishments (see Appendix A). However, as mentioned above, it can be discussed whether new firms or new establishments are the best indicator of entrepreneurship. Regardless, it is important to be aware of that they show different aspects. It should also once again be noted that in this paper new establishments are used because there is no municipality-level data on the number of new firms in each industry publicly available. Therefore, inter-industry differences could not be tested without using new establishments.

There is also relatively weak correlation between the two definitions which both use the number of new establishments as numerator; the labour market approach and the ecological approach (0.472). The correlation between the two approaches is significantly lower than the correlation found by Johnson (2004). The weak correlation is an indication of that the relationship between the two denominators, the labour force and the number of existing establishments, i.e. the mean establishment size, varies across municipalities. Since previous studies have shown that there are substantial regional differences in mean establishment size, the relatively weak correlation between new firm formation rate with the labour market approach and with the ecological approach is not surprising (Rogers, 2012; Backman, 2015). Also, in their comparison of the two approaches, Audretsch and Fritsch (1994a) find that they are so different that what conclusions are drawn often depends on whether the labour market approach or the ecological approach is used. Thus, the weak correlation is in line with previous findings. Despite this, the regressions carried out in the study give very similar results with the labour market approach and the ecological approach. This consistency is discussed more in a subsequent section.

The bivariate correlation between total new firm formation rate and the variables describing local access to banks differs across the three different definitions of new firm formation rate. Hence, this further shows that the definitions are relatively different. Using the primary definition, new establishments and the labour market approach, there is strong positive bivariate correlation between the new firm formation rate and the number of bank branches per capita. There is also strong negative correlation between new firm formation rate and mean establishment size. Based on this, and since number of bank branches per capita and mean establishment size are negatively correlated, it is reasonable that much of the variation in number of bank branches per capita is captured by mean establishment size. Therefore,
regressions where mean establishment size is excluded have been estimated. The results are shown in Appendix D. Nevertheless, since several previous studies have shown that industry structure is an important determinant of new firm formation, mean establishment size is kept for the main analysis (Mason, 1991; Davidsson et al., 1994; Armington & Acs, 2002).

As discussed above, there is significant negative correlation between average bank branch size and number of bank branches per capita. Though, none of these variables are significantly correlated with the level of concentration in the bank market. Thus, concentration level seems to capture an aspect of the local bank market which is not captured by the other variables. It is clear that the number of bank branches is not the only determinant of concentration level, but that market shares also matter, because the correlation between number of bank branches and concentration level is close to zero (-0.040).

Another interesting aspect is how the rate of new firm formation in each industry category is correlated with the rate in the other industries and with the total new firm formation rate. These correlation coefficients are displayed in Table 6 using the labour market approach.
Table 6. Correlation between new firm formation rate in the industry categories using the labour market approach

<table>
<thead>
<tr>
<th></th>
<th>NFF Total</th>
<th>NFF Primary sector</th>
<th>NFF Manufacturing</th>
<th>NFF Trade, hotels and restaurants</th>
<th>NFF Business services</th>
<th>NFF Public and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFF Total</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFF Primary sector</td>
<td>0.618**</td>
<td>1</td>
<td>0.612**</td>
<td>0.030</td>
<td>0.033</td>
<td>0.528**</td>
</tr>
<tr>
<td>NFF Manufacturing</td>
<td>0.521**</td>
<td>0.030</td>
<td>0.367**</td>
<td>0.039**</td>
<td>0.237**</td>
<td>0.253**</td>
</tr>
<tr>
<td>NFF Trade, hotels and restaurants</td>
<td>0.367**</td>
<td>0.392**</td>
<td>0.392**</td>
<td>0.172**</td>
<td>0.206**</td>
<td>0.206**</td>
</tr>
<tr>
<td>NFF Business services</td>
<td>0.367**</td>
<td>-0.329**</td>
<td>0.329**</td>
<td>0.172**</td>
<td>0.253**</td>
<td>0.253**</td>
</tr>
<tr>
<td>NFF Public and personal services</td>
<td>0.512**</td>
<td>-0.0033</td>
<td>-0.0033</td>
<td>0.237**</td>
<td>0.206**</td>
<td>0.206**</td>
</tr>
</tbody>
</table>

Note: * and ** indicate significance at the 5 and 1 per cent levels, respectively. The following abbreviations are used: E - establishments, LMA - labour market approach.

All industries are significantly positively correlated with the total new firm formation rate. Yet, the industry with the strongest correlation with the new firm formation rate is the primary sector. Given that the total new firm formation rate is high in many rural municipalities in the north-west part of Sweden and most of these municipalities have the highest proportion of new firms within the primary sector, this correlation is logical. It is also confirmed by studying Figure 1 and 3, which illustrate that the new firm formation rate in total and in the primary sector show very similar regional patterns.
Furthermore, the correlation coefficients between the rate of new firm formation in the different industry categories give valuable insights about whether municipalities with many new firms in one industry tend to have many new firms also in some other industries or whether different industries tend to cancel each other out in the sense that many new firms in one industry result in fewer firms in another industry. In general, the correlation between the different industries is significant although relatively weak. Most correlation coefficients are positive, indicating that the industries show no signs of being mutually exclusive, i.e. new firms in different industries do not cancel each other out. Rather, there is some evidence of that municipalities with many new firms in one industry often have many new firms also in other industries. It can therefore be concluded that a municipality’s business conditions make a difference for various industries. However, the fact that most correlation coefficients are relatively close to zero indicates that the different industries are not very closely related.

The only industry categories which are significantly negatively correlated are the primary sector and business services. Their negative correlation is not surprising, because these are the two industries which experience the most evident urban-rural division; primary sector firms are most common in rural areas, whereas business service firms are most common in cities. Therefore, the negative correlation does not imply that firms in the two industries cancel each other out, but rather that they are most prevalent in municipalities with very different characteristics. The strongest positive bivariate correlation is found between business services and public and personal services. Thus, new establishments within these industries are to a relatively large extent started in the same municipalities. Even though public and personal services are not as clearly clustered to larger cities as business services are, they are still more common in urban areas than in rural areas. This may not seem reasonable, as these services are needed by people in all parts of the country and most of them need to be consumed in the same area as the establishment is located (Kotler, Armstrong, & Parment, 2011). The inseparability of services and their consumers is most likely the reason why public and personal services is the industry category with smallest standard deviation (Table 3). Even though some of these services need to be present in all municipalities, the limited, yet present, urban clustering is logical, since some establishments, such as museums, police offices and schools for higher education, are primarily opened in cities and people who want to visit them have to travel there.

5.3 Regression analysis

5.3.1 Total new firm formation rate

Table 7 shows the results when an OLS regression is used to estimate Equation 1 with the total new firm formation rate. It displays the results using both the primary approach and the two other approaches utilised to test the robustness of the results.
Table 7. Total new firm formation rate and its relationship with the independent variables using three different approaches

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Total E LMA</th>
<th>NFF Total F LMA</th>
<th>NFF Total E EA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average bank branch size</strong></td>
<td>-0.005</td>
<td>0.006</td>
<td>-0.025</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td>(0.050)</td>
</tr>
<tr>
<td><strong>Number of bank branches per capita</strong></td>
<td>3.959***</td>
<td>-2.357**</td>
<td>22.510**</td>
</tr>
<tr>
<td></td>
<td>(1.230)</td>
<td>(1.017)</td>
<td>(10.017)</td>
</tr>
<tr>
<td><strong>Concentration level</strong></td>
<td>9.954E-5</td>
<td>-1.244E-4**</td>
<td>4.555E-4</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td><strong>Mean establishment size</strong></td>
<td>-1.158***</td>
<td>-0.372***</td>
<td>0.369</td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.051)</td>
<td>(0.498)</td>
</tr>
<tr>
<td><strong>Human capital level</strong></td>
<td>0.187***</td>
<td>0.176***</td>
<td>1.789***</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.027)</td>
<td>(0.269)</td>
</tr>
<tr>
<td><strong>Income growth</strong></td>
<td>-0.508**</td>
<td>-0.760***</td>
<td>-6.335***</td>
</tr>
<tr>
<td></td>
<td>(0.239)</td>
<td>(0.198)</td>
<td>(1.947)</td>
</tr>
<tr>
<td><strong>Unemployment rate</strong></td>
<td>0.067</td>
<td>-0.322***</td>
<td>0.352</td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.050)</td>
<td>(0.494)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>23.776***</td>
<td>16.063***</td>
<td>126.527***</td>
</tr>
<tr>
<td></td>
<td>(1.480)</td>
<td>(1.224)</td>
<td>(12.057)</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.700</td>
<td>0.492</td>
<td>0.173</td>
</tr>
<tr>
<td><strong>Durbin-Watson d statistic</strong></td>
<td>1.566 †</td>
<td>1.477 †</td>
<td>1.645 †</td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parentheses. † and ‡ indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. ** indicates an indecisive result.

The following abbreviations are used: E - establishments, F - firms, LMA - labour market approach, EA - ecological approach.

Using the labour market approach, the use of either new establishments or new firms give considerably different results, especially for the variables related to local access to banks. This is not surprising, given that the relationship between the number of new establishments and the number of new firms differs substantially across municipalities (see Appendix B). The inconsistency is a central weakness of the test. Thus, it is important to stress that the conclusions which are drawn about the formation of new establishments cannot be said to hold for new firms. The different results indicate that regions where many firms per capita are started have very different characteristics compared to regions where many establishments per capita are started. As discussed above, there are substantially more new establishments than new firms in many rural municipalities, whereas the number of new establishments and the number of new firms are almost equal in and around the largest cities.

Nevertheless, it is argued that the inconsistency between new establishments and new firms does not eradicate the validity of the test. The study tests the relationship between local access to banks and the formation of new establishments. It does not claim that the same relationships hold for new firms. Since many previous studies also have used new establishments, the employed definition is not unique for this study and these results should therefore be regarded equally valid as previous ones using the same definition of new firm formation rate (Davidsson et al., 1994; Armington & Acs, 2002; Acs & Armington, 2004;
Fritsch & Falck, 2007; Andersson & Koster, 2011). Even though the importance of the coefficient of determination should not be overstated, the regression using new establishments has a considerably higher $R^2$ than the regression using new firms, indicating that the model better explains the new firm formation rate when measured by new establishments than when measured by new firms. In order to fulfil the purpose of testing whether there are inter-industry differences, which for this study only is possible with the use of new establishments due to lack of data on new firms, the rest of this analysis deals exclusively with new firm formation in terms of new establishments.

Using new establishments, the labour market approach and the ecological approach give very similar results. The two approaches show the same signs for all variables except mean establishment size. Also, the same variables, except mean establishment size, are significant at the 5 per cent level. The consistency between the two approaches contradicts Audretsch and Fritsch’s (1994a) finding that they can give significantly different results and lead to opposing conclusions. Nevertheless, the conformity in this study gives robustness to the results, since the same conclusions can be drawn regardless of which of the two most commonly employed approaches for measuring the new firm formation rate is used. Still, as argued above, the labour market approach is considered to give a fairer indication of the rate of new firm formation, as it is insensitive to the mean establishment size in a municipality. The results using that approach are therefore analysed more in depth.

Average bank branch size is insignificant, indicating that, holding the number of bank branches per capita and the concentration level constant, how many employees the bank branches in a municipality have is not an important determinant of the rate of new firm formation. Based on previous research on size and specialisation, it was hypothesised that the size of bank branches, as an indicator of specialisation and authority to grant loans, would have a positive effect on formation of new firms (Biggs et al., 1985; Francois, 1990; Parker, 2004). The hypothesis was also based on previous Swedish evidence presenting a positive relationship between average bank branch size and the rate of new firm formation (Backman, 2015). Though, this study does not present any evidence of such a relationship. Agarwal and Hauswald (2010a) argue that the lending decision is less likely to be made at the bank branch where the loan was applied for if the branch is small, but then rather be transferred to a larger regional office. In light of this, the insignificant coefficient for average bank branch size neither confirms nor rejects that lending decisions which are made further away from the firm founder who wishes to borrow significantly reduces the chances to obtain credit and start the business. However, one should not draw too far-reaching conclusions. The insignificant result does not necessarily imply that how specialised and knowledgeable the bank branches’ employees are does not matter for how well they can serve potential firm founders and for formation of new firms. It is more likely a consequence of the spatial patterns in the total rate of new firm formation and average bank branch size discussed above. Figure 1 and 8 illustrate that the new firm formation rate is high in many rural municipalities where the bank branches have few employees. Thus, the negative, although insignificant, coefficient for average bank branch size is presumably a consequence of negative correlation rather than causality. Also, average bank branch size may not be a good proxy for specialisation and authority to grant loans. Further research may therefore be needed to deepen the knowledge of whether local access to specialised loan officers is important for new firm formation.

The coefficient for number of bank branches per capita is positive and significant. This indicates that, given the size of the existing branches and the concentration level, more bank branches are associated with more new firms. Thus, the empirical results provide evidence
of the arguments put forward in the theoretical framework and are in line with previous studies which have investigated the relationship between number of bank branches per capita and the new firm formation rate (Rogers, 2012; Backman, 2015). More bank branches within a reasonable distance imply that there are more sources from which an entrepreneur can potentially obtain funds for his or her venture. The positive relationship supports Thakor’s (1996) view that approaching multiple banks increases the chances to obtain financing from at least one lender and consequently to be able to start a new firm. Since different loan officers will make different decisions as a result of imperfect information and relationships, the chances that at least one of them will accept the loan request are higher if multiple lenders are approached. Also, different banks may have different lending requirements and business ideas and may therefore assess the same request differently. As the study is carried out on a local level, the significant relationship also indicates that the conditions of the local bank market matter for new firm formation; thus providing further evidence of the view that spatial proximity is important for lending relationships and that bank markets are largely local (Kwast, 1999; Bonaccorsi di Patti & Gobbi, 2001; Storper & Venables, 2004; Agarwal & Hauswald, 2010b). Since previous research has shown that knowledge about the local market conditions is important for banks’ ability to assess loan requests correctly and that such information is better acquired if the bank is located close to the borrower, it is logical that more bank branches within the market in which the new firm plans to operate increase the number of lenders with the knowledge which is needed and therefore the chances for the entrepreneur to obtain financing and start a firm (Pollard, 2003; Michelacci & Silva, 2007; Agarwal & Hauswald, 2010b).

Nevertheless, just as for average bank branch size, one should not claim that the relationship between number of bank branches per capita and the new firm formation rate is only due to clear causality. From Figure 1 and 9 it is evident that both the total rate of new firm formation and number of bank branches per capita are high in many rural municipalities. As discussed above, this is most likely to some extent due to that both variables are standardised by the population or labour force, which are small in those municipalities. Thus, as a consequence of their definitions, these variables tend to be high in rural municipalities. Still, the model utilised in this study controls for human capital level, which also is a proxy for an urban-rural distinction, population density and population size (correlation of 0.637, 0.529 and 0.487, respectively).16 Therefore, even when many urban-rural differences are controlled for, there is still a strong positive relationship between number of bank branches per capita and the rate of new firm formation and it can be concluded that, all else equal, more bank branches are associated with more new establishments.

The positive relationship between number of bank branches per capita and the rate of new firm formation on a municipal level has important social implications. It shows that the local bank sector and how many potential sources of funds there are for entrepreneurs are important for the possibilities to start new firms. Since it has previously been shown that new firms are important for employment and economic growth, it is in the society’s interest to reduce the hurdles which potential firm founders face (Carree & Thurik, 2003; Fritsch & Mueller, 2004). In Sweden, there is an ongoing political debate about how new jobs can be created and some policies have specifically been aimed at improving the chances to start successful firms (The Riksdag, 2009; Ringarp, 2013; Government Offices of Sweden, 2015). Also, as the country experiences urbanisation and many rural regions have negative population growth, there are policies and supports aimed at preserving the access to essential

16 The same regressions have been estimated with population density and population size included separately. They give the same results. However, the variables are excluded in order to avoid multicollinearity.
services in those regions (Swedish Board of Agriculture, 2013 & 2016; SOU 2016:26). In light of the political will to improve the conditions for entrepreneurs, increase new firm formation and keep the entire country flourishing, the finding that how many bank branches a municipality has matters for its new firm formation rate is important. It indicates that local access to banks should be an imperative objective for the society as a whole. It could therefore be worrying that the number of bank branches in Sweden is decreasing and that most branches are closed where there are already few sources of financing, as the empirical results indicate that fewer bank branches are associated with fewer new firms. However, banks, at least those which are commercial, are independent companies with the goal to maximise the shareholders’ profits. This is a goal which may require closure of unprofitable branches. Thus, the objective of banks is not always in line with what is best for the society as a whole and that conflict of interest may result in a lack of available financing in some regions. Even though the government cannot force independent banks to have branches in specific locations, it can use structural reforms and political incentives to stimulate bank branches in those regions where there is limited access to financing without the incentives. Just as the government supports firms in other industries in some regions, it should be understood that bank branches are important for the existence of firms in the real economy and incentives may therefore be needed in order for banks to profitably have branches in those regions.

One such reform could be to improve the possibilities to start and run savings banks. As mentioned above, savings banks do not have any shareholders who require that profits are maximised. The objective is instead to strengthen the local community in which they operate (Sparbankernas Riksförbund, 2016). Therefore, they do not need to make large profits each year but can instead focus on how the region can flourish. Furthermore, savings banks are often located in regions where not many other banks are present, i.e. in rural regions (Backman, 2015). With their objective and local presence, savings banks could fulfil an important role as financiers of existing and new firms in regions where other banks are closing their branches. Since the Swedish government wants to stimulate entrepreneurship in rural regions, more and stronger savings banks could be an efficient means in fulfilling that objective. In order to deepen the knowledge of the importance of different types of banks, future research could investigate if local access to certain types of banks is more important for new firm formation in certain industries. For example, it could be investigated whether the impact on local new firm formation in specific industries differs between foreign banks and Swedish banks or between commercial banks and savings banks.

Concentration level does not have any significant effect on the rate of new firm formation. It was not predicted whether it would have a positive or negative effect, since previous research has not given harmonised evidence. Some studies, supporting Petersen and Rajan’s (1995) theory that concentration is necessary for banks to profitably enter into long-term lending relationships, have found that bank concentration is better for new firms (Jackson & Thomas, 1995; Bonaccorsi di Patti & Dell’Ariccia, 2004). On the other hand, studies supporting the paradigm that many actors of equal size result in competition and an optimal output show that fragmented bank markets are better for new firms (Black & Strahan, 2002; Cetorelli & Strahan, 2006; Backman, 2015). Since previous studies have found evidence of both high and low levels of concentration being better for new firm formation, it is not surprising that this study does not find any clear evidence of any of the opposing views. Rather, the insignificant result further shows that there is an ambiguous relationship between bank concentration and new firm formation. Hence, although much research has already been carried out, this is an area which should be subject to further investigation.
Also, the insignificance of concentration level could be due to that concentration is not a good indicator of competition, as some studies have suggested. These studies claim that banks in a very concentrated market can still behave competitively if they are faced with the threat of potential entrants (Baumol, 1982; Claessens & Laeven, 2004 & 2005; Claessens, 2009). Thus, if concentration level does not say anything about how competitively the bank branches act, it may just explain the structure of the market rather than the behaviour of the market participants. Another weakness of the variable which could be a reason for the insignificant result is the relatively unprecise definition of concentration level, due to the lack of exact data. First, market share is measured in terms of employees, instead of loans outstanding to new firms, which most likely would give a fairer measure of market shares. Second, the number of employees is not exact, but only an estimation based on the size class to which each bank branch belongs. Hence, municipalities which have relatively different bank markets could still have the same concentration level in this study and the lack of exact data leads to estimations which could make the results flawed and less clear; thus resulting in insignificance.

As expected, mean establishment size has a negative effect on the rate of new firm formation when the labour market approach is used. This finding is further supported by the strong negative bivariate correlation (-0.812). Thus, the empirical findings in this study are consistent with previous research (Mason, 1991; Davidsson et al., 1994; Armington & Acs, 2002; Backman, 2015). It is reasonable that the existence of many small firms creates a business climate where people get inspired to start their own firms. When some people start new businesses, friends or colleagues are more likely to be inspired to do the same thing. Also, as previously pointed out, people who work in small firms gain experience which can be used to start a firm on their own (Cooper, 1973; Davidsson et al., 1994; Boden, 1996). In contrast, when the ecological approach is used, mean establishment size has a positive, although insignificant, effect. The positive sign is in line with Armington and Acs’ (2002) claim that the ecological approach gives higher rates of new firm formation where the mean establishment size is large. The reason is not that many new firms are started, but rather that the new firms are standardised by few, although large, firms. The inconsistency between the labour market approach and the ecological approach is therefore not a challenge of the robustness of the test. Instead, it gives strength to the argument that the labour market approach is more appropriate, since the ecological approach gives results which contradict the widely held view that new firms are more prevalent where there are many small firms.

All else equal, a higher level of human capital has a positive effect on the rate of new firm formation. This was expected, as it is in line with previous findings (Audretsch & Fritsch, 1994b; Armington & Acs, 2002; Karlsson & Backman, 2011). Thus, this study gives further support to the importance of higher education in creating new jobs. It is logical that those who are well-educated have more of the competencies which are needed to start successful businesses and may therefore be more likely to make the decision to start. Another aspect, which is related to financing, is the likelihood of people with different levels of education to obtain loans. As a consequence of the lack of more standardised information, personal characteristics of the entrepreneur are important when new firms apply for loans (Petersen & Rajan, 2002; Backman, 2015). It is then reasonable if loan officers, given the same business plan, have a tendency to accept loan requests from well-educated individuals more often than those from individuals with a lower level of human capital.

The results show that income growth has a significant negative effect on the rate of new firm formation. This was not expected, as income growth is used as an indicator of the change in local demand. It was therefore predicted that positive conditions in the local market
stimulate more new firms, which some studies have shown (Armington & Acs, 2002; Acs & Armington, 2004). However, the negative relationship between income growth and the rate of new firm formation does not show any such link, but could rather indicate the presence of necessity-based entrepreneurship, the concept discussed above. It gives some indication of that firms are not only started because the local market presents great opportunities, but not seldom also because the local market does not give any other opportunities for employment than self-employment, i.e. to start a new firm.

On the other hand, the unemployment rate does not have any significant effect on the rate of new firm formation. Thus, in contrast to income growth, this variable does not give evidence of necessity-based entrepreneurship. It shows neither that unemployment pulls people into self-employment nor that the unattractive market conditions which could be associated with a high unemployment rate push people away from starting new firms. The finding that the unemployment rate has no significant effect on the local new firm formation rate is consistent with several previous studies (Reynolds et al., 1994; Armington & Acs, 2002; Sutaria & Hicks, 2004; Backman, 2015). Together, income growth and unemployment rate do not show any clear evidence of that the local market conditions have a strong influence on the new firm formation rate. However, this may be due to that the model controls for human capital level, which has strong positive correlation with median income (0.703). The positive effect of the level of human capital therefore indicates that, all else equal, more new firms are started in municipalities where the inhabitants are rich and have more money to spend.

5.3.2 Inter-industry differences

Table 8 and 9 show the results of the OLS regressions used to estimate Equation 1 in each of the five industry categories. Table 8 shows the results when the labour market approach is used, whereas Table 9 shows the results with the ecological approach. The 95 per cent confidence intervals, which are shown in brackets, are used to indicate whether there are statistically significant differences between the industry categories in some relationships.
Table 8. New firm formation rate in each industry category and its relationship with the independent variables using the labour market approach

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Primary sector</th>
<th>NFF Manufacturing</th>
<th>NFF Trade, hotels and restaurants</th>
<th>NFF Business services</th>
<th>NFF Public and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>-0.006* (0.003) [-0.013 - 0.001]</td>
<td>3.469E-4 (0.002) [-0.004 - 0.005]</td>
<td>4.217E-4 (0.003) [-0.005 - 0.002]</td>
<td>0.001 (0.002) [-0.002 - 0.005]</td>
<td></td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>4.951*** (0.706) [3.562 - 6.340]</td>
<td>-1.134** [-2.125 - -0.143]</td>
<td>-0.227 (0.480) [-1.172 - 0.717]</td>
<td>0.154 (0.511) [-0.853 - 1.160]</td>
<td>-0.553 (0.345) [-1.231 - 0.125]</td>
</tr>
<tr>
<td>Concentration level</td>
<td>1.646E-4*** (0.000) [9.645E-5 - 2.327E-4]</td>
<td>-5.211E-5** [-1.007E-4 - -3.471E-6]</td>
<td>-6.936E-5*** [-1.157E-4 - -2.301E-5]</td>
<td>3.919E-6 (0.000) [-4.547E-5 - 5.330E-5]</td>
<td>2.011E-5 (0.000) [-1.317E-5 - 5.340E-5]</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>-0.388*** (0.035) [-0.206*** - 0.138**]</td>
<td>-0.134*** (0.025) [-0.024 - 0.017]</td>
<td>-0.134*** (0.025) [-0.024 - 0.017]</td>
<td>0.130*** (0.017) [-0.134*** - 0.191***]</td>
<td></td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.038*** (0.019) [-0.014 - 0.013]</td>
<td>-0.034** (0.098) [-0.093 - 0.099]</td>
<td>-0.304*** (0.013) [-0.014 - 0.013]</td>
<td>0.210** (0.067) [-0.099 - 0.099]</td>
<td>0.072 (0.009) [-0.014 - 0.013]</td>
</tr>
<tr>
<td>Income growth</td>
<td>0.073 (0.137) [-0.087 - 0.075]</td>
<td>-0.304*** [-0.304*** - -0.304***]</td>
<td>-0.015 (0.093) [-0.099 - 0.099]</td>
<td>-0.069*** (0.025) [-0.024 - 0.025]</td>
<td>-0.006 (0.017) [-0.025 - 0.025]</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.189*** (0.025) [-0.065* - 0.015]</td>
<td>0.210** (0.025) [-0.024 - 0.025]</td>
<td>-0.069*** (0.025) [-0.024 - 0.025]</td>
<td>0.072 (0.009) [-0.014 - 0.013]</td>
<td>-0.006 (0.017) [-0.025 - 0.025]</td>
</tr>
<tr>
<td>Constant</td>
<td>3.817*** (0.849) [6.922*** - 0.606]</td>
<td>4.960*** (0.578) [0.515 - 0.615]</td>
<td>2.481*** (0.312) [0.515 - 0.615]</td>
<td>3.016*** (0.415) [0.515 - 0.615]</td>
<td>1.754*** (0.415) [0.515 - 0.615]</td>
</tr>
<tr>
<td>R²</td>
<td>0.681 0.681 0.681 0.681 0.681</td>
<td>0.269 0.269 0.269 0.269 0.269</td>
<td>0.190 0.190 0.190 0.190 0.190</td>
<td>0.606 0.606 0.606 0.606 0.606</td>
<td>0.312 0.312 0.312 0.312 0.312</td>
</tr>
<tr>
<td>Durbin-Watson d statistic</td>
<td>1.621' 1.621' 1.621' 1.621' 1.621'</td>
<td>1.649' 1.649' 1.649' 1.649' 1.649'</td>
<td>1.940 1.940 1.940 1.940 1.940</td>
<td>1.529' 1.529' 1.529' 1.529' 1.529'</td>
<td>1.754''' 1.754''' 1.754''' 1.754''' 1.754'''</td>
</tr>
<tr>
<td>Number of observations</td>
<td>290 290 290 290 290</td>
<td>290 290 290 290 290</td>
<td>290 290 290 290 290</td>
<td>290 290 290 290 290</td>
<td>290 290 290 290 290</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parantheses. 95 per cent confidence intervals in brackets. ' and '' indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. ''' indicates an indecisive result.
Table 9. New firm formation rate in each industry category and its relationship with the independent variables using the ecological approach

<table>
<thead>
<tr>
<th>Dependent variable: NFF</th>
<th>Primary sector</th>
<th>NFF Manufacturing</th>
<th>NFF Trade, hotels and restaurants</th>
<th>NFF Business services</th>
<th>NFF Public and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>-0.058*</td>
<td>0.028</td>
<td>-0.001</td>
<td>0.019</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.026)</td>
<td>(0.021)</td>
<td>(0.025)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>37.778***</td>
<td>-13.588***</td>
<td>-2.654</td>
<td>0.464</td>
<td>-4.867</td>
</tr>
<tr>
<td></td>
<td>(6.473)</td>
<td>(5.200)</td>
<td>(4.251)</td>
<td>(4.976)</td>
<td>(3.453)</td>
</tr>
<tr>
<td>Concentration level</td>
<td>0.001***</td>
<td>-0.001***</td>
<td>-0.001***</td>
<td>3.684E-5</td>
<td>2.321E-4</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>-2.270***</td>
<td>0.655**</td>
<td>0.919***</td>
<td>0.818***</td>
<td>0.560***</td>
</tr>
<tr>
<td></td>
<td>(0.322)</td>
<td>(0.258)</td>
<td>(0.211)</td>
<td>(0.247)</td>
<td>(0.172)</td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.539***</td>
<td>-0.408***</td>
<td>0.194*</td>
<td>2.000***</td>
<td>0.615***</td>
</tr>
<tr>
<td></td>
<td>(0.174)</td>
<td>(0.140)</td>
<td>(0.114)</td>
<td>(0.134)</td>
<td>(0.093)</td>
</tr>
<tr>
<td>Income growth</td>
<td>0.667</td>
<td>-1.241</td>
<td>-3.116***</td>
<td>-2.651***</td>
<td>-1.002</td>
</tr>
<tr>
<td></td>
<td>(1.258)</td>
<td>(1.010)</td>
<td>(0.826)</td>
<td>(0.967)</td>
<td>(0.671)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1.788***</td>
<td>-0.844***</td>
<td>0.008</td>
<td>-0.804***</td>
<td>-0.053</td>
</tr>
<tr>
<td></td>
<td>(0.320)</td>
<td>(0.257)</td>
<td>(0.210)</td>
<td>(0.246)</td>
<td>(0.170)</td>
</tr>
<tr>
<td>Constant</td>
<td>27.598***</td>
<td>45.823***</td>
<td>24.674***</td>
<td>4.474</td>
<td>10.812*</td>
</tr>
<tr>
<td></td>
<td>(7.792)</td>
<td>(6.259)</td>
<td>(5.117)</td>
<td>(5.989)</td>
<td>(4.156)</td>
</tr>
<tr>
<td>R²</td>
<td>0.594</td>
<td>0.125</td>
<td>0.224</td>
<td>0.667</td>
<td>0.336</td>
</tr>
<tr>
<td>Durbin-Watson d statistic</td>
<td>1.618*</td>
<td>1.773&quot;&quot;</td>
<td>1.872</td>
<td>1.478*</td>
<td>1.762&quot;&quot;</td>
</tr>
<tr>
<td>Number of observations</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parantheses. 95 per cent confidence intervals in brackets. ' and " indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. "" indicates an indecisive result.

Similar to the tests of the total new firm formation rate, the labour market approach and the ecological approach give very similar results across all industries for all variables except mean establishment size. As discussed above, the inconsistency between the two approaches for mean establishment size is not surprising. Instead, it strengthens the argument to primarily use the labour market approach. That the labour market approach and the ecological approach overall give almost identical results strengthens the robustness of the test. The foundations of this analysis are based on the results using the labour market approach.

Just as for the total new firm formation rate, average bank branch size is not shown to have any significant effect on the rate of new firm formation when the new firms are divided into industry categories. The relationship is insignificant for all industries except the primary sector. The insignificant relationship was not expected, as it was predicted that larger bank
branches which have specialised employees with the authority to grant loans would result in more new firms in the local area. In the primary sector, average bank branch size is negative and significant at the 10 per cent level. Though, this weak negative relationship does not imply that larger bank branches result in fewer primary sector firms. Rather, it is most likely a matter of spatial correlation. As Figure 3 and 8 illustrate, both the new firm formation rate in the primary sector and average bank branch size differ considerably between urban and rural regions. Logically, new firms within the primary sector are more common in rural municipalities. At the same time, bank branches tend to be relatively small in those municipalities. Consequently, it cannot be concluded that average bank branch size has any significant effect on the rate of new firm formation. Neither is this relationship shown to differ significantly across industries.

In contrast, more significant results are found for number of bank branches per capita. There is a strong positive relationship between number of bank branches per capita and the new firm formation rate in the primary sector. This is in line with the proposed hypothesis, as it has been shown that primary sector firms are in need of capital and rely on bank financing to a large extent (Federation of Swedish Farmers, 2014). It is also likely that most new establishments within the primary sector are started by individuals who live in the same municipality and not by firms based in other parts of the country, as the data shows that the mean establishment size is small in this industry. Therefore, it is reasonable that primary sector firms without establishments in other regions are more heavily dependent on the local bank sector and that more potential sources of financing in the local community are associated with more primary sector firms. However, even though urban-rural differences are controlled for with the variable human capital level, one should not draw too far-reaching conclusions regarding the causality between number of bank branches per capita and the new firm formation rate in the primary sector. Figure 3 and 9 show that the two variables are to a large extent high in the same municipalities. This is possibly due to that many of these municipalities are sparsely populated with much land used for primary sector activities, and at the same time have many bank branches relative to their small populations in order to cover the large geographical areas. Thus, the positive relationship between number of bank branches per capita and the rate of new firm formation in the primary sector is to some extent due to correlation which is a result of other aspects.

The empirical results show a negative relationship between number of bank branches per capita and the new firm formation rate within manufacturing. The negative relationship was not expected, since previous research has shown that this is a capital-intensive industry which normally to a large extent relies on bank financing (Berggren et al., 2001; Johnsen & McMahon, 2005; Berggren & Silver, 2010). Figure 4 and 9 do not give any clear indications of the reasons for this surprising relationship. Compared to some of the other industries, the rate of new firm formation in manufacturing does not have any evident urban-rural division, which number of bank branches per capita has. Neither does the relatively weak bivariate correlation between number of bank branches per capita and the new firm formation rate within manufacturing (0.204) explain the negative relationship. A possible reason for the unexpected result could be that several factors which are important for new firm formation within manufacturing are not controlled for in this model, which the low coefficient of determination indicates. Thus, it should not be concluded that fewer bank branches in a municipality result in more new manufacturing firms, because that entirely contradicts the theory which has previously been presented. On the other hand, the results do not give any indications of that how many bank branches there are in a municipality has a positive impact on the formation of new manufacturing firms.
In order to further investigate why the relationship between number of bank branches per capita and the new firm formation rate within manufacturing is negative, separate regressions are estimated for each of the five industries within manufacturing (see Table 1). The regression results are presented in Appendix E. The results indicate that partly real estate activities and mainly construction are the industries which cause the unexpected negative relationship. The new firm formation rate within the other industries has no significant relationship with number of bank branches per capita. Therefore, new regressions are estimated for manufacturing when construction is excluded. These results are also shown in Appendix E. They show that there is no significant relationship between the number of bank branches per capita and the new firm formation rate in manufacturing when construction firms are excluded. Thus, the industries which are included in this category are heterogeneous. Further research could therefore focus on finding industry categories which are homogeneous and for which more robust conclusions can be drawn. In order to do that, it may be needed to include fewer firms within each category.

The relationship between number of bank branches per capita and the new firm formation rate is not significant for trade, hotels and restaurants, business services or public and personal services. Thus, the results do not give any evidence of that how many bank branches there are in a municipality matters for how many new firms that are started in any of those industries. Since banks have been shown to be important for small firms across all industries in Sweden, it was predicted that number of bank branches per capita would be positive and significant also for these industries (Cressy & Olofsson, 1997; Berggren et al., 2001; Berggren & Silver, 2010). However, it was also predicted that banks would be less important for the service industries than for the more capital-intensive primary sector and manufacturing industry. Even though the negative relationship for manufacturing was not expected, the results indicate that the number of bank branches per capita is more important for new firms in the primary sector than for new service firms. Despite the relationship being significant for manufacturing and not significant for trade, hotels and restaurants, business services or public and personal services, the confidence intervals reveal that the differences in the relationships are not statistically significant. The only significant inter-industry difference which seems to exist is between the primary sector and all other industries. This is interesting and partly in line with the predictions based on previous research, as it has been shown that business service firms are less dependent on bank financing (Berggren et al., 2001; Johnsen & McMahon, 2005; Berggren & Silver, 2010). However, it once again has to be noted that the number of bank branches per capita generally is higher in municipalities where there are many primary sector firms and lower in urban regions where service firms are most prevalent. As the model may not control for all variables which determine those differences, they should therefore be analysed with caution without drawing too far-reaching conclusions.

The relationship between concentration level and the rate of new firm formation is positive in the primary sector, negative within manufacturing and trade, hotels and restaurants and insignificant within business services and public and personal services. Thus, these results are similar to those for number of bank branches per capita. In general, in the primary sector, where new firm formation rate is positively related with number of bank branches per capita, it is also positively related with concentration level, whereas in those industries where the new firm formation rate is negatively related with number of bank branches per capita, it is also negatively related with concentration level. This is interesting, as it presents a potential trade-off; for many new primary sector firms to be started in a municipality, there should be many bank branches per capita, but the bank market should be concentrated. In contrast, for manufacturing, there should be few branches per capita, but a fragmented market. When analysing these results, it is important to remember that the absolute number of bank
branches, not number of bank branches per capita, is one of the components of concentration level. Therefore, a municipality with few inhabitants and few bank branches could have both many bank branches per capita and a concentrated bank market. However, as discussed above, number of bank branches per capita and concentration level have almost no bivariate correlation (-0.040), indicating that these two variables are not high in the same municipalities. The different spatial patterns are also highlighted in Figure 9 and 10. Given that number of bank branches per capita and concentration level are uncorrelated, the potential trade-off between the two variables is surprising. Nevertheless, since both the correlation analysis and the regression analysis show that concentration level is not an important determinant of the total new firm formation rate, it seems like not too much focus should be given to this variable when inter-industry differences are analysed either.

In terms of all the three variables used to describe local access to banks, the results show that there is an opposite relationship between the variables and new firm formation rate in the primary sector compared to manufacturing. In general, the primary sector seems to be the industry where new firm formation rate is most correlated with the bank variables. However, as discussed above, both average bank branch size and number of bank branches per capita differ significantly between urban and rural municipalities, similarly to the new firm formation rate within the primary sector. Therefore, the strong relationship is most likely due to correlation rather than a causal relationship from well-developed bank markets to many new primary sector firms. Interestingly, none of the bank variables have a significant relationship with the new firm formation rate in any of the service industries, indicating that the local bank sector is not an important determinant of how many service firms that are started in a municipality. Even though it was predicted that there would still be a significant relationship, the results give some support to the hypothesis that local banks are less important for new service firms than for other new firms. Thus, this supports previous research which has shown that business service firms are less dependent on banks, partly because they lack fixed assets which can be pledged as collateral, and partly because they are more open for other sources of financing (Berggren et al., 2001; Berger & Udell, 2002; Carpenter & Petersen, 2002; Johnsen & McMahon, 2005; Berggren & Silver, 2010). That local access to banks has a stronger relationship with the new firm formation rate in industries which are most common in rural regions could be a reason why Backman (2015) finds that several of the bank variables used in her study are more important for new firm formation in rural municipalities than in urban municipalities.

Another reason why access to banks in the same municipality seems to be more important for industries which are most common in rural areas could be the size of municipalities. In general, many municipalities in the north-west part of Sweden where primary sector firms are common are very large in terms of area. In contrast, most municipalities in urban regions where many business service firms are started are relatively small and densely populated. Consequently, when a municipality is small, it should be easier to obtain financing from a bank in a neighbouring municipality. When the municipalities are small and spatially close, bank branches in one municipality should have more knowledge about the market conditions in bordering municipalities than if there are large distances between towns in neighbouring municipalities. Thus, the importance of knowing the local market conditions, which has been highlighted in previous studies, should not be limited to the municipality in which a bank branch is located when the municipality is small (Pollard, 2003; Michelacci & Silva, 2007; Agarwal & Hauswald, 2010b). Also, as the distance to other municipalities decreases, it becomes easier for entrepreneurs to travel to bank branches there and the costs of approaching banks outside the home municipality are reduced (Storper & Venables, 2004). It is therefore argued that business service firms are less dependent on bank branches in the
same municipality partly because they are often started in small municipalities where they are relatively likely to obtain financing from banks in bordering municipalities.

Given that Backman (2015) has shown that local access to banks is more important for new firm formation in rural regions and that the results in this study indicate that it is more important for new firms in industries which are most common in rural regions, future regulations may be worrying for banks in these areas and therefore for entrepreneurial activity there. Today, much of the financial counselling banks give to their customers is financed through benefits to the bank from the fund company which the bank recommends (Finansinspektionen, 2016).\footnote{If a bank’s customer chooses to invest in a financial instrument which is produced by a certain fund company, that fund company will often pay a commission, so called benefit, to the bank in order to compensate it for that it has recommended the fund company’s product.} In Sweden, the dependence on these benefits is particularly high for savings banks, which do not have their own financial instruments, but only distribute other financial institutions’ products (Finansinspektionen, 2016). However, by 2018, a new directive from the European Commission, MiFID II, will drastically reduce the possibilities to pay such benefits (SOU 2015:2; European Commission, 2016). Furthermore, it has been proposed that a complete ban of these benefits will be applied in Sweden (SOU 2015:2). The main reason for the ban is to eliminate the conflict of interest which financial advisers face between recommending what is best for the customer and recommending what gives the bank the highest benefits from the third party (SOU 2015:2; Finansinspektionen, 2016). Though, the opponents of the benefit ban argue that it will affect banks differently and that savings banks will be more severely hurt than the commercial banks (Swedish Competition Authority, 2015; Sparbankernas Riksförbund, 2015a, b). This fear could be based on what has happened in the United Kingdom and the Netherlands, where similar benefit bans have already been implemented. In both countries, it has been argued that the ban has hit small financial advisory firms harder than larger firms (Association of Professional Financial Advisers, 2014; Fundscape, 2014; Oxera, 2015). If the proposed benefit ban in Sweden will be shown to have a negative effect on savings banks, this could also be harmful for new firm formation in the regions where savings banks have dominant positions, especially since the results in this study indicate that local access to banks is most important there. Even though the benefit ban is not related to business loans specifically, it may affect the banks’ entire product range if they get severely hurt. Thus, the consequences of the proposed ban need to be monitored closely. If the fear that savings banks will be more severely hurt is shown to be correct, remedial measures may be needed to assure that small business lending and new firm formation in rural regions are not negatively affected by the benefit ban.

Similar to the relationship with the total new firm formation rate, mean establishment size is negative for all industries when the labour market approach is used and positive for all industries except the primary sector when the ecological approach is used. Thus, as it has been argued that the labour market approach gives the most reasonable results for this variable, it can be concluded that there are no significant inter-industry differences in the impact mean establishment size has on the new firm formation rate. Rather, a business climate with many small firms is better for new firm formation across all industries and it seems like the experience which can be gained by working in small firms is important in order to be able to start new firms no matter in which industry the firm is started. Consequently, the results for all industries support previous research on total new firm formation (Mason, 1991; Davidsson et al., 1994; Armington & Acs, 2002; Backman, 2015).

Interesting inter-industry differences are found for the level of human capital, which has a negative relationship with the new firm formation rate in the primary sector and
manufacturing, an insignificant relationship in trade, hotels and restaurants and a positive relationship in business services and public and personal services. These differences are logical in two ways. First, the data shows that the level of human capital is in general substantially higher in urban regions than in rural regions. Thus, it has a similar spatial pattern as new firms within business services (correlation of 0.721) and to some extent public and personal services (correlation of 0.356). In contrast, it has to a large extent an opposite spatial pattern as new firms in the primary sector (correlation of -0.490). It is therefore reasonable that the relationship is positive for the industries which are most common where human capital levels are highest and negative for the industries which are most common elsewhere.

Second, this paper argues that the relationship between human capital level and new firm formation rate is causal. Previous studies have shown that the level of human capital is more important for new firm formation in service industries than in manufacturing and especially for those kinds of services which require well-educated founders (Acs & Armington, 2004; Bishop & Brand, 2014). Therefore, it is reasonable that many service firms are started where many inhabitants have the skills which are needed to run such firms, i.e. skills which are acquired by studying at universities. These firms do not only need skilled founders, but also workers with the right skills (Parker, 2004). It is then even more important that there is a large pool of well-educated inhabitants in order to be able to start knowledge-intensive service firms. Lack of skilled workers may therefore be a reason why skilled individuals who live in regions with low levels of human capital do not choose to start service firms there. Consequently, in regions where few inhabitants have university degrees, people choose to start other types of firms which do not need the same skills, but rather skills which are obtained in other ways than by studying at universities, for instance from certain high school courses. Finally, the regression for business services has a comparably high coefficient of determination. It is suggested that the reason for this is that much of the variation in the new firm formation rate in this industry is captured by human capital level.

Just as for the total new firm formation rate, income growth and unemployment rate give different indications of the presence of necessity-based entrepreneurship. Income growth is only significant, and negative, for trade, hotels and restaurants and business services. As discussed above, the highest rates of new firm formation within trade, hotels and restaurants are often found in municipalities which rely heavily on tourism. These new firms may therefore not be very dependent on the local market conditions. Though, it was not predicted that income growth would have a negative relationship with new firm formation within business services, since business service firms are most prevalent in rich municipalities with high levels of human capital. Therefore, it has to be noted that income growth may not be a perfect indicator of how well the local market is doing, since it only measures the change during the last two years and not the income level.

It is argued that the unemployment rate is a better indicator of how wealthy the inhabitants are, as it has strong negative correlation with median income (-0.639). The results for unemployment rate are more in line with the predictions than the results for income growth are. Unemployment rate is positive for new firm formation in the primary sector, negative for business services and insignificant for the other industries. This may indicate that those who are unemployed are more likely to be able to start primary sector firms than business service firms. However, the negative relationship between unemployment rate and the new firm formation rate in business services is most likely due to correlation based on other aspects rather than causality. New business service firms are most prevalent in and around the large cities. These are the regions where the rate of unemployment generally is lowest (see Appendix C).
CONCLUSIONS

Previous studies show that formation of new firms is important, since they create jobs and economic growth. As entrepreneurs often lack the financial resources which are needed to start a firm, banks, most often those which are spatially close to the borrower, play an important role in financing new firms. It has also been found that the extent to which new firms rely on banks for their financing needs differs across industries. In light of this theoretical background, this study uses a cross-sectional sample containing data from all municipalities in Sweden to investigate if local access to banks, measured by average bank branch size, number of bank branches per capita and concentration level, has a significant relationship with the municipality’s rate of new firm formation and whether this relationship is stronger for some industries than for others.

This paper does not find that average bank branch size or concentration level in a municipality’s bank market have any significant impact on its new firm formation rate. However, it provides support for that the number of bank branches per capita has a positive relationship with the new firm formation rate. Therefore, it is concluded that how many potential sources of funds entrepreneurs have access to in the local area matters for how many new firms that are started. Thus, local access to banks is related with the total rate of new firm formation. Given the economic importance of new firms, policies may be needed to dampen the trend of a decreasing number of bank branches which is particularly present in regions where other sources of financing are limited, in order to stimulate entrepreneurship and growth in those regions.

Some inter-industry differences in the relationship between local access to banks and the rate of new firm formation are found in this study. Average bank branch size is insignificant for the new firm formation rate across all industries. In contrast, the relationship with number of bank branches per capita is positive in the primary sector, but negative within manufacturing. It is insignificant in trade, hotels and restaurants, business services and public and personal services. Concentration level is positive for the primary sector, negative for manufacturing and trade, hotels and restaurants and insignificant for the two service industries. Consequently, the evidence supports H1 in the sense that the relationship between local access to banks and the rate of new firm formation differs across industries; however, no evidence is found to support the hypothesis that local access to banks is more important for new firm formation in capital-intensive industries. Since most new primary sector firms are started in sparsely populated rural municipalities which are large in terms of area and the relationship between local access to banks and the rate of new firm formation is strongest in that industry, it appears likely that local banks are most important in rural regions. The same urban-rural differences have previously been found in Sweden. This is reasonable, as there are few other sources of funds in those regions and there are long distances to bank branches in neighbouring municipalities. On the other hand, none of the bank variables are found to be significant for the rate of new firm formation in the service industries. This also seems reasonable, since previous research has shown that service firms are less dependent on banks. Also, service firms are to a larger extent than firms in other industries started in geographically small municipalities in and around cities. Because of the spatial proximity to other municipalities, these new firms should be better able to obtain financing from bank branches in neighbouring municipalities and thus be less dependent solely on local banks.

The finding that local access to banks seems to be most important for new firm formation in the primary sector has important policy implications, as firms in this sector often are started in regions where the number of bank branches is decreasing most rapidly. Therefore, policies which are directed specifically towards rural regions may be needed if firms there
should be able to obtain financing to start and maintain the regions’ well-being. Even though the study is carried out in Sweden, the results are likely to be valid also in other bank-based countries, such as Norway, Germany and Italy.

In order to be able to test for inter-industry differences, this paper, just as several previous studies, measures the new firm formation rate with new establishments. However, there are indications of that different results would have been found if data on new firms per industry would instead have been available. Since the relationship between the number of new establishments and the number of new firms differs substantially across municipalities, future studies could use industry-specific data on new firms in each local area in order to investigate how access to local banks is related with new firms rather than new establishments. Despite controlling for human capital level, the model used in this study seems to suffer from urban-rural differences which are not controlled for. The reason why other variables covering urban-rural settings are omitted is to avoid the issue of multicollinearity; all potential variables which have been tried have strong correlation with the human capital level. Thus, finding a model which better controls for urban-rural differences would most likely result in more robust results. Finally, the limitations of the new firm formation rate as a measure of how entrepreneurially flourishing regions are have to be noted. The results show that the rates of new firm formation are consistently high in the north-west part of Sweden, which experiences negative population growth and is less wealthy than other parts of the country. Therefore, it cannot be concluded that a region with a high new firm formation rate automatically is rich and flourishing.
7 REFERENCES


Lapteacru, I. (2014). Do more competitive banks have less market power? The evidence from Central and Eastern Europe. *Journal of International Money and Finance, 46*, 41-60. http://dx.doi.org/10.1016/j.jimonfin.2014.03.005


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8 Appendix

A New firm formation rate with establishments and firms

Figure 11. Total new firm formation rate per municipality with the labour market approach using new establishments to the left and new firms to the right.
B  New establishments per new firms

Figure 12. Number of new establishment divided by number of new firms per municipality
C Spatial patterns of the control variables

Figure 13. Mean establishment size per municipality

Figure 14. Human capital level per municipality

Figure 15. Income growth per municipality

Figure 16. Unemployment rate per municipality
## Results without mean establishment size

Table 10. Total new firm formation rate and its relationship with the independent variables using three different approaches

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Total E LMA</th>
<th>NFF Total F LMA</th>
<th>NFF Total E EA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average bank branch size</strong></td>
<td>-0.006 (0.009)</td>
<td>0.005 (0.005)</td>
<td>-0.025 (0.050)</td>
</tr>
<tr>
<td><strong>Number of bank branches per capita</strong></td>
<td>16.980*** (1.535)</td>
<td>1.819** (0.919)</td>
<td>18.357** (8.301)</td>
</tr>
<tr>
<td><strong>Concentration level</strong></td>
<td>2.274E-4** (0.000)</td>
<td>8.335E-5 (0.000)</td>
<td>4.148E-4 (0.000)</td>
</tr>
<tr>
<td><strong>Human capital level</strong></td>
<td>0.176*** (0.050)</td>
<td>0.172*** (0.030)</td>
<td>1.793*** (0.269)</td>
</tr>
<tr>
<td><strong>Income growth</strong></td>
<td>-0.216 (0.359)</td>
<td>-0.666*** (0.215)</td>
<td>-6.428*** (1.941)</td>
</tr>
<tr>
<td><strong>Unemployment rate</strong></td>
<td>-0.142 (0.090)</td>
<td>-0.389*** (0.054)</td>
<td>0.418 (0.486)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>8.030*** (1.844)</td>
<td>11.012*** (1.104)</td>
<td>131.549*** (9.970)</td>
</tr>
<tr>
<td><strong>R^2</strong></td>
<td>0.318</td>
<td>0.394</td>
<td>0.172</td>
</tr>
<tr>
<td><strong>Durbin-Watson d statistic</strong></td>
<td>1.519'</td>
<td>1.458'</td>
<td>1.641'</td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

**Note:** *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parentheses. ' and '' indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. ''' indicates an indecisive result.

The following abbreviations are used: E - establishments, F - firms, LMA - labour market approach, EA - ecological approach.
Table 11. New firm formation rate in each industry category and its relationship with the independent variables using the labour market approach

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Primary sector</th>
<th>NFF Manufacturing</th>
<th>NFF Trade, hotels and restaurants</th>
<th>NFF Business services</th>
<th>NFF Public and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>-0.006 (0.004) [-3.107 - 0.200]</td>
<td>0.002 (0.003) [-0.004 - 0.007]</td>
<td>2.663E-4 (0.003) [-0.005 - 0.005]</td>
<td>3.433E-4 (0.003) [-0.005 - 0.005]</td>
<td>0.001 (0.002) [-0.003 - 0.005]</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>9.309*** (0.699) [7.933 - 10.686]</td>
<td>1.186** (0.464) [0.272 - 2.101]</td>
<td>1.320*** (0.420) [0.493 - 2.147]</td>
<td>1.660*** (0.444) [0.787 - 2.533]</td>
<td>0.914*** (0.313) [0.297 - 1.530]</td>
</tr>
<tr>
<td>Concentration level</td>
<td>2.074E-4*** (0.000) [1.265E-4 - 2.883E-4]</td>
<td>-2.932E-5 (0.000) [-8.307E-5 - 2.443E-5]</td>
<td>-5.416E-5 (0.000) [-1.028E-4 - 5.541E-6]</td>
<td>1.871E-5 (0.000) [-3.263E-5 - 7.005E-5]</td>
<td>3.452E-5* (0.000) [0.005 - 7.078E-5]</td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.042* (0.023) [-0.036 - 0.015]</td>
<td>-0.036** (0.015) [-0.014 - 0.014]</td>
<td>0.190*** (0.014) [0.014 - 0.014]</td>
<td>0.055*** (0.010) [0.010 - 0.010]</td>
<td></td>
</tr>
<tr>
<td>Income growth</td>
<td>0.171 (0.614) [0.109 - 0.109]</td>
<td>-0.035 (0.014) [-0.098 - 0.098]</td>
<td>-0.270*** (0.014) [-0.098 - 0.098]</td>
<td>-0.176* (0.014) [-0.098 - 0.098]</td>
<td>-0.039 (0.014) [-0.098 - 0.098]</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.120*** (0.041) [0.027 - 0.027]</td>
<td>-0.102*** (0.025) [-0.098 - 0.098]</td>
<td>-0.039 (0.026) [-0.098 - 0.098]</td>
<td>-0.093*** (0.026) [-0.098 - 0.098]</td>
<td>-0.029 (0.018) [-0.098 - 0.098]</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.454* (0.840) [0.558 - 0.558]</td>
<td>4.116*** (0.558) [0.504 - 0.504]</td>
<td>3.089*** (0.533) [0.533 - 0.533]</td>
<td>0.660 (0.376) [0.376 - 0.376]</td>
<td>1.242*** (0.376) [0.376 - 0.376]</td>
</tr>
<tr>
<td>R²</td>
<td>0.543 0.543 0.543 0.543 0.543</td>
<td>1.706** 1.706** 1.817** 1.817** 1.625**</td>
<td>1.625** 1.625** 1.625** 1.625** 1.625**</td>
<td>1.631** 1.631** 1.631** 1.631** 1.631**</td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>290 290 290 290 290</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parentheses. 95 per cent confidence intervals in brackets.

' and '' indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level.

''' indicates an indecisive result.
Table 12. New firm formation rate in each industry category and its relationship with the independent variables using the ecological approach

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Primary sector</th>
<th>NFF Manufacturing</th>
<th>NFF Trade, hotels and restaurants</th>
<th>NFF Business services</th>
<th>NFF Public and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>-0.060* (0.035) [-0.128 - 0.009]</td>
<td>-3.435E-4 (0.022) [-0.043 - 0.042]</td>
<td>0.019 (0.025) [-0.030 - 0.069]</td>
<td>0.019 (0.017) [-0.015 - 0.053]</td>
<td></td>
</tr>
<tr>
<td>Concentration level</td>
<td>0.002*** (0.000) [-0.001 - 0.002]</td>
<td>-0.001*** (0.000) [-0.001 - 0.001]</td>
<td>-0.001*** (0.000) [-0.001 - -2.625E-4]</td>
<td>-5.347E-5 (0.000) [-1.667E-4 - 4.324E-4]</td>
<td></td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.562*** (0.188) [-0.402 - 1.359]</td>
<td>-0.402*** (0.118) [-0.001 - 1.018]</td>
<td>-0.203 (0.118) [-3.348 - 0.850]</td>
<td>2.009*** (0.136) [-2.857 - 0.982]</td>
<td></td>
</tr>
<tr>
<td>Income growth</td>
<td>1.240 (1.359)</td>
<td>-1.407 (1.018)</td>
<td>-3.348*** (0.850)</td>
<td>-2.857*** (0.982)</td>
<td>-1.143* (0.681)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1.379*** (0.340) [-0.726 - 1.025]</td>
<td>0.174 (0.213)</td>
<td>-0.657*** (0.246)</td>
<td>0.048 (0.170)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.258 (6.981)</td>
<td>54.733*** (5.229)</td>
<td>37.164*** (4.366)</td>
<td>15.593*** (5.042)</td>
<td>18.419*** (3.497)</td>
</tr>
<tr>
<td>R²</td>
<td>0.523</td>
<td>0.105</td>
<td>0.172</td>
<td>0.654</td>
<td>0.311</td>
</tr>
<tr>
<td>Durbin-Watson d statistic</td>
<td>1.555'</td>
<td>1.729*</td>
<td>1.918</td>
<td>1.399*</td>
<td>1.798**</td>
</tr>
<tr>
<td>Number of observations</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parantheses. 95 per cent confidence intervals in brackets. ' and '' indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. '''' indicates an indecisive result.
### Table 13. New firm formation rate in each industry within manufacturing and its relationship with the independent variables using the labour market approach

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Manufacturing and quarrying</th>
<th>NFF Energy supply and remediation activities</th>
<th>NFF Construction</th>
<th>NFF Transportation and storage</th>
<th>NFF Real estate activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>- 0.001 (0.001)</td>
<td>- 1.64E-4 (0.000)</td>
<td>0.002 (0.002)</td>
<td>0.001 (0.001)</td>
<td>5.517E-5 (0.001)</td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>- 0.044 (0.203)</td>
<td>0.085 (0.053)</td>
<td>- 1.018*** (0.352)</td>
<td>0.228 (0.154)</td>
<td>- 0.331* (0.186)</td>
</tr>
<tr>
<td>Concentration level</td>
<td>- 5.867E-6 (0.000)</td>
<td>5.312E-7 (0.000)</td>
<td>- 3.702E-5** (0.000)</td>
<td>- 8.333E-9 (0.000)</td>
<td>- 6.363E-6 (0.000)</td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>- 0.068*** (0.010)</td>
<td>0.001 (0.003)</td>
<td>- 0.088*** (0.017)</td>
<td>- 0.017** (0.008)</td>
<td>- 0.027*** (0.009)</td>
</tr>
<tr>
<td>Human capital level</td>
<td>- 0.012** (0.005)</td>
<td>0.002 (0.001)</td>
<td>- 0.038*** (0.009)</td>
<td>- 3.552E-5 (0.004)</td>
<td>0.018*** (0.005)</td>
</tr>
<tr>
<td>Income growth</td>
<td>- 0.123*** (0.039)</td>
<td>0.010 (0.010)</td>
<td>- 0.077 (0.068)</td>
<td>0.028 (0.030)</td>
<td>0.075** (0.036)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>- 0.015 (0.010)</td>
<td>0.001 (0.003)</td>
<td>- 0.078*** (0.017)</td>
<td>0.006 (0.008)</td>
<td>0.019** (0.009)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.068*** (0.244)</td>
<td>- 0.007 (0.064)</td>
<td>4.054*** (0.423)</td>
<td>0.317* (0.185)</td>
<td>0.410* (0.224)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.279</td>
<td>0.035</td>
<td>0.182</td>
<td>0.060</td>
<td>0.137</td>
</tr>
<tr>
<td>Durbin-Watson ( d ) statistic</td>
<td>2.001</td>
<td>2.110</td>
<td>1.689'</td>
<td>1.586'</td>
<td>1.975</td>
</tr>
<tr>
<td>Number of observations</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

**Note:** *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parantheses. ' and '' indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level. ''' indicates an indecisive result.
Table 14. New firm formation rate in each industry within manufacturing and its relationship with the independent variables using the ecological approach

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Manufacturing and quarrying</th>
<th>NFF Energy supply and remediation activities</th>
<th>NFF Construction</th>
<th>NFF Transportation and storage</th>
<th>NFF Real estate activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bank branch size</td>
<td>-0.10</td>
<td>-0.02</td>
<td>0.023</td>
<td>0.013*</td>
<td>4.827E-4</td>
</tr>
<tr>
<td>(0.010)</td>
<td>(0.003)</td>
<td>(0.019)</td>
<td>(0.008)</td>
<td>(0.010)</td>
<td></td>
</tr>
<tr>
<td>Number of bank branches per capita</td>
<td>-0.495</td>
<td>0.653</td>
<td>-10.743***</td>
<td>1.442</td>
<td>-3.763*</td>
</tr>
<tr>
<td>(1.999)</td>
<td>(0.561)</td>
<td>(3.779)</td>
<td>(1.520)</td>
<td>(2.031)</td>
<td></td>
</tr>
<tr>
<td>Concentration level</td>
<td>-2.252E-5</td>
<td>1.495E-6</td>
<td>-4.836E-4***</td>
<td>-5.655E-5</td>
<td>-8.735E-5</td>
</tr>
<tr>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>Mean establishment size</td>
<td>-0.137</td>
<td>0.057**</td>
<td>0.425**</td>
<td>0.147*</td>
<td>0.267***</td>
</tr>
<tr>
<td>(0.099)</td>
<td>(0.028)</td>
<td>(0.188)</td>
<td>(0.076)</td>
<td>(0.101)</td>
<td></td>
</tr>
<tr>
<td>Human capital level</td>
<td>-0.128**</td>
<td>-0.021</td>
<td>-0.436***</td>
<td>-0.024</td>
<td>0.202***</td>
</tr>
<tr>
<td>(0.054)</td>
<td>(0.015)</td>
<td>(0.101)</td>
<td>(0.041)</td>
<td>(0.055)</td>
<td></td>
</tr>
<tr>
<td>Income growth</td>
<td>-1.225***</td>
<td>0.170</td>
<td>-1.088</td>
<td>0.154</td>
<td>0.717*</td>
</tr>
<tr>
<td>(0.389)</td>
<td>(0.109)</td>
<td>(0.734)</td>
<td>(0.295)</td>
<td>(0.395)</td>
<td></td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-0.178*</td>
<td>0.025</td>
<td>-0.936***</td>
<td>-0.029</td>
<td>0.227**</td>
</tr>
<tr>
<td>(0.099)</td>
<td>(0.028)</td>
<td>(0.187)</td>
<td>(0.075)</td>
<td>(0.100)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>15.019***</td>
<td>-0.682</td>
<td>30.491***</td>
<td>1.696</td>
<td>-1.658</td>
</tr>
<tr>
<td>(2.407)</td>
<td>(0.675)</td>
<td>(4.549)</td>
<td>(1.829)</td>
<td>(2.445)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.106</td>
<td>0.042</td>
<td>0.151</td>
<td>0.027</td>
<td>0.227</td>
</tr>
<tr>
<td>Durbin-Watson d statistic</td>
<td>2.043</td>
<td>1.982</td>
<td>1.763**</td>
<td>1.552*</td>
<td>2.014</td>
</tr>
<tr>
<td>Number of observations</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parentheses.

' and " indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level.

"*" indicates an indecisive result.
Table 15. New firm formation rate in manufacturing including all five industries except construction and its relationship with the independent variables using two different approaches

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>NFF Manufacturing except Construction</th>
<th>NFF Manufacturing except Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LMA</td>
<td>EA</td>
</tr>
<tr>
<td><strong>Average bank branch size</strong></td>
<td>-4.955E-4 (0.002)</td>
<td>0.005 (0.017)</td>
</tr>
<tr>
<td><strong>Number of bank branches per capita</strong></td>
<td>0.234 (0.350)</td>
<td>0.943 (3.395)</td>
</tr>
<tr>
<td><strong>Concentration level</strong></td>
<td>-2.258E-6 (0.000)</td>
<td>4.182E-5 (0.000)</td>
</tr>
<tr>
<td><strong>Mean establishment size</strong></td>
<td>0.023 (0.017)</td>
<td>-0.020 (0.169)</td>
</tr>
<tr>
<td><strong>Human capital level</strong></td>
<td>-0.004 (0.009)</td>
<td>0.049 (0.091)</td>
</tr>
<tr>
<td><strong>Income growth</strong></td>
<td>0.061 (0.068)</td>
<td>0.471 (0.660)</td>
</tr>
<tr>
<td><strong>Unemployment rate</strong></td>
<td>0.032* (0.017)</td>
<td>0.283* (0.168)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>0.920** (0.422)</td>
<td>12.620*** (4.086)</td>
</tr>
<tr>
<td><strong>R(^2)</strong></td>
<td>0.029</td>
<td>0.011</td>
</tr>
<tr>
<td><strong>Durbin-Watson d statistic</strong></td>
<td>1.698***</td>
<td>1.909</td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>290</td>
<td>290</td>
</tr>
</tbody>
</table>

**Note:** *, ** and *** indicate significance at the 10, 5 and 1 per cent levels, respectively. Standard errors in parantheses.

' and " indicate significant positive and negative autocorrelation, respectively, at the 5 per cent level.

" indicates an indecisive result.

The following abbreviations are used: LMA - labour market approach, EA - ecological approach.
Heteroscedasticity tests

Figure 17 shows the standardised residuals against the standardised predicted values for the regressions which have been estimated in order to indicate whether they suffer from heteroscedasticity, i.e. unequal variance. All scatter plots show that the residuals are random and are not dependent on the predicted value. Therefore, it can be concluded that the regressions do not exhibit heteroscedasticity and, hence, the estimators can be considered efficient.

Figure 17. Scatter plots indicating potential presence of heteroscedasticity