BI Norwegian Business School - campus Oslo

GRA 19703

Master Thesis

Thesis Master of Science

What happens to firm performance and financing when bank branches close?

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Start:	15.01.2019 09.00
Finish:	01.07.2019 12.00

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Date of Submission

28.06.2019

Program

Master of Science in Business, Major in Finance 2017 – 2019

BI Norwegian Business School

Acknowledgements

First, we would like to thank our supervisor Leon Bogdan Stacescu for all his knowledge, ideas for improvements and excellent guidance throughout this process. Also, we would like to share our gratitude to FinansNorge, for quick response and good service when we purchased the Bank Location Register data. Thirdly, we would like to thank the Center for Corporate Governance Research for providing us with crucial data, we would not have managed to conduct this study without it. Finally, we are grateful for all the support from friends and family through this master program.

Abstract

The thesis study how bank branch closures affect firm performance and financing, with a special focus on rural areas in Norway and the savings bank branches role in these areas. To analyze the topic, we use a Difference-in-Difference regression model on a sample consisting of Norwegian independent firms operating between 2001 and 2015. We find that firm financing and performance is in some cases affected negatively by bank branch closures, whereas the results are even more apparent in rural areas. Savings bank branches seem to be more critical to startups in terms of providing capital.

Table of Contents

1. Introduction

In light of the digital revolution, the banking industry has been through significant changes in the past years. The transformation of the banking industry has grown exponentially to serve customers' accelerating technological demands that facilitate more accessible use of everyday banking services. A common conception within finance is that bank survival has become dependent on the banks' digital transition, and furthermore, the expanding costs of technology have triggered bank mergers to achieve economies of scale. In terms of bank branches, there has been an extensive discussion of whether they have become purely outdated and inefficient. These perceptions, combined with bank mergers, have caused bank branches to close worldwide.

The change in the bank branch landscape causes the distance between the bank and borrower to increase, which prompts us to question if firms' financing and performance are affected by bank branch closures, as bank debt has been a vital source of financing firm growth through ages. Hence, we introduce the research question of our thesis:

"*What happens to firm performance and financing when bank branches close?*"

The frequent closures of bank branches have triggered researchers to study the potential outcomes of the bank consolidation. Degryse & Ongena (2008) discovered that an increased distance between the bank and the borrower induces a higher lending rate and limit the credit available to firms. Additionally, Petersen & Rajan (1994) finds evidence that bank-borrower relationships might expand the bank credit available to firms. Bank branch closures threaten bank-borrower relationships, which might compromise bank credit available. In turn, this might negatively affect firms' performance, as they might not be able to pursue positive net present value (NPV) projects to achieve firm growth.

Relationships between the banks and borrowers are in some cases a decisive factor when it comes to lending terms, as some firms are dependent on the assessment of soft information, i.e., information collected through personal relations (Stein, 2002). Researchers find evidence that smaller banks are better at

processing soft information (Berger et al., 2005). In general, Norwegian savings banks are considered small banks and amount to 68% of total bank branches. Hence, the closures of savings banks might constitute a loss in the processing of soft information in lending processes. In turn, this might influence the bank credit available to firms that are dependent on the consideration of soft information. We want to examine whether there are any differences between savings and total bank branch closures.

An interesting aspect of Norway is that 20% of the population is resident in rural areas, which is quite high in an international context. Bernhardt & Schwartz (2014) performed a study on German bank branch closures and found that the most frequent closures occur in rural areas. Relationship lending practices are common in rural areas, and soft information is considered crucial to lending terms. An interesting aspect is the distribution of bank branch closures across Norway, and whether firms in rural areas are hit harder by bank branch closures.

Based on existing theory and literature, we expect that bank branch closures affect firm performance and financing. Our main expectation is that bank credit available to firms will decrease when bank branches close, as bank-borrower distance increases and firms' relations with their banks are in jeopardy. Consequently, we also expect firms' average interest rate to increase. Further, we are interested in studying whether lower firm financing will lead to lower firm performance, as most firms are dependent on bank credit to pursue new positive NPV projects. Different objectives and lending practices between savings banks and commercial banks make us want to explore if savings bank branches are more crucial concerning lending terms. Regarding rural areas, we question if these areas are hit harder by bank branch closures. To our knowledge, there have not been any similar studies on rural areas performed on Norwegian data, which is the main contribution of this thesis.

From the descriptive analysis, we find that there indeed exist regional differences concerning bank branch closures. The most frequent bank branch closures occur in the most urban municipalities and most rural ones. Savings banks tend to pull away from urban areas, while commercial banks tend to close in rural areas.

To analyze the impact of bank branch closures, we use a Difference-in-Difference regression model. Our key findings from the main regression analysis regarding firm financing are that we see a tendency that both firms' debt ratio and financial debt ratio is decreasing in rural municipalities where bank branches close. The results hold for closures of any bank, i.e., we do not find any evidence that savings banks are more crucial than other banks in terms of credit available to firms in rural areas. The results are essential, as we observe that the bank credit available to firms has decreased, which might influence firms' ability to pursue positive NPV projects. Our results support existing literature, that relationship lending and evaluation of soft information tend to be more crucial in rural areas. Considering the average interest rate, we find no evidence that the interest rate increases when bank branches close, rather that it decreases. The two financing results combined might indicate that banks provide better lending terms to their best borrowers. Furthermore, we find evidence that in municipalities where total bank branches close by 100%, bank credit decreases and growth of sales decreases. Hence, we find evidence that bank branch closures affect firms' growth in sales negatively. Moreover, we find no evidence that firms' ROA is affected by bank branch closures. ROA has been increasing in the same municipalities that we observe a decrease in bank credit. This might indicate that the firms are more financially constrained and forced to pursue only the most profitable investments.

Further, we use a difference-in-difference model to explore the firm survival- and newly established firms rate of firms operating in municipalities with bank branch closures. We find no statistically significant evidence that bank branch closures impact firm survival, yet regarding newly established firms, we find that the share of new firms has decreased in rural areas with savings bank branch closures. This is consistent with theory within soft information, that savings banks might provide additional credit to firms dependent on the evaluation of soft information.

To improve robustness and validity, we conduct a cross-sectional regression where we analyze how firm performance affects bank branch closures. We find that ROA seems to be a decisive factor for total bank branch closures on a general basis. In rural areas, we find that ROA impacts both total and savings bank branch closures. However, we find several statistically significant variables, which imply that firms' ROA is not a decisive factor in rural areas.

In conclusion, we can observe from our various analyses that the results have different implications for our research question. However, we do find evidence that bank branch closures have an impact on bank credit available to firms and firm performance. Considering financing, we find evidence in line with our expectations in which debt ratio and financial debt ratio is decreasing in municipalities with bank branch closures. Studying rural areas, the evidence is even more apparent. In terms of firm performance, we find evidence that bank branch closures impact the growth of sales negatively. However, we do not observe the same for firms' ROA. Furthermore, we find no indication that municipalities with savings bank branch closures perform any worse than total bank branch closures. However, it seems that savings bank branch closures impact the share of newly established firms in rural areas. The negative impact on startups might indicate that savings banks in rural areas provide more capital to startups. Concluding, firm financing and performance is in some cases affected negatively by bank branch closures, whereas the tendencies are even more apparent in rural areas, and savings bank branches seem to be more critical to startups in terms of providing capital.

2. A Brief Overview of the Norwegian Financial System

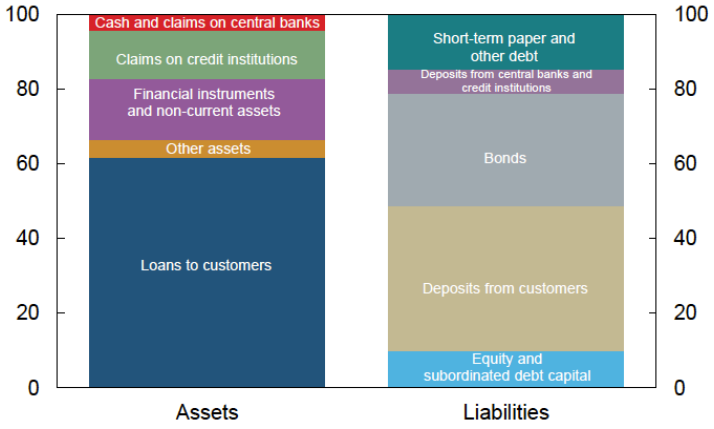
2.1 Structure and Characteristics

The financial system plays an essential role in the economy and has three main tasks (Norges Bank, 2018, p.9). The first task is to give people and businesses the ability to borrow and save money. The second task is to conduct payments, which is a central part of a country’s infrastructure and important for the stability of the domestic currency, the financial system and the economy in general. The last main task is to handle risks for both people and businesses. In an expanded version of the definition of the financial system, several aspects are useful to consider. For instance, institutions and mechanisms that provide security for entered contracts and that ensure credible information for effective credit communication and risk management. This applies to supervision, regulation, register of ownership rights, accounting, auditing, credit ratings and other financial analyses (Norges Bank, 2018, p.9).

Further, the financial system consists of many different markets, institutions and infrastructures. Thus, Norges Bank (2018) divides the financial system into three groups. Financial markets are the first group which issues and trades financial instruments. The second group is financial institutions that act as intermediaries between various actors in the economy and have crucial roles related to the main tasks of the financial system. Examples of financial institutions are banks, mortgage corporations, insurance and pension funds, and mutual funds. Financial infrastructures are the last group which ensures that trading of financial instruments is recorded and settled (Norges Bank, 2018, p.9).

Moreover, the role of a bank as a financial institution is to offer various products and services to the actors in the economy. In particular, the main tasks for a bank is to give the actors in the economy the possibility to borrow and save, assess risk and conduct payments. Thus, the functions of a bank are closely connected to the main functions of the whole financial system. However, banks differ from other financial institutions as they have exclusive rights to create and receive deposits from the public (Norges Bank, 2018, p.45). Jeanne Gobat, a Senior Economist in the International Monetary Fund (IMF), defines banks' role as: "Institutions that match up savers and borrowers help ensure that economies function smoothly" (Gobat, 2012).

The structure of a bank's resources, on a specific point in time, is shown through its balance sheet, which consists of assets and liabilities including equity. Lending constitutes a major part of the assets of a bank (Norges Bank, 2018). Credit to customers represents 60% of Norwegian banks' assets, as illustrated in figure 2.1.1. Per March 2019, lending to households amounted for 1,545.425 billion NOK and lending to businesses represented 1,416.076 billion NOK (SSB, 2019f). Norwegian banks finance their business mainly through deposits and bonds. As shown in figure 2.2.1, deposits from households and bonds account for around 70% of the liabilities in Norwegian banks (Norges Bank, 2018). Norwegian banks held deposits of 1,272.116 billion NOK from households per March 2019 (SSB, 2018f). Besides financing through deposits and debt, banks are financed with equity and subordinated debt, which constitutes approximately 10% of banks total financing (Norges Bank, 2018).



1) Total of all banks and covered bond mortgage companies excluding subsidiaries and branches of foreign banks in Norway.

Figure 2.1.1: *Distribution of assets and funding in the balance sheet of Norwegian banks per 31st of December 2017 (Norges Bank, 2018, p.53).*

The Norwegian banking sector entailed 124 banks in 2018, whereas the banks' total assets amounted for approximately two times Gross Domestic Product (GDP) (Norges Bank, 2018, p.44 & 51). Norges Bank (2018) states that the Norwegian banking sector is relatively small related to total value creation, compared to other European countries. One reason for this is that many European banks operate internationally, while Norwegian banks tend to mainly work with domestic customers (Norges Bank, 2018, p.51). However, the number of banks in the Norwegian banking sector is relatively large and is dominated by Norwegian-owned banks, such as DNB Bank ASA and SpareBank 1 group, as shown in appendix 1.

Further, Norwegian banks classifies as either commercial banks (forretningsbanker) or savings banks (sparebanker) (Sparebankforeningen, 2018b). The main difference between the two is related to the ownership structure and not the products they offer to their customers (Norges Bank, 2018, p.46). Commercial banks are profit maximizing financial institutions with shareholders as sole owners, whereas savings banks are financial institutions owned by several stakeholders trying to achieve both economic and social objectives.

2.2 Savings Banks

At their creation, the savings banks in Norway were a philanthropic project for the citizens to spread the idea of saving among people (Ostergaard, Schindele & Vale, 2016). In January 2017, there were 99 savings banks in Norway

(Sparebankforeningen, 2018c). Norwegian savings banks are institutions with representatives consisting of different stakeholders that act mutually to achieve financial and social objectives. Thus, these institutions are governed by stakeholders such as depositors, employees, and representatives of the local government councils, from local communities in which they have branches (Ostergaard et al, 2016). Therefore, due to this ownership structure, no stakeholder has any cash flow rights. Consequently, savings banks are genuinely ownerless enterprises (Bøhren & Josefsen, 2007, p.2).

In addition to commercial banks and pure savings banks, there exist two other forms of savings banks differentiating in ownership structure. In 1987, a deregulation enabled savings banks to raise equity in the market through issuing Primary Capital Certificates (PCC), later called equity certificates (Sparebankforeningen, 2018b; Norges Bank, 2018, p.47). A PCC bank (grunnfondsbank) is partly a savings bank and partly a stock company. Thus, it is, to some extent, controlled by non-owner stakeholders without cash flow rights and equity certificate owners with full cash flow rights (Bøhren & Josefsen, 2007, p.2).

Primary capital certificates are savings banks' form of shares, but do not give full ownership rights to equity, which is the case with stocks. However, during 2009 PCCs changed its name to equity certificates (EC). The main difference between ECs and PCCs is that investors' ownership interests in savings banks can be held stable. This is possible as a larger share of profits can be distributed in the form of gifts. Thus, savings banks can avoid dilution effects.

According to Norges Bank (2018), 35 out of the 99 savings banks are PCC banks. After a change in the Norwegian savings bank law (Sparebankloven) in 2002, savings banks have the opportunity to convert to a limited liability company or public limited company (Regjeringen, 2009, p.248-249; Regjeringen, 2018). To be defined as a savings bank, all or parts of the bank’s equity must be transferred to a foundation that owns at least 10% of the shares. The largest Norwegian savings banks that have been converted to a limited liability company or public limited company are DNB and SpareBank 1 SR-bank (Sparebankforeningen, 2018e).

During the last two decades, most of the savings banks began to cooperate on a strategic and operating level to obtain benefits such as economies of scale and technology advantages. The cooperation resulted in two groups or alliances: SpareBank 1 Gruppen and Eika Gruppen (Sparebankforeningen, 2018c). SpareBank 1 alliance consists of around 14 larger savings banks, in contrast to the Eika alliance which incorporates 68 smaller savings banks. Approximately 17 of the savings banks are not part of any of the alliances (Norges Bank, 2018; Sparebankforeningen, 2018d). In figure 2.2.1, the lending market shares of the Norwegian banks are shown. Thus, the Eika alliance, the SpareBank 1 alliance and other savings banks have 43% of the market shares in the private market and 26% in the business market. Therefore, savings banks are important competitors in the financial services industry (Schmidt, 2009, p.367).

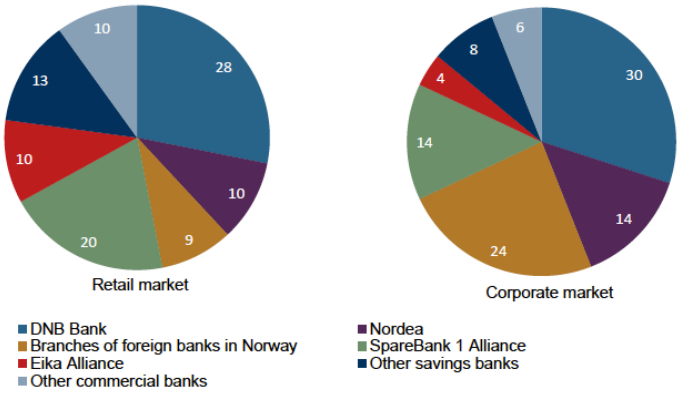


Figure 2.2.1: *Lending market shares in percentage as of 31st of December 2017 (Norges Bank, 2018, p.50).*

2.3 A Brief History of Savings Banks and the Bank Consolidation

The first Norwegian savings banks were established in 1822 in larger cities and later spread to smaller towns and the countryside, while the first commercial bank founded in 1848 (Bøhren & Josefsen, 2007; Ostergaard et al., 2018). The savings banks were organized without owners, had a strong focus on the local community, and parts of the surplus were distributed to charity. As stated by Thue (2014) in Ostergaard et al. (2018), from the 1950's the banks incorporated lending as a part of their main activities and have served as an essential source of finance for local firms and households ever since.

In the 1960s, 600 savings banks were operating in Norway. Economic and structural changes led to a consolidation of the industry. Therefore, the number of

savings banks was halved in the middle of the 1980's (Ostergaard et al., 2018). Figure 2.3.1 illustrates the change in the number of Norwegian savings banks from 1922 until 2018. In the middle of the 1980's, a comprehensive deregulation of branching and credit restriction was established. Consequently, Norwegian savings banks faced serious product competition from the branch networks of banks with goals of profit maximization, i.e., commercial banks. Hence, the savings banks were suddenly exposed to competition, which they had been protected against before the deregulation (Ostergaard et al, 2016).

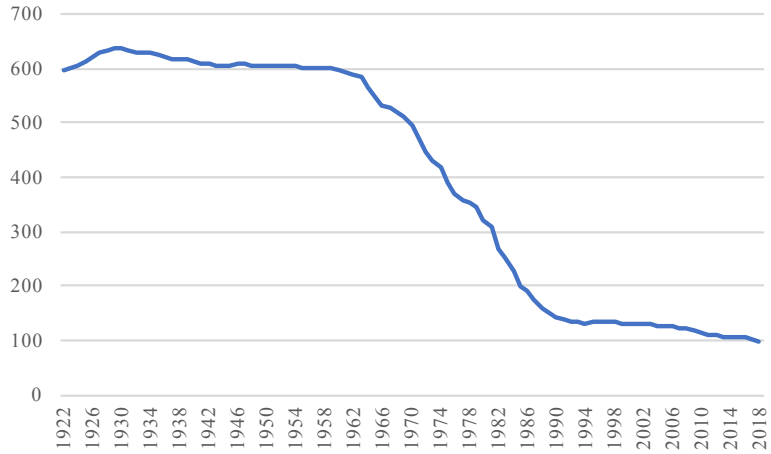


Figure 2.3.1*: Number of savings banks in Norway from 1922 to 2018 (Sparebankforeningen, 2018a).*

The deregulation enabled all banks to open local branches, which again enabled local depositors to move their savings to competing banks at low costs if they were dissatisfied with their local bank. Hence, the financial foundation of the banks which built upon the local community was no longer as stable as before and risked being undermined. Thus, the risk regarding loss of equity increased (Ostergaard et al., 2016). Moreover, the deregulation in 1987 introduced the market to PCC banks, enabling the first PCC bank was established in 1988 (Norges Bank, 2018; Bøhren & Josefsen, 2007).

From 1988 to 1992 Norwegian banks went through a systematic crisis. Consequently, 70% of the total assets of the savings banks were collected in the ten largest savings banks. Alliances in the savings bank sector were developing throughout the 1990s, with the SpareBank 1 alliance established in 1996 and the Eika alliance formed in 1997. The purpose of the alliances were collective product enterprises for non-bank business, like technology advantages and administration

activities, while the pure banking activities remained in the individual banks (Norges Bank, 2018, p.48).

Moreover, since the 1960's Norwegian savings banks have decreased from 600 to 99. The reduction is a result of mergers and acquisitions of savings banks to build more robust and impactful units in the districts, hence, to improve the local business environment. However, this tendency has been weaker than anticipated. Today, the largest district and region savings banks manage the majority of the savings banks' capital. As shown in appendix 2, the twenty largest savings banks represent more than 75% of the total assets in the savings bank sector (Sparebankforeningen, 2018c).

2.4 Reasons Behind the Bank Consolidation

The Norwegian Savings Banks have followed the European trend regarding the bank consolidation. Bøhren & Josefsen (2007) state that Germany and Spain are two European countries where savings banks have established positions. Thus, indicating that it is possible to use the Spanish and German bank landscape as a benchmark for Norway. The European Central bank earlier announced that the number of banks in the Eurozone is reduced. In 2014, 269 banks either closed or merged (Bernhardt & Schwartz, 2014) and 5,152 bank branches closed (ECB, 2018). In Germany, there has been a distinct decrease in bank branches, for instance, between 2003 and 2013 the number of bank branches was reduced by 12%. In the following years, there was 16.8% bank branches closed in Germany. In comparison, Spain had bank branch closures of 18.5% in the same period (ECB, 2018).

Bernhardt & Schwartz (2014) argues that the reasons underlying the banking consolidation and cutbacks of bank branches in Germany is cost-cutting and profitability considerations for the most part. Additionally, professionalization is increasing and there is more focus on the elimination of surplus capacities. A consequence of the significant number of mergers was that bank branches closed due to duplications within newly merged organizations.

Further, Bernhardt & Schwartz (2014) argues that a significant factor of the consolidation is "The Digital Revolution". Digitalization has increased

competition due to the development of online banks. Besides, the use of digital distribution channels to buy financing and investment products and services has accelerated among private banking customers (Bernhardt & Schwartz, 2014). As a result, local branches have closed due to overcapacity in resources, for instance labor.

Among researchers, there have been questions of whether bank branch closures have an impact on firm performance and financing on a local level. One of the downsides of the decrease in the number of bank branches is the increasing distance between borrowers and banks. The increase in the physical distance might affect the bank-borrower relationship, both on a psychological and psychical level. Our literature review elaborates both upsides and downsides of the bank branch consolidation. Further, in our analyses, we will try to find any evidence for poor firm performance and financing as a consequence of bank branch closures.

3. Literature review

3.1 Banks' Lending Practices

As a result of the bank consolidation, existing literature in this field consists of several theories regarding the impact on local businesses. One of the benefits compromised due to the consolidation is a typical bank-firm relationship, also known as relationship lending. Petersen & Rajan (1994) have addressed the benefits of lending-relationships in terms of lending cost and availability. The study finds that the supply of credit available to the firm is highly influenced by the length and extent of a firm's relationship with its bank. Further, the study finds that firms with more than one lender pay higher interest rates, indicating that a relationship with one lender lowers the firm's borrowing costs (Petersen & Rajan, 1994).

The ways of producing and processing information are critical to the activity of lending (Berger, Miller, Petersen, Rajan, & Stein, 2005). Banks and loan officers use different lending practices, i.e., various forms of producing and processing information, which is mainly due to different risk exposures regarding loan defaults. To assess risk, banks may use a quantitative method, such as financial

statement lending, asset-based lending and credit-scoring. Another way to assess risk is by applying a qualitative approach, which mainly focuses on relationships. The two lending practices are primarily based on how the information is gathered. The practices are referred to as transactional lending practices, which is based upon "hard" information, and relationship lending practices, which is based on "soft" information (Berger & Udell, 2006).

In the literature, the organizational structure is supported as the determinant of lending technology. Berger et al. (2005) question "how the nature of an organization affects both the way it does business and the kinds of activities that it can efficiently undertake." In particular, whether small organizations are better at undertaking specific tasks than large organizations. The primary assumption is that smaller banks tend to be better at producing and processing soft information (Berger et al., 2005; Stein, 2002).

Soft information is often easily distributed without dilution within organizations that have fewer layers of management. The reason is that it is more difficult to quantify and transmit the data through a large organization's communication channels (Trönnberg & Hemlin, 2012). Establishing the argument further, Berger et al. (2005) find evidence that small organizations have comparative advantages in activities associated with the use of soft information. Such action might be evaluating an investment project where the information is naturally "soft," for instance, lending to a new entrepreneur with no accounting records, solely based on the manager's local rumor of being dependable and successful. According to Stein (2002), larger, more complex and hierarchically organized banks tend to be less good at processing soft information. In contrast, larger institutions may have an advantage in managing hard information, such as economies of scale in terms of technology in lending processes. Large organizations perform relatively well when information can be easily "hardened" and passed along the hierarchy (Berger et al., 2005).

A different aspect related to the use of soft information is the role of the loan officers. Degryse & Ongena (2005) found that in local branches, a loan officer's decision tends to be influenced by soft information, such as the officers' assessment of the development of the relationship with the firms, and the skills

and reputation of the firm's management. Even though key statistics and other hard information assess firms, the officers still decide upon local discretion (Degryse & Ongena, 2005). The findings support the primary assumption that smaller banks tend to be better at processing soft information, and how a bank branch closure might negatively influence local economies.

Knowing the environment and acting upon soft information have turned out to be essential in rural communities. In the paper by DeYoung, Glennon, Nigro & Spong (2012) called "Small Business Lending and Social Capital: Are Rural Relationships Different?", the research finds evidence that small banks based in rural communities are especially good at monitoring and granting credit to small firms that lacks hard information. Loans made by small, rural banks tend to default much less often. According to DeYoung et al. (2012), the low default risk advantage is applicable for "rural banks located in rural market via the characteristics of rural businesses, rural economies and rural cultures", indicating the value of soft information and the benefits of knowing your customer. The advantage is positively related to the ruralness of the bank-firm relationship, i.e., when the size of the rural market declines, the benefit is intensified. However, when the bank and firm are located in different rural markets, the advantage weakens (DeYoung et al., 2012).

Furthermore, firms in financial distress are especially dependent on a bank-firm relationship. When firms are financially distressed, Höwer (2016) finds mixed signals regarding a bank's complexity and ability to process soft information. The study finds a positive correlation between a bank's complexity and the share of financially distressed firms with improved ratings. These findings contradict the primary assumption that smaller banks are better at processing soft information, in contrast to discussed existing literature. However, studying regionally active banks, Höwer finds evidence aligned with the primary assumption and concludes that regionally active banks can make more efficient liquidation if they have a close bank-firm relationship (Höwer, 2016).

Moreover, a recent study by Iwanicz-Drozdowska, Jackowicz & Kozłowski (2018) concludes that local banks extend a helping hand to troubled SMEs. Their research shows that where local banks hold a strong position, SMEs rarely suffer

losses, have lower default and financial distress risk, and recover more quickly from recessions (Iwanicz-Drozdowska et al., 2018). The findings of Höwer (2016) and Iwanicz-Drozdowska et al. (2018) provides evidence that local banks are imperative for the survival of financially distressed firms in local areas.

Further investigating the establishment of soft information in banks, Uchida, Udell & Yamori. (2011) challenge the primary assumption that small banks are better at processing soft information in the paper "Loan officers and relationship lending to SMEs." Based on the argument of Stein (2002), that institutional frictions might cause difficulties for loan officers to communicate soft information within an organization keeping the content pure, Uchida et al. (2011) imply that the crucial relationship for SMEs is the loan officer-firm relationship in contrast to the bank-firm relationship. Moreover, the study questions whether the loan officers in small banks are better at processing soft information than the loan officers in large banks. Evidence infer that the way of processing soft information may not be substantially different from small to large banks. However, large banks tend to use less soft information. Thus, if loan officers in large banks were more actively engaged with the clients, they would have been as efficient as small banks to produce and process soft information (Uchida et al., 2011).

Another prospect of lending costs (lending rates) and credit availability are discussed by Degryse & Ongena (2005) in their paper "Distance, Lending Relationships, and Competition." The study finds that the lending rate decrease with the distance between the borrower and the lender. Likewise, the lending rates increase with the distance between the borrower and competing lenders. Degryse & Ongena (2005) reason that the probable primary basis behind the spatial price discrimination is transportation costs, in contrast to other literature assuming that price discrimination is influenced by information asymmetry.

Furthermore, new technology has challenged the small banks' comparative advantage in producing and processing soft information. According to Jagtiani & Lemieux (2016), smaller banks have been facing a more competitive environment over the years, with accelerating competition from the commercial banks as lending technology is improving exceedingly. Following the development to improve cost efficiency, savings banks have developed software to provide small

businesses with loans instantly, e.g., Sparebanken Vest (Trumpy, 2018). However, this development creates a more significant distance between the lender and the borrower. The technological developments might compromise the savings banks' crucial comparative advantage, i.e., their ability to process soft information, such as local information the banks have about their clients and bank account relationships (Jagtiani & Lemieux, 2016).

Another prospect of lending processes is the banks' lending approach towards small- and medium-sized enterprises (SMEs). The majority of Norwegian firms are SMEs, whereas 99.5% of the firms have less than 100 employees, and 93% have less than ten employees (Nærings- og Handelsdepartementet, 2012). Danièle Nouy (2018), Chair of the Supervisory Board of the ECB, states that "SMEs are the heart and soul of the economy." Further, she argues that "If they do well, the economy does well. So, when it comes to SMEs, small is not only beautiful, it is also important" (Nouy, 2018).

A challenge related to the bank consolidation is whether SMEs will continue to receive funding. SMEs are limited in their choice of funding source, for instance, the capital markets are not an opportunity as high fixed costs and low volume retains them from issuing bonds and stocks (Nouy, 2018). Bernhardt & Schwartz (2014) states that one-third of the investment volume within SMEs comes from bank loans. Thus, bank loans are, by far the most crucial source of financing. On average, 36% of all small to medium-sized investors apply for financing loans from banks or savings banks each year in Germany (Bernhardt & Schwartz, 2014).

A critical assumption in the literature is that large banks, mainly made of major acquisitions and mergers, may not react to the credit needs of SMEs (Peek & Rosengren, 1998). Berger et al. (2005) show that large banks are more likely to underwrite credit to larger firms. Smaller firms are perceived as more opaque from a bank's perspective and thereby need more monitoring and processing of soft information compared to larger firms (Mccann & Mcindoe-Calder, 2015). Newly founded and smaller SMEs are dependent on a bank evaluating a firm's soft information to bridge the gap considering the hard information. Evidence in the paper "Loan officers and relationship lending to SMEs" by Uchida et al.

(2011), suggest that there is a possibility that larger banks use transactional lending in favor of relationship lending when distributing their resources to the SME market. Hence, older SMEs with complete financial statements are preferred to larger banks, while younger and smaller firms need to seek smaller banks that consider soft information.

Another perspective of SME lending is the impact of capital requirements and regulation in larger banks. After the financial crisis, the global regulatory framework Basel III was introduced. Basel III tightened the capital requirement regulation for larger banks, and the banks were required to hold far more capital than before and of better quality. However, the policy was aiming to maintain the credit available to SMEs. Danièle Nouy states that at some point, the capital requirements will affect banks' lending decisions and shows concern whether this has had an impact on business loans to SMEs, as SMEs are considered riskier assets (Nouy, 2018). One might expect from these findings that SMEs would be more negatively affected by bank branch closures in terms of unavailable financing compared to larger firms.

Similar to the high concentration of SMEs, families own the majority of Norwegian firms. Family-firms' controlling owner is often a group of people who has tight relationships sociologically, which in turn will profoundly influence the behavior of the firm as they have more shared values and interest than a typical shareholder incentive to maximize the firm profit (Berzins, Bøhren & Stacescu, 2018). Furthermore, family firms tend to prefer debt financing compared to equity financing, as they want to keep control of the firm. Agency theory has been one paradigm in studying issues in the governance of family firms. The theory explains that the problem of moral hazard and adverse selection tends to negatively influence the lender's decision from supplying credit to borrowers with high agency costs (Jensen & Meckling, 1976). Family firms are considered to have lower agency costs than non-family firms due to the firms' different incentives and behavior. Moreover, a study by Anderson, Mansi & Reeb (2003), concludes that family firms benefit from a lower cost of financing, which is consistent with the theory that family firms have ownership structures that gives rise to fewer agency conflicts between shareholders and creditors.

Furthermore, D'Aurizio, Oliviero & Romano (2015) explore whether a family firm might mitigate bank-firm agency conflicts during a financial crisis in the paper "Family firms, soft information and bank lending in a financial crisis." Their research is closely related to Jensen & Meckling's (1976) agency theory and finds evidence that credit to family firms was contracted less sharply than credit to non-family firms during the financial crisis. D'Aurizio et al. (2015) further find that during the financial crisis, Italian banks tended to rely more on soft information. Studying the matter more closely, they found that the banks tended to reallocate credit towards family firms (D'Aurizio et al., 2015).

Another exciting aspect of lending practices is the value of the collateral. Several researchers have investigated how banks assess firms' capital structure when firms consider raising financing. Schmalz, Sraer & Thesmar (2017) researched whether collateral could be a financial constraint to entrepreneurs. Their study is based on French administrative data and cross-sectional variation in local house-price appreciation as shocks to collateral values. The researchers state that an underlying idea is when house prices rise, the value of the collateral increase and make it more attractive for homeowners to start a business. Controversially, declining house prices negatively affect the number of entrepreneurs. The findings show that financial constraints in terms of collateral, restrict firm entry and post-entry growth (Schmalz et al., 2017).

Moreover, Chaney, Sraer & Thesmar (2012) study how real estate shocks affect corporate investments in the United States. In the presence of financial frictions, firms use pledgeable assets as collateral to finance new projects (Chaney et al., 2012). In situations where firms use pledgeable assets as collateral, the value of the assets may shrink if the real estate prices are shocked, which in turn may have a significant impact on the firm's financial capacity and hence investments. The researchers use local variations in the real estate prices to calculate the sensitivity of the collateral value (Chaney et al., 2012). In conclusion, Chaney et al. (2012) find that real estate shocks on investments have a higher impact on firms, which is more likely to be financially constrained.

3.2 Savings Banks Characteristics

The organizational form of savings banks is designed to internalize the preferences of its stakeholders (Ostergaard et al., 2016). The stakeholders act mutually to achieve both financial and social objectives. According to existing literature, savings banks have historically pursued these types of purposes (Schmidt, 2009; Ostergaard et al., 2016). Further, corporate social responsibility (CSR) tends to continue to be a part of Norwegian savings banks strategies, for instance, sponsoring activities in their local communities.

Savings banks differ from commercial banks concerning the ownership structure and primary objectives. Bøhren & Josefsen (2007) questions whether the stakeholder structure has an impact on corporate behavior. Their study finds that savings banks have less risky balance sheets, compared to commercial banks. Their results are based on the predictions that savings banks are less risky, smaller, charge higher prices, and grow less than commercial banks. Additionally, the researchers find that commercial banks do not outperform savings banks in economic terms. Interestingly, commercial banks sometimes underperform both in statistical and financial terms (Bøhren & Josefsen, 2007, p.3). Given these results, one would expect that there have been fewer closures in savings bank branches than commercial ones.

Putnam (1993) argues in Ostergaard et al. (2016) that institutions operating with collective initiatives are more efficient in communities with high levels of trust and community engagement. This implies that savings bank branches in local areas should be more efficient than branches in urban areas. Hence, in terms of efficiency, one would expect that savings bank branches in urban areas would have a higher decline in branches than the ones in rural areas.

Having stakeholder controlled firms in rural communities, such as savings banks, can be highly beneficial for the local communities and businesses due to its dividend policy. Since the non-owners are the insiders in the savings bank, they are the ones who determine its dividend policy (Bøhren, Josefsen & Steen, 2012, p.4). Thus, in decision-making processes, the ones who determine the dividend policy act in favor of the stakeholder's interest. Contradictory, the dividend policy of commercial banks is determined by the board, which often base their decision

solely on the shareholders' interests. The shareholders on the general assembly make the final policy approval. In terms of dividend size, Bøhren et al. (2012) find that savings banks pay out significantly more dividends than commercial banks, especially when they are small and grow fast.

3.3 Bank Branch Closures in Rural Areas

Over the past decades, consolidation of the banking industry has been a distinctive feature of the financial sector, both internationally and nationally, as introduced in the first part. A critical aspect of the consolidation is whether the closures of bank branches differ across municipalities in a country. In particular, whether rural districts are more exposed to closures in bank branches than urban areas. Bowles (1999) states that there have been concerns about its impact on the "geography of finance." Thus, an important question is whether bank mergers will lead to a concentration of financial institutions in urban areas and if it will lead to financial abandonment and exclusion in rural areas (Bowles, 1999). In conclusion, Bowles finds that if the proposed bank mergers in British Columbia would have been accepted, it will have a significant negative impact on the rural districts and its availability of financial institutions.

The same phenomenon, "geography of finance," has been investigated by the German researchers Bernhardt & Schwartz (2014). Their study "The network of Germany's bank branches is Dwindling" questions whether the closures of bank branches concern all regions of Germany or if there is inconsistency to the general trend in some areas. Findings show that branches are not evenly distributed among Germany's regions, whereas branch networks are observed thinning out in over 80% of Germany's 402 districts and independent towns. However, they discovered that in 17 of the districts and independent towns, the number of bank branches had not changed, and the banking market was surprisingly growing in 48 of the regions. Bernhardt & Schwartz (2014) finds that it is mainly the rural regions that are feeling the changes. From 2003 to 2013, rural areas have suffered a 15% decline in bank branches, while the urban areas only had a decrease of 9% (Bernhardt & Schwartz, 2014).

In Norway, 80% of the population lives in urban settlements. Still, Norway is the Nordic country where fewest inhabitants live in large cities. Hence, Norwegian

urban areas are small in an international context. Also, the urban areas are located far apart and have low density both in terms of inhabitants and the number of jobs (Kommunal-og Moderniseringsdepartementet, 2018). It is highly essential to consider the effects of bank branch closures in rural parts of Norway and how it affects the benefits of bank-firm relationships.

4. Hypothesis Development

In this chapter, we will develop and present our hypotheses. Our research question and the hypotheses are based on the literature review, which provide different aspects regarding the bank branch consolidation. For the economy to be dynamic, banks have crucial roles as financial institutions in being available and provide credit to their customers. Different lending practices determine whether firms will obtain finance and tend to vary with bank type and size. When building bank-borrower relationships, it does not seem to be a clear consensus among researchers whether it is the loan officers or the bank itself, which sets the prerequisites of the relationship. Also, the digitalization in the banking sector have been debated regarding bank-borrower relationships and have contributed to an upheaval of the industry. Based on these arguments, we have developed the following research question:

What happens to firm performance and financing when bank branches close?

The existing literature discusses possible outcomes and consequences of the choice of lending practices and the increasing distance between banks and borrowers in terms of bank branch closures. Bernhardt & Schwartz's (2014) have studied the impact of bank branch closures in rural Germany and find that bank branches are closing more frequently in rural areas. However, we find no similar research conducted on rural areas in Norway. Furthermore, the literature shows that there is a tendency that banks in rural areas approach a relationship lending practice, thus, they consider firms' soft information. Firms in rural areas tend to depend on the processing of soft information. To study how bank branch closures affect local economies in Norway, we have analyzed firm performance and financing, with an additional emphasis on rural areas.

4.1 Firm Financing

Two essential concerns regarding bank debt are the availability of credit and the associated cost. To shed light on these topics, we introduce two main variables as an approximation to these issues. To measure credit availability, we have chosen to look at firms' debt ratios. Since the debt ratio may include different types of debt, we perform a separate regression analysis on the financial debt ratio to analyze the bank credit availability. The cost of debt is measured by the average interest rate on long-term debt.

4.1.1 Impact on Debt Financing

To analyze firms' debt financing, we consider two approximations to financing; firms' debt ratio as a proxy for credit availability and financial debt ratio as a proxy for bank credit availability. The debt ratio indicates whether firms' debt has increased as bank branches close. However, the debt ratio does not provide an answer to whether the bank debt has decreased or increased, hence, we also analyze the financial debt ratio.

The debt ratio for firm i is defined as:

$$Debt\ ratio_{i,t} = \frac{Total\ debt_{i,t}}{Total\ assets_{i,t}}$$

The financial debt ratio for firm i is defined as:

$$Financial\ Debt\ Ratio_{i,t} = \frac{long\ term\ financial\ debt_{i,t} + current\ financial\ debt_{i,t}}{total\ assets_{i,t}}$$

Previous research has established several determinants of the amount of credit available to firms. One of the determinants that have been widely discussed is lending practices, whereas researchers state that the use of soft information may increase the credit available to firms. Further, Petersen & Rajan (1994) argue that the supply of credit available to firms is highly influenced by the length and extent of the firms' relationships with their banks. Based on the literature, we would expect that both debt ratio and financial debt ratio decrease when bank branches close.

Furthermore, Norwegian firms are mainly small firms. Bank loans are a crucial funding source for firms, especially SMEs (Bernhardt & Schwartz, 2014). SMEs might be financially constrained due to lack of reliable accounting records and sufficient collateral, thus preventing them from pursuing positive NPV projects. However, local bank officers tend to be influenced by soft information and act according to this information (Degryse & Ongena, 2008), which is beneficial for SMEs.

Hypothesis 1A:

H0: Bank branch closures have no impact on firms' debt ratio.

HA: Firms' debt ratio is affected by bank branch closures.

Hypothesis 1B:

H0: Bank branch closures have no impact on firms' financial debt ratio.

HA: Firms' financial debt ratio is affected by bank branch closures.

Moreover, researchers establish that small banks are better at processing soft information (Stein, 2002; Berger et al., 2005). Norwegian savings banks are considered to be small banks and account for 68% of total bank branches in Norway. Historically, there has been a high presence of savings banks in rural parts of Norway. Bank branch closures in rural areas will most likely cause fewer opportunities for firms to raise capital due to the restricted bank credit availability, especially savings bank branch closures. However, Bernhardt & Schwartz (2014) found that most bank branch closures occur in rural areas in Germany. Operating with the same hypotheses, we would like to research whether bank branches close most frequent in rural parts of Norway and how it affects firm performance and financing.

4.1.2 Impact on Average Interest Rate

To measure firms' cost of debt, we use an average interest rate on long-term debt as a proxy. The proxy has some limitations since we only consider long-term debt, and the firms most likely have some level of short-term debt, which is accounted for in the interest expenses.

The average interest rate of firm i is defined as:

$$Average\ interest\ rate_{i,t} = \frac{Interest\ expenses_{i,t}}{(Long\ term\ debt_{i,t} + Long\ term\ debt_{i,t-1})/2}$$

According to existing literature, the cost of debt or lending rate increases when the physical distance between the bank and borrower increases (Degryse & Ongena, 2008). Therefore, when bank branches close and bank-borrower distance might increase, it is reasonable to assume that the average interest rates will rise. Moreover, SMEs with one bank connection through their business life might have deeper trouble in achieving the same level of interest rate in a new bank. However, regardless of the type of firm, a firm would typically obtain a lower interest rate if it provides sufficient hard information. Since SMEs are more dependent on relationship lending with soft information compared to other firms, this might lead to higher interest rates when switching banks (Berger et al., 2005). Based on the literature, we anticipate that the average interest rate will increase when bank branches close.

Hypothesis 2:

H0: Bank branch closures have no impact on firms' average interest rates.

HA: Firms' average interest rates is affected by closures of bank branches.

Furthermore, the bank consolidation was partly caused by bank acquisitions and mergers. Bowles (1999) found that possible mergers of banks in British Columbia in Canada would lead to financial abandonment and exclusion in rural areas. As the physical distance between bank and borrower is quite high in rural areas, further abandonment would increase the distance additionally. Hence, in line with Degryse & Ongena's (2008) research, it is interesting to research whether average interest rates rise even more in rural areas when bank branches close.

4.2 Firm Performance

Firm financing and performance are closely related to each other, as firm financing tend to influence performance. In this thesis, we use firms' growth of sales as a proxy to measure firm growth. However, the growth of sales does not provide a measure of how much resources spent relative to achieve sales. Thus, we also analyze firms' return on assets (ROA).

4.2.1 Impact on Growth of Sales

Firms' growth of sales is used to study bank branch closures impact on firm performance. Commonly, sales have high fluctuations following the business cycle. However, in our regression analysis, we control for this by including macro variables, as presented in chapter 5.1.5.

The growth of sales of firm i is defined as:

$$Growth\ of\ Sales_{i,t} = \frac{\text{Sales}_{i,t} - \text{Sales}_{i,t-1}}{\text{Sales}_{i,t-1}}$$

For a firm to grow, it needs a sufficient level of capital to pursue new positive NPV projects, among other factors. As introduced in the literature review, bank debt tends to be the preferred source of finance after retained earnings. When bank branches close, firms' bank credit availability can decrease, while the cost of debt might increase. Based on existing literature, one would expect that a decrease in the number of bank branches might result in lower growth of sales, as we anticipate the bank credit availability to decrease, discussed above.

Hypothesis 3:

H0: Bank branch closures have no impact on firms' growth of sales.

HA: Firms' growth of sales is affected by bank branch closures.

4.2.2 Impact on Return on Assets

To measure the relative of resources spent to achieve sales, one can analyze firms' ROA. High ROA is usually associated with highly effective use of resources, which might indicate excellent firm performance. On the other hand, if ROA is low or decreasing, it may explain weak firm performance. Firms' ROA differ widely within industries and is dependent on how capital-intensive the firms are. To adjust for this, we have controlled for industries in our analyses.

The ROA for firm i is defined as:

$$ROA_{i,t} = \frac{\text{Income before extraordinary items}_{\text{i,t}} + \text{ Other interest expenses}_{i,t}}{Total\ assets_{i,t}}$$

To sustain a high ROA, firms need to further develop operations by investing in new assets. Bank credit is imperative to pursue new positive NPV projects. Hence, if firms are unable to undertake new projects, ROA might decrease, which might indicate that the firm is underperforming. Additionally, a decrease in the growth of sales might impact income before extraordinary items. Overall, we expect firms' ROA to decrease.

Hypothesis 4:

H0: Bank branch closures have no impact on firms' ROA.

HA: Firms' ROA is affected by bank branch closures.

5. Methodology

In this study, we want to investigate if there is a causal relationship between bank branch closures and financing and performance of local firms by using a difference-in-difference model i.e., a quantitative approach. To analyze the relationship, we have collected data which we have merged at a municipality level, to catch the local variations of bank branch closures. The data used in this paper will mainly be panel or longitudinal data. One of the datasets collected is from the Center for Corporate Governance Research (CCGR) database at BI, which contains financial statements and general company information of independent Norwegian companies in the period 2001 to 2015. The other dataset is purchased from Finans Norge, which includes all Norwegian bank branches as of 1.1.2002, 1.1.2007 and 1.1.2017. Also, we have collected a dataset from Statistics Norway (SSB) containing a centrality class for all municipalities as of 1.1.2018 (SSB, 2017), which indicates the ruralness of the different Norwegian municipalities. Macro variables for control purposes are merged at a county level.

5.1 Data Specification and Processing

5.1.1 Postal codes, municipality and county numbers

To analyze the impact of bank branch closures in local regions, we have connected the datasets by postal codes, the municipality number and the county number. As of 2019, there are 18 counties and 422 municipalities in Norway (Kartverket, 2019), but there have been some distinct changes in the past years. One of the significant changes is the merger of Nord-Trøndelag and Sør-

Trøndelag, generating 48 new municipality numbers. Since the CCGR dataset contains old municipality numbers in our sample period, we have decided to operate with municipality numbers and postal codes from 1.1.2017, however, for simplicity work with Trøndelag as one county. Appendix 3 gives an overview of the municipalities used in this study, counting in a total of 428 municipalities and 18 counties.

5.1.2 Bank Location Register

To study the effect of bank branch closures we purchased "The Bank Location Register" from Finans Norge, containing information on all bank branches in Norway operating 01.01 as of the respective year. To catch the effect of closures, we assembled the years 2002, 2007 and 2017. The bank location register contains the postcodes of all the bank branches in Norway. Using a postcode register from 2017 provided by Posten (Wold, 2019), we connected the bank branches to a municipality number, which further was matched with the CCGR dataset.

The Bank Location Register does not provide any information on whether the bank branches classify as a savings bank or a commercial bank. However, Finans Norge publishes the total numbers of operating bank branches each year, separating commercial banks and saving bank branches. Using the definition and characteristics of savings banks and Finans Norge's overview of "Commercial Banks in Norway from 1932" (Finans Norge, 2019a & 2019b), we were able to classify the branches and match the numbers to Finans Norge to an extent.

	Finans Norge **Savings Banks**	*Finans Norge* **Commercial Banks**	*Dataset in thesis* **Savings Banks**	*Dataset in thesis* **Commercial Banks**
01.01.2002	972	442	970	444
01.01.2007	781	479	762	492
01.01.2017	648	295	642	293

Table 5.1.2.1*: Classification of savings banks and commercial banks in the bank location register, number of commercial/savings banks in thesis compared to Finans Norge's overview of number of commercial and savings bank branches (Finans Norge, 2019a).*

The case of DNB

Den norske Bank (DnB) is a result of a series of grand mergers of banks starting in 1990. In 2003, DnB merged with Gjensidige NOR Sparebank (Union Bank of Norway). The most extensive parts of the shares in Gjensidige NOR was owned

by “The Savings Bank Foundation” (Stiftelsen Gjensidige NOR Sparebank) (Gjensidige NOR, 2003). As a result, the merger lead to the establishment of “Sparebankstiftelsen DNB” in 2002, which intended to protect the savings bank tradition by distributing parts of the surplus to the local community. According to DNB’s annual reports from 2003 to 2018, the bank met the requirement of a savings bank as the Savings Bank Foundation owned a minimum of 10% (2003-2012). However, as of 30.06.18, the savings bank foundation owns 8.1% of DNB. Finans Norge classifies DNB as a commercial bank, as of that we classify DNB as a commercial bank, even though there might be some uncertainty which categorization it should be assigned to in the early years.

The Case of Nordea in 2017

All of the Nordea bank branches (all subsidiaries) in Norway merged with the Swedish parent company, with effect from the 2nd of January 2017. Due to this, the Nordea bank branches were removed from Finans Norge's Bank Location Register, as they were no longer registered in Norway. As illustrated in appendix 1, Nordea is still the second largest bank in Norway measured by total assets in 2017 (Finans Norge, 2019a). Consequently, we have added back the Nordea bank branches which operated in Norway in 2019. Due to this, we have a differential from Finans Norge's numbers in 2017 (935 to 943).

5.1.3 Centrality

In Norway, urbanization is closely related to the term centralization (sentralisering). To understand the ruralness of each municipality in Norway, we apply The Centrality Index by Statistisk Sentralbyrå (SSB). The index ranks the Norwegian municipalities by the population’s access to the number of workplaces and various types of services, and provides an image of center structure and settlement pattern in Norway. The municipalities are classified on a level from 1 to 6, whereas 1 is the most urban and 6 is the most rural (Kommunal- og Moderniseringsdepartementet, 2018). In appendix 4, a visualizing map of the municipalities in their respective classification is provided, while all munici cipalities are listed with their centrality class in appendix 5 A. To apply the dataset in our thesis, we have merged the dataset with the CCGR dataset by the municipality number.

5.1.4 CCGR Data

The CCGR dataset consist of accounting data, industry codes, ownership control and firm specifics, this is further outlined in seven tables shown in appendix 6 A (BI Norwegian Business School, 2019). We use data on Norwegian independent firms collected from GGCR in the period from 2001 to 2015, the extracted items are shown in appendix 6 B. All items or variables have been inflation adjusted to avoid time trends and spurious data, using 2015 as reference year (=100) (SSB, 2019). To make all variables as credible as possible, we have made some restrictions for both main and balanced sample, and filtered out the following:

1. All inactive firms by the definition of sales < 1 NOK
2. Financial statements in other currencies than NOK
3. Average assets < 5000 NOK
4. Firms with no municipality number

Further, we have calculated several variables based on the data from CCGR. Accordingly, all our calculated variables have been winsorized individually to avoid extreme outliers.

5.1.5 Macro Variables

To improve explanation power for firm performance and financing, we have controlled for different variables in our analyses, thus avoiding other variations inferring with our results. These control variables are crucial factors to include since they reflect the business cycle, which affects firm performance and financing. A description of the variables is provided in appendix 7. We have included the following macro variables on county level:

1. Norwegian GDP
2. Norwegian Unemployment Rate
3. Norwegian House Price Growth per Square Meter
4. Norwegian Population

The GDP is reported in million NOK, which we further have CPI-adjusted and detrended by calculating the growth. The unemployment rate is calculated as the unemployed in percentage of the total workforce per county (NAV, 2019). Moreover, the number of people living in the counties are important to include to get a better picture of the causality in our analyses. Lastly, the house price growth

contains the price of used detached houses per square meter on a county level and is used to control for personal collateral in lending processes.

5.2 Panel Data

Often in financial modelling, it arises data comprising both time series and cross-sectional elements. This type of dataset is known as a panel of data or longitudinal data. A panel of data will obtain information of both time and space (Brooks, 2014, p.526). According to Brooks (2014), a cross-sectional regression is a regression involving series that are measured only at a single point in time but across many entities. Time series regressions are models built using time series data, i.e., data collected over time for one or more variables (Brooks, 2014, p.694).

The data used in this paper will mainly be panel data. The CCGR dataset is characterized as panel data, as we have observations of several companies from 2001 to 2015. However, the CCGR dataset given in the period is unbalanced, since we have both firm closures and startups within the period. As of that, we have created a dummy variable, specifying whether the company has been active and operating throughout the period to balance the dataset. The bank location register also observes the number of bank branches in each municipality in three specific years. Macro variables are at county level for each of the years between 2001 and 2015. However, the centrality index only has observations for each of the municipalities in one year, making it purely cross-sectional data. We assume that it is quite unlikely that one municipality would change from rural to urban within the time period, hence, that the ruralness of Norwegian municipalities are quite stable.

5.3 Difference-in-Difference Model

To get credible causal effects, it is crucial to have a set of data where one has followed the same units over time, namely panel data (Finseraas & Kotsadam, 2013). An important part of the model, is that some of the observations have been through a change in a variable X over time so that one can measure the effect of the difference from the period before to after, e.g., in our case, that there have been bank branch closures in a given municipality within 2001 to 2006. In our

model, we study if there are any causal effects between bank branch closures in 2001 to 2006 (before) and firm performance and financing in the years 2007 to 2015 (after).

To apply the model, observations are divided into two groups. The first group is called a "Treatment Group", where certain observations with the change in variable X is embedded, i.e., firms operating in municipalities where there have been bank branch closures. Since it is impossible to obtain observations where one could observe both the effects of closures and non-closures within one municipality, one also needs a "Control Group" (Finseraas & Kotsadam, 2013). The latter group contains observations where there has been an increase in bank branches or no changes.

When building the model, we first define the time dummy (d_{time}) equal to 1 in period after and 0 in period before, with coefficient β_1. The treatment dummy ($d_{treatment}$) is equal to 1 for the treatment group and 0 for the control group, with coefficient β_2. Based on the time and treatment dummy, we observe the relative changes in the treatment and control group, as shown in table 5.3.1. Then, we look at the difference for the treatment group and compare it to the difference in the control group, thus, obtaining the difference-in-difference (DiD) estimator β_3. We use the following definition when interpreting β_3: *"we compare the change in the relevant variable before and after the treatment date for the treatment group compared to the control group"*. Hence, the DiD estimator capture the variation in the difference-in-difference for the two groups (Roberts & Whited, 2013).

	Before	*After*	***Difference***
Treatment Group	β_2	$\beta_1 + \beta_2 + \beta_3$	$\beta_1 + \beta_3$
Control Group	0	β_1	β_1
Difference	β_2	$\beta_2 + \beta_3$	*Difference-in-Difference* β_3

Table 5.3.1*: Building the difference-in-difference model.*

Further, we estimate the difference-in-difference regression model in levels, as shown below (Stacescu, 2019). We run different regressions with various dependent variables (y) and add control variables in our regression analysis.

According to Roberts & Whited (2013), single cross-sectional estimators avoid the problem of omitted trends by looking at the same two groups in both time-periods, whereas time series estimators avoid the problem of unobserved differences between the two groups in the before and after periods. The DiD estimator combines the cross-sectional and time series estimators to take advantage of the strengths of the two (Roberts & Whited, 2013, p.32).

$$y = \alpha + \beta_1 * d_{time} + \beta_2 * d_{treatment} + \beta_3 * d_{time} * d_{treatment} + \varepsilon$$

However, there exist some limitations with the DiD estimator, thus, we need to check for different aspects with the model. The model assumes parallel trends for the treatment and control group, prior to the treatment (Stacescu, 2019, p.17). Further, to improve internal validity and robustness, we use three different samples of treatment and control groups in our analysis. We check that there are no significantly difference in number of observations between the both treatment and control group. Also, we have look at the reversal of the treatment whether firm performance impact bank branch closures. Further, we present three samples operating with different specifications regarding closures.

5.3.1 Defining Treatment and Control Groups

In the analysis, we will operate with three samples of treatment and control groups. In addition, we will test the impact of both total bank branch closures and savings bank branch closures. Applying the difference-in-difference model, we focus on the time periods 2001 to 2006 (before) and 2007 to 2015 (after).

5.3.1.1 Sample 1

Sample 1 consists of all firms operating between 2001 and 2015 (our balanced sample). The treatment group consists of firms operating in municipalities where there have been bank branch closures in the before state (2001-2006), while the control group consists of firms operating in municipalities where there has been no change in the number of bank branches or an increase in the number of bank branches. As illustrated in table 6.3.1.1, the total number of observations for savings and total bank branches are quite similar, counting a total of 200,235 observations.

Sample 1	Municipalities	Observations	Relative size
Total Branches - Treatment	122	99397	50 %
Total Branches - Control	306	100838	50 %
Savings Branches - Treatment	157	125736	63 %
Savings Branches - Control	271	74499	37 %
Total	428	200235	100 %

Table 6.3.1.1: *The number of municipalities and observations of sample 1 separated in the two groups, whereas treatment group = firms operating in municipalities with bank branch closures, and control group = firms operating in municipalities with no bank branch closures or an increase in bank branches.*

5.3.1.2 Sample 2

In sample 2, we use our balanced sample to select the treatment and control groups. The treatment group consists of firms operating in municipalities where there has been a 100% decrease in bank branches in the first period, i.e., that the municipality used to have one or more bank branches in 2001, but which all closed within 2006. The control group consists of firms operating in municipalities where there has been an increase in bank branches from 2001 to 2006. The new specifications of the groups alter the observation sizes.

For total bank branches, a total of 41 municipalities met the criteria for either treatment or control group. As shown in table 6.3.2.1, sample 2 is much smaller than sample 1. The total number of observations in the treatment and control group only counts for about 16% of the sample used in sample 1. The sample is quite uneven, which might affect the results. For savings bank branches, 67 municipalities were selected, where total observations amounted to 17% of sample 1.

Sample 2	Municipalities	Observations	Relative size
Total Branches - Treatment	11	955	3 %
Total Branches - Control	30	30918	97 %
Total	41	31873	100 %
Savings Branches - Treatment	40	11751	34 %
Savings Branches - Control	27	22528	66 %
Total	67	34279	100 %

Table 6.3.2.1: *The number of municipalities and observations of sample 2 separated in the two groups, whereas treatment group = firms operating in municipalities where there has been a 100% decrease in bank branches, and control group = firms operating in municipalities with an increase in bank branches.*

5.3.1.3 Sample 3

Further, we have also used our balanced sample to create the treatment and control groups in sample 3. However, for the treatment group, we have selected firms operating in municipalities where there have been closures of bank branches in the before state and no changes in the number of bank branches in the following period. For the control group, the sample consists of firms operating in municipalities with no changes or an increase in the number of bank branches before, and no changes in the after state. Total bank branches include 181 municipalities, and savings bank branches consist of 238 municipalities, as shown in table 6.3.3.1. An interesting aspect is that for total bank branches, there are most observations in the control group, while we observe the opposite for savings bank branches.

Sample 3	Municipalities	Observations	Relative size
Total Branches - Treatment	57	13840	32 %
Total Branches - Control	124	28917	68 %
Total	181	42757	100 %
Savings Branches - Treatment	96	74711	69 %
Savings Branches - Control	142	32870	31 %
Total	238	107581	100 %

Table 6.3.3.1: *The number of municipalities and observations of sample 3 separated in the two groups, whereas treatment group = firms operating in municipalities with bank branch closures in the first period and no changes in the second period, and control group = firms operating in municipalities with an increase in bank branches or no change in the first period and no change in the second period.*

5.4 Cross-Sectional Model

A part of our analysis requires that we estimate separate cross-sectional regressions. In line with Brooks (2014) definition of cross-sectional series, we use the relative bank branch closures from 2007 to 2015 as our dependent variable, across Norwegian municipalities. We perform a reverse exercise to check if local firm performance affect bank branch closures. Firm performance is measured by firms' growth of sales and ROA, on a yearly basis. Therefore, we use the cross-sectional regression model instead of the difference-in-difference regression model.

5.5 Limitations and Assumptions

The thesis has some limitations that can affect our results.

(1) We do not directly observe which bank branch lends to which firm, how many lenders each firm has or what lending terms each firm has.

(2) We do not have data on the length of the firms' bank-borrower relationship.

(3) We have not measured the physical distance in kilometers between the bank branches and the firms. Municipalities in rural areas are usually large, and we cannot observe if the firm is closer to a bank branch in a neighbor municipality.

(4) Also, we have minimum insight on the competition amongst banks in the municipalities, and the sizes of the branches which are closed. In some municipalities, there might be other branches waiting to seize the opportunities to obtain new customers, while in other municipalities the supply of bank credit might be substantially low.

(5) In our main regression analysis, we use a balanced dataset, which consists of firms operating from 2001 throughout 2015. These firms are filtered out from several criteria, hence, they have relatively good performance, as the firms have survived throughout the period. Thus, this might influence our results positively since we don't observe the firms that have been closed.

Due to all the limitations, we make one big assumption: all firms only have relationships with bank branches within the municipality they are operating.

6. Descriptive Statistics

In this section, we present descriptive statistics of our data to get an impression of the consequences of the frequent bank branch closures. Firstly, we provide an overview of the changes in the bank branch landscape, where we intend to show the distribution of bank branch closures across Norway. Further, we illustrate the development in four of the main variables debt ratio, average interest rate, growth of sales and ROA. Lastly, we analyze the variables presented where we separate the observations into treatment and control group, and before/after, to see if we can observe some tendencies of the results we might obtain in the regression analysis. Further, descriptive statistics of the full and balanced sample are presented in appendix 8 A and B, and include the mean, standard deviation, coefficient of variation, minimum, maximum and median of several relevant variables. Also, correlation matrices for both full and balanced sample for relevant variables are shown in appendix 9 A and B.

6.1 Closures in the Bank Branch Landscape

Table 6.1.1 presents the development in total and savings bank branches in Norway from 2001 throughout 2015 by county. As discussed previously in the thesis, we observe a decreasing trend in the number of bank branches. From 2001 to 2006, 21% of savings bank branches closed while only 11% of total bank branches closed. From 2007 to 2015, there were 25% closures of total bank branches and only 16% closures of savings bank branches. Hence, in the first period, relative savings bank branch closures were higher than total bank branch closure, while in the second period, we observe the opposite. Interestingly, combining the two periods, both total and savings bank branches had the same relative changes in bank branches of -34%.

When we observe the development of bank branch closures by county, we find that there are some substantial differences across regions. In the first period, Oslo had the highest relative closures of savings bank branches (-72%), whereas Rogaland had a relative increase of savings bank branches (+8%). However, Oppland was the county that had the highest total closures (-23%), compared to Akershus, which had an overall total increase in bank branches (+4%) in the first period. In the second period, 70% of the savings bank branches in Troms closed,

compared to an increase in savings banks of 15% in Telemark and Buskerud. Troms also had the highest total closure of bank branches (-61%) in the second period, whereas Akershus was the county with fewest total closures (-3%).

Observing the two periods combined, Troms had most closures of total and savings bank branches. Møre og Romsdal had the least closures of savings bank branches (-2%) over the whole period. Finally, 45% of savings bank branches in Akershus closed during the whole period. However, Akershus is the only county that did not have any closures of total bank branches on average. This implies that there has been an equal relative increase in commercial banks in Akershus from 2001 to 2015. If we look at yearly changes in total and savings bank branches, the difference in closures between the two periods is rather small in total, as illustrated in appendix 10.

County	Δ S 2001-2006	Δ T 2001-2006	Δ S 2006-2015	Δ T 2006-2015	Δ S 2001-2015	Δ T 2001-2015
01 Østfold	-48 %	-23 %	-9 %	-26 %	-52 %	-43 %
02 Akershus	-51 %	4 %	13 %	-4 %	-45 %	0 %
03 Oslo	-72 %	-23 %	0 %	-40 %	-72 %	-54 %
04 Hedmark	-4 %	-3 %	-16 %	-20 %	-19 %	-23 %
05 Oppland	-51 %	-23 %	-17 %	-34 %	-59 %	-49 %
06 Buskerud	-38 %	-12 %	15 %	-9 %	-28 %	-20 %
07 Vestfold	-63 %	-10 %	14 %	-26 %	-58 %	-33 %
08 Telemark	-29 %	-13 %	15 %	-5 %	-18 %	-17 %
09 Aust-Agder	-7 %	0 %	-18 %	-26 %	-23 %	-26 %
10 Vest-Agder	-7 %	-12 %	-8 %	-13 %	-14 %	-24 %
11 Rogaland	8 %	3 %	-11 %	-18 %	-4 %	-16 %
12 Hordaland	-11 %	-9 %	-47 %	-44 %	-53 %	-50 %
14 Sogn og Fjordane	-9 %	-9 %	-17 %	-27 %	-24 %	-33 %
15 Møre og Romsdal	5 %	-8 %	-6 %	-16 %	-2 %	-23 %
18 Nordland	-23 %	-21 %	-30 %	-34 %	-47 %	-48 %
19 Troms	-12 %	-10 %	-70 %	-61 %	-74 %	-65 %
20 Finnmark	-15 %	-10 %	-41 %	-48 %	-50 %	-53 %
50 Trøndelag	-14 %	-12 %	0 %	-12 %	-14 %	-23 %
Total	-21 %	-11 %	-16 %	-25 %	-34 %	-34 %

Table 6.1.1: *Development of total and savings bank branches in Norway per county in the periods 2001 to 2006, 2006 to 2015 and 2001 to 2015.*

In conclusion, we can see that there are regional differences in the bank branch closures in Norway. In Oslo and Akershus, there have been significant closures of savings bank branches. However, the closures of total bank branches are not as distinct. As we know that Oslo and Akershus are two urban counties, this might indicate that savings bank branches are pulling away from the more urban areas. Likewise, the high relative closures of total bank branches in Nordland, Troms, and Finnmark, indicate that there are indeed more closures in rural areas. To further establish this argument, we continue analyzing bank branch closures in the municipalities relative to their centrality class.

Figure 6.1.2 illustrates the relative changes in total and savings bank branches by "Centrality Class" (Høydahl, 2017). Surprisingly, the majority of closures happen *both* in the most urban municipalities and in the most rural ones (centrality class 1 & 6). In the most urban municipalities of Norway (centrality class 1), savings bank branches were reduced by over half (61%) in the period 2001to 2015. However, total bank branches were reduced only by 42%, indicating that commercial banks relatively closed fewer branches than savings banks in these areas. In the most rural parts (centrality class 6), it seems that savings banks have closed relatively fewer branches than commercial banks, as savings bank branches closed by 50% and total bank branches by 54%. In conclusion, we observe the most relative closures in category 1 and 6. However, there has been a more considerable decline in total bank branches in the rural parts of Norway (54%), compared to the closures in the most urban areas (42%) and other categories. Hence, it seems that bank branches tend to close more frequently in rural areas in Norway.

As we observed in closures across counties, there is a tendency that savings banks are pulling away from the urban areas and controversially, commercial banks are pulling away from the rural areas. The relative closures in savings bank branches in centrality class 4 to 6 are lower than total bank branches, while the relative closures of total bank branches are lower than relative closures of savings banks in centrality class 1 to 3.

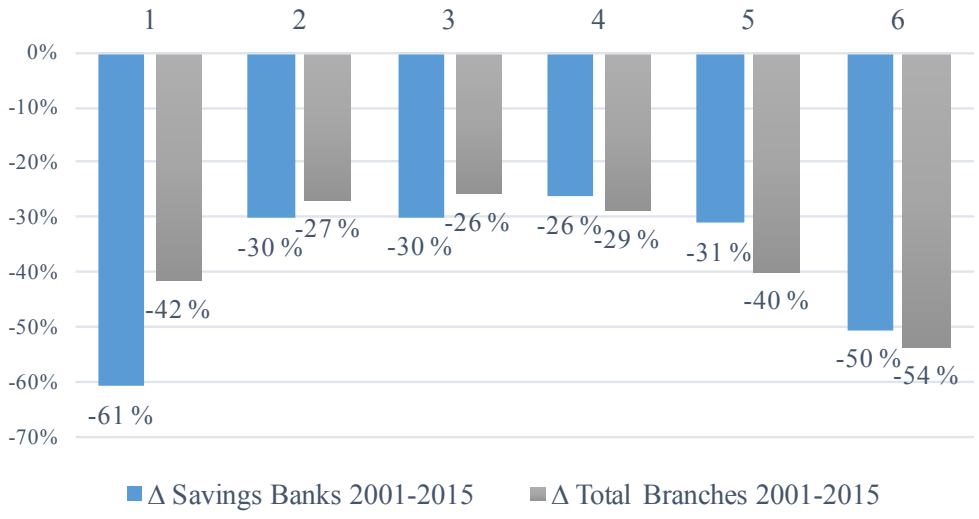


Figure 6.1.2: *The relative changes in total and savings bank branches from 2001 to 2015, by different centrality classes, whereas 1 is the most urban municipalities and 6 is the most rural ones.*

Breaking down the two periods into relative closures on a yearly average (figure 6.1.3), one can observe that savings bank branches faced severe closures from 2001 to 2006, most heavily in the urban areas and less in rural areas. A probable cause is the merger of Gjensidige NOR and DNB, converting the previous savings bank branches of Gjensidige NOR to a commercial bank. In the second period, savings banks closed more branches in the rural areas than urban ones. Looking at the closures of total bank branches, one can observe that the yearly averages are somewhat more stable than the savings banks.

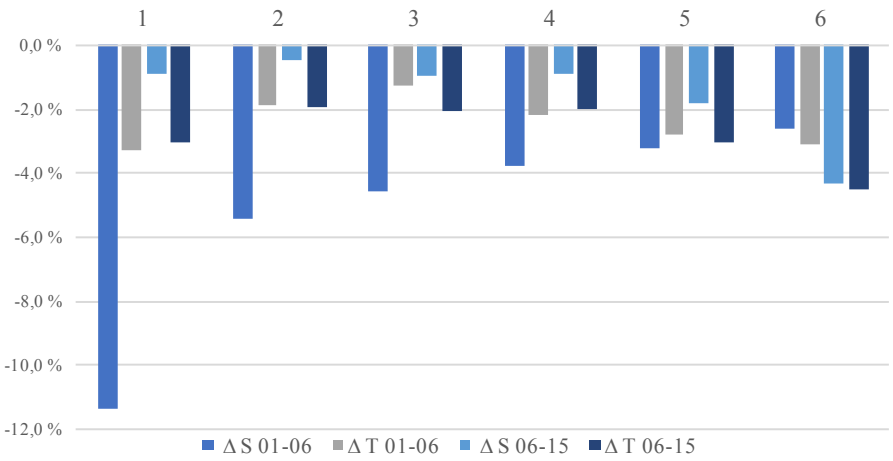


Figure 6.1.3*: The relative yearly changes in total and savings bank branches during the periods 2001 to 2006 and 2006 to 2015.*

So far, we have discussed the relative changes in the number of bank branches. Another perspective is looking at the changes in bank branches per capita. Using the population in the year 2001, 2006 and 2015 for each county and assigning each county an averaged centrality class, we were able to calculate branches per capita (see appendix 5 B). If one looks at the absolute numbers in total bank branches per capita in the years 2001, 2006 and 2015 (figure 6.1.4), one can observe that the highest number of branches per capita is in centrality class 4 and 5, while the lowest observable numbers are in classes 1 and 2. Compared to savings bank branches per capita (figure 6.1.5), one can see that savings bank branches provide the most branches per capita in category 4 and 5, while they provide fewer branches in the most urban areas. In conclusion, savings bank branches provide most branches per capita in rural areas, while commercial banks tend to provide more branches per capita in urban areas. In general, there has been a distinct decrease in the numbers of branches per capita.

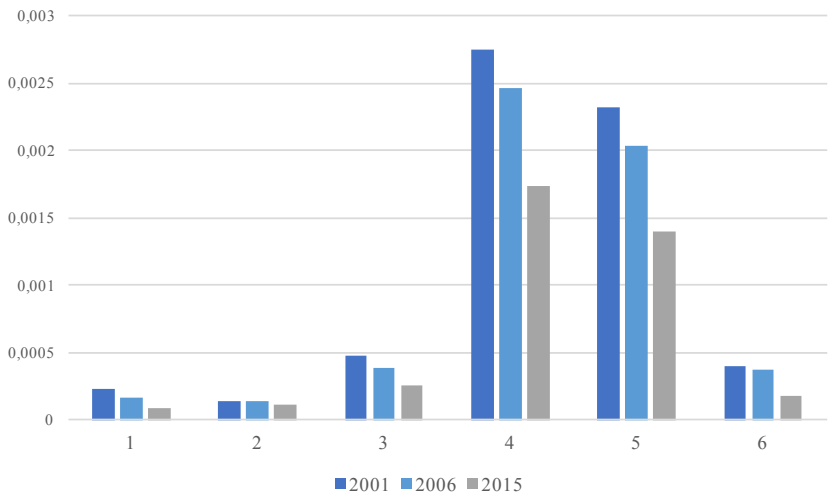


Figure 6.1.4: *Total bank branches per capita in centrality classes in absolute values.*

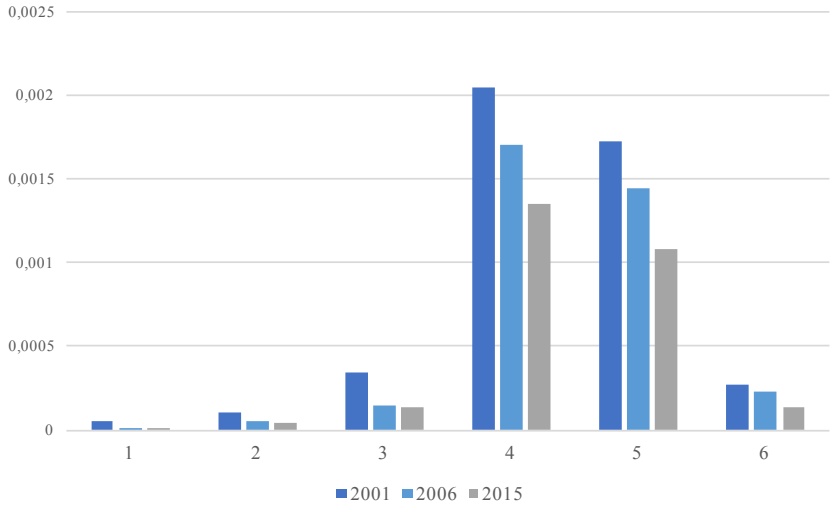


Figure 6.1.5: *Savings bank branches per capita in centrality classes in absolute values.*

Appendix 8 C and D illustrates the difference between the relative changes in bank branches and the relative changes in bank branches per capita, for total bank branches and savings bank branches respectively. One can observe that the total bank branches per capita has remained the same throughout the entire period, in the most rural parts of Norway (class 5 & 6). In classes 1, 3 & 4 branches per capita has decreased more than the relative closures which holds for both savings bank branches and total bank branches, except for total bank branches in centrality class 2, where there has been a lower decrease per capita than relative closures. Hence, we observe some tendencies that the banks keep the branches per capita quite stable in the rural areas. In urban areas, the change in bank branches per capita are quite higher than the relative closures. However, the distance between the bank and borrower has necessarily not increased by much.

6.2 Development of Main Variables

It is crucial to look at the development of the main variables to capture possible trends and how the different variables differ across time and space. Our balanced sample consists of firms operating throughout the years 2001 to 2015. Since we filter firms operating throughout the entire period, we end up with firms performing relatively well in this sample, differing from the full sample that consists of all firms operating in between the years 2001 and 2015. Interestingly, there are some differences in the development of the main variables between the two samples worth mentioning.

Across counties, we can see in table 6.2.1 that the average debt ratio is lower for the balanced sample compared to the average debt ratio for full sample in appendix 8 E. This might imply that firms that perform better on average have lower debt ratio. Further, the average growth of sales gives us some interesting implications. For the balanced sample, the average growth of sales is in-between 4% and 7%, while it is 11% to 15% for the full sample. Indicating that newly established firms have substantially higher growth of sales than mature firms. Development of the main variables in the periods before and after for both balanced and full sample is attached in appendix 8 F, G, H and I. In addition, development in financial debt ratio by counties from 2001 to 2006, 2007 to 2015 and 2001 to 2015, is provided in appendix 13 A.

Balanced Sample: 2001-2015				
County	**Average Debt Ratio**	**Average Interest Rate**	**Average Sales Growth**	**Average ROA**
01 Østfold	72,10 %	12,11 %	5,03 %	4,73 %
02 Akershus	69,42 %	11,20 %	5,50 %	6,38 %
03 Oslo	69,52 %	11,55 %	5,83 %	6,35 %
04 Hedmark	69,28 %	11,61 %	5,43 %	5,07 %
05 Oppland	70,14 %	11,21 %	5,28 %	3,86 %
06 Buskerud	71,00 %	11,38 %	5,63 %	5,78 %
07 Vestfold	71,45 %	11,66 %	5,24 %	5,66 %
08 Telemark	72,08 %	10,68 %	5,31 %	3,07 %
09 Aust-Agder	69,30 %	11,41 %	4,51 %	4,77 %
10 Vest-Agder	72,74 %	11,45 %	4,99 %	5,44 %
11 Rogaland	69,77 %	10,98 %	5,57 %	6,94 %
12 Hordaland	70,05 %	11,46 %	6,02 %	5,13 %
14 Sogn og Fjorande	69,48 %	10,80 %	5,45 %	2,96 %
15 Møre og Romsdal	68,95 %	12,37 %	4,76 %	3,67 %
18 Nordland	69,28 %	11,54 %	5,98 %	3,87 %
19 Troms	68,40 %	11,21 %	7,01 %	4,51 %
20 Finnmark	67,21 %	10,52 %	5,88 %	2,10 %
50 Trøndelag	68,94 %	11,38 %	5,98 %	4,76 %

Table 6.2.1: *Development of main variables per county for balanced sample by county from 2001 to 2015.*

Furthermore, to look deeper into the development in the main variables and the bank branch closures based on the balanced sample, we have selected Akershus and Rogaland which are the two counties with fewest closures between 2001 and 2015, and Troms and Oslo, which have most closures between 2001 and 2015. In general, we observe that the debt ratio has decreased over time. One possible explanation for this could be the implementation of the tax-reform in 2006. In figure 6.2.1, we can see that the development of the average debt ratio is relatively similar in all four counties compared to the balanced sample. However, the average debt ratio decreased more in Rogaland in the period between 2011 and 2014, than the other counties. Hence, we observe a tendency that areas with fewest bank branch closures have a decrease in debt ratio, which contradicts our expectations.

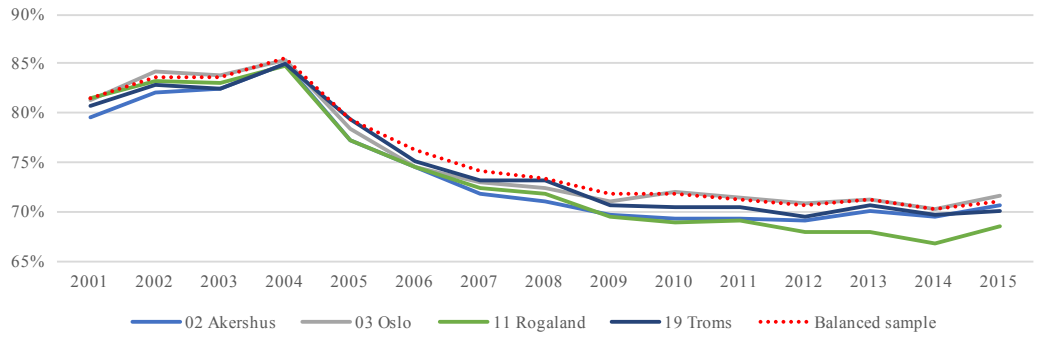


Figure 6.2.1: *Development in debt ratio for Akershus, Oslo, Rogaland and Troms from 2001 to 2015.*

Similar to the debt ratio, we can see that for the average interest rate, the counties almost follow the same trend as the balanced sample. The trend seems to be decreasing from 2002 to 2006, then strengthen towards 2009 and the financial crisis, and after that have a slow and stable yearly decrease. The lowest interest rates are observed in Oslo and Akershus, as one can see from figure 6.2.2. The fact that Oslo has had a higher decrease in average interest rate compared to the other counties, is inconsistent with our expectation that the bank branch closures impose a higher average interest rate. However, this might be caused by a highly competitive business environment.

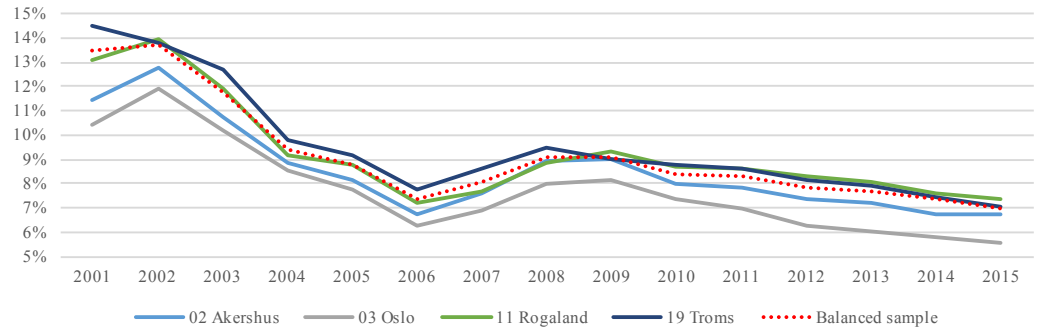


Figure 6.2.2: *Development in average interest rate for Akershus, Oslo, Rogaland and Troms from 2001 to 2015.*

Moreover, considering the development for the growth of sales across the four counties, we observe that the performance indicator has higher fluctuations than average debt ratio and average interest rate. We can see that the growth of sales tends to follow the business cycle among all four counties.

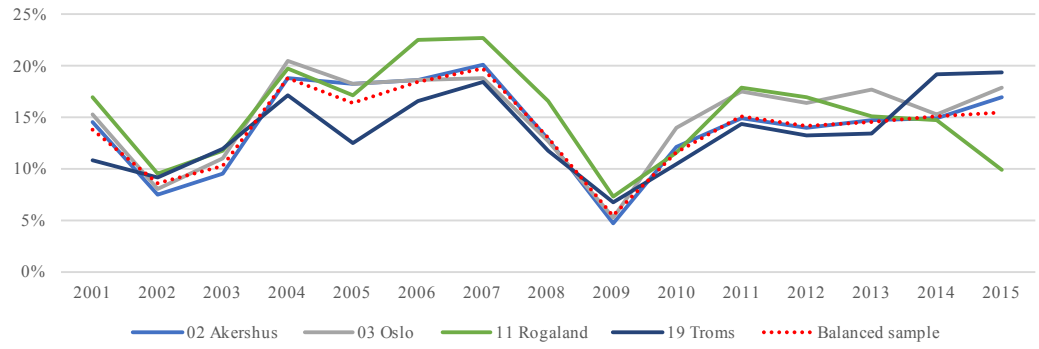


Figure 6.2.3*: Development in growth of sales for Akershus, Oslo, Rogaland and Troms from 2001 to 2015.*

Similar to the growth of sales, ROA seems to be fluctuating more than debt ratio and average interest rate, and varies across the four counties, as illustrated in figure 6.2.4. We can see that Troms has the lowest ROA among the four counties, however, the gap between Troms and the balanced sample seems to be tightening after 2006. This probably means that when bank branches close, firms use their resources more efficiently. Interestingly, ROA in Akershus seems to be decreasing after 2006, even though Akershus has had the fewest bank branch closures. These results contradict our expectations that ROA decrease when bank branches close.

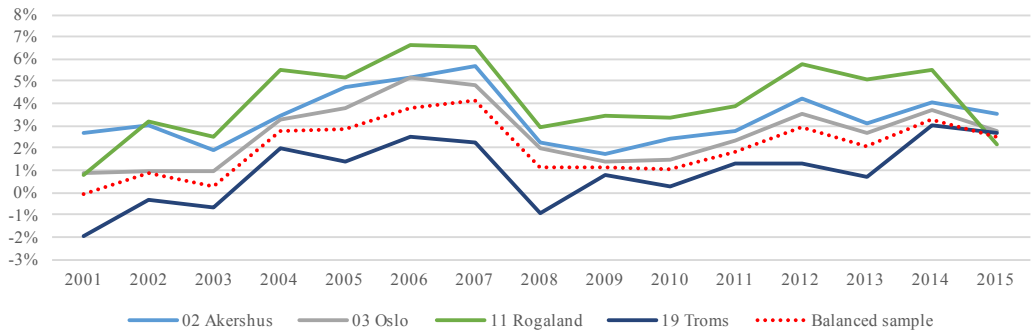


Figure 6.2.4: *Development in ROA for Akershus, Oslo, Rogaland and Troms from 2001 to 2015.*

6.3 Main Variables in Groups and States

In this section, we intend to get an insight into how four of our main variables behave in the different treatment and control groups, and across the states. We analyze how the financial data from CCGR of firms that operates in-between 2001 and 2015, distribute among the different treatment and control groups, and observe if we find any indications that can support our hypotheses.

6.3.1 Debt Ratio

In sample 2, the treatment group and control group differ from one another (71.8%, 77.6%), whereas the treatment group generally has a lower debt ratio. However, the decrease in the debt ratio in the control group has exceeded the treatment group profoundly. This indicates that a bank branch closure solely does not affect credit availability.

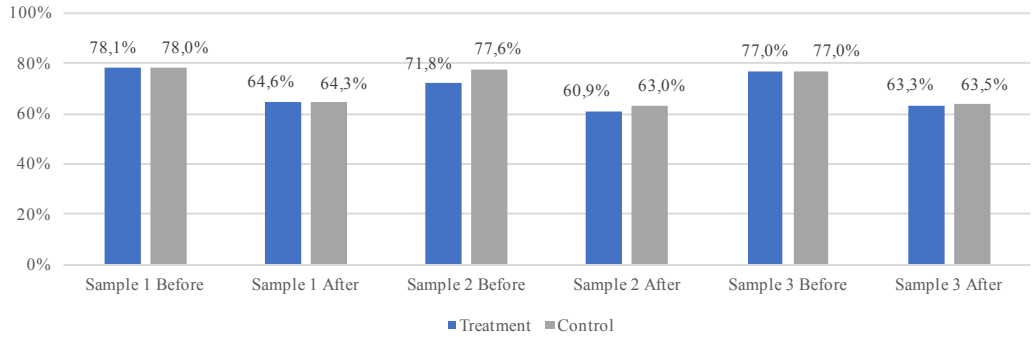


Figure 6.3.1.1: *Debt ratio in states before (2001-2006) and after (2007-2015) for total bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

We observe no distinct differences between the groups regarding savings bank branch closures. However, looking at the difference between the total bank branches (figure 6.3.1.1) and the savings bank branches in sample 2 (figure 6.3.1.2), one can observe that firms' debt ratio in the savings bank branch sample is higher than total bank branches in both states. This indicates that savings bank branches provide some extra liquidity than commercial banks. The difference in change between the treatment and control group is somewhat different, whereas the treatment group has had a higher decrease in debt ratio compared to the control group. Based on this, one might say that a savings bank branch closures can have a negative impact on the debt ratio.

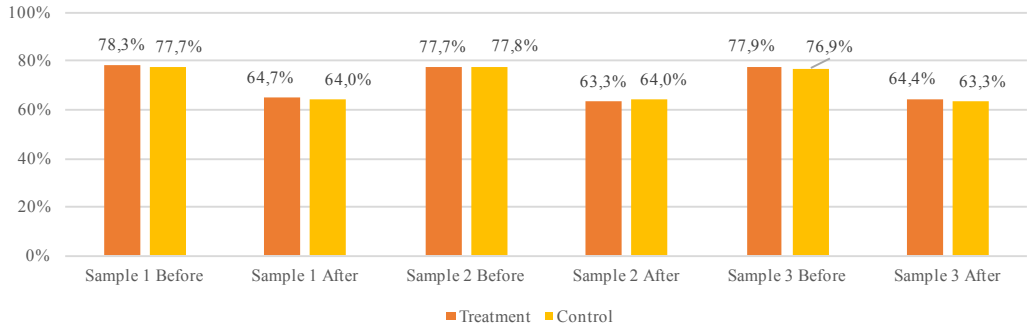


Figure 6.3.1.2: *Debt ratio in states before (2001-2006) and after (2007-2015) for savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

6.3.2 Average Interest Rate

In general, average interest rates have decreased from the first period to the second, as illustrated in figure 6.3.2.1. For sample 1, one can observe that the interest rates in the groups are about the same levels both before and after. In addition, we can observe from sample 3 that the treatment group has had a more extensive decrease (-2.40 percentage points), than the control group (-1.90 percentage points). As the difference between the groups for samples 2 and 3 have increased over time, it is not reasonable to believe that a bank branch closure imposes a higher interest rate. The same applies to sample 2, hence, as the difference between the groups for samples 2 and 3 have increased over time, it is not reasonable to believe that bank branch closures impose lower interest rates.

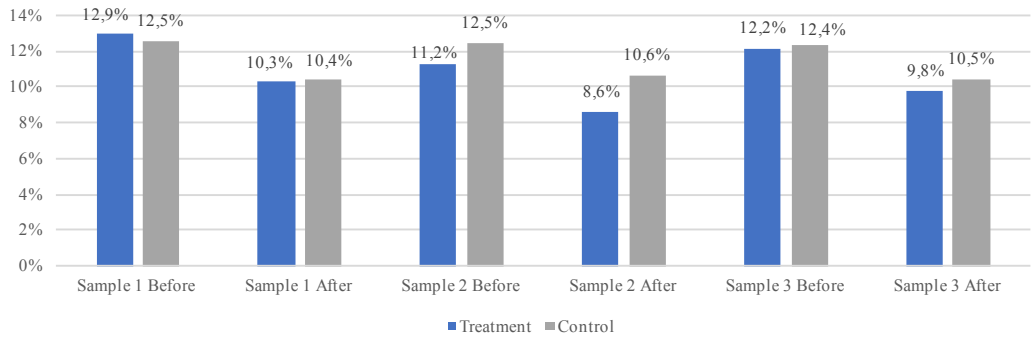


Figure 6.3.2.1*: Average interest rate in states before (2001-2006) and after (2007-2015) for total bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

Concerning the closures of savings banks, the treatment group of sample 2 seems to have a more substantial decrease in interest rates than the control group. This might imply that savings bank branch closures do not impose higher interest rates, as shown in figure 6.3.2.2.

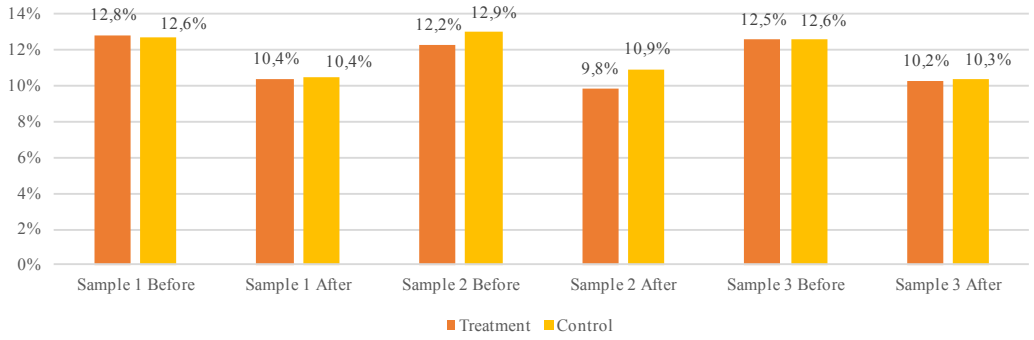


Figure 6.3.2.2*: Average interest rate in states before (2001-2006) and after (2007-2015) for savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

6.3.3 Growth of Sales

In sample 3, we observe that the treatment group used to have a higher growth of sales than the control group, while it is the opposite in the after state. In sample 2, the treatment group appears to have higher growth of sales than the control group (15.22% to 9.19%). Looking at the changes, the treatment group had a reduction of 11.14 percentage points, while the control group has had a decrease of 6.33. The treatment group has suffered substantial loss compared to the control group. From sample 2 and 3, one can observe a tendency that firms' growth of sales is clearly affected by the total bank branch closures.

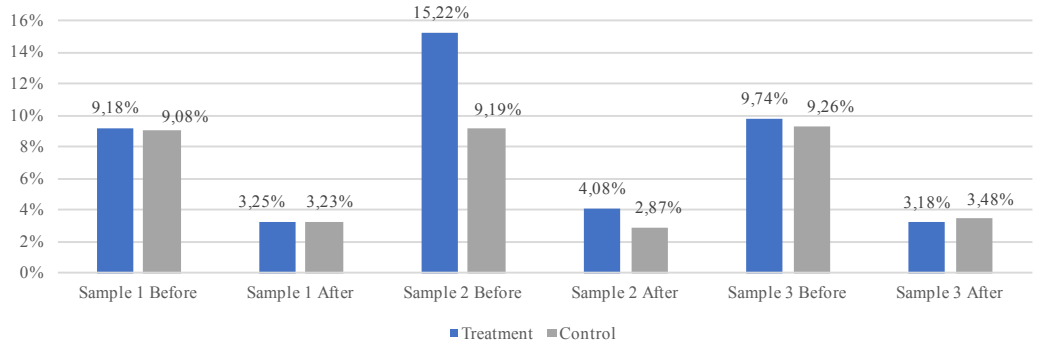


Figure 6.3.3.1*: Growth of sales in states before (2001-2006) and after (2007-2015) for total bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

For savings bank branches, the control groups' growth of sales has decreased more than the treatment group in sample 2, which indicates that a closure of a savings bank branch has a positive impact on the growth of sales. However, in sample 3, the treatment groups' growth of sales has decreased by 5.89 percentage points, while the control group has decreased by 5.43 percentage points. The results from sample 3 make it reasonable to assume that savings bank branch closures do impact the growth of sales.

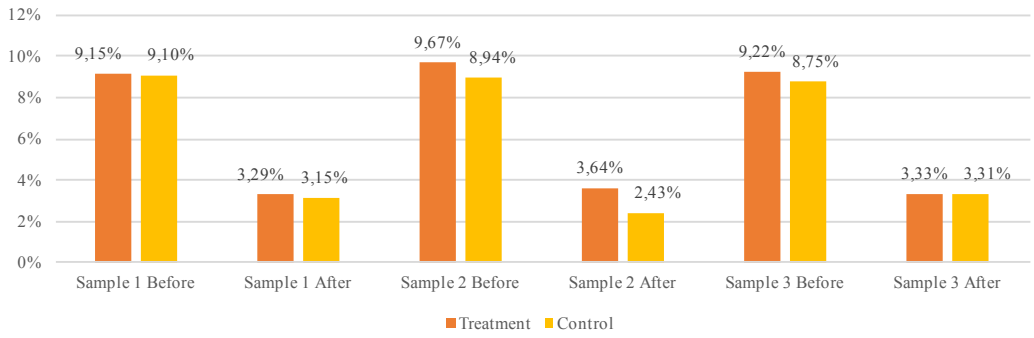


Figure 6.3.3.2: *Growth of sales in states before (2001-2006) and after (2007-2015) for savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

6.3.4 Return on Assets

For samples 1, 2, and 3, the difference in change between the groups is minor, indicating that bank branch closures have no impact on firms' ROA.

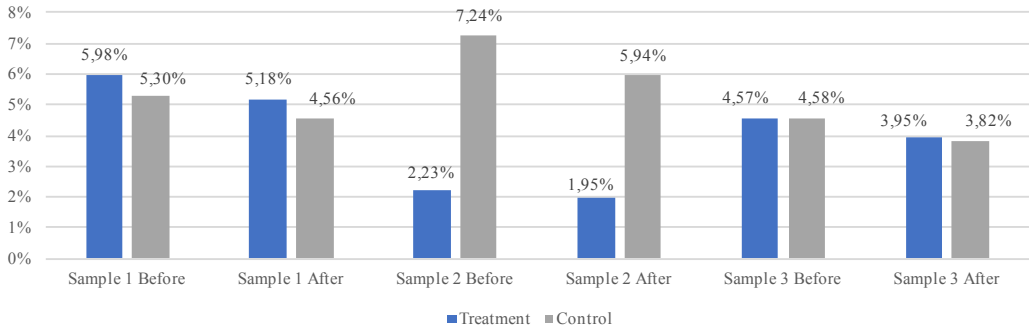


Figure 6.3.4.1: *Average return on assets in states before (2001-2006) and after (2007-2015) for total bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

For samples 1 and 3 in figure 6.3.4.2, we observe that the difference in change between the treatment and control group is slightly higher for the treatment group. This gives an indication that savings bank branch closures impact firms' ROA. However, in sample 2, there are no significant changes between the two groups, indicating that savings bank branch closures do not have any impact on ROA.

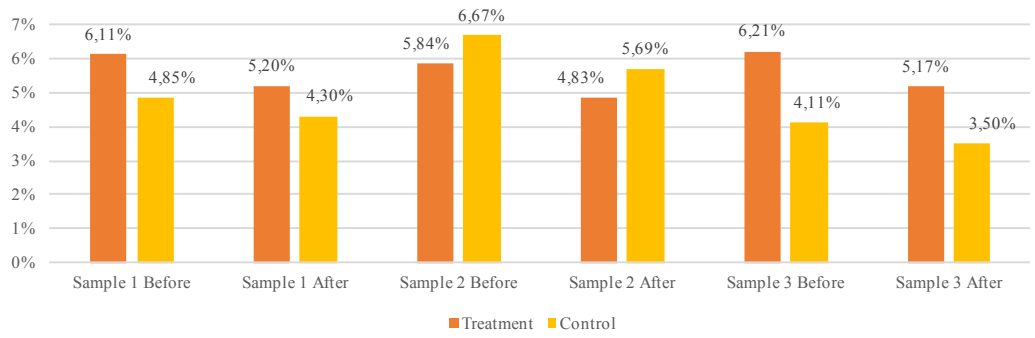


Figure 6.3.4.2*: Average return on assets in states before (2001-2006) and after (2007-2015) for savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

6.5 Summary of Results

From the results of closures in the bank branch landscape, we observe that both total and savings bank branches had the same relative closures from 2001 to 2015 (-34%). When analyzing yearly average bank branch closures, savings banks closed relatively more branches in the first period, while commercial banks closed relatively more in the second period. Further, we observe that there are regional differences in the bank branch closures across counties in Norway. Interestingly, when looking at bank branch closures in relation to the Centrality Class for Norwegian municipalities, the highest closure rates are observed in the most urban (centrality class 1) and most rural (centrality class 6) municipalities. However, bank branches tend to close more frequently in rural areas in Norway. In addition, savings banks tend to pull away from the urban areas, while commercial banks are pulling away from the rural areas. When analyzing closures in relation to the population, the relative closure of bank branches per capita is higher than the relative bank branch closures in the urban areas, while in the rural areas, relative bank branch closures per capita appears to correspond with the relative closures. One can observe that the highest number of branches per capita is in centrality classes 4 and 5, while the lowest observable numbers are in classes 1 and 2.

Observing the development of main variables, we see that firms that perform better on average have a lower debt ratios, comparing the full sample to the firms

operating from 2001 throughout 2015. Further, the growth of sales in the full sample is higher than the balanced sample, indicating that newly established firms have higher growth of sales than stable firms.

In general, there has been a distinct decrease in debt ratio, average interest rate, growth of sales, and ROA amongst all firms represented in the balanced sample. We observe that there is a tendency that savings bank branches provide some extra liquidity compared to commercial banks. Tendencies are pointing towards that savings bank branch closures can have a negative impact on the debt ratio. Judging from the descriptive statistics, we find it hard to believe that we will find that the bank branch closures impose a higher interest rate. In most cases, savings bank branch closures do not seem to have a negative impact on growth of sales, yet we can observe a tendency regarding total bank branch closures. For bank branch closures impact on firms' ROA, we observe contradicting results.

7. Main Regression Analysis

This section presents our main regression analysis with the respective hypotheses, followed by our results and a discussion of whether our findings are in accordance with existing theory and literature. Results are obtained when there is a significant difference between the treatment and control groups in between the two time periods, i.e., when the difference-in-difference (DiD) estimator is significantly different from zero within a 5% level. In addition, we present estimators significant on a 10% level as tendencies. We will provide our results in two segments – firm financing and firm performance. All main variables are run with three different model specifications:

1. Difference-in-difference variables
2. Difference-in-difference with control variables
3. Difference-in-difference with control variables run solely on rural municipalities (centrality class 4, 5 & 6).

The first model intends to establish a benchmark for the difference in main variables between our three different samples of treatment and control groups, distinguishing closures in total bank branches (T) and savings bank branches (S). In the second model, we add control variables that might influence the

performance and financing of firms and local business cycle fluctuations. The purpose of the third model is to establish whether there is a significant difference in rural areas. For our first dependent variable, we will provide the outputs of all three regressions, while for the other main variables we present the tables where we find the most interesting results. Outputs for the remaining tables are found in appendix 11A-H.

7.1 Firm Financing

7.1.1 Debt Ratio

Hypothesis 1A:

H0: Bank branch closures have no impact on firms' debt ratio.

HA: Firms' debt ratio is affected by bank branch closures.

The regression results from model 1, shown in table 7.1.1.1, illustrates that the coefficient of the time dummy in all samples is negative, indicating that there has been a decrease in firms' debt ratio from the state before to after. The DiD estimators show no significant difference between the groups on a 5% level. However, sample 2T is significant on a 10% level, with a positive coefficient equal to 0.0360. Regression model 2 appears to be quite similar to model 1. When including control variables, one can observe that the DiD estimator in sample 2T is significant on a 1% significance level with a coefficient equal to 0.0445, as illustrated in table 7.1.1.2. Where there have been total bank branch closures, we observe an increased debt ratio. For savings bank branches, we do not find evidence consistent with this. One might see a tendency that closures of savings bank branches do not contribute to higher debt ratio. Hence, savings bank branch closures appear to limit the credit available to firms in the municipality, compared to other banks.

Result 1 (2T): A 100% closure of total bank branches has a positive effect on the debt ratio of firms operating in the same municipality, which is inconsistent with our expectations.

Further, running the model on rural areas reveals some interesting results, contradicting the two other models. In sample 1T, 3T and 1S, we find that bank branch closures in rural districts have a negative impact on the debt ratio. The

significant results (on 1%, 5%, and 0.1% level respectively) allows us to reject H0. However, sample 2T remains significant on a 5% level and shows a positive effect. In rural areas, we observe that sample 1S has a higher coefficient than 1T, thus, closures of savings bank branches have a slightly higher impact on firms' debt ratio than total bank branch closures. This indicates that in rural areas, savings bank branches matter more. We cannot say the same for sample 3 since there are only total bank branches which are significant on a 5% level.

Result 2 (1T, 1S): Closures of both total and savings bank branches in rural municipalities have a negative effect on the debt ratio of firms operating in the same municipality, which is aligned with our expectations.

Result 3 (3T): In rural municipalities, total bank branch closure in the first period and no change in bank branches in the second period, have a negative effect on the debt ratio of firms operating in the same municipality, which is aligned with our expectations.

Result 4 (2T): A 100% closure of total bank branches in rural areas has a positive effect on the debt ratio of firms operating in the same municipality, which is inconsistent with our expectations.

From our results, we observe that bank branch closures in rural areas impose a decreasing debt ratio. Hence, when bank-borrower distance increase, total credit availability decrease. This is in accordance with the study of Petersen & Rajan (1994), which states that the credit available to firms is highly influenced by the length and extent of the bank-borrower relationship. Our results prove that distance between the firm and the bank branch matter, and that firms in the rural municipalities of Norway are hit harder by a bank branch closure than an average Norwegian firm. However, we cannot observe the development of bank credit. A higher debt ratio can, for instance, be a result of higher trade credit or higher deferred taxes. When bank branches close, firms are possibly forced to fully utilize their available trade credit.

Model 1 (diff-in-diff) on dependent variable Debt Ratio

$$Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-Diff	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.137***	-0.146***	-0.136***	-0.137***	-0.138***	-0.136***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.000922	-0.0578***	0.000165	0.00609**	-0.00114	0.00942**
	(0.642)	(0.000)	(0.970)	(0.003)	(0.822)	(0.001)
Treatment * time	0.00212	0.0360	-0.00185	0.000606	-0.00624	0.00162
Diff-in-Diff	(0.444)	(0.075)	(0.760)	(0.830)	(0.377)	(0.684)
N	200 201	31 870	42 754	200 201	34 275	107 565
R-sq	4,3 %	5,0 %	4,8 %	4,3 %	4,6 %	4,2 %
adj. R-sq	4,3 %	5,0 %	4,8 %	4,3 %	4,6 %	4,2 %
rmse	0,314	0,311	0,297	0,314	0,312	0,316

Table 7.1.1.1: *Bank branch closures effect on firm financing measured by the dependent variable debt ratio defined in 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

Model 2 (full model) on dependent variable Debt Ratio

$$Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Model	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0782***	-0.0832***	-0.0823***	-0.0765***	-0.0802***	-0.0770***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00533**	-0.0553***	-0.00183	0.0114***	-0.00710	0.0137***
	(0.003)	(0.000)	(0.634)	(0.000)	(0.152)	(0.000)
Treatment * time	-0.0000425	0.0445**	-0.00418	-0.00107	-0.000175	0.000684
Diff-in-Diff	(0.985)	(0.007)	(0.401)	(0.650)	(0.977)	(0.840)
Return on Assets	-0.502***	-0.442***	-0.564***	-0.502***	-0.491***	-0.492***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.0477***	0.0481***	0.0447***	0.0477***	0.0523***	0.0487***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	-0.0126***	-0.00972***	-0.00305**	-0.0126***	-0.0115***	-0.0125***
	(0.000)	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)
Tangibility	-0.0549***	-0.0477***	-0.0511***	-0.0542***	-0.0435***	-0.0604***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.123***	-0.128***	-0.114***	-0.123***	-0.122***	-0.121***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.0245*	0.00920	0.0263	0.0274**	0.0390	0.0279*
	(0.013)	(0.735)	(0.234)	(0.005)	(0.182)	(0.027)
GDP growth	0.0717***	0.0631*	0.0606*	0.0780***	0.0444	0.0722***
	(0.000)	(0.048)	(0.037)	(0.000)	(0.177)	(0.000)
Unemployment Rate	-0.0329	-0.111	-0.160	0.0470	-0.203*	0.0218
	(0.513)	(0.197)	(0.061)	(0.359)	(0.038)	(0.753)
Population	-1.84e-08***	-4.92e-09	-5.56e-08***	-2.57e-08***	-4.50e-08***	-1.44e-08**
	(0.000)	(0.668)	(0.000)	(0.000)	(0.000)	(0.005)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	186 741	29 742	39 909	186 741	31 981	100 279
R-sq	41,4 %	43,6 %	42,9 %	41,5 %	41,5 %	40,8 %
adj. R-sq	41,4 %	43,5 %	42,9 %	41,4 %	41,4 %	40,8 %
rmse	0,247	0,239	0,231	0,247	0,245	0,249

Table 7.1.1.2: *Bank branch closures impact on firm financing measured by the dependent variable debt ratio defined in chapter 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses per county, GDP growth per county, unemployment rate per county and population per county. Controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

Model 3 (rural model) on dependent variable Debt Ratio

$$Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas	Total Bank Branches			Saving Banks Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0830***	-0.0911***	-0.0825***	-0.0817***	-0.0913***	-0.0826***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00882**	-0.0353*	0.00112	0.0111***	-0.00721	0.00889*
	(0.007)	(0.018)	(0.822)	(0.001)	(0.485)	(0.030)
Treatment * time	-0.0115**	0.0414*	-0.0135*	-0.0140***	0.0175	-0.00868
Diff-in-Diff	(0.006)	(0.026)	(0.034)	(0.001)	(0.183)	(0.101)
Return on Assets	-0.597***	-0.506***	-0.609***	-0.597***	-0.567***	-0.611***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.0492***	0.0399**	0.0462***	0.0493***	0.0516***	0.0510***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	-0.0101***	-0.00347	-0.00497**	-0.0101***	-0.0108***	-0.00847***
	(0.000)	(0.264)	(0.001)	(0.000)	(0.000)	(0.000)
Tangibility	-0.0282***	0.0247	-0.0376***	-0.0281***	0.00810	-0.0292***
	(0.000)	(0.098)	(0.000)	(0.000)	(0.536)	(0.000)
Current Ratio	-0.110***	-0.101***	-0.108***	-0.110***	-0.108***	-0.108***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.0435**	0.0536	0.0218	0.0432**	0.0732	0.0443*
	(0.008)	(0.496)	(0.451)	(0.009)	(0.249)	(0.041)
GDP growth	0.0893***	0.175*	0.0734	0.0893***	0.101	0.0753*
	(0.000)	(0.044)	(0.067)	(0.000)	(0.173)	(0.024)
Unemployment Rate	-0.111	-0.200	-0.130	-0.106	-0.858***	-0.0187
	(0.163)	(0.412)	(0.283)	(0.181)	(0.000)	(0.849)
Population	-2.14e-08*	-3.43e-08	-6.62e-08***	-2.13e-08*	3.86e-08	-1.75e-08
	(0.011)	(0.340)	(0.000)	(0.011)	(0.173)	(0.150)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	61 149	5 714	25 699	61 149	7 956	36 814
R-sq	41,3 %	41,2 %	42,2 %	41,3 %	42,1 %	41,3 %
adj. R-sq	41,3 %	40,9 %	42,1 %	41,3 %	41,9 %	41,3 %
rmse	0,238	0,229	0,233	0,238	0,238	0,238

Table 7.1.1.3: *Bank branch closures impact on firm financing in rural areas measured by the dependent variable debt ratio defined in chapter 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses per county, GDP growth per county, unemployment rate per county and population per county. Controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

7.1.2 Financial Debt Ratio

Hypothesis 1B:

H0: Bank branch closures have no impact on firms' financial debt ratio.

HA: Firms' financial debt ratio is affected by bank branch closures.

Looking at the time dummy in model 1, as illustrated in appendix 11 A, we can observe that the proportion of firms' total assets financed by financial debt, has decreased over time which is similar to what we observe for debt ratio. In model 1, we find statistically significant DiD estimators for 1S, 2S, and 3S on a 0.1%, 1%, 0.1% level, respectively. Additionally, 1T and 2T are statistically significant on a 10% level. Sample 1T and the savings bank branches samples' DiD estimators, are all positive. This indicates that bank branch closures have a positive effect on the firms' financial debt ratio, especially in municipalities where there are closures of savings bank branches.

When including control variables in the model, we can observe that the time dummy is positive, as illustrated in table 7.1.2.1. This is the opposite of what we observed in model 1, which means that the financial debt ratio is increasing over time. The same model with debt ratio as the independent variable was decreasing over time. Hence, the proportion of bank debt has increased compared to other debt. The coefficient observed in model 1 is possibly shifted due to the control variable return on assets. This indicates that the decrease in the financial debt ratio is not driven by bank branch closures, but rather a higher ROA which makes the firms less dependent on debt financed by banks as they can finance new projects by the increasingly efficient use of firms' resources. The output of regression model 2 shows that sample 1S, 2S, and 3S are significant on a 0.1% level, while 2T is significant on a 1% level. Sample 1S, 2S, and 3S have positive DiD estimators, indicating that closures of savings bank branches impose a higher financial debt ratio. Hence, it is reasonable to assume that closures of savings bank branches do not impose any issues related to obtaining financial debt. We do not observe the same for total bank branch closures.

Result 5 (1S, 2S, 3S): Independent of sample setup, closures of savings bank branches have a positive impact on the financial debt ratio for firms operating in the same municipality, which is inconsistent with our expectations.

Observing the results of sample 2T, the DiD estimator is negative (-0.0360), which contradicts the results from the same sample and model with debt ratio as the dependent variable, where we had an increase in the debt ratio. This indicates that the bank branch closures had a negative impact on financial debt ratio, however, since bank branch closures had a positive impact on debt ratio, it is reasonable to assume that non-financial debt has risen. This could be a result of higher trade credit in municipalities where the bank branches have closed, due to unavailable bank credit. However, it is worth mentioning that the distribution of observations in the two groups in sample 2T is uneven, which might influence the results and provide unlikely casualties.

Result 6 (2T): A 100% closure of total bank branches has a negative effect on the financial debt ratio of firms operating in the same municipality, which is aligned with our expectations.

In regression model 3, we find that the DiD estimator for sample 1T, 2T and 1S are significant on a 10% level, as illustrated in appendix 11 B. All DiD estimators are negative, which indicates that bank branch closures have a negative impact on financial debt ratio in rural areas. Thus, bank branch closures might impact firms' financial debt ratio in rural areas. However, we cannot observe any severe differences between total and savings bank branch closures. Hence, savings bank branches do not appear to have a more important role than any bank branch, when it comes to bank credit.

Result 7 (1T, 2T, 1S): In rural areas, we observe a tendency that bank branch closures have a negative effect on the financial debt ratio for firms operating in the same municipality, which is aligned with our expectations.

In conclusion, the analysis points to diverging results within the different samples and models. While the significant findings from sample 1S, 2S, and 3S in model 2 cause us to keep H0, stating that savings bank branches have a positive effect on the financial debt ratio, 2T causes a rejection of H0. The positive impact on debt ratio imposed by the closures of savings banks might be due to the savings bank abandonment in urban areas. The sample contains several observations of firms' operating in urban areas, which can switch bank easily within a city. In rural

areas, we would reject H0 on a 10% level, where it seems that bank branch closures have a negative impact on the financial debt ratio. A possible explanation for these results can be related to debt capacity, as a higher debt ratio implies lower bank credit availability. We can observe this in our data by looking at the major difference in the financial debt ratio between rural areas and urban areas. Firms in rural areas have on average a considerably higher financial debt ratio than urban areas, shown in appendix 13 B and illustrated in appendix 13 C.

Model 2 (full model) on dependent variable Financial Debt Ratio

$$Financial\ Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Model	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	0.0153***	0.0169***	0.0194***	0.00807***	0.00105	0.00431
	(0.000)	(0.000)	(0.000)	(0.000)	(0.741)	(0.066)
Treatment Dummy	-0.00585***	0.0589***	-0.00333	-0.0213***	-0.0335***	-0.0331***
	(0.000)	(0.000)	(0.305)	(0.000)	(0.000)	(0.000)
Treatment * time	0.00171	-0.0360**	-0.00208	0.0104***	0.0171***	0.0163***
Diff-in-Diff	(0.294)	(0.009)	(0.593)	(0.000)	(0.000)	(0.000)
Return on Assets	-0.120***	-0.123***	-0.143***	-0.120***	-0.146***	-0.0958***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	0.286***	0.243***	0.401***	0.286***	0.270***	0.262***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth of Sales	0.00277*	0.00841**	0.00757*	0.00275*	0.00677*	0.000146
	(0.030)	(0.005)	(0.011)	(0.032)	(0.035)	(0.928)
Company Size	0.00679***	0.00615***	0.00684***	0.00681***	0.00645***	0.00654***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.416***	0.374***	0.443***	0.415***	0.376***	0.414***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	0.0285***	0.0247***	0.0390***	0.0285***	0.0258***	0.0274***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.0378***	0.0472**	0.0322	0.0333***	0.0234	0.0259**
	(0.000)	(0.009)	(0.065)	(0.000)	(0.229)	(0.001)
GDP growth	0.0101	-0.0133	-0.0370	0.0000344	-0.0263	-0.0197
	(0.270)	(0.497)	(0.084)	(0.997)	(0.232)	(0.082)
Unemployment Rate	-0.0148	-0.268***	0.0651	-0.138***	-0.660***	0.0660
	(0.680)	(0.000)	(0.333)	(0.000)	(0.000)	(0.198)
Population	.000000108***	.000000115***	-7.34e-08***	-9.75e-08***	-6.22e-08***	.000000108***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	186 741	29 742	39 909	186 741	31 981	100 279
R-sq	42,3 %	37,9 %	49,1 %	42,4 %	38,7 %	42,8 %
adj. R-sq	42,3 %	37,8 %	49,1 %	42,3 %	38,6 %	42,8 %
rmse	0,164	0,154	0,17	0,164	0,164	0,158

Table 7.1.2.1: *Bank branch closures impact on firm financing measured by the dependent variable financial debt ratio defined in chapter 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached house, GDP growth, unemployment rate and population. Controlled for industries, see appendix 12. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*

7.1.3 Average Interest Rate

Hypothesis 2:

H0: Bank branch closures have no impact on firms' average interest rates.

HA: Firms' average interest rate is affected by closures of bank branches.

In model 1, we find that the DiD estimator in sample 1T is significant on a 1% level with a negative coefficient, as shown in appendix 11 C. Including control variables, we find that the DiD estimator is significant in sample 1T, 3T, 1S and 2S (significance level 0.1%, 5%, 1% and 1%), with negative coefficients, as illustrated in table 7.1.3.1. This indicates that there is a significant difference between the treatment and control group in the different samples, the average interest rate seems to decrease when bank branches close.

Result 8 (1T, 1S): Closures of both total and savings bank branches have a negative effect on the average interest rate of firms operating in the same municipality, which is inconsistent with our expectations.

Result 9 (3T): Total bank branch closure in the first period and no change in bank branches in the second period, have a negative effect on the average interest rate of firms operating in the same municipality, which is inconsistent with our expectations.

Result 10 (2S): A 100% closure of savings bank branches has a negative effect on the average interest rate of firms operating in the same municipality, which is inconsistent with our expectations.

In rural areas, we find that 3T and 3S are significant on a 5% level, while T1 is significant on a 10% level. 3T and 3S have a coefficient of -0.00657 and -0.00510, respectively, as illustrated in appendix 11 D.

Result 11 (3T, 3S): In rural municipalities, total and savings bank branch closure in the first period and no change in bank branches in the second period, have a negative effect on the average interest rate, i.e., average interest rate has decreased, of firms operating in the same municipality, which is inconsistent with our expectations.

All findings are inconsistent with our expectations. Hence, that bank branch closures impose a lower interest rate. These results contradict existing literature, as Degryse & Ongena (2008) states that the cost of debt in terms of lending rate increases when bank-borrower distance increase. In addition, the closure of a bank branch would imply that the competition between bank branches would decline. Hence, one would expect an increasing interest rate due to less competition between the remaining branches. However, combined with the results from the debt ratio analysis, it might be that the banks only keep lending to their best customers, and provide better lending terms, hence, the financial debt ratio decreases and the interest rate decreases.

Model 2 (full model) on dependent variable Average Interest Rate

$$Average\ interest\ rate_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Model	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.00478***	0.00450	-0.000865	-0.00514***	0.00418	-0.00561***
	(0.000)	(0.062)	(0.640)	(0.000)	(0.112)	(0.000)
Treatment Dummy	0.00121	-0.00136	-0.00130	-0.00145	0.00501	-0.00394*
	(0.277)	(0.791)	(0.540)	(0.195)	(0.086)	(0.011)
Treatment * time Diff-in-Diff	-0.00480***	-0.00241	-0.00586*	-0.00360**	-0.00979**	-0.00306
	(0.001)	(0.712)	(0.028)	(0.009)	(0.006)	(0.108)
Return on Assets	-0.0982***	-0.0928***	-0.116***	-0.0982***	-0.0992***	-0.0998***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.00787***	-0.00268	-0.00610	-0.00788***	-0.00939*	-0.00489*
	(0.000)	(0.583)	(0.058)	(0.000)	(0.022)	(0.037)
Growth in sales	0.00514***	0.00345	0.0108***	0.00513***	0.00800**	0.00589***
	(0.000)	(0.302)	(0.000)	(0.000)	(0.008)	(0.000)
Company Size	-0.00313***	-0.00483***	-0.00460***	-0.00314***	-0.00445***	-0.00303***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.134***	-0.134***	-0.139***	-0.135***	-0.130***	-0.136***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.0213***	-0.0223***	-0.0219***	-0.0214***	-0.0230***	-0.0201***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	-0.0424***	-0.0659***	-0.0392***	-0.0428***	-0.0694***	-0.0340***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
GDP growth	0.0155	0.0673**	0.0318	0.0131	0.0803***	-0.00207
	(0.069)	(0.003)	(0.053)	(0.126)	(0.000)	(0.857)
Unemployment Rate	-0.0901**	0.276***	0.0890	-0.107***	0.271***	-0.100**
	(0.002)	(0.000)	(0.059)	(0.000)	(0.000)	(0.007)
Population	-1.68e-08***	-4.02e-08***	-3.20e-08***	-1.47e-08***	-3.61e-08***	-1.22e-08***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	56 780	7 438	14 888	56 780	9 103	28 951
R-sq	22,2 %	22,7 %	24,7 %	22,2 %	22,9 %	22,7 %
adj. R-sq	22,2 %	22,5 %	24,5 %	22,2 %	22,7 %	22,6 %
rmse	0,0786	0,0801	0,0746	0,0786	0,0791	0,0768

Table 7.1.3.1: *Bank branch closures impact on firm financing measured by the dependent variable average interest rate defined in chapter 4.1.2. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: ROA ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth of sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached house, GDP growth, unemployment rate and population. Controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

7.2 Firm Performance

7.2.1 Growth of Sales

Hypothesis 3:

H0: Bank branch closures have no impact on firms' growth of sales.

HA: Firms' growth of sales is affected by bank branch closures.

In model 1, we find no significant DiD estimators, as illustrated in appendix 11 E. From model 2 and 3, we observe that 2T has a significant DiD estimator of -0.0749 at a 5% level in model 2 and -0.0739 at a 5% level in model 3, as shown in appendix 11 F and table 7.2.1.1. Hence, we do not find that rural areas differ from the general basis.

Result 12 (2T): On the general basis and in rural areas, a 100% closure of total bank branches has a negative effect on the growth of sales of firms operating in the same municipality, which is aligned with our expectations.

Despite that the DiD estimators for the remaining samples are insignificant, it is noteworthy to mention that the growth of sales regression models have conflicting DiD estimators, whereas some coefficients are positive, and some are negative. This question whether our results are credible, especially considering that the treatment and control group in sample 2 are uneven. If one judge our results to be credible, we have found significant evidence which indicates that firms' growth of sales is negatively affected by total bank branch closures. Savings bank branch closures seem to have no negative impact on firms' growth of sales. However, we cannot state whether savings banks keep their branches in areas where the bank branches are needed to sustain firm growth, while other banks may close their branches due to non-profitable operations, as the banks differ in primary objectives. Hence, savings banks might close in areas where firms are not dependent on their functions and keep branches where firms' growth of sales is low. From the financial debt ratio regression analysis, we observe that both on a general basis and in rural areas, a 100% decrease of total bank branches has a negative impact on the financial debt ratio for firms operating in the same municipality. Hence, when bank credit availability decreases, firms might be financially constrained and unable to pursue new positive NPV projects.

Model 3 (rural model) on dependent variable Growth of Sales

$$Growth\ of\ Sales = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0116**	-0.00844	-0.0101	-0.0137**	-0.00259	-0.0136*
	(0.006)	(0.527)	(0.130)	(0.001)	(0.820)	(0.013)
Treatment Dummy	-0.00199	0.0946**	0.00713	-0.00423	0.0414*	-0.00237
	(0.693)	(0.002)	(0.382)	(0.395)	(0.016)	(0.710)
Treatment * time Diff-in-Diff	-0.000101	-0.0739*	-0.0122	0.00593	-0.0121	0.00548
	(0.987)	(0.033)	(0.209)	(0.327)	(0.557)	(0.476)
Return on Assets	0.490***	0.456***	0.510***	0.490***	0.440***	0.487***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	0.0948***	0.0859**	0.0955***	0.0949***	0.101***	0.0977***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	0.0221***	0.0157**	0.0197***	0.0221***	0.0188***	0.0213***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.0469***	0.0421*	0.0376***	0.0468***	0.0456*	0.0442***
	(0.000)	(0.050)	(0.000)	(0.000)	(0.013)	(0.000)
Current Ratio	-0.00176	-0.00118	-0.00314	-0.00177	0.000401	-0.00168
	(0.268)	(0.814)	(0.176)	(0.266)	(0.928)	(0.391)
House Price sq.m. growth	0.161***	0.318*	0.165***	0.161***	0.250*	0.142***
	(0.000)	(0.021)	(0.000)	(0.000)	(0.024)	(0.000)
GDP growth	0.271***	0.374**	0.337***	0.272***	0.468***	0.318***
	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment Rate	0.187	0.128	0.244	0.187	0.696*	0.226
	(0.099)	(0.754)	(0.171)	(0.097)	(0.026)	(0.114)
Population	-4.05e-08***	-2.27e-08	-4.89e-08*	-4.07e-08***	-6.14e-08	-5.16e-08**
	(0.000)	(0.679)	(0.030)	(0.000)	(0.087)	(0.003)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	61 149	5 714	25 699	61 149	7 956	36 814
R-sq	6,5 %	6,7 %	6,6 %	6,5 %	6,1 %	6,4 %
adj. R-sq	6,5 %	6,3 %	6,5 %	6,5 %	5,8 %	6,3 %
rmse	0,3310	0,3350	0,3360	0,3310	0,3330	0,3300

Table 7.2.1.1: *Bank branch closures effect on firm performance in rural areas measured by the dependent variable growth of sales defined in 4.1.3. The independent variable of interest is the difference-in-difference estimator. Tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*

7.2.2 Return on Assets

Hypothesis 4:

H0: Bank branch closures have no impact on firms' ROA.

HA: Firms' ROA is affected by bank branch closures.

In model 1, we observe that 1S is significant at a 5% level with a coefficient of -0.00363 and 3S is significant at a 10% level with a coefficient of -0.00431, as shown in appendix 11 G. This indicates that savings bank branch closures have a negative impact on firms' ROA. When including control variables, we see that only 2T is significant at a 1% level with a positive coefficient of 0.0278, as illustrated in table 7.2.2.1.

Result 13 (2T): A 100% closure of total bank branches has a positive effect on return on assets of firms operating in the same municipality, which is inconsistent with our expectations.

Similarly, in rural areas, we observe that 2T with a coefficient of 0.0348 and 2S with a coefficient of 0.0149 are significant at a 1% and 5% level, as observed in appendix 11 H.

Result 14 (2T, 2S): A 100% closure of both total and savings bank branches in rural areas has a positive effect on return on assets of firms operating in the same municipality, which is inconsistent with our expectations.

Overall, bank branch closures do not seem to have any negative impact on ROA. Thus, it contradicts our expectation, that firm performance decreases due to less bank credit available to firms, caused by loss of the bank-borrower relationship. However, there is no way to know what happens to the loan officers of that bank. One possible scenario is that the officer moves the soft information to the neighbor municipality, another is that the officer starts working in a competing bank, and continue the relationship in the new bank. Hence, bank branch closures might not necessarily indicate that firms will perform worse.

Further, as we observed from the regression analysis on the financial debt ratio, we find that a 100% closure of total bank branches has a negative effect on

financial debt ratio, on a general basis and in rural areas. For the same sample, we find that total bank branch closures have a positive effect on ROA. This might imply that firms have higher financial constraints as they only pursue investments that are most profitable. This might indicate that bank branch closures have a negative impact on firm performance, as ROA cannot always predict good performance.

Model 3 (rural model) on dependent variable Return on Assets

$$ROA = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0313***	-0.0460***	-0.0369***	-0.0312***	-0.0408***	-0.0336***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00528**	-0.0348***	0.000150	0.00597**	-0.0177**	0.00463
	(0.009)	(0.000)	(0.962)	(0.002)	(0.004)	(0.067)
Treatment * time	-0.00195	0.0348**	0.00281	-0.00234	0.0149	0.000720
Diff-in-Diff	(0.437)	(0.003)	(0.467)	(0.340)	(0.052)	(0.817)
Debt Ratio	-0.202***	-0.192***	-0.209***	-0.202***	-0.198***	-0.202***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth of Sales	0.0860***	0.0803***	0.0845***	0.0860***	0.0783***	0.0842***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	0.0151***	0.0175***	0.0170***	0.0151***	0.0157***	0.0149***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.0887***	-0.0846***	-0.0849***	-0.0885***	-0.0817***	-0.0866***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.0108***	-0.00986***	-0.00941***	-0.0107***	-0.0120***	-0.00951***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.0251*	-0.0802*	0.0189	0.0251*	0.0110	0.0323*
	(0.010)	(0.036)	(0.263)	(0.010)	(0.773)	(0.015)
GDP growth	0.106***	0.107*	0.106***	0.107***	0.117**	0.101***
	(0.000)	(0.046)	(0.000)	(0.000)	(0.008)	(0.000)
Unemployment Rate	-0.325***	-0.174	-0.321***	-0.326***	-0.279*	-0.363***
	(0.000)	(0.285)	(0.000)	(0.000)	(0.028)	(0.000)
Population	2.95e-08***	-5.42e-09	3.88e-08***	3.04e-08***	1.96e-08	3.98e-08***
	(0.000)	(0.827)	(0.000)	(0.000)	(0.267)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	61 149	5 714	25 699	61 149	7 956	36 814
R-sq	22,5 %	21,8 %	23,9 %	22,5 %	22,1 %	22,8 %
adj. R-sq	22,5 %	21,5 %	23,8 %	22,5 %	21,9 %	22,8 %
rmse	0,1390	0,1410	0,1370	0,1390	0,1400	0,1370

Table 7.2.2.1: *Bank branch closures effect on firm performance in rural areas measured by the dependent variable Return on Assets defined in 4.1.4. The independent variable of interest is the difference-in-difference estimator. Tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included is as follows: debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

7.3 Summary of Results

Regarding credit availability, we find that a 100% closure of total bank branches has a positive effect on the debt ratio of firms operating in the same municipality. However, for the same sample, we find that the financial debt ratio has decreased. This might indicate that firms have expanded their non-financial debt such as trade credit, as bank credit might have been unavailable. In rural areas, we find that the closures of both total and savings bank branches in rural municipalities have a negative effect on the debt ratio of firms operating in the same municipality. As for the financial debt ratio, we observe a tendency that bank branch closures have a negative effect on bank credit availability. These results are consistent with our alternative hypotheses and expectations and support previous literature, that relationship lending and evaluation of soft information tend to be more crucial in rural areas. However, we do not find any evidence consistent with literature that lending rates increase with an increasing distance between bank and borrower. We rather find that bank branch closures impose a lower interest rate. Combined with a lower credit available, a possible explanation could be that banks only offer their best customers better lending terms, hence the lower financial ratio and lower interest rate. In conclusion, we find some evidence to reason that bank branch closures seem to impact firm financing and that rural areas are hit harder than others. However, we find no evidence that firms are more affected by savings bank branch closures.

Further, we find that on a general basis and in rural areas, a 100% closure of total bank branches has a negative effect on the growth of sales of firms operating in the same municipality. This result is in accordance with our alternative hypothesis and expectations based on theory and existing literature. For the same sample, we have established that the financial debt ratio has decreased. Hence, lower bank credit seems to have affected firm performance in terms of growth of sales. Analyzing the return on assets, we find that a 100% closure of both total and savings bank branches has a positive effect on return on assets of firms operating in the same municipality, in general, and rural areas. Thus, this result contradicts our alternative expectations based on theory and existing literature. However, an increasing ROA might indicate that firms are forced to only pursue the most profitable projects as they are unable to raise sufficient capital to realize all positive NPV projects due to the decreased financial debt ratio.

8. From Performance to Closures: Reverse Exercise

In order to improve the validity and robustness of our analysis, and obtain a thorough picture of the development within the Norwegian bank branch landscape, we have performed a "reverse exercise", where we analyze whether firm performance has influenced bank branch closures. In this section, we run four cross-sectional regression models, where we try to explain how firm performance in the first period (2001-2006) has had an impact on relative bank branch closures in the second period (2007-2015). Hence, we run only the years 2001 to 2006 on the relative bank branch closures in the second period. The model includes firm performance indicators (ROA and growth in sales), while we control for other financial, industry, and macro variables. The two main variables, relative bank branch closures of total and savings banks, are run with two different model specifications:

1. Cross-sectional model with control variables
2. Cross-sectional model with control variables in rural areas

In model 1 for total bank branches, we find that ROA is significant on a 5% level with a coefficient of 0.018014, as shown in table 8.1.1. A positive coefficient inclines that the variables move together. Since the bank branch closures are given in a negative sign, a one-unit decrease in ROA infers a 0.018014 percentage points decrease in the mean of relative bank branch closures.

Result 1: Firms' return on assets has a positive impact on relative changes of total bank branches in the same municipality, hence, a decrease in ROA imposes a decrease in total bank branches, i.e., bank branch closures.

In model 1 for savings bank branches, we find that growth of sales is the main firm performance indicator that causes savings bank branches to close, however, the coefficient is quite small (0.002902) and significant only at a 10% level, illustrated in table 8.1.2. However, we find a tendency that a decrease in firms' growth of sales seems to impact savings bank branch closures, on a general basis.

Model 1 – Relative Bank Branch Closures as dependent variable

$$\%Closures = \alpha + \beta_1 ROA_{i,t} + \beta_2 Growth\ of\ Sales_{i,t} + controls_{i,t} + u$$

Reverse Analysis - Perfomance on Bank Branch Closures				
Full Model	**Total BB closures 07-15**		**Savings BB closures 07-15**	
Independent variables	**Coef.**	**P>t**	**Coef.**	**P>t**
Firm survival (D)	0,0010207	0,721	-0,000106	0,979
New Firms (D)	-0,004506	0,640	-0,027713	0,001
Return on Assets	0,018014	0,011	-0,003012	0,711
Debt Ratio	0,000278	0,958	-0,000266	0,970
Growth of Sales	0,002527	0,180	0,002902	0,097
Company Size	-0,000891	0,539	0,000831	0,486
Tangibility	-0,006948	0,670	-0,034651	0,115
Current Ratio	-0,000254	0,860	-0,000641	0,760
Houseprice growth per sqm.	-0,145058	0,021	-0,147534	0,037
GDP growth	0,199261	0,237	-0,247688	0,059
Unemployment Rate	-0,873130	0,612	2,187174	0,106
Population	0,000000	0,600	0,000000	0,789
Constant Term	-0,114743	0,242	-0,125366	0,235
Controlled for industry	yes	yes	yes	yes
Number of obs	335 840		317 599	
F(22, 405)	3,09		3,32	
Prob > F	0,000		0,000	
R-squared	0,0087		0,0123	
Root MSE	0,33099		0,39959	
Clusters in municipalities*	406		406	

*(Std. Err. Adjusted for 406 clusters in s_mun_no)

D = dummy

BB = Bank Branches

Table 8.1.1: *Firms' performance, measured by growth of sales and ROA defined in chapter 4.1.3 and 4.1.4, impact on bank branch closures in between 2007 and 2015. The dependent variables are 1) relative closures of total bank branches in the second period on municipality level, 2) relative closures of savings bank branches in the second period on municipality level. Control variables included: company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population. Controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

Concerning rural areas, the regression outputs for total bank branches tell us that ROA is significant on a 0.1% level. When ROA decreases by one-unit, total bank branches are reduced by 0.040955 percentage points. Comparing the coefficients of ROA in models 1 and 2, it appears that ROA is more affected by a decrease in one unit in rural areas, compared to a general basis. Hence, when firms in rural areas perform poorly, there is a bigger chance of bank branch closures.

Result 2: In rural areas, firms' return on assets has a positive impact on relative changes of total bank branches in the same municipality, hence, a decrease in ROA imposes a decrease in total bank branches, i.e., bank branch closures.

Result 3: Compared to a general basis, total bank branches in rural areas are more likely to close when firms' ROA is decreasing.

In model 2 for savings bank branches, we find that ROA is significant on a 5% level with a coefficient of 0.037307, as shown in table 8.2. Looking at the difference in the ROA coefficients of total and savings bank branches in rural areas, we observe that the coefficient of savings bank branch closures is lower than total bank branch closures. This might indicate that savings bank branch closures are not as affected by firms' ROA.

Result 4: In rural areas, firms' return on assets has a positive impact on relative changes of savings bank branches in the same municipality, hence, a decrease in ROA impose a decrease in savings bank branches, i.e., bank branch closures.

Result 5: In rural areas, savings bank branch closures are not as affected by firms' ROA compared to total bank branch closures.

In conclusion, we find that bank branch closures are affected by firm performance, mainly that a decrease in return on assets impose bank branch closures. We observe that the coefficients in rural areas are much higher than the full model. Hence, bank branch closures in rural areas seem to be more affected by firms' ROA. However, looking at the control variables for all models, we find that other financial and macro variables also seem to impact bank branch closures. Hence, ROA does not seem to be a decisive factor of bank branch closures in rural areas. Other significant variables that impact bank branch closures, is presented in appendix 14.

Model 2 – Rural Areas with Relative Bank Branch Closures as dependent variable

$$\%Closures = \alpha + \beta_1 ROA_{i,t} + \beta_2 Growth\ of\ Sales_{i,t} + controls_{i,t} + u$$

Reverse Analysis - Perfomance on Bank Branch Closures				
Rural Model	**Total BB closures 07-15**		**Savings BB closures 07-15**	
Independent variables	**Coef.**	**P>t**	**Coef.**	**P>t**
Firm survival (D)	0,000581	0,909	0,000394	0,948
New Firms (D)	-0,022215	0,018	-0,026275	0,033
Return on Assets	0,040955	0,001	0,037307	0,012
Debt Ratio	0,022827	0,064	0,014587	0,304
Growth of Sales	0,002701	0,413	0,005152	0,215
Company Size	0,005319	0,013	0,007083	0,002
Tangibility	-0,047292	0,001	-0,053928	0,003
Current Ratio	0,002356	0,352	0,001879	0,512
Houseprice growth per sqm.	-0,119875	0,003	-0,157381	0,000
GDP growth	0,087770	0,526	0,036085	0,835
Unemployment Rate	2,353529	0,072	3,997475	0,036
Population	0,000000	0,187	-0,000001	0,043
Constant Term	-0,301719	0,000	-0,196986	0,054
Controlled for industry	yes	yes	yes	yes
Number of obs	96 495		94 334	
F(22, 405)	3,55		3,32	
Prob > F	0,000		0,000	
R-squared	0,0203		0,0329	
Root MSE	0,36492		0,42881	
Clusters in municipalities*	306		296	

*(Std. Err. Adjusted for clusters in s_mun_no)

D = dummy

BB = Bank Branches

Table 8.1.2: *Firms' performance, measured by growth of sales and ROA defined in chapter 4.1.3 and 4.1.4, impact on bank branch closures in between 2007 and 2015 in rural areas. The dependent variables are 1) relative closures of total bank branches in the second period on municipality level, 2) relative closures of savings bank branches in the second period on municipality level. Control variables included: company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population. Controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

9. Survival Analysis & New Firm Analysis

9.1 Descriptive Statistics of Closures and Newly Established Firms

9.1.1 Startups and Closures

In the CCGR dataset, company age is somewhat unevenly distributed and contains several missing values, especially in the years of 2001 and 2002. To obtain more proper numbers of firm startups and closures, we have decided to assign each firm a dummy variable signifying in which year the first and last observation was made. As 2001 includes all firms entering the sample and 2015 includes all existing firms, we exclude these for startups and closures, respectively. For this part of the analysis, we are using one set of the previously introduced treatment and control groups. The treatment group contains municipalities where there have been closures in total bank branches, and the control group contains municipalities where there have been no changes or an increase in total bank branches (sample 1). However, differing from previous analysis, we are using the full sample to catch the firm closures and startups, instead of the balanced sample.

Table 9.1.1 presents the general trend amongst startups and firm closures in each year of the full sample. Comparing the two periods, there was an average increase of 1.2% in startups from the first period to the second. There were 54 098 firm establishments during the five-year period (2002-2006), while in the second period there were 98 551 startups over a nine-year period (2007-2015). Comparing the two on a yearly basis, it was on average 10 820 startups a year in the first period, and 10 950 in the second period, indicating that in general, the number of startups has increased.

Regarding firm closures, relative closures increased by 10.7% from the first period to the second, which states that firm closures accelerated in the second period. In the first period, there were 46 501 firm closures, which amount to a yearly average of 7 750 firm closures. In the second period, there were 68 637 firm closures in total, a yearly average of 8 580 firm closures.

Year	Startups	Closures	Total Firms	Startup Rate	Closure Rate
2001		6071	57079		10,6 %
2002	4115	4840	53131	7,7 %	9,1 %
2003	21458	7337	68700	31,2 %	10,7 %
2004	9710	7182	70184	13,8 %	10,2 %
2005	9898	8280	71592	13,8 %	11,6 %
2006	8917	12791	69246	12,9 %	18,5 %
Total Before	54098	46501			
Yearly Avg.	10 820	7 750			
2007	13417	8256	71070	18,9 %	11,6 %
2008	8436	7879	70807	11,9 %	11,1 %
2009	7498	7313	70605	10,6 %	10,4 %
2010	8471	7231	72350	11,7 %	10,0 %
2011	8601	8117	73846	11,6 %	11,0 %
2012	13262	8453	79829	16,6 %	10,6 %
2013	14149	16485	86565	16,3 %	19,0 %
2014	13692	4903	86399	15,8 %	5,7 %
2015	11025		94590	11,7 %	
Total After	98551	68637			
Yearly Avg.	10 950	8 580			
Change	1,2 %	10,7 %			

Table 9.1.1: *Startups and closures in the full data sample from CCGR year-by-year.*

Table 9.1.2 illustrates the startups and closures in areas where there have been closures of total bank branches (treatment group), one can observe that the startups on a yearly basis in the first period were 5 754 and 5 635 in the second period. Thus, the startup rate has been reduced by 2.1% on average where there have been total bank branch closures. In the control group, one can observe that the startups have increased from the first period to the second by 4.9% on average. Hence, we observe a pattern that the closure of bank branches negatively affects the number of startups.

Considering firm closures, the treatment group had an increase of 5.4% on average each year, while the control group had an increase of 17%. Comparing the two, the firm closures in the control group have accelerated quite heavily compared to the treatment group. The treatment group has an increase lower than the general trend in the before state of 10.7%, indicating that firm closures are unrelated to closures in total bank branches.

Sample 1 - Total		Startups	Yearly Avg.	Closures	Yearly Avg.	Obs. Startups	Obs. Closures
Treatment	Before	28 772	5 754	25 363	4 227	173 445	203 572
	After	50 716	5 635	35 653	4 457	354 202	306 576
Control	Before	25 326	5 065	21 138	3 523	159 408	186 360
	After	47 835	5 315	32 984	4 123	351 859	304 895
Change Treatment			-2,1 %		5,4 %		
Change Control			4,9 %		17,0 %		

Table 9.1.2*: Startups and closures in treatment and control group 1 (total bank branches). Observations in startups column is total observations in group excluded 2001 in before state, while observation in closures columns is observations in each group, excluding 2015 in the after state.*

Moving on to savings bank branches, we observe the same trends as for total bank branches. However, the decrease in startups is not as distinct as the one for total bank branches (-2.1% to -0.4%). This indicates that the closures of savings bank branches do not affect the number of startups as much as total bank branches. Regarding firm closures, the increase is a bit higher than for total bank branches, but in general, we see the same trends. This might indicate that a closure of a savings bank branch affects firm closures even more than a closure of any bank branch. However, since control group closures have increased much higher than the treatment group, one cannot say that a savings bank branch closure affects the number of firm closures.

Sample 1 - Savings		Startups	Yearly Avg.	Closures	Yearly Avg.	Obs. Startups	Obs. Closures
Treatment	Before	34 933	6 987	30 587	5 098	213 780	250 785
	After	62 630	6 959	43 708	5 464	443 747	383 859
Control	Before	19 165	3 833	15 914	2 652	119 073	139 147
	After	35 921	3 991	24 929	3 116	262 314	227 612
Change Treatment			-0,4 %		7,2 %		
Change Control			4,1 %		17,5 %		

Table 9.1.3: *Startups and closures in treatment and control group 1 (savings bank branches). Observations in startups column is total observations in group excluded 2001 in before state, while observation in closures columns is observations in each group, excluding 2015 in the after state.*

Summarizing the findings, one can observe from the analysis that:

(1) There is a general trend that startups are more frequent than firm closures on average. However, the relative increase in firm closures has been increasing from the first period to the other.

(2) In municipalities where there have been closures of total bank branches,

there has been a decrease in the number of startups. Municipalities with closures of total bank branches have suffered a higher decrease in startups, than in municipalities where there have been closures of savings bank branches.

(3) The changes in the closures of firms seem to have no impact on bank branch closures when comparing the control and treatment group. However, it appears that municipalities, where there are closures of savings bank branches, are somewhat more affected than the closure of total bank branches.

9.1.2 Survival of Startups

To analyze the lifetime and survival of startups, we continue to use our first treatment and control group on the full sample. By using the dummy variable constructed by noting the first observation of each firm, and thereby lagging this variable up to 8 lags, we were able to follow certain startups. In the state before, we follow startups originated in 2002 and five years into their life (4 lags), while in the after state we follow startups originated in 2007 and into 2015 (8 lags).

Table 9.1.4 presents the existence and survival rate of startups from the year in the state before. In 2002, there were 4 115 startups in total, whereas 65% of the firms survived until the next year. By the second year, 49% survived, and after five years only 24% of the firms remained. Looking at the treatment and control group for total bank branches, one can observe that the control group is doing somewhat better than the treatment group. This also holds for savings bank branches, but the differences are less distinct. Comparing the total and savings bank branches, they appear to be almost equal.

Year	2002	2003	2004	2005	2006	2007
Existence	0	1	2	3	4	5
Startups	4 115	2 656	2 011	1 620	1 250	1 003
Survival Rate		65 %	49 %	39 %	30 %	24 %
Sample 1 - Total						
Treatment	2416	1508	1140	934	715	567
Survival Rate		62 %	47 %	39 %	30 %	23 %
Control	1699	1148	871	686	535	436
Survival Rate		68 %	51 %	40 %	31 %	26 %
Sample 1 - Savings						
Treatment	2890	1841	1390	1130	866	684
Survival Rate		64 %	48 %	39 %	30 %	24 %
Control	1225	815	621	490	384	319
Survival Rate		67 %	51 %	40 %	31 %	26 %

Table 9.1.4: *Existence and survival rate of startups from year 2002 (before). Counting observations yearly by limiting the count by groups, year and the lags of first observation. Example: count if (d_treat1_T ==1) & (yr==2003) and (d_lag1 ==1).*

In 2007, there were 13 417 startups. Looking at the survival rates in the after state in table 9.1.5, one can observe that the survival rates tend to be higher, indicating that startups from 2007 are surviving relatively longer than the startups from 2002. While 24% of the 2002 startups remained after five years, 41% of the 2007 startups survived their five first years, as illustrated in table 9.1.5.

Looking at the total bank branches, one can observe that the difference in survival rate through the first year of firm life between the control group and treatment the after state (table 9.1.5) and the before state (table 9.1.4) is quite similar to each other, hence, there is no significant difference between the two groups. However, in some years after origin, the difference between treatment and control in the after state is more uneven than in the first period, and the treatment group appears to be doing slightly worse. This may indicate that the closures of total bank branches might influence firm survival. However, when looking at savings bank branches, the differences between the states and groups are quite equal, indicating that a savings bank branch closure does not impose any effect on firm survival.

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Existence	0	1	2	3	4	5	6	7	8
Startups	13 417	10 163	8 335	7 163	6 296	5 546	5 009	4 176	4 027
Survival Rate		76 %	62 %	53 %	47 %	41 %	37 %	31 %	30 %
Sample 1 - Total									
Treatment	6824	5050	4120	3548	3079	2711	2435	2013	1944
Survival Rate		74 %	60 %	52 %	45 %	40 %	36 %	29 %	28 %
Control	6593	5113	4215	3615	3217	2835	2574	2163	2083
Survival Rate		78 %	64 %	55 %	49 %	43 %	39 %	33 %	32 %
Sample 1 - Savings									
Treatment	8282	6182	5087	4376	3824	3367	3049	2526	2439
Survival Rate		75 %	61 %	53 %	46 %	41 %	37 %	30 %	29 %
Control	5132	3981	3248	2787	2472	2179	1960	1650	1588
Survival Rate		78 %	63 %	54 %	48 %	42 %	38 %	32 %	31 %

Table 9.1.5: *Existence and survival rate of startups from year 2002 (before). Counting observations yearly by limiting the count by groups, year and the lags of first observation. Example: count if (d_treat1_T ==1) & (yr==2009) and (d_lag2 ==1).*

9.2 Regression Analysis on Probability of Survival

In this regression, we use a dummy variable "firm survival" as our dependent variable. The variable is equal to 1 if the firm has positive revenues the following year. Otherwise, the setup is equal to the main regression analysis in chapter 7,

where we use a difference-in-difference model (models 1, 2, and 3) while testing on different samples and whether there is any difference in rural areas.
In this analysis, the DiD estimator can be interpreted as the difference in probability of survival between the treatment and control group in between the before and after state. One can observe a trend in the CCGR dataset, in which the total number of firms increases over time, as presented in table 9.1.1. The trend is a result of the increasing number of startups, compared to the number of closures, yet we also observe a trend in which "old firms" seem to be sticking around much longer (Stacescu, 2019b).

From model 1, illustrated in appendix 15 A, we find that the DiD estimator of sample 1T, 1S and 3S is significant on a 0.1% level with positive coefficients. This indicates that the probability of survival is higher in municipalities with bank branch closures. In model 2, we find that 1T is significant on a 5% level with a positive coefficient of 0.0039, as shown in table 9.2.1.

Result 1 (1T): Closures of total bank branches have a positive effect on the survival of firms operating in the same municipality.

Looking at rural areas we find no significant DiD estimators, indicating that there is no significant difference between the two groups (see appendix 15 B).

One would assume that bank branch closures would affect firm performance and financing negatively, as tested in our main regression analyses. Hence, poorer performance and less available credit would imply lower firm survival. The result in this analysis contradicts our expectations and we cannot prove that bank branch closures impose lower firm survival. However, as we find no significant positive effect regarding savings bank branch closures, it seems that savings bank branches are slightly more important to firm survival than total bank branches.

Model 2 (full model) with survival dummy as dependent variable

$$d_{firmsurvival} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Sample	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	0.0357***	0.0273***	0.0298***	0.0354***	0.0303***	0.0333***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	-0.00935***	0.0273*	-0.00785	-0.00390*	0.00673	-0.0102***
	(0.000)	(0.033)	(0.051)	(0.029)	(0.145)	(0.000)
Treatment * time Diff-in-Diff	0.00390*	-0.00975	0.00330	0.00319	0.00739	0.00462
	(0.042)	(0.496)	(0.463)	(0.107)	(0.138)	(0.110)
Return on Assets	0.0991***	0.0907***	0.108***	0.0991***	0.103***	0.0944***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.0513***	-0.0582***	-0.0501***	-0.0514***	-0.0533***	-0.0475***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.00872***	0.0143***	0.00927***	0.00874***	0.0117***	0.00920***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	0.0156***	0.0153***	0.0152***	0.0155***	0.0139***	0.0166***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.0339***	0.0208***	0.0407***	0.0343***	0.0293***	0.0320***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.00462***	-0.00702***	-0.00320***	-0.00461***	-0.00529***	-0.00405***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	-0.0886***	-0.236***	-0.123***	-0.0916***	-0.158***	-0.129***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	-0.0689***	-0.201***	-0.102***	-0.0698***	-0.127***	-0.0373**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)
Unemployment Rate	0.631***	0.189**	0.484***	0.612***	0.417***	0.713***
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
Population	-2.63e-08***	1.47e-09	-4.30e-08***	-2.76e-08***	-1.56e-08*	-3.34e-08***
	(0.000)	(0.857)	(0.000)	(0.000)	(0.039)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	682 889	115 177	133 768	682 889	121 557	353 551
R-sq	2,8 %	2,8 %	2,7 %	2,7 %	2,7 %	2,8 %
adj. R-sq	2,8 %	2,8 %	2,7 %	2,7 %	2,7 %	2,8 %
rmse	0,325	0,33	0,311	0,325	0,329	0,322

Table 9.2.1: *Bank branch closures effect on firm survival measured by a dummy variable = 1 if the firm has positive revenues the following year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included is as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

9.3 Regression Analysis on Newly Established Firms

In this regression, we run a dummy variable "new firms" as the dependent variable, which is equal to 1 if the firm has no positive revenue in the past year, i.e., indicating that the firm is newly established. We have excluded the years 2006 and 2007, as there were a lot of startups (holdings) due to the tax reform in 2006, and excluded 2001 as all firms were entering the sample that precise year. The DiD estimator can be interpreted as the difference in the share of newly established firms between the treatment and control group.

The time dummy in model 1 implies that the share of newly established firms is decreasing over time, as illustrated in appendix 16 A. We find that the DiD estimators of sample 1T, 1S, 2S and 3S significant on a 5%, 0.1%, 1% and 1% level with positive coefficients. This indicates that the share of newly established firms is somewhat higher in the municipalities where there have been bank branch closures, especially where the savings bank branches close.

In model 2, we see the same result for savings bank branches, as DiD estimators for samples 1S, 2S, and 3S are positive on a significance level of 0.1%, 0.1%, and 5%, as shown in table 9.3.1. For total bank branches, we find one contradicting result, as sample 1T has a negative DiD estimator of -0.00297 on a significance level of 1%. The contradicting results show that the presence of savings bank branches is not as important as total bank branches in terms of new firm establishments.

Result 1 (1S, 2S, 3S): Independent of sample, savings bank branch closures have a positive impact on the share of newly established firms in the same municipality.

Result 2 (1T): Total bank branch closures have a negative impact on the share of newly established firms in the same municipality.

In model 3, 3S is significant on a 1% level with a coefficient of -0.00727 and 2T is significant on a 10% level with a coefficient of 0.016, as shown in appendix 16 B.

Result 3 (3S): In rural municipalities, savings bank branch closures in the first period and no change in bank branches in the second period, have a negative effect on the share of newly established firms in the same municipality.

Comparing the results from model 2 and 3, one can observe that savings bank branches are more crucial to firm establishments in rural areas, while it seems to not matter on a general basis. In conclusion, bank branch closures seem to have no impact on firm establishment, except for the role of savings bank branches in rural areas.

Model 2 (full model) with new firm dummy as dependent variable

$$d_{newfirms} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Sample - New firm	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0653***	-0.0633***	-0.0646***	-0.0697***	-0.0689***	-0.0673***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00326***	-0.00570	0.000706	-0.00281**	-0.0128***	-0.00175
	(0.001)	(0.465)	(0.766)	(0.005)	(0.000)	(0.241)
Treatment * time	-0.00297**	0.00464	-0.000158	0.00463***	0.0160***	0.00304*
Diff-in-Diff	(0.003)	(0.564)	(0.948)	(0.000)	(0.000)	(0.047)
Return on Assets	-0.0335***	-0.0319***	-0.0371***	-0.0335***	-0.0327***	-0.0300***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.00802***	-0.00678***	-0.00954***	-0.00799***	-0.00870***	-0.00673***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.0429***	0.0436***	0.0471***	0.0429***	0.0448***	0.0411***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	-0.00206***	-0.00232***	-0.00237***	-0.00205***	-0.00233***	-0.00190***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.000312	-0.00167	-0.00219	-0.000428	-0.00143	-0.00139
	(0.649)	(0.333)	(0.132)	(0.533)	(0.388)	(0.149)
Current Ratio	-0.000957***	-0.000948***	-0.00130***	-0.000960***	-0.00127***	0.000989***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	-0.532***	-0.629***	-0.476***	-0.532***	-0.587***	-0.585***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	-0.189***	-0.114***	-0.207***	-0.189***	-0.0779***	-0.234***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment Rate	0.459***	0.316***	0.322***	0.453***	0.287***	0.542***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population	9.03e-09***	-1.96e-09	5.62e-09*	9.01e-09***	1.20e-09	8.25e-09***
	(0.000)	(0.549)	(0.033)	(0.000)	(0.673)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	758 757	127 258	148 057	758 757	134 614	393 196
R-sq	7,5 %	7,3 %	7,3 %	7,5 %	7,1 %	8,5 %
adj. R-sq	7,5 %	7,3 %	7,3 %	7,5 %	7,1 %	8,5 %
rmse	0,146	0,146	0,145	0,146	0,147	0,143

Table 9.3.1: *Bank branch closures effect on the share of newly established firms measured by a dummy variable = 1 if the firm has no revenues the past year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included is as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

9.4 Summary of Results

The descriptive analysis of startups and firm closures, reveals that startups have increased in general, and exceed the firm closures. Hence, the total number of firms has increased. Studying the matter more closely, we find that there has been a decrease in the number of startups in municipalities where there have been closures of bank branches. The decrease in startups seems to be higher in municipalities with total bank branches compared to closures of savings bank branches (-2.1% to -0.4%). However, analyzing the survival of startups, we find that startups from 2007 are surviving relatively longer than the startups from 2002. This indicates that firms tend to survive longer. In municipalities with bank branch closures, the survival rate tends to be lower compared to the survival rate of startups in municipalities where there are no changes or an increase in the number of bank branches. The descriptive analysis indicates that bank branch closures influence firm survival.

Further, we run two regression analyses on survival and newly established firms. In the first regression, we find that the closures of total bank branches have a positive effect on the survival of firms operating in the same municipality. Analyzing newly established firms, we find that independent of sample, savings bank branch closures have a positive impact on the share of newly established firms in the same municipality, while total bank branch closures have a negative impact on the share of newly established firms in the same municipality. Regarding rural municipalities, we find that savings bank branch closures in the first period and no change in bank branches in the second period have a negative effect on the share of newly established firms in the same municipality. In conclusion, we find that bank branch closures impact the share of newly established firms. Total bank branches closures impact more on a general basis, while in rural areas, savings bank branch closures appear to be more crucial to establishments of firms.

10. Conclusion

The purpose of this thesis is to answer if bank branch closures impact firm performance and financing. Bank branch closures might increase the distance between the bank and the borrower. Existing literature emphasize that an increased distance between bank and borrower might impose a higher interest rate and limit the bank credit available. Further, literature establish that the length and extent of bank-borrower relationship is crucial in lending decisions. This indicates that firm financing and performance might be negatively affected by bank branch closures. Therefore, it is reasonable to assume that bank branch closures will lower bank credit availability and harm firm growth in municipalities where there are bank branch closures. This thesis contributes to existing literature with new insights regarding the impact of bank branch closures on firm performance and financing in rural areas in Norway.

From our descriptive statistics, we discover that there are regional differences in bank branch closures across Norwegian counties. Interestingly, when we category bank branch closures by the Centrality Class, we find that total and savings bank branch closures are most common in the most urban and the most rural municipalities, however, bank branches tend to close more frequent in rural areas. Existing literature suggests that lending practices in rural areas tend to build more upon soft information rather than hard information.

The results from our main regression are not corresponding across the different control and treatment groups, however, in terms of firm financing, we do observe a tendency that total and savings bank branch closures affect financial debt ratio negatively in rural areas, i.e., the bank credit available to firms decreases. We also find that a 100% closure of total bank branches has a positive effect on the debt ratio of firms operating in the same municipality. However, we find the opposite effect regarding the financial debt ratio. This might imply that firms in these municipalities need to expand their debt in other ways than bank credit. Analyzing the average interest rate, we find evidence of a decreased interest rate when bank branches close. Combined with a lower financial debt ratio, this could imply that the banks only lend to their best customers and provide lower lending costs to these customers. Regarding firm performance, we find that a 100% decrease in

total bank branches decreases the growth of sales. For this sample, we also find that the financial debt ratio has decreased. Hence, we find that bank branch closures have decreased the bank credit available and the performance in terms of growth of sales. Considering ROA, we find that a 100% closure of both total and savings bank branches has a positive effect on the return on assets of firms operating in the same municipality. However, combined with a decrease in financial debt ratio, this might indicate that firms are affected by closures, as they might be forced to pursue only the most profitable NPV projects. In conclusion, we do find some evidence that bank branch closures affect firm financing and performance.

When analyzing startups and firm closures, we observe a trend that there are on average more startups than firm closures. From the descriptive analysis, we observe that closure of bank branches might influence firm survival, as the survival rate in municipalities with bank branch closures are lower than the municipalities with no closures or an increase in bank branches. When we run regression on survival and newly established firms, we find that the closures of total bank branches have a positive effect on the survival of firms operating in the same municipality. In result, bank branch closures seem to have no impact on firm establishment, except for the role of savings bank branches in rural areas.

To improve the validity and robustness of our results, we test whether firm performance impacts bank branch closures. On a general basis, we find that a decrease in firms' ROA imposes closures of total bank branches. In rural areas, we find that ROA imposes closures of both total and savings bank branches. Additionally, when firms' ROA decrease, total bank branches in rural areas are more likely to close than on a general basis. However, in rural areas, ROA is one of several statistically significant variables to impact bank branch closures.

In conclusion, we can observe from our various analyses that the results have different implications for our research question. Some findings proved that bank branch closures affect firm financing positively, while other results prove that firms are affected negatively. Further research on this field would be interesting, especially if one were able to obtain data on bank connections, lending terms, and the status of the banks' digital transition.

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12. Appendix

Appendix 1 – Ten Largest Banks in Norway

#	Bank	NOK Mill	MS	#branches
1	DNB Bank ASA	1 158 437	28,6	113
2	Nordea Bank Norge	473 006	11,7	62*
3	Danske Bank Norge	257 343	6,4	28
4	Handelsbanken	229 000	5,7	52
5	SpareBank 1 SR-Bank ASA	181 740	4,5	53
6	Sparebanken Vest	138 387	3,4	36
7	SpareBank 1 SMN	134 745	3,3	50
8	SpareBank 1 Nord-Norge	93 481	2,3	39
9	Sparebanken Sør	91 655	2,3	36
10	Statlige låneordninger (boliglån)	87 045	2,2	
	Andre/Others	1 202 477	29,7	466

Table 1: *Ten biggest banks in Norway measured by gross lending (Norway) as of December 31. 2016 (FinansNorge, 2017a), where branches are obtained from Bank Location Register as of January 1. 2017, except for *Nordea Bank Norge that is operating branches in 2019.*

Appendix 2 – Twenty Largest Savings Banks in Norway

#	Savings Bank	Assets NOK mill	# branches
1	SpareBank 1 SR-Bank ASA	175 456	53
2	SpareBank 1 SMN	135 043	50
3	Sparebanken Vest	106 973	36
4	SpareBank 1 Nord-Norge	87 142	39
5	Sparebanken Sør	79 113	36
6	Sparebanken Hedmark	58 832	30
7	Sparebanken Møre	45 300	31
8	Sparebanken Sogn og Fjordane	38 266	24
9	Sparebanken Øst	26 970	25
10	Helgeland Sparebank	24 561	14
11	SpareBank 1 BV	23 743	7
12	Sandnes Sparebank	20 993	5
13	Sparebanken Telemark	20 861	10
14	SpareBank 1 Ringerike Hadeland	20 759	10
15	SpareBank 1 Østfold Akershus	19 097	9
16	Fana Sparebank	15 735	4
17	Jæren Sparebank	12 745	7
18	SpareBank 1 NordVest	12 488	12
19	Totens Sparebank	12 084	9
20	Haugesunds Sparebank	9 516	8
	All savings banks	**1 242 198**	**642**

Table 2: *The twenty largest savings banks in Norway assorted by average total assets in 2016 (FinansNorge, 2017b) of 99 savings banks (Sparebankforeningen, 2018a).*

Appendix 3 – Norwegian Counties and Municipalities

Counties	Municipalities (Municipality number)
01 Østfold	Halden (0101), Moss (0104), Sarpsborg (0105), Fredrikstad (0106), Hvaler (0111), Aremark (0118), Marker (0119), Rømskog (0121), Trøgstad (0122), Spydeberg (0123), Askim (0124), Eidsberg (0125), Skiptvet (0127), Rakkestad (0128), Råde (0135), Rygge (0136), Våler i Østfold (0137), Hobøl (0138). = 18 municipalities
02 Akershus	Vestby (0211), Ski (0213), Ås (0214), Frogn (0215), Nesodden (0216), Oppegård (0217), Bærum (0219), Asker (0220), Aurskog-Høland (0221), Sørum (0226), Fet (0227), Rælingen (0228), Enebakk (0229), Lørenskog (0230), Skedsmo (0231), Nittedal (0233), Gjerdrum (0234), Ullensaker (0235), Nes i Akershus (0236), Eidsvoll (0237), Nannestad (0238), Hurdal (0239). = 22 municipalities
03 Oslo	Oslo (0301) = 1 municipality
04 Hedmark	Kongsvinger (0402), Hamar (0403), Ringsaker (0412), Løten (0415), Stange (0417), Nord-Odal (0418), Sør-Odal (0419), Eidskog (0420), Grue (0423), Åsnes (0425), Våler i Hedmark (0426), Elverum (0427), Trysil (0428), Åmot (0429), Stor-Elvdal (0430), Rendalen (0432), Engerdal (0434), Tolga (0436), Tynset (0437), Alvdal (0438), Folldal (0439), Os i Hedmark (0441), = 22 municipalities
05 Oppland	Lillehammer (0501), Gjøvik (0502), Dovre (0511), Lesja (0512), Skjå (0513), Lom (0514), Vågå (0515), Nord-Fron (0516), Sel (0517), Sør-Fron (0519), Ringebu (0520), Øyer (0521), Gausdal (0522), Østre Toten (0528), Vestre Toten (0529), Jevnaker (0532), Lunner (0533), Gran (0534), Søndre Land (0536), Nordre Land (0538), Sør-Aurdal (0540), Etnedal (0541), Nord-Aurdal (0542), Vestre Slidre (0543), Øystre Slidre (0544), Vang (0545). = 26 municipalities
06 Buskerud	Drammen (0602), Kongsberg (0604), Ringerike (0605), Hole (0612), Flå (0615), Nes i Buskerud (0616), Gol (0617), Hemsedal (0618), Ål (0619), Hol (0620), Sigdal (0621), Krødsherad (0622), Modum (0623), Øvre Eiker (0624), Nedre Eiker (0625), Lier (0626), Røyken (0627), Hurum (0628), Flesberg (0631), Rollag (0632), Nore og Uvdal (0633).

	= 21 municipalities
07 Vestfold	Horten (0701), Holmestrand (0702), Tønsberg (0704), Sandefjord (0706), Larvik (0709), Svelvik (0711), Sande i Vestfold (0713), Hof *(0714), Re (0716), Andebu* (0719), Stokke* (0720), Nøtterøy* (0711), Tjøme* (0723), Lardal* (0728). = 14 municipalities *These days (2019), Vestfold has 9 municipalities. Nøtterøy and Tjøme is merged to Færder municipality, Stokke and Andebu is merged with Sandefjord, Hof is merged with Holmestrand and Lardal is merged with Larvik.
08 Telemark	Porsgrunn (0805), Skien (0806), Notodden (0807), Siljan (0811), Bamble (0814), Kragerø (0815), Drangedal (0817), Nome (0819), Bø i Telemark (0821), Sauherad (0822), Tinn (0826), Hjartdal (0827), Seljord (0828), Kviteseid (0829), Nissedal (0830), Fyresdal (0831), Tokke (0833), Vinje (0834). = 18 municipalities *(current number)*
09 Aust-Agder	Risør (0901), Grimstad (0904), Arendal (0906), Gjerstad (09''), Vegårshei (0912), Tvedestrand (0914), Froland (09)19, Lillesand (0926), Birkenes (0928), Åmli (0929), Iveland (0935), Evje og Hornnes (0937), Bygland (0938), Valle (0940), Bykle (0941). = 15 municipalities *(current number)*
10 Vest-Agder	Kristiansand (1001), Mandal (1002), Farsund (1003), Flekkefjord (1004), Vennesla (1014), Songdalen (1017), Søgne (1018), Marnardal (1021), Åseral (1026), Audnedal (1027), Lindesnes (1029), Lyngdal (1032), Hægebostad (1034), Kvinesdal (1037), Sirdal (1046). = 15 municipalities *(current number)*
11 Rogaland	Eigersund (1101), Sandnes (1102), Stavanger (1103), Haugesund (1106), Sokndal (1111), Lund (1112), Bjerkreim (1114), Hå (1119), Klepp (1120), Time (1121), Gjesdal (1122), Sola (1124), Randaberg (1127), Forsand (1129), Strand (1130), Hjelmeland (1133), Suldal (1134), Sauda (1135), Finnøy (1141), Rennesøy (1142), Kvitsøy (1144), Bokn (1145), Tysvær (1146), Karmøy (1149), Utsira (1151), Vindafjord (1160). = 26 municipalities *(current number)*
12 Hordaland	Bergen (1201), Etne (1211), Sveio (1216), Bømlo (1219), Stord (1221), Fitjar (1222), Tysnes (1223), Kvinnherad (1224), Jondal (1227), Odda (1228), Ullensvang (1231), Eidfjord (1232), Ulvik

	(1233), Granvin (1234), Voss (1235), Kvam (1238), Fusa (1241), Samnanger (1242), Os i Hordaland (1243), Austevoll (1244), Sund (1245), Fjell (1246), Askøy (1247), Vaksdal (1251), Modalen (1252), Osterøy (1253), Meland (1256), Øygarden (1259), Radøy (1260), Lindås (1263), Austrheim (1264), Fedje (1265), Masfjorden (1266). = 33 municipalities *(current number)*
14 Sogn og Fjordane	Flora (1401), Gulen (1411), Solund (1412), Hyllestad (1413), Høyanger (1416), Vik (1417), Balestrand (1418), Leikanger (1419), Sogndal (1420), Aurland (1421), Lærdal (1422), Årdal (1424), Luster (1426), Askvoll (1428), Fjaler (1429), Gaular (1430), Jølster (1431), Førde (1432), Naustdal (1433), Bremanger (14)38, Vågsøy (1439), Selje (1441), Eid (1443), Hornindal (1444), Gloppen (1445), Stryn (1449). = 26 municipalities *(current number)*
15 Møre og Romsdal	Molde (1502), Ålesund (1504), Kristiansund (1505), Vanylven (1511), Sande i Møre og Romsdal (1514), Herøy i Møre og Romsdal (1515), Ulstein (1516), Hareid (1517), Volda (1519), Ørsta (1520), Ørskog (1523), Norddal (1524), Stranda (1525), Stordal (1526), Sykkylven (1528), Skodje (1529), Sula (1531), Giske (1532), Haram (1534), Vestnes (1535), Rauma (1539), Nesset (1543), Midsund (1545), Sandøy (1546), Aukra (1547), Fræna (1548), Eide (1551), Averøy (1554), Gjemnes (1557), Tingvoll (1560), Sunndal (1563), Surnadal (1566), Rindal (1567), Halsa (1571), Smøla (1573), Aure (1576). = 36 municipalities *(2019: 35 municipalities)* *Rindal municipality is as of 2019 a municipality in Trøndelag county.
50 Trøndelag (16: Sør-Trøndelag) (17: Nord-Trødelag)	Trondheim (1601), Hemne (1612), Snillfjord (1613), Hitra (1617), Frøya (1620), Ørland (1621), Agdenes (1622), Rissa (1624), Bjugn (1627), Åfjord (1630), Roan (1632), Osen (1633), Oppdal (1634), Rennebu (1635), Meldal (1636), Orkdal (1638), Røros (1640), Holtålen (1644), Midtre Gauldal (1648), Melhus (1653), Skaun (1657), Klæbu (1662), Malvik (1663), Selbu (1664), Tydal (1665), Steinkjer (1702), Namsos (1703), Meråker (1711), Stjørdal (1714), Frosta (1717), Leksvik (1718), Levanger (1719), Verdal (1721), Verran (1724), Namdalseid (1725), Snåase – Snåsa (1736), Lierne (1738), Raarvihke-Røyrvik (1739), Namsskogan (1740), Grong (1742), Høylandet (1743), Overhalla (1744), Fosnes (1748), Flatanger (1749), Vikna (1750), Nærøy (1751), Leka (1755), Inderøy (1756).

	= 48 municipalities *(current number)* *As of 1.1.18 Nord-Trøndelag and Sør-Trødelag merged into one county.
18 Nordland	Bodø (1804), Narvik (1805), Bindal (1811), Sømna (1812), Brønnøy (1813), Vega (1815), Vevelstad (1816), Herøy i Nordland (1818), Alstahaug (1820), Leirfjord (1822), Vefsn (1824), Grane (1825), Hattfjelldal (1826), Dønna (1827), Nesna (1828), Hemnes (1832), Rana (1833), Lurøy (1834), Træna (1835), Rødøy (1836), Meløy (1837), Gildeskål (1838), Beiarn (1839), Saltdal (1840), Fauske – Fuossko (1841), Sørfold (1845), Steigen (1848), Hamarøy – Hábmer (1849), Divtasvuodna – Tysfjord (1850), Lødingen (1851), Tjeldsund (1852), Evenes (1853), Ballangen (1854), Røst (1856), Værøy (1857), Flakstad (1859), Vestvågøy (1860), Vågan (1865), Hadsel (1866), Bø i Nordland (1867), Øksnes (1868), Sortland – Suortá (1870), Andøy (1871), Moskenes (1874). = 44 municipalities *(current number)*
19 Troms	Harstad – Hárstták (1901), Tromsø (1902), Kvæfjord (1911), Skånland (1913), Ibestad (1917), Gratangen (1919), Loabák – Lavangen (1920), Bardu (1922), Salangen (1923), Målselv (1924), Sørreisa (1925), Dyrøy (1926), Tranøy (1927), Torsken (1928), Berg (1929), Lenvik (1931), Balsfjord (1933), Karlsøy (1936), Lyngen (1938), Storfjord – Omasvuotna – Omasvuono (1939), Gáivuotna – Kåfjord – Kaivuono (1940), Skjervøy (1941), Nordreisa - Ráisa - Raisi (1942), Kvænangen (1943). = 24 municipalities *(current number)*
20 Finnmark	Vardø (2002), Vadsø (2003), Hammerfest (2004), Guovdageaidnu – Kautokeino (2011), Alta (2012), Loppa (2014), Hasvik (2015), Kvalsund (2017), Måsøy (2018), Nordkapp (2019), Porsanger – Porsáŋgu – Porsanki (2020), Kárášjohka – Karasjok (2021), Lebesby (2022), Gamvik (2023), Berlevåg (2024), Deatnu – Tana (2025), Unjárga – Nesseby (2027), Båtsfjord (2028), Sør-Varanger (2030). = 19 municipalities *(current number)*

Table 3*: Norwegian counties and municipalities by county and municipality number.*

Appendix 4 – Centrality Classes across Norwegian Municipalities

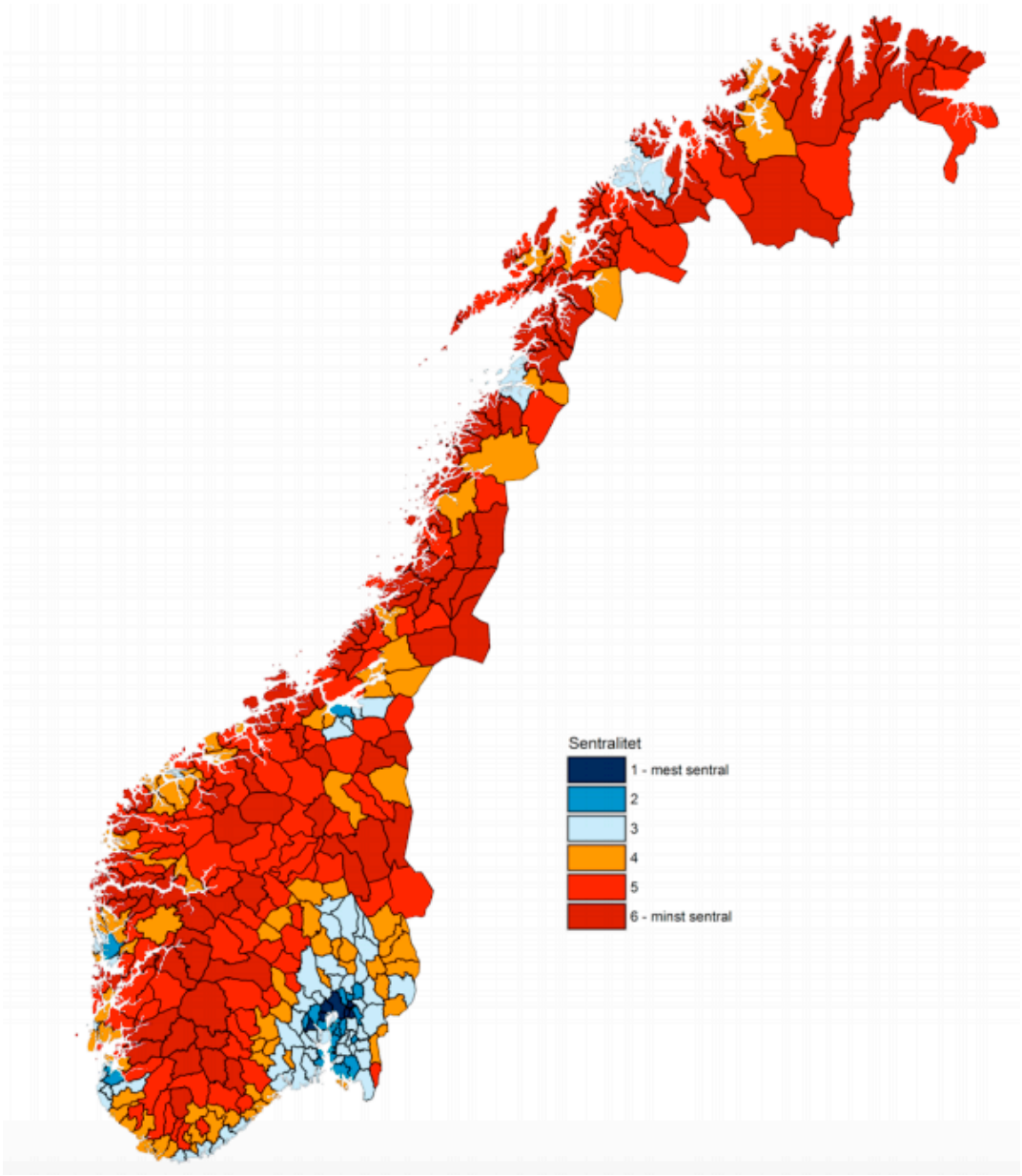

Figure 4: *Centrality classes across Norwegian municipalities (Kommunal- og Moderniseringsdepartementet, 2018, p. 18).*

Appendix 5 – Centrality Classes for Municipalities and Counties

A) Centrality Class for All Norwegian Municipalities

#	Name	Class	#	Name	Class	#	Name	Class	#	Name	Class
1622	Agdenes	5	1246	Fjell	3	1413	Hyllestad	6	1711	Meråker	5
1820	Alstahaug	4	1859	Flakstad	6	1034	Hægebostad	5	1545	Midsund	5
2012	Alta	4	1749	Flatanger	6	1416	Høyanger	5	1648	Midtre Gauldal	4
0438	Alvdal	5	1004	Flekkefjord	4	1743	Høylandet	6	1252	Modalen	6
0719	Andebu	2	0631	Flesberg	4	1119	Hå	3	0623	Modum	3
1871	Andøy	6	1401	Flora	4	1917	Ibestad	6	1502	Molde	3
0118	Aremark	4	0615	Flå	5	1756	Inderøy	4	1874	Moskenes	6
0906	Arendal	3	0439	Folldal	6	0935	Iveland	5	0104	Moss	1
0220	Asker	1	1129	Forsand	4	0532	Jevnaker	3	1924	Målselv	5
0124	Askim	2	1748	Fosnes	6	1227	Jondal	6	2018	Måsøy	6
1428	Askvoll	6	0106	Fredrikstad	2	1431	Jølster	5	1725	Namdalseid	5
1247	Askøy	3	0215	Frogn	2	2021	Karasjok	5	1703	Namsos	4
1027	Audnedal	5	0919	Froland	4	1936	Karlsøy	6	1740	Namsskogan	6
1547	Aukra	5	1717	Frosta	5	1149	Karmøy	4	0238	Nannestad	3
1576	Aure	6	1548	Fræna	4	2011	Kautokeino	6	1805	Narvik	4
1421	Aurland	6	1620	Frøya	5	1120	Klepp	3	1433	Naustdal	5
0221	Aurskog-Høland	3	1241	Fusa	5	1662	Klæbu	3	0625	Nedre Eiker	2
1244	Austevoll	5	0831	Fyresdal	6	0604	Kongsberg	3	0236	Nes (Akershus)	3
1264	Austrheim	4	1432	Førde	4	0402	Kongsvinger	3	0616	Nes (Buskerud)	4
1554	Averøy	5	2023	Gamvik	6	0815	Kragerø	4	1828	Nesna	6
1418	Balestrand	6	1430	Gaular	5	1001	Kristiansand	3	0216	Nesodden	3
1854	Ballangen	6	0522	Gausdal	4	1505	Kristiansund	4	2027	Nesseby	6
1933	Balsfjord	5	1838	Gildeskål	6	0622	Krødsherad	5	1543	Nesset	5
0814	Bamble	3	1532	Giske	4	2017	Kvalsund	6	0830	Nissedal	6
1922	Bardu	5	1557	Gjemnes	5	1238	Kvam	4	0233	Nittedal	2
1839	Beiarn	6	0234	Gjerdrum	2	1037	Kvinesdal	4	0819	Nome	4
1929	Berg	6	0911	Gjerstad	4	1224	Kvinnherad	5	0542	Nord-Aurdal	4
1201	Bergen	2	1122	Gjesdal	3	0829	Kviteseid	5	0516	Nord-Fron	4
2024	Berlevåg	6	0502	Gjøvik	3	1144	Kvitsøy	6	0418	Nord-Odal	4
1811	Bindal	6	1445	Gloppen	5	1911	Kvæfjord	5	1524	Norddal	6
0928	Birkenes	4	0617	Gol	4	1943	Kvænangen	6	2019	Nordkapp	6
1114	Bjerkreim	4	0534	Gran	3	1940	Kåfjord	6	0538	Nordre Land	4
1627	Bjugn	5	1825	Grane	6	0728	Lardal (-2017	3	1942	Nordreisa	5
1804	Bodø	3	1234	Granvin	5	0709	Larvik	3	0633	Nore og Uvdal	6
1145	Bokn	5	1919	Gratangen	6	1920	Lavangen	6	0807	Notodden	4
1438	Bremanger	6	0904	Grimstad	3	2022	Lebesby	6	1751	Nærøy	6
1813	Brønnøy	5	1742	Grong	5	1419	Leikanger	5	0722	Nøtterøy (-2017	3
0938	Bygland	5	0423	Grue	4	1822	Leirfjord	5	1228	Odda	4
0941	Bykle	6	1411	Gulen	6	1755	Leka	6	1634	Oppdal	4
0219	Bærum	1	1866	Hadsel	5	1718	Leksvik	5	0217	Oppegård	2
1867	Bø (Nordland)	6	0101	Halden	3	1931	Lenvik	5	1638	Orkdal	3
0821	Bø (Telemark)	4	1571	Halsa	6	0512	Lesja	6	0441	Os (Hedmark)	5
1219	Bømlo	5	0403	Hamar	2	1719	Levanger	4	1243	Os (Hordaland)	3
2028	Båtsfjord	5	1849	Hamarøy	6	0626	Lier	2	1633	Osen	6
0511	Dovre	5	2004	Hammerfest	4	1738	Lierne	6	0301	Oslo kommune	1
0602	Drammen	1	1534	Haram	4	0501	Lillehammer	3	1253	Osterøy	4
0817	Drangedal	5	1517	Hareid	4	0926	Lillesand	3	1744	Overhalla	5
1926	Dyrøy	6	1901	Harstad	4	1029	Lindesnes	4	2020	Porsanger	5
1827	Dønna	6	2015	Hasvik	6	1263	Lindås	4	0805	Porsgrunn	3
1443	Eid	5	1826	Hattfjelldal	6	0514	Lom	5	1260	Radøy	4
1551	Eide	5	1106	Haugesund	3	2014	Loppa	6	0128	Rakkestad	3
1232	Eidfjord	6	1612	Hemne	5	1112	Lund	5	1833	Rana	4
0125	Eidsberg	3	1832	Hemnes	5	0533	Lunner	3	1127	Randaberg	2
0420	Eidskog	4	0618	Hemsedal	5	1834	Lurøy	6	1539	Rauma	5
0237	Eidsvoll	3	1515	Herøy (MR)	4	1426	Luster	5	0716	Re	3
1101	Eigersund	4	1818	Herøy	6	1032	Lyngdal	4	0432	Rendalen	6
0427	Elverum	4	1617	Hitra	5	1938	Lyngen	6	1635	Rennebu	5
0229	Enebakk	3	0827	Hjartdal	5	1422	Lærdal	5	1142	Rennesøy	4
0434	Engerdal	6	1133	Hjelmeland	6	1851	Lødingen	5	1567	Rindal	5
1211	Etne	5	0138	Hobøl	3	0230	Lørenskog	1	0520	Ringebu	4
0541	Etnedal	5	0714	Hof (-2017)	3	0415	Løten	3	0605	Ringerike	3
1853	Evenes	6	0620	Hol	5	1663	Malvik	3	0412	Ringsaker	3
0937	Evje og Hornnes	4	0612	Hole	3	1002	Mandal	3	1624	Rissa	5
1003	Farsund	4	0702	Holmestrand	3	0119	Marker	4	0901	Risør	4
1841	Fauske	4	1644	Holtålen	6	1021	Marnardal	5	1632	Roan	6
1265	Fedje	6	1444	Hornindal	5	1266	Masfjorden	6	0632	Rollag	5
0227	Fet	2	0701	Horten	2	1256	Meland	4	0136	Rygge	2
1141	Finnøy	5	0239	Hurdal	4	1636	Meldal	5	0228	Rælingen	1
1222	Fitjar	5	0628	Hurum	3	1653	Melhus	3	1836	Rødøy	6
1429	Fjaler	5	0111	Hvaler	4	1837	Meløy	6	0121	Rømskog	4

#	Name	Class	#	Name	Class	#	Name	Class	#	Name	Class
1640	Røros	4	1124	Sola	2	1121	Time	3	1724	Verran	5
1856	Røst	6	1412	Solund	6	1560	Tingvoll	5	0211	Vestby	2
0627	Røyken	2	1017	Songdalen	4	0826	Tinn	5	1535	Vestnes	4
1739	Røyrvik	6	1870	Sortland	4	1852	Tjeldsund	6	0543	Vestre Slidre	5
0135	Råde	3	0123	Spydeberg	3	0723	Tjøme (-2017)	3	0529	Vestre Toten	4
1923	Salangen	5	0417	Stange	3	0833	Tokke	6	1860	Vestvågøy	5
1840	Saltdal	5	1103	Stavanger	2	0436	Tolga	5	1816	Vevelstad	6
1242	Samnanger	4	1848	Steigen	6	1928	Torsken	6	1417	Vik	6
1514	Sande (MR)	5	1702	Steinkjer	4	1927	Tranøy	6	1750	Vikna	5
0713	Sande (Vestfold)	3	1714	Stjørdal	3	1902	Tromsø	3	1160	Vindafjord	4
0706	Sandefjord	2	0720	Stokke	2	1601	Trondheim	2	0834	Vinje	5
1102	Sandnes	2	0430	Stor-Elvdal	5	0428	Trysil	5	1519	Volda	4
1546	Sandøy	6	1221	Stord	4	1835	Træna	6	1235	Voss	4
0105	Sarpsborg	2	1526	Stordal	5	0122	Trøgstad	3	1857	Værøy	6
1135	Sauda	5	1939	Storfjord	6	0914	Tvedestrand	4	1865	Vågan	5
0822	Sauherad	4	1130	Strand	4	1665	Tydal	6	1439	Vågsøy	5
0517	Sel	5	1525	Stranda	5	0437	Tynset	4	0515	Vågå	5
1664	Selbu	4	1449	Stryn	5	1850	Tysfjord	6	0426	Våler (Hedmark)	4
1441	Selje	6	1531	Sula	4	1223	Tysnes	5	0137	Våler (Østfold)	3
0828	Seljord	5	1134	Suldal	6	1146	Tysvær	4	1868	Øksnes	5
0621	Sigdal	4	1245	Sund	4	0704	Tønsberg	2	1621	Ørland	5
0811	Siljan	4	1563	Sunndal	5	0235	Ullensaker	2	1523	Ørskog	4
1046	Sirdal	5	1566	Surnadal	5	1231	Ullensvang	6	1520	Ørsta	4
1657	Skaun	4	1216	Sveio	4	1516	Ulstein	4	0528	Østre Toten	4
0231	Skedsmo	1	0711	Svelvik	4	1233	Ulvik	5	0624	Øvre Eiker	3
0213	Ski	2	1528	Sykkylven	4	1151	Utsira	6	0521	Øyer	4
0806	Skien	3	1018	Søgne	3	2003	Vadsø	5	1259	Øygarden	4
0127	Skiptvet	3	1812	Sømna	6	1251	Vaksdal	4	0544	Øystre Slidre	5
1941	Skjervøy	5	0536	Søndre Land	4	0940	Valle	6	1630	Åfjord	6
0513	Skjåk	5	0540	Sør-Aurdal	5	0545	Vang	6	0619	Ål	4
1529	Skodje	4	0519	Sør-Fron	5	1511	Vanylven	5	1504	Ålesund	3
1913	Skånland	5	0419	Sør-Odal	3	2002	Vardø	6	0929	Åmli	5
1573	Smøla	6	2030	Sør-Varanger	5	1824	Vefsn	4	0429	Åmot	5
1613	Snillfjord	5	1845	Sørfold	5	1815	Vega	6	1424	Årdal	5
1736	Snåase - Snåsa	6	1925	Sørreisa	5	0912	Vegårshei	5	0214	Ås	2
1420	Sogndal	4	0226	Sørum	3	1014	Vennesla	4	1026	Åseral	6
1111	Sokndal	4	2025	Tana	6	1721	Verdal	4	0425	Åsnes	4

Table 5 A: *Centrality classes for all Norwegian municipalities by municipality name.*

B) Centrality Class for All Norwegian Counties

County name	Sum of centrality classes	# Municipalities	Average centrality	Centrality Class
01 Østfold	52	18	2,89	3
02 Akershus	48	22	2,18	2
03 Oslo	1	1	1,00	1
04 Hedmark	93	22	4,23	4
05 Oppland	113	26	4,35	4
06 Buskerud	76	21	3,62	4
07 Vestfold	38	14	2,71	3
08 Telemark	81	18	4,50	5
09 Aust-Agder	65	15	4,33	4
10 Vest-Agder	63	15	4,20	4
11 Rogaland	103	26	3,96	4
12 Hordaland	148	33	4,48	4
14 Sogn og Fjordane	142	26	5,46	5
15 Møre og Romsdal	161	36	4,47	4
18 Nordland	239	44	5,43	5
19 Troms	129	24	5,38	5
20 Finnmark	105	19	5,53	6
50 Trøndelag	231	48	4,81	5
Total	**1888**	428	4,41	4

Table 5 B*: Average centrality classes for all Norwegian counties by county name.*

Appendix 6 – CCGR Data and Items

A) CCGR data

Table	Description
1	Account_Data: Accounting data from 1994 to 2015.
2	Consolidated_Account_Data: Consolidated accounting data for 1994 to 2015.
3	Industry_Code: NACE industry codes for the companies from 1998 to 2015. A company can be member of more than one industry.
4	Ownership_Control: Governance data from 2000 to 2015.
5	Misc_1994: Misc. data from 1994 to 2015.
6	Misc_2000: Misc. data from 2000 to 2015.
7	Misc_2009: Misc. data from 2009 to 2015.

Table 6 A*: CCGR data consisting of seven tables (BI Norwegian Business School, 2019).*

B) CCGR items

Description	Item Number
Firm Specific Variables	
Full county number	item_503
Industry codes	item_11102
Company age	item_13420
Largest family sum ultimate ownership	item_15302
Number of Employees	item_50109
Financial Variables	
Revenue	item_9
Other interest expenses	item_30
Income before extraordinary items	item_35
Total fixed assets (tangible)	item_51
Total fixed assets	item_63
Inventory	item_64
Account receivable	item_65
Cash and cash equivalents	item_76
Total current assets	item_78
Retained earnings	item_86
Total equity	item_87
Liabilities to financial institutions (long-term)	item_94
Total other long-term liabilities (Convertible loans, Bonds, Liabilities to financial institutions, Subordinated loan capital, Long-term liabilities – group, Other long-term liabilities)	item_98
Liabilities to financial institutions (current)	item_101
Account payable	item_102
Extraction Filter	
Is Independent (ultimate ownership)	item_14507

Table 6 B*: CCGR item numbers and description.*

Appendix 7 – Macro Variables and the Norwegian Centrality Index

Variable	Description	Source
Norwegian GDP	Yearly gross domestic product in million NOK, CPI adjusted in our dataset	SSB (2019b) & SSB (2019c)
Norwegian CPI	Yearly consumer price index, reference year 2015 = 100	SSB (2019a)
Norwegian Unemployment Rate	Yearly unemployment in % of the total workforce, per county	NAV (2019)
Norwegian Population	Population in number of persons per county	SSB (2019d)
Norwegian House Price Index	Price index for used houses, divided into 11 regions	SSB (2019e)
Norwegian Centrality Index	Centrality index and classes of each Norwegian municipality as of 1.1.18.	Høydahl, E. (2017).

Table 7*: Description of macro variables and centrality index.*

Appendix 8 – Descriptive Statistics

A) Descriptive statistics of Full sample

Variable	Mean	Standard Deviation	Coefficient of Variation	Min	Max	Median	Observations
Debt Ratio	0,752	0,385	0,511	0,014	1,756	0,746	1 095 115
Bank Credit Availability	0,140	0,253	1,804	0,000	1,159	0,000	1 095 115
Average Interest Rate	0,091	0,106	1,164	0,000	0,414	0,061	593 627
Sales Growth	0,141	0,579	4,099	-1,000	1,942	0,022	926 801
Average Sales Growth	0,119	0,325	2,746	-0,938	1,131	0,038	600 567
ROA	0,021	0,228	10,746	-0,579	0,408	0,037	1 095 115
Current Ratio	1,823	1,594	0,874	0,020	6,853	1,315	1 092 186
Cash Ratio	0,924	1,346	1,457	0,000	6,389	0,480	1 092 186
Tangibility	0,208	0,272	1,309	0,000	0,970	0,076	1 095 115
Sales mill NOK	12,710	208,453	16,401	0,001	117 339,000	2,560	1 095 993
Equity mill NOK	3,015	53,380	17,704	-1 563,349	17 403,620	0,351	1 095 993
Total Assets mill NOK	10,440	235,203	22,528	-0,796	58 659,000	1,709	1 095 993
Long term debt mill NOK	2,812	94,268	33,523	-5,018	25 524,950	0,000	1 095 993
Family Firms	0,795	0,403	0,507	0,000	1,000	1,000	1 095 993
Small Firms	0,965	0,184	0,190	0,000	1,000	1,000	1 095 993
Distressed Firms	0,284	0,451	1,589	0,000	1,000	0,000	1 095 993
No Leverage Firms	0,252	0,434	1,725	0,000	1,000	0,000	1 095 993
Firm Survival	0,854	0,353	0,413	0,000	1,000	1,000	1 001 403
New Firms	0,168	0,374	2,229	0,000	1,000	0,000	1 095 993
Operating in 2001 and 2015	0,178	0,383	2,149	0,000	1,000	0,000	1 095 993
Number of Employees	6,998	33,309	4,760	0,000	4 504,000	3,000	923 442
Company Age	10,381	10,879	1,048	0,000	344,000	7,000	1 092 478
Company Size	14,582	1,902	0,130	6,908	25,488	14,755	1 095 993

Table 8 A: *Descriptive statistics of full sample.*

B) Descriptive Statistics of Balanced Sample

Variable	Mean	Standard Deviation	Coefficient of Variation	Min	Max	Median	Observations
Debt Ratio	0,699	0,321	0,459	0,014	1,756	0,703	200 201
Bank Credit Availability	0,124	0,217	1,757	0,000	1,159	0,000	200 201
Average Interest Rate	0,100	0,106	1,068	0,000	0,414	0,069	108 506
Sales Growth	0,056	0,375	6,707	-1,000	1,942	0,011	199 633
Average Sales Growth	0,141	0,037	0,265	0,056	0,197	0,145	200 235
ROA	0,052	0,179	3,451	-0,579	0,408	0,054	200 201
Current Ratio	1,841	1,394	0,757	0,020	6,853	1,406	200 110
Cash Ratio	0,890	1,176	1,322	0,000	6,389	0,540	200 110
Tangibility	0,204	0,247	1,211	0,000	0,970	0,094	200 201
Sales mill NOK	13,483	166,533	12,351	0,001	23 862,010	3,906	200 235
Equity mill NOK	2,611	38,101	14,593	-232,667	5 894,099	0,552	200 235
Total Assets mill NOK	9,184	301,747	32,854	-0,402	58 659,000	2,197	200 235
Long term debt mill NOK	1,723	91,227	52,941	-0,403	25 524,950	0,000	200 235
Family Firms	0,841	0,366	0,435	0,000	1,000	1,000	200 235
Small Firms	0,970	0,170	0,175	0,000	1,000	1,000	200 235
Distressed Firms	0,213	0,409	1,922	0,000	1,000	0,000	200 235
No Leverage Firms	0,207	0,405	1,957	0,000	1,000	0,000	200 235
Firm Survival	1	0	0	1	1,000	1	186 886
New Firms	0	0	.	0	0,000	0	200 235
Number of Employees	7,066	35,940	5,086	0,000	3 928,000	4,000	195 442
Company Age	16,727	10,523	0,629	0,000	141,000	15,000	200 207
Company Size	15,130	1,488	0,098	6,908	23,896	15,178	200 235

Table 8 B: *Descriptive statistics of balanced sample.*

C) Difference between the relative changes in total bank branches and the relative changes in total bank branches per capita.

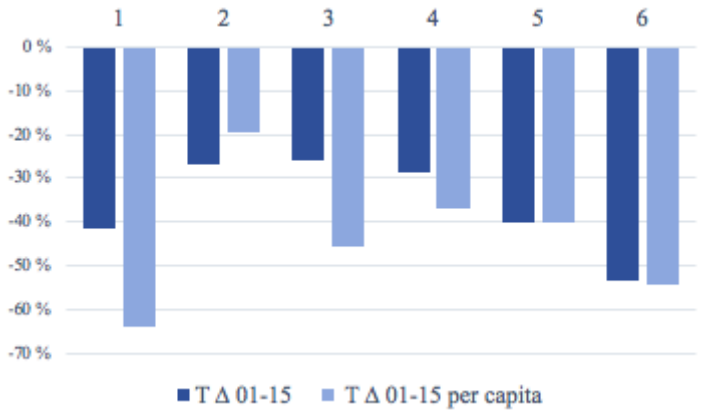

Figure 8 C: *Difference between the relative changes in total bank branches and the relative changes in total bank branches per capita from 2001 to 2015.*

D) Difference between the relative changes in savings bank branches and the relative changes in savings bank branches per capita.

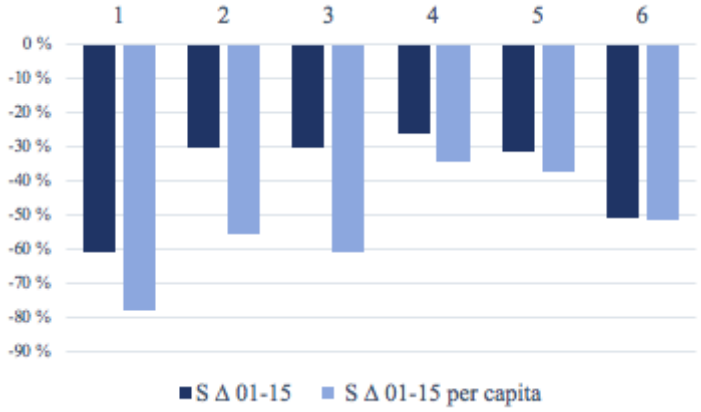

Figure 8 D: *Difference between the relative changes in savings bank branches and the relative changes in savings bank branches per capita from 2001 to 2015.*

E) Development of main variables per county for full sample

Full Sample: 2001-2015				
County	Average Debt Ratio	Average Interest Rate	Average Sales Growth	Average ROA
01 Østfold	77,31 %	11,47 %	13,20 %	1,85 %
02 Akershus	73,54 %	11,26 %	14,33 %	3,42 %
03 Oslo	75,11 %	11,48 %	15,33 %	2,73 %
04 Hedmark	77,16 %	11,48 %	12,96 %	1,28 %
05 Oppland	75,97 %	11,00 %	12,96 %	1,49 %
06 Buskerud	75,71 %	11,15 %	14,12 %	2,77 %
07 Vestfold	77,05 %	11,70 %	13,69 %	1,97 %
08 Telemark	77,01 %	10,84 %	13,23 %	0,98 %
09 Aust-Agder	75,64 %	10,89 %	13,32 %	1,74 %
10 Vest-Agder	76,50 %	10,71 %	14,54 %	2,29 %
11 Rogaland	73,10 %	11,13 %	15,22 %	4,23 %
12 Hordaland	75,51 %	11,08 %	14,21 %	2,05 %
14 Sogn og Fjorande	73,77 %	9,99 %	11,52 %	0,82 %
15 Møre og Romsdal	74,41 %	11,85 %	13,05 %	0,93 %
18 Nordland	76,86 %	11,30 %	13,92 %	0,05 %
19 Troms	74,39 %	10,95 %	13,96 %	1,10 %
20 Finnmark	75,06 %	10,46 %	14,19 %	-0,95 %
50 Trøndelag	74,24 %	11,38 %	14,32 %	1,60 %

Table 8 E: *Development of main variables per county for full sample from 2001 to 2015.*

F) Balanced Sample for Main Variables per County: 2001 to 2006

Balanced Sample: 2001-2006				
County	Average Debt Ratio	Average Interest Rate	Average Sales Growth	Average ROA
01 Østfold	79,25 %	13,82 %	8,99 %	5,48 %
02 Akershus	78,02 %	12,65 %	9,21 %	7,46 %
03 Oslo	77,19 %	12,91 %	9,30 %	7,11 %
04 Hedmark	77,52 %	12,58 %	8,14 %	5,70 %
05 Oppland	77,99 %	12,39 %	7,89 %	4,31 %
06 Buskerud	79,07 %	12,60 %	9,56 %	6,64 %
07 Vestfold	79,72 %	12,43 %	9,32 %	6,49 %
08 Telemark	80,53 %	11,92 %	9,84 %	3,21 %
09 Aust-Agder	76,01 %	12,22 %	8,40 %	6,23 %
10 Vest-Agder	80,46 %	12,71 %	8,79 %	5,97 %
11 Rogaland	79,33 %	11,94 %	10,26 %	6,96 %
12 Hordaland	77,76 %	13,18 %	9,59 %	5,51 %
14 Sogn og Fjorande	77,81 %	11,95 %	6,63 %	2,02 %
15 Møre og Romsdal	77,10 %	13,86 %	8,39 %	4,03 %
18 Nordland	78,87 %	12,88 %	8,51 %	3,28 %
19 Troms	77,69 %	12,52 %	10,45 %	4,24 %
20 Finnmark	76,03 %	11,52 %	8,49 %	1,92 %
50 Trøndelag	76,87 %	12,60 %	9,42 %	4,91 %

Table 8 F: *Development of main variables per county for balanced sample from 2001 to 2006.*

G) Balanced Sample for Main Variables per County: 2007 to 2015

Balanced Sample: 2007-2015				
County	Average Debt Ratio	Average Interest Rate	Average Sales Growth	Average ROA
01 Østfold	67,37 %	10,75 %	2,43 %	4,23 %
02 Akershus	63,92 %	10,15 %	3,15 %	5,69 %
03 Oslo	64,14 %	10,45 %	3,42 %	5,81 %
04 Hedmark	63,81 %	10,89 %	3,64 %	4,65 %
05 Oppland	64,97 %	10,29 %	3,58 %	3,56 %
06 Buskerud	65,63 %	10,49 %	3,03 %	5,20 %
07 Vestfold	66,06 %	11,06 %	2,59 %	5,11 %
08 Telemark	66,52 %	9,55 %	2,36 %	2,98 %
09 Aust-Agder	64,95 %	10,85 %	1,99 %	3,82 %
10 Vest-Agder	67,60 %	10,47 %	2,48 %	5,08 %
11 Rogaland	63,39 %	10,16 %	2,46 %	6,93 %
12 Hordaland	64,88 %	9,81 %	3,63 %	4,88 %
14 Sogn og Fjorande	63,94 %	9,79 %	4,68 %	3,58 %
15 Møre og Romsdal	63,51 %	11,25 %	2,36 %	3,43 %
18 Nordland	62,87 %	10,42 %	4,31 %	4,27 %
19 Troms	62,19 %	10,12 %	4,73 %	4,68 %
20 Finnmark	61,34 %	9,80 %	4,15 %	2,22 %
50 Trøndelag	63,65 %	10,36 %	3,69 %	4,66 %

Table 8 G*: Development of main variables per county for balanced sample from 2007 to 2015.*

H) Full Sample for Main Variables per County: 2001 to 2006

Full Sample: 2001-2006				
County	Average Debt Ratio	Average Interest Rate	Average Sales Growth	Average ROA
01 Østfold	83,34 %	13,15 %	13,44 %	1,46 %
02 Akershus	80,07 %	12,85 %	14,82 %	3,55 %
03 Oslo	81,18 %	13,05 %	15,49 %	2,60 %
04 Hedmark	82,80 %	13,15 %	13,07 %	0,93 %
05 Oppland	83,07 %	12,43 %	12,35 %	1,02 %
06 Buskerud	82,04 %	12,79 %	14,90 %	3,01 %
07 Vestfold	83,11 %	12,99 %	13,84 %	2,03 %
08 Telemark	82,99 %	12,19 %	14,51 %	0,69 %
09 Aust-Agder	80,49 %	12,28 %	15,00 %	1,66 %
10 Vest-Agder	83,02 %	12,38 %	14,91 %	2,09 %
11 Rogaland	80,61 %	12,64 %	16,53 %	4,11 %
12 Hordaland	82,31 %	12,94 %	14,68 %	1,45 %
14 Sogn og Fjorande	80,28 %	11,43 %	10,25 %	0,00 %
15 Møre og Romsdal	79,99 %	13,38 %	14,14 %	0,77 %
18 Nordland	84,71 %	12,97 %	14,28 %	-1,42 %
19 Troms	80,82 %	12,53 %	13,20 %	0,62 %
20 Finnmark	80,74 %	11,99 %	14,52 %	-1,72 %
50 Trøndelag	80,61 %	13,03 %	14,93 %	1,37 %

Table 8 H*: Development of main variables per county for full sample from 2001 to 2006.*

I) Full Sample for Main Variables per County: 2007 to 2015

Full Sample: 2007-2015				
County	**Average Debt Ratio**	**Average Interest Rate**	**Average Sales Growth**	**Average ROA**
01 Østfold	74,00 %	10,31 %	13,06 %	2,06 %
02 Akershus	70,05 %	10,26 %	14,05 %	3,35 %
03 Oslo	71,53 %	10,27 %	15,24 %	2,80 %
04 Hedmark	74,07 %	10,45 %	12,89 %	1,46 %
05 Oppland	72,30 %	10,04 %	13,29 %	1,72 %
06 Buskerud	72,22 %	10,09 %	13,67 %	2,64 %
07 Vestfold	73,62 %	10,78 %	13,59 %	1,93 %
08 Telemark	73,70 %	9,82 %	12,49 %	1,13 %
09 Aust-Agder	73,17 %	10,10 %	12,43 %	1,79 %
10 Vest-Agder	73,16 %	9,65 %	14,34 %	2,39 %
11 Rogaland	69,13 %	10,10 %	14,50 %	4,30 %
12 Hordaland	71,73 %	9,69 %	13,94 %	2,39 %
14 Sogn og Fjorande	70,24 %	9,00 %	12,22 %	1,26 %
15 Møre og Romsdal	71,20 %	10,80 %	12,40 %	1,02 %
18 Nordland	72,44 %	10,08 %	13,71 %	0,87 %
19 Troms	70,82 %	9,75 %	14,39 %	1,36 %
20 Finnmark	72,05 %	9,58 %	14,01 %	-0,55 %
50 Trøndelag	70,73 %	10,21 %	13,97 %	1,72 %

Table 8 I: *Development of main variables per county for full sample from 2007 to 2015.*

Appendix 9 – Correlation Matrix

A) Correlation Matrix on Full sample

Correlation Matrix	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(1) Debt Ratio	1.0000																									
(2) Bank Credit Availability	0.3740	1.0000																								
(3) Average Interest Rate	0.0913	0.0311	1.0000																							
(4) Sales Growth	0.0138	-0.0228	-0.0207	1.0000																						
(5) Average Sales Growth	0.0007	-0.0150	-0.0871	0.0705	1.0000																					
(6) ROA	-0.4828	-0.2996	-0.1046	0.1252	0.0635	1.0000																				
(7) Current Ratio	-0.3835	-0.1325	-0.2137	-0.0444	0.0057	0.1355	1.0000																			
(8) Cash Ratio	-0.3122	-0.1363	-0.2278	-0.0357	0.0030	0.1375	0.7402	1.0000																		
(9) Tangibility	0.0209	0.4244	-0.1505	-0.0128	-0.0229	-0.1047	-0.2048	-0.0305	1.0000																	
(10) Sales mill NOK	-0.0207	-0.0319	-0.0036	0.0079	0.0016	0.0203	-0.0206	-0.0285	0.0012	1.0000																
(11) Equity mill NOK	-0.0562	-0.0304	-0.0167	0.0026	-0.0005	0.0214	0.0109	0.0077	0.0291	0.7090	1.0000															
(12) Total Assets mill NOK	-0.0100	-0.0113	-0.0138	0.0042	-0.0008	0.0063	-0.0107	-0.0069	0.0306	0.8029	0.8263	1.0000														
(13) Long Term Debt mill NOK	0.0020	0.0044	-0.0187	0.0048	-0.0014	-0.0015	-0.0069	-0.0026	0.0374	0.5633	0.6839	0.8897	1.0000													
(14) GDP Growth	-0.0037	-0.0057	-0.0164	0.0314	0.3680	0.0268	0.0016	-0.0022	-0.0115	0.0034	0.0024	0.0016	0.0008	1.0000												
(15) Unemplyment Rate	0.0482	-0.0062	0.0463	-0.0005	-0.0567	-0.0146	-0.0508	-0.0370	0.0091	-0.0100	-0.0113	-0.0100	-0.0096	-0.1451	1.0000											
(16) Population	0.0125	-0.1415	-0.0405	0.0119	-0.0008	0.0183	0.0116	0.0261	-0.1080	0.0284	0.0190	0.0158	0.0104	0.0727	0.0975	1.0000										
(17) House Price sq.m. Growth	0.0199	-0.0191	0.0754	0.0212	0.2314	0.0056	-0.0492	-0.0375	-0.0148	-0.0069	-0.0066	-0.0054	-0.0050	0.0862	0.0365	-0.0524	1.0000									
(18) Family Firms	0.0047	-0.0160	-0.0141	-0.0473	-0.0037	0.0166	0.0234	0.0202	0.0237	-0.0061	0.0006	0.0027	0.0028	-0.0041	-0.0126	-0.0120	-0.0026	1.0000								
(19) Small Firms	0.0747	0.0180	0.0284	-0.0068	0.0033	-0.0180	-0.0145	0.0076	-0.0254	-0.2479	-0.1959	-0.1397	-0.1168	-0.0012	0.0003	-0.0415	0.0008	0.0520	1.0000							
(20) Distressed Firms	0.4384	0.1999	0.1291	-0.0140	-0.0195	-0.2837	-0.5006	-0.2945	0.3240	0.0033	0.0007	0.0177	0.0173	-0.0119	0.0412	0.0083	0.0263	0.0225	0.0206	1.0000						
(21) No Leverage Firms	-0.0910	-0.1310	-0.1535	0.0241	0.0072	0.0590	0.0175	0.0578	-0.1017	-0.0038	0.0003	-0.0030	-0.0057	0.0032	-0.0195	0.0393	0.0904	0.0047	0.0061	-0.0139	1.0000					
(22) New Firms	0.0161	-0.0194	0.0165	0.1536	-0.1015	-0.0194	-0.0304	-0.0188	-0.0228	-0.0010	-0.0024	-0.0022	-0.0024	-0.0533	0.0980	-0.0045	-0.0939	-0.0143	-0.0049	0.0138	0.0787	1.0000				
(23) Firm Survival	-0.1014	-0.0371	-0.0139	0.0189	-0.0303	0.1061	0.0162	0.0076	0.0181	-0.0041	-0.0020	-0.0013	-0.0017	-0.0171	-0.0062	-0.0156	-0.0171	0.0439	0.0263	-0.0757	-0.0157	-0.0079	1.0000			
(24) Number of Employees	-0.0312	-0.0396	0.0023	0.0019	-0.0022	0.0171	-0.0405	-0.0442	-0.0081	0.4239	0.2412	0.1781	0.1081	0.0012	-0.0005	0.0317	-0.0111	-0.0211	-0.2973	-0.0008	-0.0115	0.0026	-0.0058	1.0000		
(25) Company Age	-0.1429	-0.0461	-0.0321	-0.1411	0.0158	0.0502	0.1199	0.0805	0.0288	0.0493	0.0461	0.0294	0.0205	-0.0000	-0.0263	0.0575	-0.0689	0.0607	-0.1290	-0.0667	-0.0184	-0.0579	0.0281	0.0587	1.0000	
(26) Company Size	-0.1346	-0.1042	0.1286	0.1096	0.0128	0.1772	-0.1366	-0.2339	-0.1610	0.2128	0.1294	0.1022	0.0775	0.0143	-0.0188	0.0100	-0.0254	-0.0932	-0.3330	-0.1356	-0.0969	-0.0044	0.0717	0.2790	0.0785	1.0000

Table 9 A: *Correlation matrix of full sample.*

B) Correlation Matrix of Balanced sample

Correlation Matrix	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1) Debt Ratio	1.0000																							
(2) Bank Credit Availability	0.3912	1.0000																						
(3) Average Interest Rate	0.1104	0.0250	1.0000																					
(4) Sales Growth	0.0057	-0.0233	-0.0099	1.0000																				
(5) Average Sales Growth	0.0066	-0.0157	-0.0890	0.0852	1.0000																			
(6) ROA	-0.3892	-0.3175	-0.1099	0.2005	0.0811	1.0000																		
(7) Current Ratio	-0.3994	-0.1531	-0.2282	-0.0504	0.0031	0.0862	1.0000																	
(8) Cash Ratio	-0.3433	-0.1556	-0.2388	-0.0305	0.0008	0.1270	0.7448	1.0000																
(9) Tangibility	0.0299	0.4584	-0.1621	-0.0008	-0.0230	-0.1377	-0.2203	-0.0371	1.0000															
(10) Sales mill NOK	-0.0064	-0.0225	-0.0021	0.0067	0.0004	0.0119	-0.0181	-0.0191	0.0080	1.0000														
(11) Equity mill NOK	-0.0377	-0.0210	-0.0134	0.0076	0.0008	0.0153	0.0079	0.0120	0.0264	0.8636	1.0000													
(12) Total Assets mill NOK	-0.0020	-0.0089	-0.0083	0.0024	-0.0003	0.0050	-0.0104	-0.0048	0.0247	0.9254	0.9161	1.0000												
(13) Long Term Debt mill NOK	0.0041	0.0051	-0.0137	0.0018	0.0010	-0.0013	-0.0048	0.0006	0.0304	0.6840	0.7807	0.8841	1.0000											
(14) GDP Growth	0.0025	-0.0072	-0.0190	0.0415	0.3591	0.0417	-0.0072	-0.0024	-0.0086	-0.0003	-0.0021	-0.0007	-0.0003	1.0000										
(15) Unemplyment Rate	0.0704	0.0062	0.0375	0.0025	-0.0622	-0.0237	-0.0488	-0.0288	0.0123	-0.0088	-0.0092	-0.0063	-0.0055	-0.1553	1.0000									
(16) Population	0.0105	-0.1368	-0.0429	-0.0045	0.0010	0.0336	0.0038	0.0223	-0.1093	0.0181	0.0098	0.0088	0.0054	0.0781	0.0957	1.0000								
(17) House Price sq.m. Growth	0.0448	-0.0168	0.0722	0.0843	0.2214	0.0156	-0.0733	-0.0500	-0.0120	-0.0059	-0.0078	-0.0046	-0.0052	0.0722	0.0415	-0.0530	1.0000							
(18) Family Firms	0.0288	0.0051	-0.0165	-0.0224	-0.0005	-0.0235	0.0196	0.0168	0.0245	-0.0038	-0.0013	0.0026	0.0029	-0.0037	-0.0114	-0.0160	-0.0052	1.0000						
(19) Small Firms	0.0555	0.0335	0.0317	-0.0113	0.0008	-0.0141	-0.0066	0.0051	-0.0153	-0.1767	-0.1744	-0.1052	-0.0906	0.0030	0.0156	-0.0356	0.0035	0.0492	1.0000					
(20) Distressed Firms	0.4057	0.2033	0.1265	-0.0141	-0.0173	-0.2114	-0.4675	-0.2704	0.3534	0.0099	0.0055	0.0166	0.0138	-0.0095	0.0479	-0.0034	0.0365	0.0407	0.0151	1.0000				
(21) No Leverage Firms	-0.0846	-0.1197	-0.1421	0.0178	0.0141	0.0736	0.0065	0.0428	-0.0961	-0.0014	-0.0001	-0.0019	-0.0042	0.0089	-0.0220	0.0322	0.0896	0.0053	-0.0006	-0.0153	1.0000			
(22) Number of Employees	-0.0194	-0.0275	0.0073	0.0075	0.0002	0.0044	-0.0289	-0.0296	-0.0060	0.3124	0.1890	0.1199	0.0706	-0.0019	0.0006	0.0235	-0.0110	-0.0156	-0.2426	0.0025	-0.0039	1.0000		
(23) Company Age	-0.1356	-0.0617	-0.0671	-0.0756	0.0243	-0.0032	0.1474	0.0978	-0.0209	0.0453	0.0510	0.0338	0.0254	-0.0175	-0.0959	0.1135	-0.1913	0.0260	-0.1102	-0.0782	-0.0229	0.0481	1.0000	
(24) Company Size	-0.1295	-0.1090	0.0879	0.0910	0.0156	0.1551	-0.1139	-0.2123	-0.1741	0.1590	0.1268	0.0878	0.0668	0.0122	-0.0432	0.0228	-0.0460	-0.0988	-0.3429	-0.1362	-0.0660	0.2195	0.1114	1.0000

Table 9 B: *Correlation matrix of balanced sample.*

Appendix 10 – Yearly changes in closures of total and savings banks branches

County	Yearly Δ S01-06	Yearly Δ T01-06	Yearly Δ S06-15	Yearly Δ T06-15
01 Østfold	-9,5 %	-4,6 %	-0,9 %	-2,6 %
02 Akershus	-10,2 %	0,9 %	1,3 %	-0,4 %
03 Oslo	-14,4 %	-4,7 %	0,0 %	-4,0 %
04 Hedmark	-0,9 %	-0,7 %	-1,6 %	-2,0 %
05 Oppland	-10,2 %	-4,7 %	-1,7 %	-3,4 %
06 Buskerud	-7,5 %	-2,4 %	1,5 %	-0,9 %
07 Vestfold	-12,6 %	-2,0 %	1,4 %	-2,6 %
08 Telemark	-5,8 %	-2,5 %	1,5 %	-0,5 %
09 Aust-Agder	-1,3 %	0,0 %	-1,8 %	-2,6 %
10 Vest-Agder	-1,4 %	-2,4 %	-0,8 %	-1,3 %
11 Rogaland	1,6 %	0,6 %	-1,1 %	-1,8 %
12 Hordaland	-2,3 %	-1,9 %	-4,7 %	-4,4 %
14 Sogn og Fjordane	-1,8 %	-1,7 %	-1,7 %	-2,7 %
15 Møre og Romsdal	1,0 %	-1,6 %	-0,6 %	-1,6 %
18 Nordland	-4,7 %	-4,2 %	-3,0 %	-3,4 %
19 Troms	-2,4 %	-2,0 %	-7,0 %	-6,1 %
20 Finnmark	-3,0 %	-2,0 %	-4,1 %	-4,8 %
50 Trøndelag	-2,7 %	-2,4 %	0,0 %	-1,2 %
Total	-4,3 %	-2,3 %	-1,6 %	-2,5 %

Table 10*: Yearly changes in closures of total and savings banks branches in Norway per county for the periods 2001 to 2006 and 2006 to 2015.*

Appendix 11 – Main Regression

A) Model 1 (diff-in-diff) on dependent variable Financial Debt Ratio

$$Financial\ Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-Diff	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0246***	-0.0157***	-0.0281***	-0.0294***	-0.0237***	-0.0324***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	-0.0290***	0.120***	0.00455	-0.0522***	-0.0120**	-0.0848***
	(0.000)	(0.000)	(0.265)	(0.000)	(0.002)	(0.000)
Treatment * time	0.00361	-0.0305	-0.00177	0.0107***	0.0112*	0.0180***
Diff-in-Diff	(0.072)	(0.089)	(0.728)	(0.000)	(0.023)	(0.000)
N	200 201	31 870	42 754	200 201	34 275	107 565
R-sq	0,6 %	1 %	0,4 %	1,3 %	0,2 %	2,9 %
adj. R-sq	0,6 %	1 %	0,3 %	1,3 %	0,2 %	2,9 %
rmse	0,217	0,195	0,238	0,216	0,21	0,207

Table 11 A: *Bank branch closures effect on firm financing measured by the dependent variable financial debt ratio defined in 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*

B) Model 3 (rural model) on dependent variable Financial Debt Ratio

$$Financial\ Debt\ Ratio_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	0.00792***	0.00728	0.00782*	0.00802***	0.00427	0.00350
	(0.001)	(0.326)	(0.029)	(0.001)	(0.521)	(0.253)
Treatment Dummy	0.00822**	0.0425**	0.00170	0.00447	0.00563	-0.000110
	(0.003)	(0.001)	(0.691)	(0.096)	(0.512)	(0.974)
Treatment * time	-0.00597	-0.0303	-0.00106	-0.00594	-0.00163	-0.00202
Diff-in-Diff	(0.070)	(0.050)	(0.834)	(0.065)	(0.875)	(0.621)
Return on Assets	-0.163***	-0.158***	-0.150***	-0.162***	-0.172***	-0.156***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	0.416***	0.377***	0.448***	0.416***	0.396***	0.425***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth of Sales	0.00347	0.00424	0.00699	0.00347	-0.00145	0.00183
	(0.191)	(0.620)	(0.071)	(0.191)	(0.853)	(0.595)
Company Size	0.0131***	0.00816***	0.0115***	0.0132***	0.0101***	0.0142***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.436***	0.399***	0.449***	0.436***	0.397***	0.438***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	0.0379***	0.0328***	0.0413***	0.0379***	0.0321***	0.0406***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.00439	-0.0360	-0.00350	0.00435	0.000568	-0.00618
	(0.741)	(0.665)	(0.883)	(0.743)	(0.994)	(0.728)
GDP growth	-0.0481*	0.0260	-0.0558	-0.0486*	-0.00942	-0.0918***
	(0.014)	(0.696)	(0.069)	(0.013)	(0.869)	(0.000)
Unemployment Rate	-0.420***	-0.766***	-0.424***	-0.425***	-0.822***	-0.572***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population	1.00e-08	1.53e-08	-4.88e-10	1.07e-08	7.02e-08**	2.83e-08**
	(0.102)	(0.577)	(0.967)	(0.080)	(0.001)	(0.002)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	61 149	5 714	25 699	61 149	7 956	36 814
R-sq	50,0 %	47,6 %	51,8 %	49,9 %	46,5 %	50,4 %
adj. R-sq	49,9 %	47,4 %	51,7 %	49,9 %	46,4 %	50,3 %
rmse	0,176	0,17	0,174	0,176	0,179	0,176

Table 11 B: *Bank branch closures impact on firm financing in rural areas measured by the dependent variable financial debt ratio defined in chapter 4.1.1. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio, growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses per county, GDP growth per county, unemployment rate per county and population per county. Controlled for industries, see appendix 12. *p < 0.05, **p < 0.01, ***p < 0.001 (p-values in brackets).*

C) Model 1 (diff-in-diff) on dependent variable Average Interest Rate

$$Average\ interest\ rate_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-Diff	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0211***	-0.0182***	-0.0190***	-0.0221***	-0.0203***	-0.0225***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00384**	-0.0124*	-0.00209	0.00180	-0.00706*	-0.000352
	(0.002)	(0.046)	(0.399)	(0.155)	(0.031)	(0.843)
Treatment * time Diff-in-Diff	-0.00474**	-0.00827	-0.00498	-0.00218	-0.00406	-0.000307
	(0.003)	(0.280)	(0.105)	(0.168)	(0.312)	(0.889)
N	61 385	8 009	16 079	61 385	9 815	31 289
R-sq	1,5 %	1,1 %	1,3 %	1,5 %	1,5 %	1,5 %
adj. R-sq	1,5 %	1,0 %	1,3 %	1,5 %	1,5 %	1,5 %
rmse	0,0944	0,0960	0,0908	0,0944	0,0951	0,0926

Table 11 C: *Bank branch closures effect on firm financing measured by the dependent variable average interest rate defined in 4.1.2. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*

D) Model 3 (rural model) on dependent variable Average Interest Rate

$$Average\ interest\ rate_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.00395**	0.00515	0.00204	-0.00474***	-0.000132	-0.00366*
	(0.004)	(0.254)	(0.337)	(0.001)	(0.974)	(0.046)
Treatment Dummy	-0.00159	-0.00962	0.00158	-0.00466**	-0.00384	-0.00263
	(0.306)	(0.163)	(0.507)	(0.002)	(0.413)	(0.178)
Treatment * time	-0.00376	0.00507	-0.00657*	-0.00131	0.00156	-0.00510*
Diff-in-Diff	(0.055)	(0.522)	(0.030)	(0.497)	(0.786)	(0.039)
Return on Assets	-0.108***	-0.126***	-0.120***	-0.108***	-0.100***	-0.114***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.00825***	-0.00421	-0.00819*	-0.00815***	-0.00600	-0.00713*
	(0.001)	(0.614)	(0.031)	(0.001)	(0.369)	(0.021)
Growth in sales	0.00669***	0.0158*	0.0109***	0.00671***	0.0121*	0.00800***
	(0.000)	(0.014)	(0.000)	(0.000)	(0.013)	(0.000)
Company Size	-0.00485***	-0.00683***	-0.00524***	-0.00487***	-0.00749***	-0.00556***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.140***	-0.143***	-0.145***	-0.140***	-0.131***	-0.141***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.0201***	-0.0183***	-0.0210***	-0.0201***	-0.0200***	-0.0196***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	-0.0239**	0.0116	-0.0192	-0.0240**	-0.0513	-0.0239*
	(0.002)	(0.751)	(0.130)	(0.002)	(0.114)	(0.013)
GDP growth	0.00714	0.0186	-0.0188	0.00673	0.0631	-0.0153
	(0.571)	(0.671)	(0.339)	(0.593)	(0.089)	(0.355)
Unemployment Rate	-0.126***	0.513***	0.0966	-0.126***	0.442***	-0.125*
	(0.001)	(0.001)	(0.113)	(0.001)	(0.000)	(0.010)
Population	-1.08e-08**	-1.31e-09	-2.55e-08**	-1.19e-08**	-2.50e-08	2.29e-09
	(0.007)	(0.947)	(0.002)	(0.003)	(0.084)	(0.706)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	26 103	2 297	10 816	26 103	3 287	15 463
R-sq	25,2 %	27,9 %	25,8 %	25,3 %	24,2 %	25,9 %
adj. R-sq	25,2 %	27,2 %	25,6 %	25,2 %	23,7 %	25,8 %
rmse	0,0737	0,0751	0,0734	0,0736	0,0755	0,0731

Table 11 D: *Bank branch closures impact on firm financing in rural areas measured by the dependent variable average interest rate defined in chapter 4.1.2. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio, growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses per county, GDP growth per county, unemployment rate per county and population per county. Controlled for industries, see appendix 12. *p < 0.05, **p < 0.01, ***p < 0.001 (p-values in brackets).*

E) Model 1 (diff-in-diff) on dependent variable Growth of Sales

$$Growth\ of\ Sales_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-Diff	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0585***	-0.0633***	-0.0578***	-0.0595***	-0.0651***	-0.0543***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00108	0.0602*	0.00479	0.000521	0.00729	0.00468
	(0.705)	(0.021)	(0.458)	(0.858)	(0.329)	(0.256)
Treatment * time Diff-in-Diff	-0.000832	-0.0481	-0.00777	0.000894	0.00482	-0.00452
	(0.812)	(0.124)	(0.322)	(0.802)	(0.599)	(0.373)
N	199 633	31 785	42 636	199 633	34 182	107 218
R-sq	0,6 %	0,7 %	0,7 %	0,6 %	0,7 %	0,5 %
adj. R-sq	0,6 %	0,7 %	0,7 %	0,6 %	0,7 %	0,5 %
rmse	0,3730	0,3780	0,3610	0,3730	0,3680	0,3820

Table 11 E: *Bank branch closures effect on firm performance in rural areas measured by the dependent variable growth of sales defined in 4.1.3. The independent variable of interest is the difference-in-difference estimator. Tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after.*

F) Model 2 (full model) on dependent variable Growth of Sales

$$Growth\ of\ Sales_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Model	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0168***	-0.0103	-0.00945	-0.0190***	-0.0142*	-0.0154***
	(0.000)	(0.061)	(0.077)	(0.000)	(0.021)	(0.001)
Treatment Dummy	-0.00421	0.106***	-0.000157	-0.00472	0.0243**	-0.00361
	(0.150)	(0.000)	(0.981)	(0.118)	(0.004)	(0.397)
Treatment * time Diff-in-Diff	0.00280	-0.0749*	-0.00662	0.00554	-0.00162	0.00313
	(0.426)	(0.021)	(0.396)	(0.121)	(0.863)	(0.537)
Return on Assets	0.462***	0.468***	0.513***	0.462***	0.443***	0.479***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	0.0978***	0.106***	0.0971***	0.0977***	0.106***	0.102***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	0.0185***	0.0174***	0.0185***	0.0185***	0.0200***	0.0174***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.0322***	0.00893	0.0326***	0.0323***	0.0298**	0.0269***
	(0.000)	(0.386)	(0.000)	(0.000)	(0.002)	(0.000)
Current Ratio	-0.0000629	0.00242	-0.00216	-0.0000659	0.00384	-0.000235
	(0.947)	(0.328)	(0.261)	(0.945)	(0.102)	(0.853)
House Price sq.m. growth	0.219***	0.303***	0.252***	0.218***	0.321***	0.173***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	0.288***	0.160***	0.252***	0.289***	0.248***	0.300***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment Rate	0.0229	0.178	0.323*	0.00731	0.428**	0.0933
	(0.761)	(0.187)	(0.014)	(0.924)	(0.004)	(0.377)
Population	-2.99e-08***	-3.39e-08*	-5.96e-08***	-2.99e-08***	-3.88e-08*	-4.11e-08***
	(0.000)	(0.042)	(0.000)	(0.000)	(0.016)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	186 741	29 742	39 909	186 741	31 981	100 279
R-sq	6,5 %	7,0 %	6,8 %	6,5 %	6,6 %	6,5 %
adj. R-sq	6,5 %	6,9 %	6,8 %	6,5 %	6,5 %	6,5 %
rmse	0,3530	0,3550	0,3400	0,3530	0,3490	0,3610

Table 11 F: *Bank branch closures effect on firm performance measured by the dependent variable growth of sales defined in 4.1.3. The independent variable of interest is the difference-in-difference estimator. Tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ *(p-values in brackets).*

G) Model 1 (diff-in-diff) on dependent variable Return on Assets

$$ROA_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-Diff	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.00743***	-0.0131***	-0.00765***	-0.00546***	-0.00978***	-0.00612***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Treatment Dummy	0.00679***	-0.0502***	-0.000123	0.0126***	-0.00825*	0.0210***
	(0.000)	(0.000)	(0.963)	(0.000)	(0.010)	(0.000)
Treatment * time	-0.000585	0.0103	0.00141	-0.00363*	-0.000277	-0.00431
Diff-in-Diff	(0.720)	(0.360)	(0.683)	(0.028)	(0.947)	(0.059)
N	200 201	31 870	42 754	200 201	34 275	107 565
R-sq	0,1 %	0,3 %	0,0 %	0,1 %	0,1 %	0,3 %
adj. R-sq	0,1 %	0,3 %	0,0 %	0,1 %	0,1 %	0,3 %
rmse	0,1790	0,1830	0,1630	0,1780	0,1790	0,1790

Table 11 G: *Bank branch closures effect on firm performance measured by the dependent variable return on assets defined in 4.1.4. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*

H) Model 2 (full model) on dependent variable Return on Assets

$$ROA_{i,t} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Full Model	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0347***	-0.0396***	-0.0397***	-0.0339***	-0.0378***	-0.0350***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.000102	-0.0370***	0.00324	0.00254*	-0.00798*	0.00697***
	(0.934)	(0.000)	(0.207)	(0.046)	(0.019)	(0.000)
Treatment * time	0.000951	0.0278**	0.00176	-0.000178	0.00443	-0.000232
Diff-in-Diff	(0.537)	(0.007)	(0.580)	(0.909)	(0.265)	(0.914)
Debt Ratio	-0.208***	-0.206***	-0.215***	-0.208***	-0.207***	-0.203***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth of Sales	0.0934***	0.0990***	0.0900***	0.0934***	0.0920***	0.0939***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	0.0169***	0.0186***	0.0159***	0.0169***	0.0181***	0.0159***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.0989***	-0.0972***	-0.0920***	-0.0987***	-0.102***	-0.0943***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.0145***	-0.0140***	-0.0126***	-0.0145***	-0.0140***	-0.0132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Price sq.m. growth	0.0247***	0.0520**	0.0378**	0.0252***	0.0688***	0.0167*
	(0.000)	(0.006)	(0.007)	(0.000)	(0.001)	(0.050)
GDP growth	0.118***	0.0910***	0.0986***	0.120***	0.0936***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment Rate	-0.363***	-0.215***	-0.478***	-0.345***	-0.266***	-0.471***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population	1.11e-08***	-3.60e-09	4.80e-08***	9.23e-09***	-7.10e-09	1.81e-08***
	(0.000)	(0.639)	(0.000)	(0.000)	(0.338)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	186 741	29 742	39 909	186 741	31 981	100 279
R-sq	20,6 %	20,0 %	23,4 %	20,6 %	20,7 %	20,0 %
adj. R-sq	20,6 %	19,9 %	23,4 %	20,6 %	20,6 %	20,0 %
rmse	0,1590	0,1630	0,1420	0,1590	0,1590	0,1600

Table 11 H: *Bank branch closures impact on firm performance measured by the dependent variable return on assets defined in chapter 4.1.4. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included are as follows: debt ratio, growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses per county, GDP growth per county, unemployment rate per county and population per county. Controlled for industries, see appendix 12. *p < 0.05, **p < 0.01, ***p < 0.001 (p-values in brackets).*

Appendix 12 – Industry codes

2002:

NACE	SSB/NACE/CCGR	Description	Our classification	Description
Z	00	Unknown	0	Unknown
A	01-02	Agriculture, hunting and Forestry	1	Agriculture, forestry, fishing and mining
B	05	Fishing	1	Agriculture, forestry, fishing and mining
C	10-14	Mining and quarrying	1	Agriculture, forestry, fishing and mining
D	15-37	Manufacturing	2	Manufacturing
E	40-41	Electricity, gas and water supply	3	Energy, Water Supply and Remediation Activities
F	45	Construction	4	Construction
G	50-52	Wholesale and retail trade, repair of motor vehicles, motorcycles and pers	5	Trade and Transport
I	60-63	Transport, storage and communication	5	Trade and Transport
J	65-67	Financial intermediation	6	Financial and Insurance Activities
K	70-74	Real estate, renting and business activities	7	Real Estate Activities
M	80	Education	8	Health, Education and Public Administration
N	85	Health and social work	8	Health, Education and Public Administration
L	75	Public administration and defence; compulsory social security	8	Health, Education and Public Administration
O	92	Other community, social and personal service activities	9	Culture
H	55	Hotels and restaurants	10	Services
I	64	Transport, storage and communication	10	Services
O	90-91 & 93	Other community, social and personal service activities	10	Services
P	95	Private households with employed persons	10	Services
Q	99	Extra-territorial organisations and bodies	10	Services

2007:

NACE	SB/NACE/CCGR	Description	Our classification	Description
A	01-03	Agriculture, forestry and fishing	1	Agriculture, forestry, fishing and mining
B	05-09	Mining and quarrying	1	Agriculture, forestry, fishing and mining
C	10-33	Manufacturing	2	Manufacturing
D, E	35, 36-39	Electricity, gas, steam and air conditioning supply, Water supply; sewerage;	3	Energy, Water Supply and Remediation Activities
F	41-43	Construction	4	Construction
G	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	5	Trade and Transport
H	49-53	Transporting and storage	5	Trade and Transport
K	64-66	Financial and insurance activities	6	Financial and Insurance Activities
L	68	Real estate activities	7	Real Estate Activities
P	85	Education	8	Health, Education and Public Administration
Q	86-88	Human health and social work activities	8	Health, Education and Public Administration
O	84	Public administration and defence; compulsory social security	8	Health, Education and Public Administration
R	90-93	Arts, entertainment and recreation	9	Culture
I	55, 56	Accommodation and food service activities	10	Services
J	58-63	Information and communication	10	Services
M	69-75	Professional, scientific and technical activities	10	Services
N	77-82	Administrative and support service activities	10	Services
S	94-96	Other services activities	10	Services
T	97	Activities of households as employers; undifferentiated goods - and services	10	Services
U	99	Activities of extraterritorial organisations and bodies	10	Services

Table 12: *Overview of industry codes by NACE letter classification and NACE, SSB and CCGR's number classification and description of every industry, and our classification and industry definitions, for both 2002 and 2007.*

Appendix 13 – Descriptive Statistics of Financial Debt Ratio

A) Development in financial debt ratio by county

County	2001-2006	2007-2015	2001-2015
01 Østfold	13,96 %	13,13 %	13,46 %
02 Akershus	7,76 %	7,61 %	7,67 %
03 Oslo	5,43 %	4,83 %	5,08 %
04 Hedmark	15,61 %	13,69 %	14,45 %
05 Oppland	18,40 %	15,71 %	16,78 %
06 Buskerud	12,35 %	11,17 %	11,64 %
07 Vestfold	12,15 %	10,98 %	11,44 %
08 Telemark	20,19 %	16,93 %	18,22 %
09 Aust-Agder	15,20 %	15,56 %	15,42 %
10 Vest-Agder	16,76 %	13,50 %	14,80 %
11 Rogaland	15,40 %	11,92 %	13,31 %
12 Hordaland	14,97 %	11,98 %	13,18 %
14 Sogn og Fjorande	25,12 %	18,62 %	21,22 %
15 Møre og Romsdal	17,78 %	14,87 %	16,03 %
18 Nordland	23,36 %	16,67 %	19,35 %
19 Troms	17,89 %	13,73 %	15,40 %
20 Finnmark	16,88 %	13,59 %	14,90 %
50 Trøndelag	15,07 %	11,29 %	12,80 %
Total	**13,72 %**	**11,47 %**	**12,37 %**

Table 13 A*: Development in financial debt ratio by counties from 2001 to 2006, 2007 to 2015 and 2001 to 2015.*

B) Financial debt ratio by centrality class

Centrality Index	2001-2006	2007-2015	2001-2015
1	6,01 %	5,43 %	5,67 %
2	10,48 %	9,00 %	9,59 %
3	14,90 %	12,69 %	13,56 %
4	18,42 %	14,87 %	16,28 %
5	23,02 %	18,40 %	20,25 %
6	24,22 %	18,66 %	20,89 %
Total	13,72 %	11,47 %	12,37 %

Table 13 B*: Financial debt ratio by centrality class from 2001 to 2006, 2007 to 2015 and 2001 to 2015.*

C) Illustration of Financial debt ratio by centrality class from 2001 to 2015

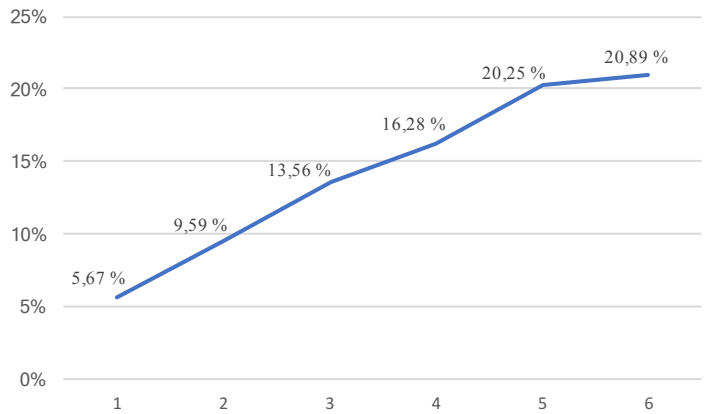

Figure 13 C*: Financial debt ratio by centrality class from 2001 to 2015.*

Appendix 14 – Reverse Exercise Results

Results – Model 1 for Total Bank Branches

i) *House price per square meter growth (5%):* -0.145058

An interesting sub-result is the coefficient of house price per square meter growth which is significant on a 5% level. The negative coefficient inclines that when house prices increase, bank branches close.

Results – Model 1 for Savings Bank Branches

i) *Share of newly established firms (0.1%):* -0.027713

In addition, we find that the share of newly established firms is significant at a 0.1% level. The negative coefficient tells us that bank branches closures and newly established firms moves adversely, hence, when there is an increase in new firms, savings bank branches close.

ii) *House price per square meter growth (5%):* -0.147534

iii) *GDP growth (10%):* -0.247688

Results – Model 2 for Total Bank Branches

i) *Share of newly established firms (5%):* -0.022215

ii) *Return on Assets (0.1%):* 0.040955

iii) *Debt Ratio (10%):* 0.022827

iv) Company size (5%): 0.005319

v) Tangibility (0.1%): -0.047292

vi) House price per square meter growth (1%): -0.119875

vii) Unemployment rate (10%): 2,353529

Results – Model 2 for Savings Bank Branches

i) *Share of newly established firms (5%):* -0.026275

ii) *Return on Assets (0.1%):* 0.037307

iii) Company size (1%): 0.007083

iv) Tangibility (1%): -0.053928

v) House price per square meter growth (0.0%): -0.157381

vi) Unemployment rate (5%): 3,997475

vii) Population (5%): -0.000001

Appendix 15 – Analysis of Firm Survival

A) Model 1 (diff-in-diff) on dependent variable Firm Survival

$$d_{firmsurvival} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-diff - Survial	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	0.0436***	0.0453***	0.0417***	0.0427***	0.0426***	0.0384***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	-0.0180***	0.0291*	-0.00511	-0.0146***	0.0122**	-0.0286***
	(0.000)	(0.025)	(0.201)	(0.000)	(0.005)	(0.000)
Treatment * time	0.00745***	-0.00257	0.00243	0.00757***	0.00670	0.0119***
Diff-in-Diff	(0.000)	(0.859)	(0.588)	(0.000)	(0.167)	(0.000)
N	822 493	139 100	158 611	822 493	146 668	425 486
R-sq	0,4 %	0,3 %	0,3 %	0,4 %	0,3 %	0,4 %
adj. R-sq	0,4 %	0,3 %	0,3 %	0,4 %	0,3 %	0,4 %
rmse	0,355	0,36	0,339	0,355	0,358	0,353

Table 15 A*: Bank branch closures effect on firm survival measured by a dummy variable = 1 if the firm has positive revenues the following year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

B) Model 3 (rural model) on dependent variable Firm Survival

$$d_{firmsurvival} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas - Survival	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	0.0320***	0.0283***	0.0254***	0.0325***	0.0235***	0.0340***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	-0.00389	0.0151	-0.00196	-0.00300	0.0103	-0.000236
	(0.226)	(0.312)	(0.698)	(0.341)	(0.273)	(0.953)
Treatment * time	0.00427	-0.00821	0.00350	0.00247	-0.0102	0.000353
Diff-in-Diff	(0.235)	(0.621)	(0.534)	(0.483)	(0.336)	(0.938)
Return on Assets	0.114***	0.114***	0.104***	0.114***	0.127***	0.112***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.0550***	-0.0747***	-0.0499***	-0.0550***	-0.0569***	-0.0499***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.00774***	0.0120*	0.0100***	0.00774***	0.00865*	0.00872***
	(0.000)	(0.014)	(0.000)	(0.000)	(0.046)	(0.000)
Company Size	0.0151***	0.0130***	0.0154***	0.0151***	0.0127***	0.0160***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.0485***	0.0501***	0.0436***	0.0485***	0.0525***	0.0481***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.00247***	-0.00332	-0.00306***	-0.00247***	-0.00202	-0.00257***
	(0.000)	(0.091)	(0.001)	(0.000)	(0.236)	(0.001)
House Price sq.m. growtl	-0.0473**	-0.136*	-0.0960***	-0.0474**	-0.0716	-0.0669***
	(0.002)	(0.017)	(0.000)	(0.001)	(0.146)	(0.001)
GDP growth	-0.111***	-0.0994	-0.148***	-0.112***	-0.0684	-0.124***
	(0.000)	(0.123)	(0.000)	(0.000)	(0.213)	(0.000)
Unemployment Rate	0.610***	0.613**	0.368***	0.609***	0.233	0.627***
	(0.000)	(0.004)	(0.000)	(0.000)	(0.173)	(0.000)
Population	-3.42e-08***	-1.97e-08	-4.50e-08***	-3.44e-08***	2.51e-08	-4.93e-08***
	(0.000)	(0.458)	(0.000)	(0.000)	(0.201)	(0.000)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	208 158	19 562	84 711	208 158	25 478	120 235
R-sq	2,8 %	3,0 %	2,6 %	2,8 %	2,8 %	2,8 %
adj. R-sq	2,8 %	2,9 %	2,6 %	2,8 %	2,7 %	2,7 %
rmse	0,309	0,316	0,306	0,309	0,309	0,307

Table 15 B*: Bank branch closures effect on firm survival in rural areas measured by a dummy variable = 1 if the firm has positive revenues the following year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included is as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

Appendix 16 – Analysis of Newly Established Firms

A) Model 1 (diff-in-diff) on dependent variable New Firm

$$d_{newfirms} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + u$$

Diff-in-diff - New firm	Total Bank Branches			Savings Banks Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0180***	-0.0157***	-0.0217***	-0.0204***	-0.0185***	-0.0204***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.00705***	-0.0104	0.00214	0.00256	-0.0175***	0.0117***
	(0.000)	(0.388)	(0.562)	(0.105)	(0.000)	(0.000)
Treatment * time	0.00402*	-0.000395	0.00178	0.00693***	0.0134**	0.00815**
Diff-in-Diff	(0.024)	(0.978)	(0.678)	(0.000)	(0.003)	(0.003)
N	898 598	150 981	172 839	898 598	159 604	465 607
R-sq	0,1 %	0,0 %	0,1 %	0,0 %	0,0 %	0,1 %
adj. R-sq	0,1 %	0,0 %	0,1 %	0,0 %	0,0 %	0,1 %
rmse	0,378	0,38	0,368	0,378	0,379	0,377

Table 16 A*: Bank branch closures effect on the share of newly established firms measured by a dummy variable = 1 if the firm has no revenues the past year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. * p < 0.05, ** p < 0.01, *** p < 0.001 (p-values in brackets).*

B) Model 3 (rural model) with dependent variable New Firm

$$d_{newfirms} = \alpha + \beta_1 time_{i,t} + \beta_2 treatment_{i,t} + \beta_3 time_{i,t} * treatment_{i,t} + controls_{i,t} + u$$

Rural Areas - New firm	Total Bank Branches			Savings Bank Branches		
Independent Variables	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 1**	**Sample 2**	**Sample 3**
Time dummy	-0.0698***	-0.0719***	-0.0654***	-0.0696***	-0.0707***	-0.0639***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treatment Dummy	0.000354	-0.0142	0.0000850	0.000742	-0.00935	0.00775**
	(0.856)	(0.118)	(0.978)	(0.698)	(0.112)	(0.002)
Treatment * time	-0.0000617	0.0160	0.00126	-0.000614	0.00737	-0.00727**
Diff-in-Diff	(0.975)	(0.088)	(0.692)	(0.754)	(0.222)	(0.004)
Return on Assets	-0.0432***	-0.0462***	-0.0369***	-0.0432***	-0.0376***	-0.0379***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt Ratio	-0.00937***	-0.0154***	-0.00945***	-0.00937***	-0.0124***	-0.00861***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth in sales	0.0459***	0.0497***	0.0449***	0.0459***	0.0475***	0.0464***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Company Size	-0.00229***	-0.00318***	-0.00232***	-0.00229***	-0.00287***	-0.00253***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	-0.00273*	0.00300	-0.00118	-0.00272*	0.000432	-0.00378*
	(0.016)	(0.432)	(0.502)	(0.016)	(0.897)	(0.010)
Current Ratio	-0.00107***	-0.000912	-0.00123***	-0.00107***	-0.00117	-0.00117***
	(0.000)	(0.191)	(0.000)	(0.000)	(0.055)	(0.000)
House Price sq.m. growth	-0.384***	-0.603***	-0.416***	-0.385***	-0.633***	-0.394***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	-0.196***	-0.159***	-0.207***	-0.196***	-0.131***	-0.220***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment Rate	0.302***	0.420***	0.349***	0.302***	0.423***	0.310***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population	-2.36e-10	-2.20e-08*	-8.51e-09	-1.85e-10	-1.35e-08	-5.96e-09
	(0.914)	(0.048)	(0.057)	(0.933)	(0.081)	(0.087)
Controlled for industry	yes	yes	yes	yes	yes	yes
N	229 800	21 450	93 321	229 800	27 997	132 764
R-sq	7,1 %	8,2 %	7,1 %	7,1 %	7,9 %	7,3 %
adj. R-sq	7,1 %	8,1 %	7,1 %	7,1 %	7,8 %	7,3 %
rmse	0,146	0,149	0,144	0,146	0,148	0,144

Table 16 B*: Bank branch closures effect on the share of newly established firms in rural areas measured by a dummy variable = 1 if the firm has no revenues the past year. The independent variable of interest is the difference-in-difference estimator. We have tested both total and savings bank branch closures on three different samples:* ***Sample 1****: treatment = firms operating in municipalities with bank branch closures, control = firms operating in municipalities with no change or an increase in bank branches.* ***Sample 2:*** *treatment = firms operating in municipalities with 100% bank branch closures, control = firms operating in municipalities with an increase in bank branches.* ***Sample 3****: treatment = firms operating in municipalities with bank branch closures in before state and no change in after state, control = firms with no change or an increase in before state and no changes in after. Control variables included is as follows: Return on assets ((income before extraordinary items + other interest expenses)/total assets), debt ratio (total debt/total assets), growth in sales, company size (ln(sales)), tangibility (tangible assets/total assets), current ratio (current assets/total assets), growth in house price per square meter of detached houses, GDP growth, unemployment rate and population, controlled for industries, see appendix 12. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (p-values in brackets).*