FinTech versus Traditional Bank Lending to Small Businesses

Doctoral Thesis submitted to Accounting and Finance Department Strathclyde Business School, University of Strathclyde, Glasgow, UK

by

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Signed: 

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I would like to dedicate this thesis to my beloved mother's mother, Saffet Gönç, whom I lost while I was doing my master's, and to my beloved father's mother, Asiye Hamarat, whom I lost last year.

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Executive Summary

In this thesis, I investigate experimentally the influence of alternative financial technology (FinTech) lending on small businesses financing. This is accomplished in the setting of the mediation process and the way alternative lenders outperform traditional banks. In this way, I contribute to the growing body of knowledge on FinTech.

After a detailed literature review, the thesis focuses on how post-crisis regulations affect traditional banking mediation through the aforementioned alternative lenders in order to arrive at its findings. To address and compare concerns connected to alternative financial technology (FinTech) peer-to-peer (P2P) lending with traditional lending, two original research questions have been developed and are given in the empirical chapters.

In the first empirical chapter, I answer the question, "after the Dodd-Frank Act, to what extent do small business loans given by alternative (P2P FinTech) lenders increase in the district where banks are affected by this legislation and where competition is low? "

In the second empirical chapter, I answer the question, "after the US Liquidity Coverage Ratio (LCR), to what extent do small business loans given by alternative (P2P FinTech) lenders increase in the district where banks are affected by this legislation and where competition is low?"

I use a difference-in-difference (DiD) methodology in both empirical chapters with robustness tests. This is quasi-experimental method that compares the changes in lending outcomes over time between the treatment group and the control group based firstly on a regulatory and secondly on a liquidity shock.

One of the study's most important conclusions is that, despite the Dodd-Frank Act's restrictions on lending to small businesses, innovative new FinTech lending models benefited from a regulatory advantage, and P2P lender took advantage of this. On the other hand, although FinTech lenders that are exempt from financial regulation, comparable to the Dodd-Frank Act, have advantages over incumbents in U.S. liquidity regulation, no notable FinTech activity was detected in small business loans following U.S. LCR regulation.

The important implication of my study's findings is that more regulatory scrutiny of banks and higher capital requirements may drive regulated institutions to reduce lending to small businesses, allowing FinTech lenders to expand their market share.

Chapter 1

Introduction

This thesis comprises two empirical essays on the role of FinTech lenders that build on an extended literature review and give insights into the nature of financial intermediation and the role of FinTech in its disintermediation. It provides an important foundation for theoretical work into FinTech, a merging of finance with technology and the application of this technology to create new and better financial services. To achieve this, the thesis explores the FinTech phenomena and how it is affecting bank small business lending. It does this in the context through the process of mediation and the way alternative lenders gain an advantage over traditional banks.

In order to reach its conclusions, the focus of the thesis is on how post-crisis regulations impact traditional banking mediation via the aforementioned alternative lenders. In this context, I examined the effects of two important regulations that emerged after the global crisis on bank intermediary action, which traditional banks are exposed to, but Fintech alternative lenders are exempted from.

Two unique research questions are established and presented in the empirical chapters. They are designed to answer and evaluate issues relating to alternative financial technology (FinTech) lending versus traditional lending. The sample period for empirical chapter 3 is 2009 to 2012 and for empirical chapter 4 is 2013 to 2017.

These were selected based on the availability of data and the respective shock applied in the difference-in-difference methodology.

The first of these regulations was the Dodd-Frank Act, a large-scale and impactful law that occurred in 2010. It was used by Bordo and Duca (2018) in their empirical study and provides a great natural experiment. With this law, traditional banks were subjected to a great deal of regulation, and as a result, it was observed that it had a negative effect on providing loans (small business loans), which is one of the main intermediary functions of traditional banks, in parallel with the study of Bordo and Duca (2018). The important contribution of this thesis to the literature (Tang, 2019; De Roure et al., 2022) is that, unlike banks, the increase in financial intermediation activities of FinTech in the same period is revealed by empirical analysis.

The other regulation is the liquidity coverage ratio (LCR) regulation, a new regulation related to Basel III but not covered in great detail in the literature (unlike the international version of LCR). In addition to investigating the effect of the American version on the banking system, as in Roberts et al. (2021), I also examined the disintermediation effect of FinTech. The latter is exempt from regulation, on small business lending, as a contribution to the literature in the same period. While a negative effect of this financial regulation on banking intermediation functions, such as the Dodd-Frank Act, was observed, no significant effect was observed on FinTech intermediation activities.

Technology has always had an influence on the financial sector, with new discoveries altering how it operates. FinTech is no different in this respect. For

instance, the emergence and growth of online/mobile banking, and the usage of ATMs as a monetary transaction alternative to bank branches (Bons et al., 2012). So, what makes the present FinTech revolution so distinctive? I argue it is the role of technology in disintermediation and demonstrate this in the subsequent chapters.

The research into this field is important because increased public scepticism of traditional financial institutions has allowed new entrants (e.g., challenger banks, shadow banks, peer-to-peer (P2P) lenders), and proliferation of cutting-edge technologies (e.g., smart phone penetration, a point of sale (POS) direct, and stored value systems to individuals) led to development of FinTech (Thakor, 2020).

From lending to asset management and portfolio advising to the payment system, new digital technologies automate a wide variety of financial processes and can deliver new and more cost-effective solutions in numerous sections of the financial industry (Vives, 2017). FinTech's effect is beginning to be seen in the banking industry and capital markets in these categories. That said, the focus of this thesis is on the role of the alternative lenders that utilize peer to peer technology.

Vives (2017) contends, the most significant advancements in the use of FinTech have happened in the areas of lending, payment systems, financial advice, and insurance. FinTech has the ability to cut the cost of intermediation and increase access to financing in all of these business segments, hence enhancing financial inclusion.

Specifically, new or enhanced financial goods and services, production processes, and organizational structures that can better serve the demand of financial system participants while reducing costs and risk procedures have all contributed to the expansion of financial inclusion. Financial innovations enable transactions over longer distances and at faster speeds, transactions without relying on personal contacts, and more transparency (Beck, 2020).

Thanks to these advantages, in the field of lending, which is one of the most basic functions of banking, alternative FinTech lenders, provide retail consumer and small business loan customers throughout the world a source of funding. The subsequent literature review chapter and empirical investigations are structured to react to a demand for research on this financial innovation and to add to the body of academic and financial literature.

In this chapter, the general focus of the thesis is explained by emphasizing the background of the research conducted. This chapter discusses the relevance of the study and identify the dissertation's major terminology. Finally, the chapter finishes with the research's conceptual framework and the structure of the rest of the thesis.

1.1 Background

By way of background, I make reference to Ang (1991). He makes the observation that the number of characteristics such as financial, business unique to small firms may be used to explain the origin of the structural and managerial variances businesses make financial decisions differently from large businesses. In this regard,

a number of papers (Petersen and Rajan, 1994; Berger and Udell,1995; Udell, 1998; Peek and Rosengren,1998b; Ely and Robinson, 2001; Revest and Sapio, 2012; Berger and Bouwman, 2013; Jagtiani, and Lemieux, 2016; Harrison et al., 2022) examine small business lending from various angles, including the effects of bank consolidation, mergers and acquisitions, or the structure of the banking market's size on small business lending, relationship lending, small businesses that are difficult to identify, and economies of small business finance. However, although many aspects of traditional financial institutions lending in small business loans have been studied, alternative (FinTech P2P) lending is a relatively new and increasing financial innovation in the finance and small business field.

The total amount of business loans extended by small and large-scale businesses between 2016 and 2020 in the United States is shown in figure 1 below.

Figure 1 Amount of Small, Large and Total Business Loans in the United States

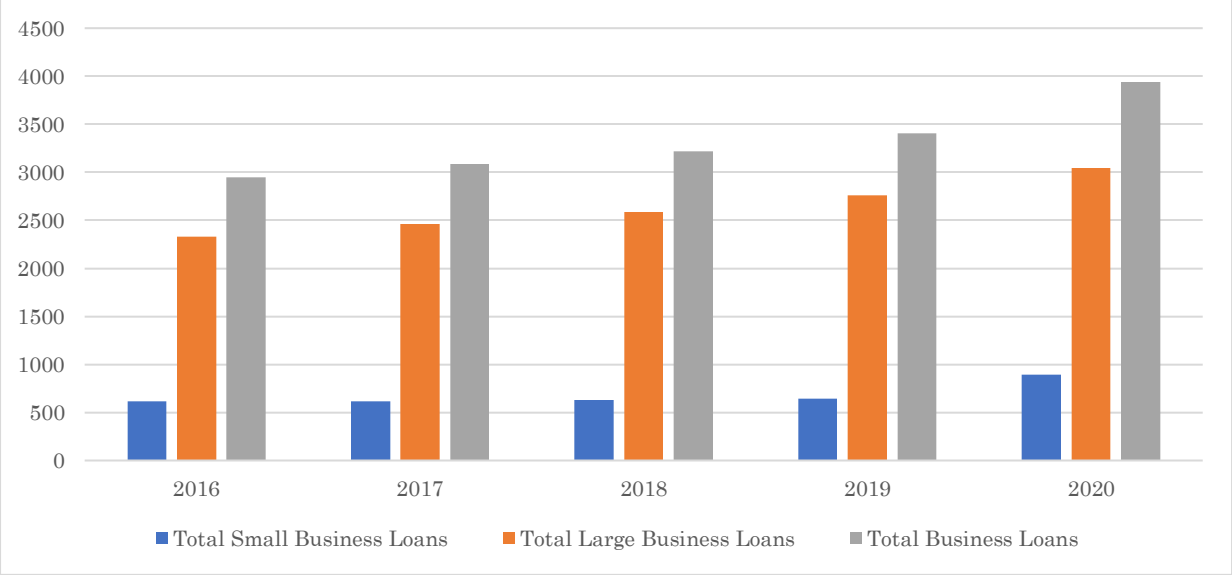

Figure 1 shows amount of small, large, and total business loans billions of dollars from 2016 to 2020. Source: The Federal Deposit Insurance Corporation, June Call Reports

In this thesis, I focus on the United States small business lending field to observe Fintech and traditional lenders activity. The higher cost of seeking loans is one of the key reasons why this thesis assumes SBL to be different from other loans. In addition, both the banking sector and the size of the small business sector make this one of the largest Fintech markets in the world, and investments in this field are in the top three globally. Another critical factor in conducting a study on the United States is providing access to relevant data during the thesis research period, during which access to data is difficult. However, focusing only on the U.S. Fintech and baking system and using only U.S. data is one of the limitations of the study and the inference cannot be general.

The global financial crisis of 2008 catalysed the FinTech revolution, particularly post-crisis regulatory reforms (e.g., strict capital and liquidity requirements). The resulting need for financing gaps (e.g., shrinkage of the interbank market and increased regulatory capital to be held against the loan portfolio) and lowering operational costs (e.g., reduced back teams by information technology (IT)) (Murinde et. al, 2022).

According to the research conducted by Deloitte in 2020, as indicated in figure 2, worldwide FinTech growth forecasts have been estimated at around 15 percent in the last five years, and this rate is expected to exceed 16 percent in 2024. Although COVID-19 promotes unpredictability, it offers new opportunities for FinTech, where contactless payment offers a safer and more practical alternative to possibly infected currency and where business and personal loans may be sought for online, avoiding

the need to go to banks in person. The industry is well-positioned to accomplish its growth path due to the sector's capacity to adapt and innovate.

Figure 2 Global FinTech compounded annual growth rate (CAGR)

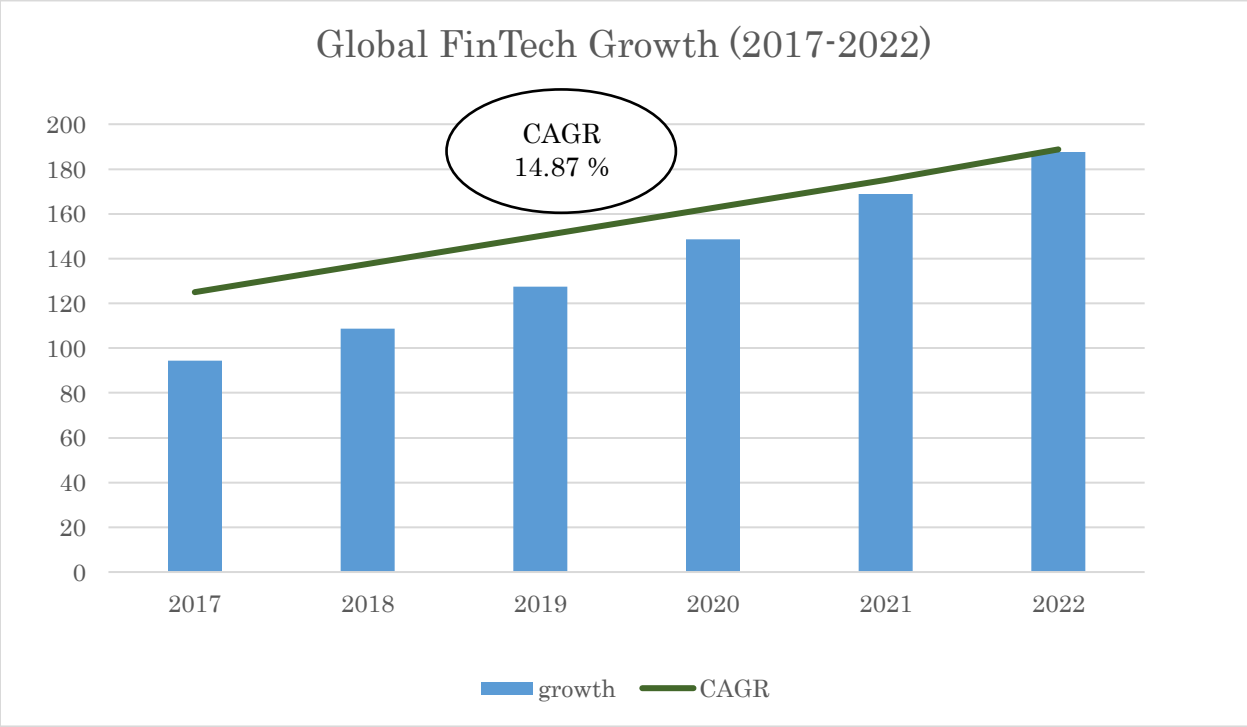

Figure 2 demonstrates global FinTech revenue growth ($bn) and compounded annual growth rate (CAGR) between 2017 and 2022. Source: 2020, Deloitte analysis

A comparative assessment of traditional lending and alternative (FinTech P2P) lending was one topic of research that Jagtiani, and Lemieux (2018) proposed for but has yet to get attention from scholars. Jagtiani, and Lemieux (2018) highlight the significance of determining what similarities and differences are significant in order to determine whether traditional lending research can be applied to alternative (FinTech P2P) lending or if alternative (FinTech P2P) lending changes the implications of traditional lending research.

A substantial amount of recent traditional lending literature that focuses on small business lending explores credit decision-making (Petersen and Rajan, 1994; Berger and Udell, 1995; Cole, 1998; Berger et al., 1998; DeYoung et al., 1999; Craig and Hardee, 2007; Berger et al., 2007; Berger and Black, 2011; Berger et al., 2015; Harrison et al., 2022). The demands from Jagtiani and Lemieux (2018) for future research were clarified by comparing this body of literature to alternative (FinTech P2P) lending. This study aims to contribute to the body of literature on small business financing both traditional and alternative (FinTech P2P) lending perspective.

In contrast to conventional lending, alternative (FinTech P2P) lending offers a distinctive user interface that makes it simple and flexible to retrieve shared material and information with benefits for both borrowers and lenders. For a snapshot explanation of alternative (FinTech P2P) lending, Tang (2019); Havrylchyk et al. (2020), Palladino (2021) and De Roure et al. (2022) all describe the alternative (FinTech P2P) lending procedure, which may be summed up as follows: From the standpoint of the borrower, applying for a loan online at their convenience rather than at a physical bank or finance firm during business hours at predetermined terms allows them to request the amount, interest rate range, and other aspects. After seeing the application, several lenders (sometimes referred to as investors) have the chance to submit bids for the portion of the loan application that offers the best rate relative to the risk being swapped.

In summary, according to borrowers, the convenience of having a say in the process and attractive interest rates outweigh any potential servicing issues or rate comparison issues depending on the loan type and credit variables. The ability to distribute risk among a large number of borrowers for a given capital expenditure, together with the lack of loan servicing, infrastructure maintenance, and collection expenses, are major benefits for lenders (investors). Due to the application being made on an open market rather than to a specific lender, lenders (investors) are also not subject to any legal restrictions on the standards for fair lending. The two empirical chapters delve deeper into these subjects.

1.2 Research Problem

The investigated problem associated with the rise of FinTech is that post-recession credit markets supplied a lower amount of credit than was previously available. This is important because such funding required for small businesses besides development and expansion important for their survival (Mills and McCarthy, 2014).

The rise of alternative (FinTech P2P) lending provided a new way of small business lending as well as a new supply of funding for small firms (Gopal and Schnabl, 2022). The decrease in post-recession credit to small businesses created a demand vacuum, allowing the new idea of alternative (FinTech P2P) lending (founded before to the global financial crisis that produces recession) to grow fast and provide significant value to small business credit markets (Weihs, 2018). This trend in small business capital market activity has prompted demands for study into how the differences and similarities in these capital market activities may alter our interpretations of

previous studies into these fields (Palladino, 2021; Beaumont et al., 2022; Gopal and Schnabl, 2022).

1.3 Research Rationale

The research is also important because economic growth is stimulated by the growth of small businesses. They generate two-thirds of net new employment and boost U.S. innovation and competitiveness. According to an official estimate, small businesses employ 47.1 percent of the private sector in the U.S. and accounting for 99 percent of all businesses (SBA Advocacy, 2020). While the availability of cash rather than the projected demands of small businesses is not a new business situation (Mills and McCarthy, 2014), the reported consequences of the 2008 recession demonstrate a real scarcity of money in comparison to the cash accessible to small enterprises previous to the crisis (Cole and Damm, 2020). Alternative (P2P FinTech) lending is a new alternative finance source available to small enterprises that can help alleviate the current cash deficit.

Alternative (P2P FinTech) financing started prior to the 2008 crisis but has surged in growth. According to Tobias et al. (2022), the market size of FinTech lending in the U.S. by the end of 2020 was USD 16.8 trillion for mortgage lending, USD 4.2 trillion for consumer credit, and USD 2.6 trillion for business lending. A body of information has arisen surrounding Alternative (P2P FinTech) lending, which has had major implications for small business owners pursuing capital sources as credit availability failed to fully recover in the post-2008 global financial crisis credit markets, with conservative lending standards prevailing.

It was felt that there was a need to study whether characteristics of traditional lending applicable to alternative (P2P FinTech) lending (Gopal and Schnabl, 2022) and what influence the differences between these two sectors may have on small business borrowers (Segal, 2015). The precise reasoning and methodology for this study were influenced by the demand for further research into alternative (P2P FinTech) lending as well as the applicability and insightful findings of academic studies into small company credit determination models for traditional lending. In order to respond to the specific research concerns of this study, founded with established academic research as a basic basis to build upon, the purpose for this study was to compare readily available bank-level and loan-level data from publicly available sources.

1.4 Research Goals

In order to better understand the effects on small business credit markets and increases in the capital made available to small businesses, the quantitative chapters compared the emergence of alternative (P2P FinTech) lenders for small businesses with more traditional sources of small business lending. While alternative or online (P2P FinTech) lending was first described by Bachmannet al. (2011) and Jagtiani and Lemieux (2016), traditional lending has progressed and been fully recorded for many years. This research compares smaller business loans provided by traditional lending with alternative (P2P FinTech) lending utilising regulatory policy changes at the county level in the United States.

Specifically, chapter three and four compares loan-level data from Lending Club, one of the largest U.S. alternative (P2P FinTech) lenders at the time of this study, with bank loan-level data from the Call Reports. The advantages of this comparison have increased the body of information around alternative (P2P FinTech) lending, allowing both lenders and borrowers to make better informed judgments when contemplating this potential alternative funding sources. In academic literature, this quantitative research study addresses a genuine and fully documented business problem.

Three additional implications of this study help to further the goal of the study. The first additional impact arises from alternative (P2P FinTech) lending as an innovative alternative to existing credit markets (Segal, 2015). This line of credit makes it possible for consumers and small businesses to obtain credit from previously inaccessible sources of finance through a convenient channel. This study aids in determining whether traditional lending research can give insight into characteristics of alternative (P2P FinTech) lending. This nascent sector may learn from prior credit issues faced in the past, and the potential for predicting patterns in this new market based on historical lending data from the past arises, if traditional lending research is applicable to alternative (P2P FinTech) lending.

The second additional aspect of this research is that it aids in understanding how alternative (P2P FinTech) lending alternatives may affect traditional lending. Alternative (P2P FinTech) lending competes with established lending alternatives, but it may also complement or replace traditional lending. This does not indicate that

alternative (P2P FinTech) lending become a substitute for traditional lending, but it does offer up alternatives for small firms that did not exist a little more than a decade ago. This will have an impact on traditional lending sources by shifting market share to the new credit sector, but it will also improve economic circumstances by growing the money supply to small businesses (Mills and McCarthy, 2014) and rising cash flows in other businesses as money exchanges hands for products and services.

The third and last additional implication is with the probable need to comprehend the two lending streams' vastly different approaches to data collecting and loan decision-making. Traditional lending is different from alternative (P2P FinTech) lending in that there is no actual connection or interaction (Bachmann et al., 2011). Due to the absence of physical encounter or interview, data gathering, and validation must be done differently, and credit decision making is only begun by the platform but finished by the investor client, who makes the ultimate choice for risk to return potential. Compared to traditional lending, this data collecting, and decision-making approach may be more volatile or unpredictable, but it also may be safer and more effective. Both lending streams may be impacted by the effects of various data collecting and loan decision-making methods.

1.5 Research Questions

The post crisis financial regulations affected the incumbents, but alternative (P2P FinTech) lenders were not obliged to comply with these rules (Berg et al., 2022). This study was set up to provide more information towards the following specific research

questions to understand how traditional and FinTech lenders have been affected by the enactment of these regulations:

1. After the Dodd-Frank Act, to what extent small business loans are given by alternative (P2P FinTech) lenders increase in the county where the banks are affected by this legislation and there is low competition?

2. After the U.S. Liquidity Coverage Ratio, to what extent small business loans are given by alternative (P2P FinTech) lenders increase in the county where the banks are affected by this legislation and there is low competition?

1.6 Contribution

The empirical results in this thesis broaden our understanding of traditional and alternative (P2P FinTech) lending methods. There are a lot of important differences between alternative (P2P FinTech) lending and traditional lending, but there hasn't been a lot of prior research highlighting the implications of these differences or the effects of alternative (P2P FinTech) lending's growing market presence on traditional lending (Jagtiani and Lemieux, 2018).

In addition, whilst alternative (P2P FinTech) lending is expanding quickly, it is still relatively new compared to traditional lending options. There is therefore a contribution and extension to the broader literature, By increasing the information that is available to create a better understanding of alternative (P2P FinTech) lending, small businesses that are looking for loans, investors who are looking to make money from these loans, and the credit markets as a whole can all benefit.

This thesis further contributes to the recent literature on FinTech disintermediation role in small business lending. Using aggregate county level data, several papers suggest that FinTech took over traditional financial intermediaries' market share when it comes to business lending (Balyuk and Davydenko (2019); Cort´es et al.(2020); Gopal and Schnabl (2022)). Big banks reduced lending to small businesses as they faced substantial regulatory burdens, leaving room for FinTech lenders.

Although several Fintech players claim to be competing with banks, one model is gaining share so far: P2P lenders offers to revolutionize credit by cutting out, or disintermediating, banks from the traditional lending process. This thesis makes another contribution by adding to this literature by showing that FinTech credit allows firms to access internal financing with access to P2P loans to maintain financial flexibility.

I also contribute by showing that an important determinant of small businesses' choice to access the FinTech platform is to diversify away from banks that are more vulnerable to capital regulations such as Dodd-Frank in this research and, as a consequence, more likely to cut credit supply to small businesses. However, unlike capital regulation, I could not observe liquidity regulation had any significant effect on Fintech small business lending.

Importantly, to the best of my knowledge, this is the first study which investigates the activities of both traditional banks and innovative alternative (P2P FinTech) lenders in the small business market using the Dodd-Frank Act and U.S. liquidity

coverage ratio regulation as an exogenous shock at the county level. In addition, my research adds alternative P2P lenders to the debate in the literature on small business lending.

1.7 Structure of the thesis

The thesis consists of five chapters including an introduction. In Chapter 2, I discuss the relevant literature on small business lending through traditional banking, FinTech and disintermediated finance. In Chapter 3, I investigate whether financial institutions providing small business loans are affected by the Dodd-Frank Act and the role of alternative (P2P FinTech) lenders in small business loans. In Chapter 4, I investigate whether the U.S. Liquidity Coverage Ratio regulation requirements, which is partially different from the BASEL III Liquidity Coverage Ratio regulation, affects the financial institutions that provide small business loans and the role of alternative (P2P FinTech) lenders in small business lending. Finally, in Chapter 5, the results of the analyzes are evaluated and the assumptions and limitations related to the research are also mentioned.

Chapter 2

Literature review

Having identified the research questions in Chapter 1, this chapter focuses on the literature related to small business lending and includes P2P lending platforms and banks through the lens of financial intermediation theory.

By way of definition of financial intermediation, Boot and Thakor (1997a) indicates that the main role of the financial system is to allow the transfer of funds from savers to those in need. In a well-developed and sophisticated financial system, intermediaries support economic growth by managing the moral hazard issue, which arises when one party engages in a risky event while knowing that it is protected from the risk and that the other party will bear the cost, and by creating incentive-compatible loan contracts to prevent money from being diverted to unrelated uses.

IMF (2021) projects that the share of total financial services in the world economy in the gross domestic product is estimated to be around 27 per cent, the share of the total size of the banking sector in the global economy is estimated to be 14 per cent[1]. In general, financial intermediaries are in other words asset transformers are thrift institutions, banks, loan companies and consumer finance companies (Gurley and Shaw, 1956).

[1] Knoema. "Market Capitalization of Listed Companies in Current Prices." Accessed May. 13, 2022.

The financial intermediary participates in a complicated financial transformation process and offers a variety of services to business and consumer households to meet their various needs. Financial intermediaries provide value to final savers and investors by transforming qualitative assets in terms of liquidity, scale, risk maturity, and location (Scholtens and Wensveen, 2000).

According to Boyd and Prescott (1985) the following factors are relevant to financial intermediaries:

(i) In the economy, intermediaries borrow from one group and lend to another.

(ii) Borrowers and lenders are both often substantial groupings. As a result, financial intermediaries are often widely diversified on both sides of their balance sheets, to the extent that numbers indicate diversification.

(iii) Financial intermediaries work with borrowers whose information sets may not be the same as their own. Practically speaking, this implies that prospective borrowers frequently know more about their own credit risk than do intermediaries.

(iv) Financial intermediaries generate pricey statistics information of potential borrowers. Loan allocation and conditions are determined using this information.

(v) Financial intermediaries make claims that differ from claims issued by final borrowers in that they involve state dependent payoffs.

Banks' contribution to lowering information asymmetry is a key focus of theories of financial intermediation. According to Leland and Pyle (1977), transaction costs can explain intermediation, but the magnitude of these costs does not appear to be

sufficient as the sole cause in most cases, and they also argue that information asymmetries may be one of the primary reasons for the existence of intermediaries. Diamond (1984) creates a model that demonstrates how financial intermediaries might exist only by offering a useful way to assess and keep track of borrowers.

Best and Zang (1993) claims that according to financial intermediation theory based on information production, banks may have a special role to play in reducing informational asymmetries. They discover that banks only sometimes provide the market with substantial information, and their findings imply that banks use other indicators as preliminary screening tools to choose where to focus their review and monitoring efforts. In addition, Ramakrishnan and Thakor (1984) say that if there is asymmetric information, mediation services increase welfare, but they claim that the information produced is generally unreliable to eliminate this asymmetric information problem.

These information transmission theories contend that in a capital market that is inefficient, banks offer various information generation functions. They provide the impression that banks are the ones who are most informed about the future prospects of the firms they lend money (Agarwal and Hauswald, 2010). Bank loan agreements should therefore offer useful information to participants. The rates on deposit certificates and other significant commercial papers are examined by Fama (1985) as a method of approaching the problem. Fama (1985) claims that bank loans must be unique since they are burdened with the expense of reserve requirements and he

argues that for individuals and firms, especially small firms without external equity, the contract costs of inside loans like bank loans are lower than external debt.

James (1987) claims that banks have a different and specialized function from other financial lending institutions. This is because they have a deeper knowledge and understanding of the company compared to other investors. In the intermediation process, banks may have a cost advantage over other intermediaries in terms of their function and structure in producing and transmitting information. Furthermore, Allen (1990) mentions that in financial investment services, the seller cannot obtain the full value of the information due to the reliability problem, and this may provide a benefit for the intermediaries in financial intermediation services in terms of using the information.

Financial intermediaries serve two roles in the financial system. These are, according to Greenbaum et al. (2015): (i) a brokerage role and (ii) maturity and risk transformation. When a financial intermediary links agents with complimentary financial requirements, it acts as a broker. A broker essentially acts as a matchmaker who assists in resolving information asymmetries that arise before and after contracts are signed (i.e., moral hazard and adverse selection).

Banks have particular abilities in understanding indications on the financial asset quality and can prevent costly repetition of screening expenses by sharing information. Financial advice, transaction services, evaluation, and quality (i.e., rating), origination and financing are all part of the brokerage business (Milne and Parboteeah, 2016). Banks link liabilities with assets of various sizes, durations,

hazards, and currencies, a financial intermediary also conducts maturity and risk transformation. Brokerage and asset transformation are both tasks carried out by banks (Havrylchyk and Verdier, 2018).

2.1 Financial Intermediation

The literature answers the question of why financial intermediation exists. Santomero (1984) answers this when he reports on microbank modelling and evaluates banking firm's optimum attitude. According to Santomero (1984), there are fundamentally three approaches to answer why financial institutions exist in the financial market. The author claims every approach focuses on a particular part of the bank's activity. First is the related role of a financial institution which played by banks an asset transformer and interest centres on the diversification potential and asset assessment. Santamero (1984) states the facilitating transfer between accounts and the advancement of cash distribution options led to the banking system's monopoly position evolution in the financial sector. The other one refers to the nature and the central monetary functions of the liabilities issued.

The banking firms demand deposit liability plays a central role upon its existence as the medium of exchange and since the Clower's (1977) contribution, it has been indicated a monetary unit unique function. Lastly, a few have highlighted these financial firms two-sided nature as basic in any clarification of their attitude. Santomero (1984) notes that according to economists, as the banks are imperfect competitors in the financial market, it causes imbalance price and price threshold, therefore, there is a need for efficient modelling which taking precautions mainly

against to credit and interest rate risk by employing hedging, risk-taking, and diversification techniques.

On the other hand, Bhattacharya and Thakor (1993) focus on the understanding of why financial intermediaries exist, what is the financial intermediaries' role in financial innovation, allocation of credit, a transformation of both liquidity and maturity, and design of the optimum bank regulation. Based on a Bhattacharya and Thakor's (1993) research, the financial intermediaries decrease the transacting costs such as by the transformation of attribute or brokerage services and these services costs are reduced mistily by diversification. Bhattacharya and Thakor (1993) note also that bank's firms increase agglomerate investment and enhance its quality. Furthermore, the author claims that asymmetric information is the most fundamental form of the transactions cost.

Financial intermediation is vulnerable to shocks. For example, deposit funding mechanism of banks led to vulnerability and therefore whole banking system may be vulnerable to shocks or panics (Betz et al., 2014). A lender of last resort facility and deposit insurance may help banks to minimize that kind of deformity (Rochet and Vives, 2004). However, applying high capital requirements on the banks may have a negative effect on the moral hazard of managers and can generate a high risk. Besanko and Thakor (1992) describe that capital requirements can lead detrimental effect on the welfare of depositors even if these requirements control the bank's risk-taking appetite.

A number of theoretical explanations for banks' existence centre on the different information issues that arise in financial transactions and how banks are better suited to manage them than the capital market or bilateral transactions between savers and borrowers (Boot and Thakor, 2000). When it is difficult to transfer information about businesses and their projects to open markets, when it is difficult to monitor borrowers' behaviour, when businesses are reluctant to make information publicly available due to competition, and when borrowers do not want to be subjected to the discipline of constant public scrutiny, banks have a comparative advantage over capital markets (Peek and Rosengren, 2013). Since transactions via the account represent customers' income, wealth, and spending habits, banks get useful information about particular customers through managing their bank accounts (Barczak et al., 1997).

The information argument for financial intermediation is that banks can address ex ante (adverse selection) and ex post (moral hazard) contractual difficulties more effectively than can be done either directly between final borrowers and lenders or via markets (Scholtens and Van Wensveen, 2000). Bisignano (1998) suggest that the gathering and sharing of information on potential borrowers is intrinsically linked to the transition of financial systems from significantly intermediated to more capital market oriented, as well as from bank intermediated to non-bank financial institution intermediation.

According to Bavoso (2020), a number of factors are working to reduce some of the banks' historical informational advantages over competing suppliers of

intermediation services. First, advances in technology have lowered the cost of obtaining and accessing information for substitute providers. Second, rating agencies have grown in order to both appraise material on behalf of possible investors and make it more freely available and accessible. Capital market participants will particularly benefit from this. As a result, information that the bank previously used for its own benefit has occasionally turned into knowledge that benefits the wider public. However, Banks' informational advantages have been diminished in each of these ways (Dell'Ariccia and Marquez, 2004).

Other than banks, the progress of information technology enhances the availability and accessibility of information to institutions (Berger and Frame, 2007). As capital markets grow more efficient, corporations have a stronger incentive to reveal more information in order to obtain access to capital market facilities (Berger and Bouwman, 2013). Therefore, as a result of the increasing availability of information, the capital market may operate more efficiently and compete more effectively with banks in the lending industry (Boot and Thakor, 2000).

According to Llewellyn (1999), 'the comparative advantage that banks have in acquiring and evaluating the credibility of borrowers and addressing the asymmetric information concerns appears to be eroding, mainly in those nations with extremely complex capital markets.' As a result, banks are in various ways losing some of the traditional information advantages that have formed the foundation of their competitive advantage (Stulz, 2019).

According to Allen (2012), securitization and financial innovation help us get closer to a future with fully functional markets. New information and trading technologies have also decreased capital market information and transaction costs in comparison to bank lending expenses. In addition to lowering the cost of transactions in the capital markets, technology has also resulted in lower information costs and more transparency for the markets' information.

Financial innovation typically has the following effect: it makes it possible to build contracts that are more comprehensive, which makes them simpler to securitize (Ross, 1989). Market pressures have generally been degrading the flaws and gaps in the markets that gave birth to the banks' competitive advantage over markets (Llewellyn, 1993).

The underlying economics of financial services are changing as a result of technology, just as it has with many other sectors (Lin, 2016). Technology has and will continue to play a crucial role in society. For banks, changing technology via Internet presents both a risk and an opportunity (Llewellyn, 1999). It enhances the efficiency of bank operations, makes it possible to offer new services, improves management's access to information, lowers barriers of entry in some fields, and alters the economics of delivery. It also enables the efficient provision of existing services as well as the availability of new services (Llewellyn, 2002).

Technology has the potential to make information more accessible and less costly in financial sector (Mishkin and Strahan, 1999). So, banks can transform in this regard like other institutions that have been changed by technology (Gomber et al.,

2018). As it both supports and tests one of the primary core strengths of the banks—information—this has the potential to be a strong force. Given that banks are essentially in the information business, everything that affects the availability, pricing, and administration of information must have a significant impact on their operations (Llewellyn, 1999).

Siaw and Yu (2004) claim that banks, like all providers of banking and financial services, face both a threat and an opportunity from the Internet's potential. It has the ability to undermine two facets of the fundamental economics of banking: information and delivery (Llewellyn, 1999). By its very nature, it broadens consumers' access to a variety of information and gives the supply of financial products another dimension. The majority of firms working on the possibility for "home banking" which would enable a variety of normal banking and other financial activities to be carried out from the house at any time of the day are now technology companies working in joint ventures with banks (Dicuonzo et al., 2021). Some of the banks' key competencies might be challenged by hardware and software businesses (Elsaid, 2021). Banks may eventually be disintermediated on a significant scale, but this is something that is uncertain (Bollaert et al., 2021).

The financial sector's recent increase in information-related innovation may be viewed in large part as the continuation of earlier advances taking place at an increasing rate (Milian et al., 2019). The capacity to generate and utilise hard information in finance was enhanced by the information technology (IT) revolution (Basha et al., 2021). This led to securitization, aided the expansion of financial

markets, boosted competition in the financial sector, and encouraged bank mergers. Information-related frictions between lenders and borrowers are reduced via credit scoring and information exchange through credit registries, which is especially advantageous for riskier and more evasive borrowers (Berg et al., 2022). Additionally, the capacity to sell and securitize loans shields borrowers from lender financial situations (Allen and Walther, 2021) and lowers the lending cost (Beck and Frame, 2018).

In general, there is evidence that adopting IT strengthens banks' crisis-resilience capabilities by assisting them in making better borrower selections (Ioannou and Demirel, 2022). Despite these benefits, the literature now in existence also emphasises a negative aspect of hard information. When used by clients for whom it is more challenging or impossible to obtain concrete facts, such as SMEs, it may result in worsened borrowing terms (Berg et al., 2022).

Despite the possibility for cross-selling offered by the first point of contact advantage, it cannot be denied that branch banking has largely become outdated in recent years when it comes to financial intermediation services (Anagnostopoulos, 2018). Actually, there are fewer bank branches now than there were in advanced economies (Berg et al., 2022). Moreover, nowadays, through web portals and mobile applications, new actors may rapidly and affordably build productive communication channels. They can also reach their target consumers by using social networking sites and other direct marketing strategies (Elsaid, 2021).

When compared to pre-crisis levels, the percentage of non-bank originators competing on accessibility has increased in the retail lending market (Berger and Roman, 2018). Additionally, in the field of payments, new entrants like Google, PayPal, and Apple Pay focus on making it easier for customers to make payments for online transactions while also offering a wider range of interconnections across payment systems in a world that is becoming more globalised (Vives, 2019). Beck (2021) supports the view that several of the new players have amassed sizable market shares in their different services implies and competition in retail banking is likely to get more intense in the future. On the other hand, Agarwal and Zhang (2020) claim that the future of banks is uncertain given the accelerated rate of technological advancement.

Lu et al. (2021) notes that the internet has also given rise to significant intermediates such as digital platforms, which combine information, connect sellers and buyers and facilitate peer-to-peer interaction. Due to the fact that they are two-sided markets, they produce substantial network externalities that reduce competitiveness and benefit a select group of major players (Bollaert et al., 2021).

Breidbach et al. (2020) contends that in an effort to produce spatial capture and serve as the initial point of contact for all of a customer's requirements, digital platforms work to provide an ever-expanding variety of services and products. As independent products and in combination with other products and services provided by the platform, financial services integrate effectively into digital ecosystems (Verhoef et al., 2021).

Furthermore, digital platforms show significant feedback effects between communication and information (Breidbach et al., 2020). Regarding communication, the platforms' activities might be compatible with matchmaking, which doesn't include taking any chances (Choi and Whinston, 2000). Customer information can be shared with other financial service providers on the information side.

As a result of their superior communication, they have access to a wealth of information on buyers and sellers, giving them a competitive edge (Vives, 2019). However, these changes provide a challenge to banks in two different ways (Boot et al., 2020). The loss of the client interface, and hence their considerable competitive advantage, which is derived from communication, is one example. The other is that specialised newcomers are now more formidable adversaries because they can swiftly disperse their services via platforms. The last innovative aspect of digital platforms is that they have an edge over banks in terms of enforcement thanks to their enormous market power over routes of distribution. The prospect of excluding clients for not making credit repayments may be quite real, especially in institutional contexts with weaker foundations (Ediagbonya and Tioluwani, 2022).

Horizontally integrated banking services can also be delivered by non-bank technology-based financial intermediaries because they don't need access to a comprehensive balance sheet (Boot et al., 2020). According to research by Bollaert et al. (2021), new channels of distribution reduce the importance of banks as suppliers of financial services and allow specialised businesses to reach clients directly. These specialised newcomers are better able to employ technology swiftly and effectively

since they are able to circumvent the organisational inefficiencies seen in big banks (Vives, 2019). Because of this, they could be able to outperform banks in terms of cost, efficiency, and convenience (Anagnostopoulos, 2018).

Offering specialised financial services frequently does not need a full banking licence, and legislation is another factor that facilitates the horizontal fragmentation of financial services in addition to technology forces (Feyen et al., 2021). For instance, a number of authorities currently provide licences for the operation of electronic payment services. As a result, specialised newcomers pay less for regulatory compliance (Anagnostopoulos, 2018).

The originate-to-distribute system, which involved credit risk being shifted from originators' balance sheets to investors, was linked to well-known incentive issues, caused by adverse selection and moral hazard (Käfer, 2018). Since communication is the primary cause of the present breakdown, information frictions are less of a barrier and deeper structural shifts in the delivery of financial services can result (Bakhtiari et al., 2020).

The growth of digital platforms, however, has had a profound impact on how services and products are distributed (Anagnostopoulos, 2018). In the past, high search prices have limited consumer choice (Kim et al., 2018). These nowadays have decreased to almost zero, making it possible to quickly and easily evaluate the costs and characteristics of the majority of services and products (Crouhy et al., 2021).

The addition of financial services would naturally complement the business strategy of most digital platforms. Gomber et al. (2017) note that because digital platforms may become intermediaries between financial institutions and customers, their presence will bring an extra layer of intermediation known as re-intermediation. Anagnostopoulos (2018) also addresses that although customers are expected to welcome the incorporation of financial services into digital ecosystems, banks face a serious threat from this change.

Ng et al. (2022) conclude that the most effective digital platforms are those that are part of the ecosystems of Bigtech companies, who can use their non-financial primary activity to leverage a broad client base that gives them the ability to exercise market power. Gomber et al. (2017) maintain that in order to assist their financial endeavours, they also have access to enormous volumes of client data. Price comparison platforms for financial items like deposits and mortgages are another kind of platforms. Since there isn't an established outside company to compete with them, digital platforms must grow quickly to reach the critical mass required to serve as a gatekeeper for customer access (Anagnostopoulos and Kabeega, 2019).

In addition, the popularity of financial comparison websites, however, may cause them to develop into financial supermarkets specialized online hubs that allow access to the whole spectrum of financial services (Claessens et al., 2002). It is important to note that platforms are not required to offer financial services directly; instead, they don't need to retain a separate balance sheet since they can monetise their competitive advantages (Crouhy et al., 2021).

Additionally, specialist financial players might make their products more generally available thanks to digital channels. That is to say, the bank business model's horizontal disintegration is exacerbated by the vertical disintegration of the bank (Vives, 2019). Platforms can also avoid compliance expenses and political opposition, particularly in the case of Big Tech businesses, by not directly providing financial services (Boot et al., 2020).

2.2 Financial Innovation and Disintermediation (P2P lending)

The nature of innovations in the finance industry is very different from those in other industries. Niehans (1983) maintains that there are three types of fundamental financial services or products. The first entails exchanging current money for future money. The other one is bringing together borrowers and lenders. The third is the processing of payments on clients' behalf. Even the most intricate financial dealings are typically best understood as "bundles" of these common products.

Financial innovation, according to Tufano (2003), the process of developing new financial institutions, technologies, markets, and instruments, as well as promoting them. The innovations may be divided into process and product categories, with examples of product innovations being new corporate securities, derivative contracts, and other types of pooled financial products (Lerner and Tufano, 2011). Process improvements, meanwhile, are best represented by new techniques for distributing securities, handling transactions, or pricing transactions.

Silber (1983) supports the view that innovations in risk-taking (futures markets), cost-effective transaction prices (automated teller machines), and the avoidance of antiquated legislation have been made via advances in financial institutions and practises. Similar to advances in physical technology, the financial innovation process produced economic advantages in terms of welfare.

Innovation in financial markets has become inevitable as a natural consequence of taxes and regulations which are main motives according to Miller (1986) besides information asymmetries and transaction costs (Tufano, 2003). Ross (1989) proposes innovations in financial market might be crucial in addressing the moral hazard issue. Lowering transaction costs is a primary goal of many process advances in payment system technology. Genuine financial innovations that aim to significantly reduce transaction processing costs (Merton, 1992) include ATMs, smart cards, and many more new products.

Financial systems that are well-established offer stronger incentives for financial innovation and accelerate their growth (Boot and Thakor, 1997b). Beck et al. (2016) claim that financial innovation is associated with more aggressive risk taking by banks and higher bank growth, which increases capital allocation efficiency and economic growth by providing credit and risk diversification services to firms and households. Moreover, by the way of advancements in technology and heightened competition, the cost of financial intermediation has decreased recently (Philippon, 2019).

P2P lending, also known as "marketplace lending," is the process of giving money directly from lenders to borrowers online, bypassing the need for an intermediary such as a bank. According to Thakor (2020), the expansion of P2P loan networks will significantly erode banks' ability to compete in the lending market. As marketplace lending gets more momentum, banks will create their own platforms, buy already-existing platforms, or establish partnerships with P2P platforms to offer another type of lending internally.

P2P financing has grown significantly since the financial crisis of 2007–2009, though it is still relatively new compared to bank lending and is expanding rapidly(Thakor, 2020). Fintech is used in financing outside of P2P networks. Additionally, there are crowdfunding platforms and shadow banks. Through the use of websites and small donations, crowdfunding is a type of finance that enables many people to support a company, initiative, or venture. Shadow banks are financial intermediaries that use fintech but are neither banks nor P2P platforms; they offer maturity transformation services similar to those of depository institutions but do not finance themselves with assets (Thakor, 2020).

FinTech P2P lenders are leading to a process of financial disintermediation. Broby (2021) explains how this works in theory. In essence, the matching of borrowers and lenders over the internet avoids the need to report to a banks' balance sheet. As a new player, financial technology (FinTech) innovators entered the credit market in financial system, seeing profitable opportunities and thinking that they could overcome some of these problems, especially due to the flaws in the financial system

including information asymmetries, high transaction costs and imperfect competition (Balyuk, 2016).

In addition, Philippon (2016) supports the view that due to high cost, banks will need to continue cutting expenses, which explains in part why new competitors have entered the market. Unmet demand for financial services is a major driver of adoption of FinTech which promise to increase financial inclusion (Frost, 2020).

Furthermore, FinTech credit provides an alternative funding source for companies and individuals, and it could make it easier for credit-deserving groups to acquire it (Claessens et al., 2018). Cornelli et al. (2020) claim that FinTech lending is more advanced in economies with more GDP per capita and bigger markups in the banking industry. Where there are fewer bank branches per population, FinTech credit is higher.

In addition, Jagtiani and Lemieux (2018) and Cornelli et al. (2020) point out that FinTech lenders' operations have gotten into places where traditional banks would not be as well-represented, such highly concentrated markets and locations with fewer bank branches per capita. Furthermore, Vives (2017) contends that in economies with high levels of public mistrust of banks, the FinTech lending market grows more quickly.

A rising non-bank activity that competes with conventional deposit-taking lenders are FinTech P2P lender and other types of disintermediated finance. Most of the time, the fast expansion of these platforms has been portrayed as a chance to increase credit

availability to consumers and small enterprises (Cornaggia et al., 2018). Cornaggia et al. (2018) demonstrate that P2P lending is a rising rival to conventional depository lenders like commercial banks. For each standard deviation rise in aggregate P2P lending, they discover that small commercial banks lose 1.8% of their volume of personal loans. These banks also see increases in loan default and charge-off measures.

FinTech especially P2P lenders frequently increases the total supply of financial services rather than redistributing them (Erel and Liebersohn, 2020). By bridging the gap between the supply of lenders and the demand for credit from borrowers depending on the risk and maturity of their needs, P2P lending platforms act as financial intermediaries (Berger and Gleisner, 2009).

P2P lending platforms, unlike banks, do not produce money or undertake risk or maturity transformation. Unlike established lenders, FinTech lenders increase their market share by lending to riskier borrowers first, followed by safer borrowers, mostly based their credit determinations on tangible information (Di Maggio and Yao, 2021). Despite the recent innovation there is not extensive literature on FinTech lending (Balyuk and Davydenko, 2019).

They can, however, arrange secondary markets to swap loan contracts before they mature, and a number of P2P lending platforms attempt to provide lenders with a set income (Dietrich et al., 2019). P2P lending platforms must avoid principal agent difficulties and align their motivations with those of lenders in order to achieve effective and sustainable financial intermediation (Havrylchyk, 2019).

An economic agent with a focus on the acquisition and disposition of financial claims is known as a financial intermediary (Crouhy et al., 2021). As a financial intermediary, P2P platforms, as their name implies, are institutions that facilitate lending by connecting lenders and borrowers directly (Johson et al., 2010). By eliminating traditional financial intermediaries, P2P companies provide an alternative to the practise of accepting deposits and issuing loans. Instead, in order to make it simpler to get credit for both personal and corporate finance, they provide a matchmaking and credit checking service. It is possible to borrow large amounts or small amounts, with or without collateral (Balyuk and Davydenko, 2019).

With no banks acting as intermediaries, borrowers and lenders may communicate online thanks to the P2P lending market. However, Balyuk and Davydenko (2019) provide evidence that P2P lending platforms have changed over time from trading venues to new types of credit intermediaries. Most lenders now use the platforms' algorithms to make all decisions and use passive investing techniques (Havrylchyk, 2019).

The idea of market competition among lenders is one of the fundamental tenets of P2P (Loureiro and Gonzalez, 2015). Dietrich et al. (2019) say, there is high market competition between P2P and incumbents where firms having a problem to reaching internal financing. Similar to other internet trading models, P2P businesses identify potential borrowers, assess their creditworthiness, establish lending and payback conditions, and then make loans available to people in a competitive bid for the contract (Yan et al., 2015). P2P proponents assert that disintermediation, often

known as cutting out the middleman or financial intermediary, is one of the technology's key benefits. Lower transaction costs and the ability to pass those savings down to the borrowers is presumably the benefit (Bollaert et al., 2021).

P2P lending systems have also progressed beyond merely connecting borrowers and lenders to something approximating a delegated asset manager, which invests creditors' funds in consumer loans of its choosing at the price it considers acceptable for a fee (Bachmann et al., 2011). P2P loans are assessed based on a small number of hard information, and investors do not have access to any private or soft information about specific borrowers (Philippon, 2016). Since investors' market knowledge is unimportant due to this information structure, loan selection is an activity that is ideal for outsourcing (Balyuk and Davydenko, 2019).

In these circumstances, the lending platform is motivated to provide investors high-quality loan analyses, which can increase loan origination volume by luring inexperienced investors who would otherwise be unable to assess the quality of loans on offer (Balyuk and Davydenko, 2019). By contrast, the tendency towards intermediation may be limited in those markets in which private information and industry expertise, as well as differences in opinion and preferences, play a more prominent role (Allen and Gale, 1999).

P2P lending systems use algorithms and big data to assess credit risk and monitor borrowers while offering credit via the Internet (Basha et al., 2021). In the United States, as an online platforms Lending Club and Prosper, which together account for more than 90% of the P2P lending market have dominated the industry by the way of

Internet (Maskara et al., 2021). As a result, they are a part of the broader FinTech movement, which is known as the use of technology and new innovative financial business models that are enabled by technology to the provision of financial services (Murinde et al., 2022).

Due to inefficiencies, excessive leverage, too large to fail issues, opacity, and rent-seeking, the introduction of FinTech businesses may be viewed as a chance to make financial intermediation more transparent, efficient, and stable (Milne and Parboteeah, 2016; Allen et al., 2022). Through the lens of the theory of financial intermediation, this study aims to examine the function of P2P lending platforms.

2.3 Implications of Bank Lending for Small Businesses

In terms of small businesses funding, banks play a significant role. According to the World Bank's data of development indicators compiled from officially recognized sources, businesses that use banks to finance their investments in the world are estimated at around 26 % for 2022.

Comparatively to other sources, such as depository and non-depository institutions, commercial banks are more likely to provide finance for small firms (Jagtiani and Lemieux, 2015). Small business lending is frequently perceived as peculiar and dependent on relationships (Beck, 2013). Because public information about small businesses is sometimes deficient, it depends on gathering and analysing comprehensive, confidential data (Pettit and Singer, 1985; Scholtens, 1999).

Berger and Udell (1995) contend that small businesses normally more rely on financial intermediaries, notably commercial banks, whereas large organisations frequently obtain credit on the public debt markets. It is hardly unexpected that the methods by which these various groups receive credit funding varied greatly. Small businesses typically have far more significant asymmetric information challenges than large businesses (Chittenden et al., 1996; Revest and Sapio, 2012).

In contrast to public debt financing, bank financing frequently entails a long-term partnership that may assist mitigate these information difficulties (Berger and Udell, 1995). Banks collect and analyse data in addition to selling loan contract details like the interest rate charged or the collateral necessary to improve the incentives for borrowers (Pettit and Singer, 1985).

Since the owner of the business is frequently more important to the lending decision than the business itself, most small business loans are handled similarly to consumer loans (Cressy and Olofsson, 1997). On the other hand, larger borrowers often have access to a wealth of public information (Elyasiani and Goldberg, 2004). Smaller, more regional (for instance community banks in the U.S.) banks may have an edge in providing these loans because of the unique information needs for small business loans (Beck, 2013). In the literature, I observe that community banks may find development prospects from nonbank (such as P2P) lenders, particularly in the form of formal alliances and partnerships.

Claessens and Perotti (2007) mentions that the expenses of control and monitoring for small company loans can be decreased through lending partnerships between

banks and businesses. Boot and Thakor (1994) and Petersen and Rajan (1995) both provide theoretical models of relationship lending. These articles emphasise the existence of information asymmetries between lenders and borrowers as well as the potential for banking relationships to address the problems related to extending loans to small businesses.

According to Petersen and Rajan (1994), the duration of the borrower-lender relationship influences availability but not cost of small business loans. Using lines of credit to separate relationship loans from other debt, Berger and Udell (1995) discovered that businesses with longer bank connections pay lower interest rates. Additionally, they claim that the chance of a lender requiring collateral to secure a loan reduces as the length of the relationship increases. On the other hand, the assumption that relationships of banking give information about bank clients is also supported by various empirical research and have advantages like cheaper financing costs and more readily available loans for clients (Ongena and Smith, 2000).

Cole (1998) shows that banks, regardless of the length of the connection, are more willing to lend to businesses with which they had a prior relationship. Relationship lending was developed on the premise that larger, more complex banks could find it prohibitively expensive to gather and manage data for specialised small business loans (Degryse and Ongena, 2002).

Larger banks would be anticipated to provide less small company credit than smaller banks if larger banks find it more expensive than smaller ones to analyse small business customers (Elyasiani and Goldberg, 2004). Larger firms, on the other

hand, may benefit from increased variety and reduced costs, which may encourage small business financing (Claessens et al., 2002).

The impact of bank mergers and acquisitions (M&As) on small business financing has been examined in a number of studies. With the use of more than 6,000 M&As from the late 1970s to the early 1990s, Ely and Robinson (1998) explore the static and dynamic effects of M&As. The date is somewhat outdated however the conclusion remains valid. When the balance sheets of the participating banks are simply added together, the static impact is the anticipated shift in lending.

The small business lending projected for the merged bank, according to Berger and Bouwman (2013), is lower than that of the two (or more) pre-M&A banks, according to the findings of a model of loan activity. However, when dynamic factors are taken into consideration, such as changes to the consolidated institution's lending objectives or the responses of other banks in the same market, the static losses in small business lending are often mitigated.

Assembling banks reshape their targets in their own image, according to Peek and Rosengren's (1998a) findings. Any concerns over how mergers and acquisitions may affect small business lending may be unfounded, though, as the majority of mergers involve two or more small banks, and the acquirers are likely to have a greater portfolio of small company loans than their targets.

Ely and Robinson (2001) point out that if organisational inefficiencies in business lending are mitigated by size-related diversification benefits, smaller banks could not

have reduced costs compared to bigger banks. Their finding that small bank mergers increase lending to small businesses while other merger types have little effect is in line with the important effects that size has on diversity.

Ely and Robinson (2001) note that making loans to small businesses is not more cost-effective for small banks. For P2P lenders, this conclusion could also be valid. Additionally, these writers report that small banks and major banks both offer loan lines to nascent businesses and those with bad credit records. This outcome is also consistent with the idea that lending to small businesses has little financial benefit for smaller banks because loans to these companies often require more thorough review.

On the other hand, Udell (1998) claims that there is usually little evidence to support the idea that the growing consolidation of the U.S. banking sector would reduce small business lending. It's also possible that bigger banks wind up paying more to lend money to small businesses, but this is obscure. The growing adoption of information technology by banks is one factor that might lower the small business loans costs (Ely and Robinson, 2001). It has been suggested that thanks to their investments in information technology, larger banks can serve small business loans at a lower cost by using credit scoring methods. (Peek and Rosengren,1998b; Ely and Robinson, 2001).

2.4 Effects of P2P Lending on Small Businesses

According to the Biz2Credit Small Business Lending Index data for January 2022, while the small business loan approval rate of large banks was 14.5%, small banks approved 20.3% of their loan requests. However, non-bank lenders approved roughly 25.1% of requests for funds.

For both borrowers and lenders, P2P lending has a number of potential advantages and disadvantages. P2P loans have the advantage of meeting credit demands in places where traditional lending by financial institutions would not be feasible. This implies that small businesses may fund expansion, manage working capital, or respond to unforeseen financial demands even though they might not otherwise have access to funds (Morse, 2015).

According to Balyuk (2016), due to the unique credit scoring algorithms used by online lending platforms, marketplace loans have lower search costs when compared to traditional loan products. For lenders, it is more cost-effective to offer small, short-term loans to businesses about whom there is less public information (Branzoli and Supino, 2020). These businesses could be in severe financial difficulties or be younger, less well-known, lack collateral, or have a short credit history.

Market lenders provide concise online forms and quick application processing, so borrowers also benefit from reduced search costs (Berg et al., 2022). Study on P2P lending has concentrated on companies like Lending Club, which brags that the confirmation and funding procedures typically take seven days, but prospective borrowers may get quotations in just a few minutes from Kabbage, which offers same-

day approval for small business loans, and OnDeck, which can provide finance in as little as 24 hours. Finding financing requires time; one survey found that small firms spent an average of 26 hours seeking for and obtaining credit, contacting three lenders and submitting three applications (Jagtiani and Lemieux, 2015).

Elsaid (2021) observes that reducing application time eliminates a substantial barrier to credit. The relevance of the mutual reduction of information and search costs may be highlighted by contrasting small company borrowers with their bigger counterparts, who might not have as many borrowing obstacles, such as a limited credit history (Jagtiani and Lemieux, 2015).

2.5 Small business lending and bank competition

In order to develop an effective strategy and offer banking services that give them a competitive edge, banks must have a thorough understanding of the degree of competition and concentration in the banking sector. For customers, bank management, regulators, and other stakeholders, measuring concentration and competition in the banking sector has important policy ramifications because it influences the effectiveness, efficiency, and security of the banking system.

Banks with a larger market share can earn enough from high-quality borrowers to balance losses from small opaque businesses. (Petersen and Rajan, 1995). As a result, banks with market strength can ensure more industry entrance and a greater quantity of loans to small companies than competitive banks. According to Cetorelli and Strahan (2006), prospective entrants or established small businesses have a more

difficult time obtaining credit in marketplaces where banking is more competitive. According to Berger et al. (2007), market power may discourage small businesses from entering the market.

In comparison to new borrowers, banks with market power will be more inclined to give to their existing borrowers. The worth of a bank's present loan arrangements will be based on the borrowers' potential future profitability, which in turn will be based on the entrance and expansion of new rivals. Thus, a bank's motivation to support the success of its more established customers may limit its readiness to provide credit to small start-up businesses. According to Cetorelli and Strahan (2006), lenders need more motivation to fund start-ups or small firms operating in an informationally opaque environment when the credit market is less competitive.

In this thesis, due to importance of bank competition in small business financing, the banking competition intensity is measured by the concentration ratio of the "big three banks" (C3) and the Herfindahl-Hirschman Index (HHI) using the banks' market share in terms of bank branches number in counties based on the study of Degryse and Ongena (2007) and Chong et al. (2013).

2.6 The competitive advantages of P2P lending platforms

A number of authors have made quite aspirational predictions about the extent to which P2P lending can gain market share in banking lending markets as a result of the P2P lending platforms' rapid growth, which has seen their business double

annually in recent years, as well as their apparent cost and other advantages over traditional banks (Bollaert et al., 2021).

There are various reasons to anticipate sustained significant rise in P2P lending. It goes without saying that one of the main causes is the adoption of new technology, which can help disintermediation by enabling direct connections between parties. However, the potential for development stems from a variety of competitive advantages enjoyed by P2P lending platforms versus incumbents (Havrylchyk and Verdier, 2018).

When compared to the profits they may have gained from putting their money in traditional bank savings accounts, lenders on P2P platforms have seen a significant improvement (Milne and Parboteeah, 2016). This is due in part to the cost benefits of P2P platforms over traditional banks. Because of the emphasis of their operations, the administrative and overhead expenditures necessary to set up a P2P platform are generally modest. Milne and Parboteeah (2016) claim P2P platforms can also connect borrowers and lenders without any interest margin (since they do not own any of the loans).

Since there is no deposit protection and no guarantee of returns, P2P lenders are subject to greater risk; nevertheless, these risks have, at least up to this point, been more than offset by far higher rates of return (Serrano-Cinca et al., 2015). However, P2P lending has expanded in part because it makes credit more accessible, which is another factor.

Since the onset of the global financial crisis, banks and traditional lenders have been less willing to provide loans to borrowers (Milne and Parboteeah, 2016). According to Balyuk and Davydenko (2019), through P2P lending platforms, small businesses and some individuals may be able to find alternative lenders willing to accept the risk of providing such loans or to offer them at lower interest rates if they do not fit the stricter standards that banks now apply to issue loans.

Chapter 3

Regulatory Constraint and Small Business Lending: Do Innovative Peer-to-Peer lenders have an advantage?

This chapter reports on my study which investigates whether innovative Peer-to-Peer lending by FinTechs' has a regulatory advantage over the big banks in respect of small business lending. I do this through the lens of the regulations imposed by the Dodd-Frank Act, using a difference-in-difference methodology. The Act tightened traditional bank credit standards on business loans, especially for small firms. However, the new FinTech lenders were not subject to the same regulatory burden. I find that traditional banks significantly reduced their lending to small businesses, as compared to their FinTech competitors. My results suggest that while the Dodd-Frank Act constrained lending to small businesses, innovative new lending models gained a regulatory advantage and the Peer-to-Peer lenders capitalized on this.

3.1 Introduction

This study investigates the regulatory advantage conferred on innovative peer-to-peer (P2P) lenders, in respect of lending to small businesses. It does this through the lens of the response to regulations imposed by the Dodd-Frank Act of both traditional banks and their online P2P competitors. The later are sometimes colloquially referred to as "FinTechs", in reference to their use of financial technology. In fact, P2P lenders are a subset of the FinTech sector. As P2P lenders are not deposit takers, they are subject to less regulation than traditional banks.

Small businesses[2] are the backbone of the U.S. economy and the provision of credit is central to their functioning[3]. Since 1995, small businesses have created two—thirds of every new job and have employed half of the private sector workforce (Mills and McCarthy, 2014). The sourcing of credit is therefore of practical as well as scholarly importance. Innovation, in the form of FinTech, and P2P lending over the Internet, is changing lending dynamics (Broby, 2021). Small firms are now getting access to credit from these non-traditional sources.

Small business loans[4] are also one of the primary sources of external financing for small firms. This type of funding is crucial to helping small enterprises maintain cash flow, purchase new inventory or equipment, hire new employees, and grow their business (Mills and McCarthy, 2014). However, after the financial crisis bank loans declined and small business lending decreased by almost 18% over the period from 2008 – 2011 (Cole and Damm, 2020). In contrast, the volume of loans exceeding $ 1 million in size grew by 80% in the same period (Bordo and Duca, 2018). At around the same time, P2P lending grew to become a viable alternative source of credit for small businesses.[5]

I build on a growing body of literature. Gopal and Schnabl (2022) address a similar question to us but from the perspective of a shock (based on balance sheet impact of

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[2] According to the U.S. Small Business Administration's (SBA) Office of Advocacy, a small business is defined as one with less than 500 employees and having $7.5 million or less in annual revenue.
[3] Small businesses represent 99.7 per cent of U.S. businesses and approximately 50 per cent of total private sector employment (Deloitte, 2017).
[4] The Community Reinvestment Act (CRA) provides a framework for financial institutions in the U.S., uses a definition for small business lending—business loans of $1 million or less (SBA Advocacy, 2018).
[5] The first peer-to-peer lender, Zopa, was founded in 2005.

accounting rule FAS 166 / 167) and their definition of FinTech lender[6] is very different from mine. They highlight that the total small business loans held on the balance sheet of the 10 largest banks in 2016 was $10.28 billion. This contrasts with the significantly lower figure of $268.7 million for total small business, loans as at that date, for FinTech lender. This represents approximately a ratio of 3,826 to 1, which highlights the nascent level of the FinTech lenders.

It has been documented that the 2008 global financial crisis hit small businesses disproportionately. It was suggested that this was because they had less financing options than larger businesses (Wille et al., 2017). Although large firms have more varied sources of financing, such as direct credit, issuing and selling debt to investors, corporate bonds and commercial paper, small firms have limited or no access to equity capital markets and public institutional debt (Şahin et al., 2011). As such, they rely heavily on bank loans. The innovative nature of P2P lending changed that at around the same time as my study (Brill, 2010). P2P lenders employ a process model that I argue widens access to smaller firms (Wang et al., 2015). It has not previously been investigated whether this model affords P2P lenders a regulatory advantage.

[6] Gopal and Schnabl (2022) use a sample of Merchant Cash Advance (MCA) lenders. These small business loan lenders make short-term loans repaid through deductions from credit card and debit card sales. Our focus is on the P2P lenders who make a more traditional unsecured lending decision.

3.1.1 Dodd-Frank Act

The Dodd–Frank Act[7] established new prudential standards including liquidity, enhanced risk–based and leverage capital, risk management and risk committee requirements; single–counterparty credit limits; stress test requirements (The Federal Reserve System, 2018). Bordo and Duca (2018) suggest that small business lending from the banks was hindered in the U.S. as a result of the Dodd–Frank Wall Street Reform[8] (commonly referred to as Dodd–Frank Act) and the Consumer Protection Act enactment on July 21, 2010.

According to academic studies (Bordo and Duca, 2018; Acharya et al., 2018; Bouwman et al., 2018), the regulations of the Dodd–Frank Act[9] strained already high operational costs and increased capital constraints on banks, especially those with $10 billion or more in assets under the Federal Reserve's stress test requirements. The cumulative number of regulations are detailed in Figure 1. Cortés et al., (2020) claim that such stress tests create a direct link from bank lending risk to capital and impose heavy capital requirements on small business loans. Therefore, the Dodd–Frank Act regulatory requirements cut down on the incentives for banks to make loans to serve businesses, especially small businesses, for which bank credit is one of the important sources of external financing (Mills and McCarthy, 2014).

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[7] The act contains more than 2,000 pages and 360,000 words (Hogan, 2019).
[8] Evanoff and Moeller (2012) claim that Dodd–Frank Act is the most significant regulatory reform since the Great Depression and the Banking Act of 1933.
[9] All federally regulated financial companies with $10 billion or more in total assets conduct annually their own internal stress tests and publicly disclose the results under the Dodd-Frank requirements (Fernandes et al., 2020).

[Figure 1]

Under the Dodd-Frank Act, the average tier 1 risk-based ratio of U.S. banks increased by 22% to 27% between 2008 and 2015 (Buchak et al., 2018). In addition, banks with more than $10 billion in total consolidated assets are subject to an annual stress test which consists of dynamic capital requirements that impose risk-sensitive capital buffers on banks for expected deterioration in an adverse economic scenario (Bindal et al., 2020). In addition, Bindal et al. (2020) state that stress tests impose dramatically higher capital requirements on small business lending.

As mentioned, during the same period, the credit needs of small businesses started to be targeted by a new set of lenders that use innovative FinTech to disrupt the small business lending market (Mills, 2018). These are collectively referred to as Peer–to–Peer lenders. Although being small relative to incumbents, these alternative lenders provide rapid turnaround and online accessibility for borrowers and use new data-rich credit score algorithms (Palladino, 2018). According to Jagtiani and Lemieux (2016), these lenders are enabled by technology and have little (or indeed, are not subject to any) regulation. It could be argued this makes alternative lenders attractive to small business lenders in a post-crisis environment, and thus emerging of alternative P2P lenders had begun to alter the game for how small businesses access financing in the U.S. (Mills and McCarthy, 2014). Alternative P2P lender total loan origination volume, loan application number and county number are presented in table 1.

[Table 1]

In order to provide causal evidence that the Dodd Frank Act impacted the provision of loans to small businesses, I use a quasi-natural experiment. This allows us to investigate how the new requirements affected treated banks with $10 billion total assets or more small sized business loans supply relative to untreated banks with less than $10 billion assets. It allows us to evaluate how the lack of the regulatory requirements gave FinTech lenders an advantage.

Firstly, to address the impact on the banks, I used small business bank and county-level data. I replicate the method used by Tang (2019). After classifying treated and control banks (1), I investigate trends at the county level some counties have banks that were subject to the regulation, and others did not. It is suggested that those counties that had an impact from the Dodd-Frank Act saw less competition in banking, and therefore saw less of an impact. This follows the observations of Boot and Thakor (2000) regarding the development of relationship lending when there is less interbank competition.

I measure the banking competition intensity by (1) the concentration ratio of the "big three banks" (C3) and (2) the Herfindahl-Hirschman Index (HHI) using the banks' market share in terms of bank branches number in counties following Degryse and Ongena (2007) and Chong et al. (2013).

Treated counties are defined as counties if there is a bank with $10 billion assets or over which subject to the Dodd-Frank Act. I define treatment groups as counties with a high concentration of Dodd-Frank eligible banks. I further classify them as where there is a low banking competition at the 75th percentile of C3 and HHI. This

means that where there is a bank asset that is below $10 billion, and there is a high competition at the 25th percentile of C3 and HHI, it is defined as a control county. In this way, my sample can be used to identify the impact of the Dodd-Frank Act impact on (1) aggregate county-level small business lending. Further, it can be used to identify (2) alternative P2P lender activity in treated and control counties.

In this regard, according to the results in table 5, I conclude that treated banks saw a decrease in the amount of small business lending. In addition, I note that county-level aggregate small business loan volume declined after the enactment of the Dodd-Frank Act. At the same time, when bank small business loan supply declines, demand for alternative P2P lending increases. Supportive of my findings in the concentrated counties, Hodula (2022) found evidence that FinTechs may act as substitutes in highly concentrated markets.

To the best of my knowledge, mine is the first study to investigate the activities of both traditional banks and innovative alternative lenders in the small business market using the Dodd-Frank Act as an exogenous shock at the county level. In addition, my research adds alternative P2P lenders to the debate in the literature on small business lending (e.g., Buchak et al., 2018; Tang, 2019; Fuster et al., 2019; Hughes et al., 2022; De Roure et al., 2022). I note that Bordo and Duca (2018) and Zou (2019) also focus on small business lending and the global financial crisis. I, however, utilize the Dodd-Frank Act's impact on small business lending to identify the regulatory advantage of the P2P lenders.

Despite a large volume of published studies on bank regulations, a small subset of them focuses on the Dodd-Frank Act (e.g., Krainer, 2012; Acharya and Richardson, 2012; Balasubramnian and Cyree, 2014; Dimitrov et al., 2015; Akhigbe et al., 2016; Lutz, 2016; Li et al., 2016; Andriosopoulos et al., 2017; Allen et al., 2018; Bouwman et al., 2018; Calem et al., 2020; Bindal et al., 2020).

After the credit crisis, regulation was focused on both capital and liquidity requirements by regulators, particularly in view of the fact that reserve requirements for U.S. banks. According to Thakor (2018), higher capital requirements can make it more challenging for banks to attract capital, and so they decreased lending in response to an anticipated rise in regulatory capital requirements after the financial crisis. There are several reasons why small business owners might turn to business loan alternatives. These include lower credit requirements, easier qualification and faster approval thanks to innovative technology (Milne and Parboteeah, 2016).

Akhigbe et al. (2016) present evidence that following the transition of the Dodd-Frank Act, banks discretionary risk-taking decreased due to the rising bank capital ratios and banks decreasing their non-performing loans levels. Andriosopoulos et al. (2017), meanwhile, investigate the impacts of key legislative events of the act and their conclusions support my view that there were changes to the competitive structure of the financial services industry.

Allen et al. (2018) further investigate the market's response to the elimination of too-big-to-fail for large banks against the passage of the Dodd-Frank Act and suggest that act do not eliminate Too-Big-to-Fail banks. In their recent study, Calem et al.

(2020) investigate banks stress test exercises impact on the supply of mortgage credit which is implemented under the Dodd-Frank Act Stress Testing (DFAST) regulatory programs and according to the paper that stress tests only alter originations of credit in the jumbo mortgage market. Additionally, Bindal et al. (2020) investigate the Dodd-Frank Act's size based regulatory requirements impact on banks merger and acquisitions and small business lending. Their results indicate that the size-related regulatory thresholds created by the Dodd-Frank Act has significant real effects on loans to small businesses but have indirect treatment effects on bank acquisitiveness.

In summary, my use of the Dodd-Frank Act as a natural experiment ties together separate strands of the literature relating to small business lending and the growing role of innovative alternative lenders.

3.2 Small businesses lending and the role of innovative sources of lending

My working hypothesis is that the innovative P2P lenders benefit from a regulatory advantage. I therefore use two testable hypotheses related to small business lending. This ties the Dodd-Frank Act and the increasing role of alternative lenders together.

The distinctive features that distinguish small businesses from medium and large sized enterprises have long been the subject of research. Ang (1991) claims that the source of the structural and managerial differences could be traced to several features peculiar to small businesses. Out of this set, small firms are shown to make financial decisions in a different way than large companies. In this line of enquiry, several papers investigate small business lending from different perspectives such as bank

consolidation, mergers and acquisitions or banking market size structure effects on small business lending, relationship lending, opaque small businesses, and economies of small business finance. I suggest the nature of small businesses makes them more amenable to the use of FinTech.

Consolidation of the banking sector is ruled out as an exogenous factor. Weston and Strahan (1996) and Takáts (2004) claim that consolidation does not adversely affect the credit availability to small businesses contrast with those of Berger et al. (1998) and Sapienza (2002), who find that the effects of consolidation reduce the small business lending activity of banks. Peek and Rosengren (1998) also indicate that while acquirer banks have a higher degree of specialization in small business lending than non-acquirer banks, similar to the mergers increase the consolidated bank small business loans. In another study, results show an external impact of consolidation in which the bank lending to small businesses can be reduced by mergers and acquisitions (Berger et al., 2004).

The size of financial institutions does matter. DeYoung et al. (1999) reveal that there is a negative relation between the size of the bank and its small business lending activity, and Berger and Udell (1995) claim that as banks become larger and more complex, they can reduce to provide loans to small firms. Regarding the market size structure of local market participants, Craig and Hardee (2007) investigate whether banking consolidation has affected small business lending by using the Small Business Finances Survey. They find that access to bank credit for small businesses is lower in markets dominated by the largest banks.

Berger et al. (2007) also investigate market size structure affects the credit supply to small firms both in terms of prices and quantity and the point out that large banks compared to small banks tend to have lower loans to small businesses to assets, however, large banks take advantage of some transaction lending technologies to lend opaque small businesses.

Additionally, Mcnulty et al. (2011) indicate that the propensity to lend to small firms decreases as bank size rises. Further, that most loans to small businesses are made by small banks. In a recent study, Berger et al. (2015) show how local banks' market size structure impacts the loans received by small businesses and find that during normal times there is a greater market presence of small banks in more lending opaque and small firms, but this effect vanishes during the financial crisis. Due to the condition that banks exposed to both Dodd-Frank Act and the Liquidity coverage ratio should be above a specific asset value, results were obtained supporting both McNulty et al. (2011) and Berger et al. (2015) inferences from bank-level analyses. While the loan utilization of large-size banks affected by these regulations decreased, an increase was observed in small-size banks that were not affected by these regulations.

Furthermore, Petersen and Rajan (1994) investigate the effect of the relation between a small firm and their creditors (banks) on the availability and funding costs of credits and they find that the close relationship between the firm and the bank has little impact on credit pricing. Berger and Udell (1995) claim that small business pays lower interest rates and less collateral if there is a longer banking relationship.

Moreover, Cole (1998) shows that lenders are more likely to expand credit to firms with which they have a constituted relation. Berger et al. (2001) examine the bank relation with internationally opaque businesses and find that some foreign-owned and large banks that are generated by mergers and acquisitions and foreign institutions may have problem to provide loans to opaque small businesses. Berger and Black (2011) analyse the comparative advantages of large and small banks in specific lending technologies and show that small banks have a comparative advantage in relationship lending for small firms.

On the other hand, Begley and Srinivasan (2021) look at the effects of new regulations that banks are exposed to after the global crisis on mortgage lending. They argue that the share of especially four big banks in mortgage loans has decreased, and some of this gap is provided by FinTech lenders in parallel with my study. But Gallo (2021) argues that these online FinTech platforms are not fully efficient, and these platforms may suffer from misrepresentation. This makes it difficult to know lenders' credit history and lead to problems with collections.

I argue that the new regulations applied to the banks negatively affected those banks with a particularly large and high market share. As a result, I observe that loans to small businesses have decreased in the counties where these banks are located and there is low competition. This yields my first hypothesis:

Hypothesis1: Ceteris paribus, after the Dodd-Frank Act, aggregate small business lending declined in the counties where the banks affected by this legislation had a presence, and there was low competition to provide credit.

Apart from the small business lending studies, I further observe that small business loan origination occurs outside the traditional banking system with changing the regulatory structure of the banking system.

As mentioned, the FinTech phenomena began at the same time. There is now a growing literature on alternative P2P lenders (e.g., Cornaggia et al., 2018; Buchak et al., 2018; Tang, 2019; Fuster et al., 2019; Allen et al., 2019; Hughes et al., 2022; De Roure et al., 2022). They all suggest P2P FinTechs' are becoming an alternative source of lending to traditional banks. This strand of the literature investigates these new type of lenders activities in the small business lending market. In this regard, Tang (2019) examines whether alternative P2P lending platforms act as substitutes for traditional financial intermediaries or instead as complements and find that alternative FinTech lending is a substitute for bank lending with regards to serving infra-marginal bank borrowers and complements for small loans.

Following a method similar to that used by Tang (2019), I observe that alternative P2P lenders can increase market share if the bank lending criteria are tightened and bank credit supply declines.

Philippon (2016) evaluates the potential impact of FinTech on the finance industry and claims that it provides efficiency-enhancing benefits. In this respect, Fuster et al. (2019) point out that the FinTech lenders provide a rapid origination process that is less susceptible to demand fluctuations than traditional lenders and so P2P lenders adjust supply in a more flexible way. In this regard, they are better positioned to deal with the external mortgage demand shocks. Wang et al. (2021) claim that online P2P

lending services give consumers and small firms a convenient and affordable loan option. Similarly, Havrylchyk et al. (2020) examine the drivers of P2P earnings growth. They produce evidence on both the role of the Internet and weak banking competition being responsible for the growth.

In a recent study, Balyuk (2016) investigates how FinTech innovation in the form of alternative P2P lending affects the credit provided by traditional intermediaries, for example, banks demonstrate that alternative lending impacts the principles in the consumer credit market by developing the information environment. According to Balyuk (2016), financial innovation can play a significant role in lowering shortcomings in the consumer credit market and FinTech innovations mitigate these shortcomings by creating information spill overs to traditional financial intermediaries. Moreover, Li et al. (2021) maintain that banks may benefit from financial innovations in the clustering of financial data for a number of financial applications such as fraud detection, reject inference, and credit evaluation. On the other hand, Kou et al. (2021a, b) contend investments in FinTech can assist banks in decreasing their operating expenses and payment and transactional data enhance SME bankruptcy prediction.

In addition, recent papers focused on P2P lending suggest that alternative lending platforms compete with incumbents at a certain level. Cornaggia et al. (2018) set up a causal relationship between alternative lending infringement and commercial bank lending. They did this by using the differences in regulatory barriers to P2P lending

on the borrower, and investor. They conclude that small banks' lending volume decline due to the activities of alternative lenders.

Buchak et al. (2018) investigate the shadow banks' growth, particularly FinTech shadow banks, in the mortgage market. They show that both regulatory burdens and improved technology can explain the growth in FinTech shadow banking in the mortgage loan market. On the other hand, Jagtiani and Lemieux (2018) investigated whether alternative lenders' loans penetrated potentially underserved areas, where there are low-income borrowers, inadequate competition in banking services, and regions where bank branches have decreased more than others and regions with fewer bank branches per capita.

Finally, similar to Tang (2019), Havrylchyk et al. (2020) and De Roure et al. (2022) investigate whether alternative lending platforms are substitutes for traditional financial intermediaries or instead as complements (in the U.S. and Germany, respectively). De Roure et al. (2022) show that alternative P2P lenders are bottom fishing when unexpected financial regulations generate a competitive disadvantage for some incumbents. This is supportive of my findings. Havrylchyk et al. (2020) contend that alternative lending platforms have partly absorbed banks in some U.S. counties that were more affected by the financial crisis. Moreover, Tang (2019) and De Roure et al. (2022) claim that the banks affected by the decrease in loan supply are not fully substituted by other banks serving in the same region.

I also posit the view that while banks' small business lending activity is slowing down, thanks to digital solutions such as digital tools for loan processing and credit

underwriting, information asymmetry and searching cost is reduced. Consequently, alternative small firms have an advantage in respect of accessing funds easily. This allows them to increase their lending market share in the county where the large and high market share banks were affected negatively by Dodd-Frank Act. This yields my second hypothesis:

Hypothesis 2: Ceteris paribus, after the Dodd-Frank Act, loans to small businesses are granted by P2P lenders increased in those counties where the banks that were affected by this legislation had a presence, and there was low credit competition.

3.3 Data

The main source of data is the Federal Financial Institutions Examination Council's (FFIEC) Consolidated Reports of Condition and Income (Call Reports) that are filed by U.S. banks. To address regulatory deficiencies identified during the last financial crisis, banking regulators were directed to begin collecting annual data on lending to small businesses by the Federal Deposit Insurance Corporation's (FDIC) Improvement Act of 1991. Regulators provide information on loans to small businesses in the Call Report of June each year as required by this act. The Call Report data covers 2009 – 2012. Table 2 presents the summary statistics of bank-level data.

[Table 2]

The second primary source of county small business data is the FFIEC's Community Reinvestment Act (CRA) database. In 1977, CRA was enacted by

Congress and had been carried out by bank regulators. In regard to CRA, Congress aimed to stimulate each financial institution to meet the needs of each firm that doing business.

In part, regulations of CRA require that financial institutions report annual information on their lending to small businesses. Especially, it is necessary to report the amounts and numbers of business loans originated in amounts less than $100,000, more than $100,000 through $250,000 and more than $250,000 through $1 million. In addition, they must report the number and amount of loans originated to firms with less than $1 million in revenues. It covers annual CRA data covering the total amount and number of loans to small businesses between 2009 and 2012.

In addition to county small business loan data, county level macro variables are collected from the U.S. Census Bureau, St. Louis and New York FED database, Bureau of Economic Analysis (BEA) and FDIC, which displayed with county level data in table 3.

[Table 3]

Lastly, the P2P lender data is sourced with comprehensive information on funded loans and loan volume from Lending Club's website. I justify my use of lending club data following the extensive analysis of the publicly available databases by Teply and Polena (2020). As a U.S. based alternative lender, only Lending Club makes its data publicly. I note this as a limitation of my study but find comfort in the dominant market share position the company enjoyed at this time. This data covers the credit

score of borrowers, payment information of funded loans, status of loan and all loan application details from 2009 to 2012 is displayed in table 4.

[Table 4]

After data is collected for the bank, county and alternative P2P lending variables, I merged the three datasets into one. To find treated bank and county and control bank and county unique 5-digit zip code is used. However, although bank and county small business data is provided with a 5-digit zip code level, the alternative P2P lender data is identified at the 3-digit zip code level. In order to evaluate alternative P2P lender activity in treated and control counties, county-level and alternative P2P lender data are merged according to this unique 3-digit zip code.

3.4 Research Method

I use a method that allows us to look at the impact of the regulation at a county level, following the approach taken by Tang (2019). I then apply a difference-in-differences (DiD) approach to obtain my empirical results.

I limited the research period so that the 2008 global financial crisis[10] does not affect the data set exogenously. My sample period starts after this date and due to using policy change in 2010 as an exogenous shock in my research method, I kept sample period limited to 4 years between 2009 and 2012 in order to mutually coincide the pre

[10] During the 2008 financial crisis, small businesses were more severely impacted than larger businesses, and they recovered from the unusually deep and protracted recession more slowly (Mills and McCarthy, 2014).

and post periods[11]. This sample was analysed in with a similar empirical method in Tang's (2019) article where the period is 2009Q1 -2012Q2. After the research period was limited to this period, I performed parallel trend analyses to test the robustness of the analyses results, and the results were confirmed.

In order to isolate the regulatory impact, I apply a negative shock at county level to supply of bank loans that leads banks to tighten their lending criteria. In this regard, I consider an arguably exogenous shock to bank small business credit supply that was due to the implementation of the Dodd-Frank Act in June 2010 which is described as the beginning point of the post-shock term. Using small business loan data at bank and county level in regard to the Dodd-Frank Act, I follow Tang[12] (2019) and De Roure et al. (2022) analyses who find that treated banks reduced lending.

In order to provide causal evidence, the Dodd-Frank Act is used as an exogenous shock. The DiD model compares the volume of small business lending one year before and two years after July 21, 2010 (the implementation date of the Dodd-Frank Act). The treatment group are banks that are affected by this regulation and control group are banks that are not affected.

I cannot completely exclude the possibility that time-varying, unobserved market variables, even with the "DiD" technique, simultaneously affect the development of FinTech loans and the position of traded banks before the shock. To alleviate this

[11] After the research period was limited to this period, I performed parallel trend analyses to test the robustness of the analyses results, and the results were proven to be correct.
[12] According to Tang (2019), the impact of adverse shock affecting small business credit supply was greater for businesses with annual revenue below $ 1 million.

problem, I present in Figure 2 findings that show a parallel trend of FinTech lending in both traded and non-traded markets before 2010Q2. I also show that the benefits of treatment began to take effect in the second quarter of 2010. Given the date of the Dodd-Frank, I also examine the impact of other additional regulations in the robustness section, it seems unlikely that other variables are responsible for this trend.

There are two cut-offs for financial institutions according to the Dodd-Frank regulations. The first one is for banks which are exceeding $10 billion in assets that subject to annual stress test and higher disclosure requirements. And the other is one for bank holding companies that are exceeding $50 billion in assets (called "systemically important banks") that subject to semi-annual stress tests and a far-reaching list of disclosure requirements. However, due to having limited data about bank holding companies, I could not include systemically important banks in the DiD model, which are exceeding $50 billion in assets; therefore, I only use $10 billion as a cut-off[13].

Firstly, by using equation one, I test and analyse the qualification of existing research related to the Dodd-Frank Act impact on bank level small business lending activity.

$$(1)\ log(SBLoan)_{i,t,c} = \beta_{i,t}(Treated_i * DFA_t) + \lambda DFA_t + \rho Treated_i + C_{i,t} + \theta_{c,t} + \Pi_i + \epsilon_{i,t,c}$$

[13] Instead of using regression discontinuity design, I employ the DiD approach. In contrast to regression discontinuity design, the DiD method compares two groups that may differ in some way prior to treatment, with the effect of that difference being assumed to be constant across time. Because the time-invariant influence is removed while calculating the first difference of the result for each group across time, the comparison of the second difference is not contaminated. In general, it is also more resistant to confounders.

where $log(SBLoan)_{i,t,c}$ is originated small business loans (origination volume $1 million or less) by bank i in year t. $Treated_i$ is a dummy variable that identifies the treatment group, one if the banks with assets over $10 billion threshold which are subject to the Dodd-Frank Act and zero for the banks with assets right below $10 billion threshold and exempted from Dodd-Frank Act. DFA_t is the treatment dummy that takes the value one from Dodd-Frank Act enactment date (21st July 2010), and zero prior for this date. $C_{i,t}$ is a vector of bank-level control variables are defined in table 2. $\theta_{t,c}$ is a variable for the county-year fixed effects and Π_i is a variable for bank fixed effects , and both are used to help remove unobserved heterogeneity such as variation in local loan demand due to (county-specific) business conditions and for unobservable bank characteristics. $\epsilon_{i,t,c}$ is an error term.

The four columns of table 5 report the Dodd-Frank Act impact on bank small business loan volume. According to results, the coefficient of interaction term, $Treated_i$ x DFA_t is negative and highly in all estimations with bank, county and year fixed effects. The results show that small business lending volume in treated banks decreases.

[Table 5]

In order to check traditional banks' responses to Dodd-Frank Act in the counties for evaluating small business loan applications, I use the following equation:

$$(2)\ log(SBLoan)_{t,c} = \beta_t(Treated_c * DFA_t) + \lambda DFA_t + \rho Treated_c + C_{t,c} + \delta_c + \gamma_t + \epsilon_{t,c}$$

where $SBLoan_{t,c}$ is originated loans to small businesses (loans origination volume $1 million or less) in county c in year t. $Treated_c$ is a dummy variable that identifies the treated counties and takes the value of 1, if there is a bank with $10 billion assets or over affected by the Dodd-Frank Act and there is low competition according to the C3 and HHI, which are in the top 75th. The total number of control counties is 6869, and the number of treatment counties is 5314 in the analysis.

If the county has a bank asset below $10 billion, and there is high competition in the bottom 25th, it is defined as a control county and takes 0. Counties other than the 75th and 25th percentile are not included in the model. DFA_t is the treatment dummy that takes the value one from Dodd-Frank Act enactment date (21st July 2010), and zero prior for this date. $C_{t,c}$ is a vector of county-level control variables. δ_c variable for the county fixed effect, and γ_t is a variable for time fixed effect. $\epsilon_{t,c}$ is an error term. The county level variables are defined in Table 3.

Table 6 reports the Dodd-Frank Act's effect on county small business lending activity. The first column shows the result for the aggregated small business loan activities county and columns 6 and 9 show the small business loan for businesses with gross revenues less than $1 million and for businesses with gross revenues of at least $1 million, respectively.

[Table 6]

According to results, the coefficient of the interaction term, $Treated_c \; x \, DFA_t$ is both negative and high in all predictions with county and time fixed effects. The results

show that small business lending in treated counties decrease relative to control group counties after the Dodd-Frank Act in terms of aggregate small business loan and for businesses with gross revenues less than $1 million, respectively. There is no significant impact on for businesses with gross revenues of at least $1 million.

In order to check if alternative lenders increased their lending in counties where small business lending decreased due to the credit supply shock's effect on small business loan applications, I use the following equation:

$$(3)\ log(SBLoan_{t,c}^{P2P}) = a_{t,c}(Treated_c * DFA_t) + \lambda DFA_t + \rho treated_c + C_{t,c} + \delta_c + \gamma_t + \epsilon_{t,c}$$

where $SBLoan_{t,c}^{P2P}$ is small business loan origination volume of alternative lenders loan in county c in year t. $Treated_c$ is a dummy variable that identifies the treated counties and takes the value of 1 if there is a bank with $10 billion assets or over and affected by Dodd-Frank Act and there is low competition according to the C3 and HHI, which are in the top 75th. If the county has a bank asset below $10 billion exempts from the Dodd-Frank Act and there is high competition in the bottom 25th, it is defined as a control county and takes the value of 0. Counties other than the 75th and 25th percentile are not included in the model. DFA_t is the treatment dummy that other takes the value one from Dodd-Frank Act enactment date (21st July 2010), and zero prior for this date. $C_{t,c}$ is a vector of county-level control variables. δ_c variable for the county fixed effect, and γ_t is a variable for time fixed effect. $\epsilon_{c,t}$ is an error term. All variables are defined in Table 4 with loan-level variables. I acknowledge that it is not clear whether the DiD coefficient of this regression reports the effect of Dodd-Frank exposure (the main point of my study) or the effect of bank concentration

(unrelated to the study). That said, I emphasize that the high concentrated counties with low competition are exposed to more regulatory impact and that this in turn should result in an advantage to P2P lenders in the less concentrated counties.

The main dependant variable measures lending volume of the alternative P2P lender data that I used the dollar amount of alternative P2P lender origination volumes from the loan book that is specified at the county level. Due to having limited county-level data, instead of using normalized[14] variables similar as in Tang (2019) paper, the logarithm value of the small business loan origination is used in the analysis.

The results of equation (3) are presented in Table 7. It is proved that in regard of control counties, loan origination volume of alternative P2P lender enhanced remarkably in treated counties after the Dodd-Frank Act became law in July 2010, in terms of the total loan amount. According to my results, there was a notable difference, between control and treated counties, in alternative P2P lender loan volume after the enactment of Dodd-Frank. The trend after the Dodd-Frank Act proves that the growth in demand for alternative credit between control and treated markets is unlikely to be urged by observable differences.

[Table 7]

[14] Tang (2019) notes that there is no quantitative difference between the results of using the normalized or logarithmic dependant variable.

In accordance with table 4, I find that treated counties experienced an increase in alternative P2P lender mall business loan applications compared to control counties.

This result is coherent with FinTechs' and banks being substitutes or complements with the findings of Tang (2019). However, this analysis is necessary for validating the Dodd-Frank Act as a negative shock to incumbents' small business loan supply. I emphasise the limitation to my approach is the restricted data available on alternative lenders. To sum up, the results on the volume of alternative P2P lender loans reveal that, when incumbents cut lending in the small business credit market, some borrowers tend to move from incumbents to alternative P2P lenders.

To check the parallel-trends assumption, I present figure 2, which shows lending by banks overtime for the treated and control group.

[Figure 2]

The figure 2 shows that in treated states, new small business loan volume is similar to that in control states before the Dodd-Frank Act. This indicates that the parallel-trends assumption is valid. After the Dodd-Frank Act, the new small business loan volume decreased both for treated and control banks, but it decreased more and faster in treated counties than in control counties which are presented in figure 3.

[Figure 3]

Similarly, I check the parallel-trends assumption with an alternative P2P lender. Figure 4 shows an alternative P2P lender credit provision in treated and control counties. It shows that the volumes of new alternative P2P lender loans to small businesses in control and treated counties displayed parallel trends prior to the Dodd-

Frank Act. After the Dodd-Frank Act, P2P small business lending increased in treated counties.

[Figure 4]

3.5 Robustness and additional tests

As a robustness check, I also conducted the difference-in-differences analysis for a restricted 2009-2010 period. By reducing the research period, I compare the predicted treatment and whether the parallel trend assumption is violated. The results are even more significant. At both the county bank lending level and the individual bank level, I have an even bigger negative coefficient for the interaction term: treatedb _ EBAt, and this coefficient is always significant at the 1% level except county level analysis results for the small business loan for businesses with gross revenues more than $1 million. Detailed results are reported in Tables 8, 9 and 10.

[Table 8]

[Table 9]

[Table 10]

I also conduct the main analysis conditioned on the bank- and county-year- fixed effects and various bank characteristics, with concurrent shocks that impose disparate effects on small business lending and the control banks. As part of this, two major potential coincident changes are examined. Collectively, these tests mitigate concerns regarding omitted concurrent shocks that drive the primary result.

Next, the Troubled Asset Relief Program (TARP)[15] was evaluated. TARP introduced by the U.S. government through the Emergency Stabilization Act (2008) to respond to the global financial crisis (Cornett et al., 2013). The TARP was planned to stabilize the financial system by purchasing troubled assets from banks to inject liquidity into the financial system, and reactivate the credit markets (Harris et al., 2013).

According to Black et al. (2013), it was expected from the TARP to increase the lending of participating banks in the initial funding program. In this regard, Li (2013) finds evidence that TARP banks significantly increased bank loan supply. In addition, Berger et al. (2019) and Chu et al. (2019) document that banks increased credit supply to businesses by way of TARP capital injections. However, Cole and Damm (2020) find no evidence that the TARP program increased lending and claim that non-TARP banks reduced lending less than TARP recipient banks.

During the research period, I note that it is possible that control banks received more government aid from TARP after the financial crisis. They would therefore extend more credit to small businesses relative to treatment banks. To test the impact of this I used the period 2009-2012 (TARP $participation_{it}$). This variable is equal to one and zero otherwise is created as a new one and interact this variable with *Year2010+*, and then added to the regression. The results are shown in Table 11. *small business lending* continues to load (two-tailed p-value < 0.01).

[15] A $700 billion fund was approved by the U.S. Congress to aid the financial institutions (Choi, 2012).

I also reviewed a non-TARP program, the Small Business Lending Fund (SBLF), which was passed by U.S. Congress and signed into law in 2010 (Wilson, 2013). The SBLF was created as part of the Small Business Jobs Act to encourage liquidity in the interbank lending market and intended to provide low-cost funding since, therefore, banks could lend to small businesses (Berger et al., 2020).

Balla et al. (2017) claim that participants in the SBLF program were well-capitalized and healthier financially so that after two-quarters of the start of the SBLF program, SBLF participated banks experienced stronger aggregate growth in lending to small firms. In contrast, Basset et al. (2020) find evidence that there was not any difference between the loan growth of participated and non-participating banks in government financial aid program.

To test the impact of SBLF, I create an indicator equal to one if a bank is participated ($SBLF\ participation_{it}$), and zero otherwise, and interact this variable with *Year2010+*. After adding this interaction to the regression, unlike TARP, I find a significant coefficient on *small business lending* continues to load (two-tailed *p*-value < 0.01) in the second column of Table 11.

[Table 11]

A limitation of my approach is the limited-time sample. Parallel trends cannot be strongly verified if there is only one time period in the pre-period. Without strong evidence of parallel trends, it is difficult to assume that the treatment and control counties would have seen a similar credit growth after the regulation. Treatment counties had larger banks and a more concentrated banking environment. Such

counties were also disproportionately exposed to the housing crisis since larger banks had higher mortgage-backed securities (MBS) exposure. It is plausible that lower credit growth is an artifact of the damage caused by the crisis. A larger time sample would help address such concerns, but this was simply not available.

I observe that my results are consistent with Cortés et al. (2020) analysis of the way in which the Dodd-Frank Act acted on banks at the local level. They suggest that affected locals raise interest rates to compensate for the capital burden imposed by the stress test element. This gives an advantage to P2P lenders because banks reduce small business loans that are more like commodities as that leads borrowers to switch.

3.6 Conclusion

This study investigated how innovative lending models gained a regulatory advantage over traditional banks, particularly in respect of loans to small businesses. I developed an empirical model for bank, county, and innovative P2P lending. I separately tested the impact of a negative regulatory shock on small business lending.

I examined two main hypotheses. First, I investigated new regulations' impact on county-level small business loan origination at traditional banks. I found that in treated counties where there was a bank with $10 billion assets or over and affected by Dodd-Frank Act, and where there was low competition according to the C3 and HHI, there was a decrease in the small business loan volume according to control counties. I conclude that unexpected regulatory reform like the Dodd-Frank Act has

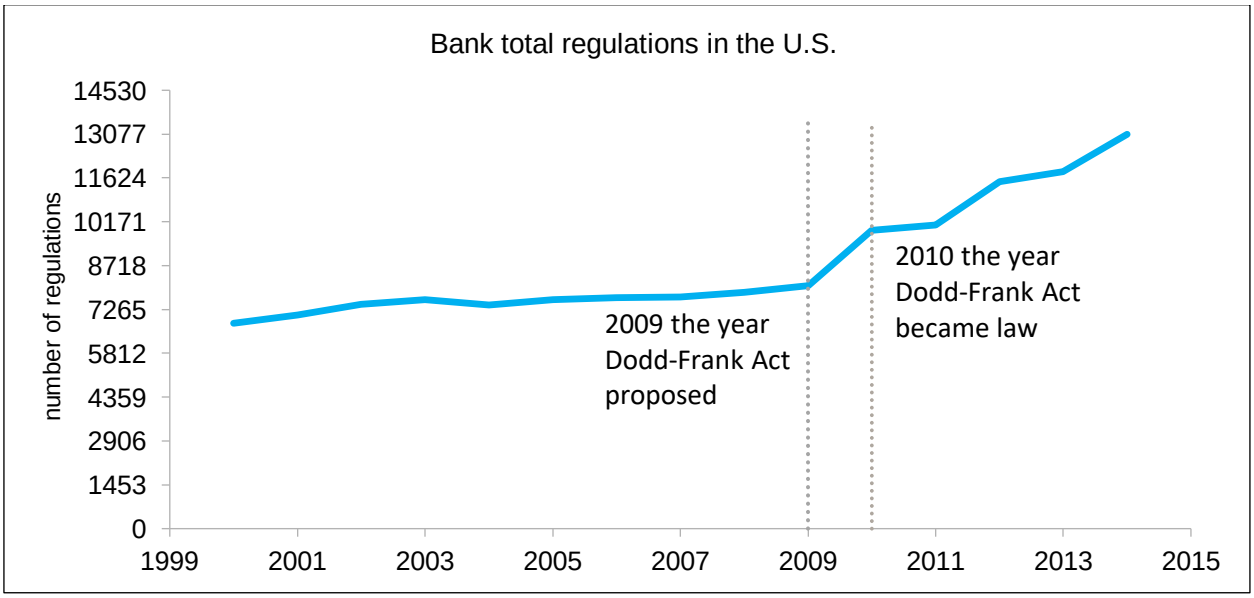
led regulators to make changes that impact financial institutions, especially banks, and may cause them to reduce their lending to small businesses.

Second, I examined whether innovative P2P lenders increase their lending in counties where small business lending decrease due to the credit supply shock's effect on small business lending. The analysis shows that alternative P2P lender volume of loan origination rose considerably in treated counties after the Dodd-Frank Act became law. This shows that there was a regulatory advantage.

I conclude that policy makers should consider whether the regulatory advantage is equitable and/or desirable. Clearly, FinTech lenders can be regulated like traditional banks, but they would then lose this regulatory competitive advantage. My contribution is in showing how the lack of regulation gives FinTech lenders a comparative advantage over traditional banks.

The important implication of my study's findings is that higher capital requirements and regulatory enforcement on banks may lead regulated banks to reduce their loans to small firms and thereby providing an opportunity for P2P lenders to grow market share.

Figure 1 Total cumulative regulations from the Federal Reserve Board (FED) from 1999 to 2015



Source: Regdata

The figure shows how the number of bank regulations have increased steadily over the period 1999 – 2015. The dotted line in the chart indicates the date when the Dodd-Frank Act passed in 2010 to regulate banks. The bank regulations accumulation accelerated between 2009 and 2010, and there was a more remarkable rise in total regulations in 2010 and after four years, as the FED added over 3,000 new regulations in response to Dodd-Frank Act. RegData can be downloaded from https://quantgov.org/regdata/

Figure 2 Bank level small business loan -Parallel-Trends

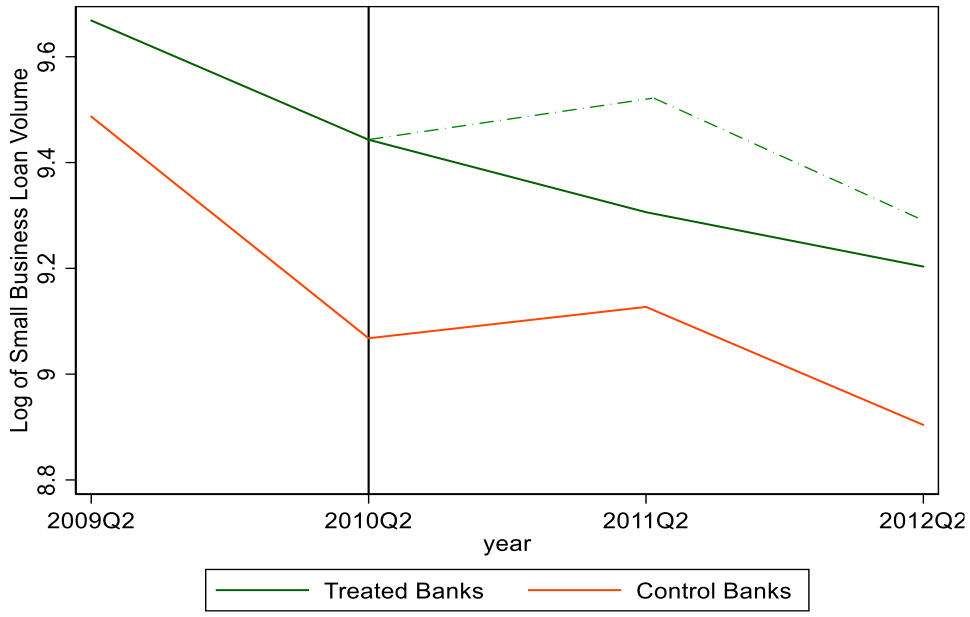


Figure 2 shows the trend of the annual mean values of small business loan volume of treated and control banks before and after the introduction of the Dodd-Frank Act. Data Source: FFIEC.

Figure 3 County level small business loan -Parallel-Trends

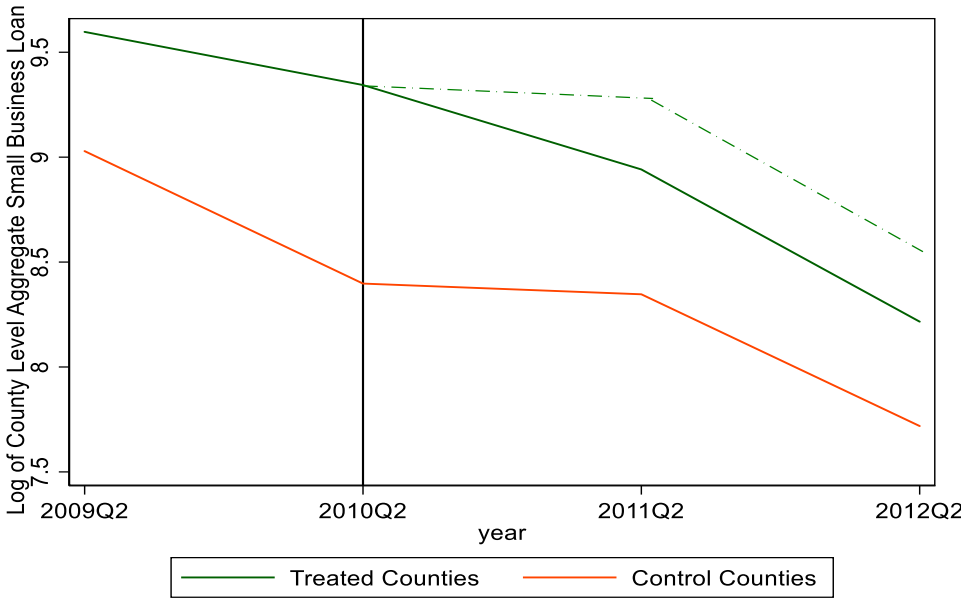


Figure 3 shows the trend of the annual mean values of small business loan volume of treated and control counties before and after the introduction of the Dodd-Frank Act.
Data Source: CRA

Figure 4 Alternative P2P lender small business loan -Parallel-Trends

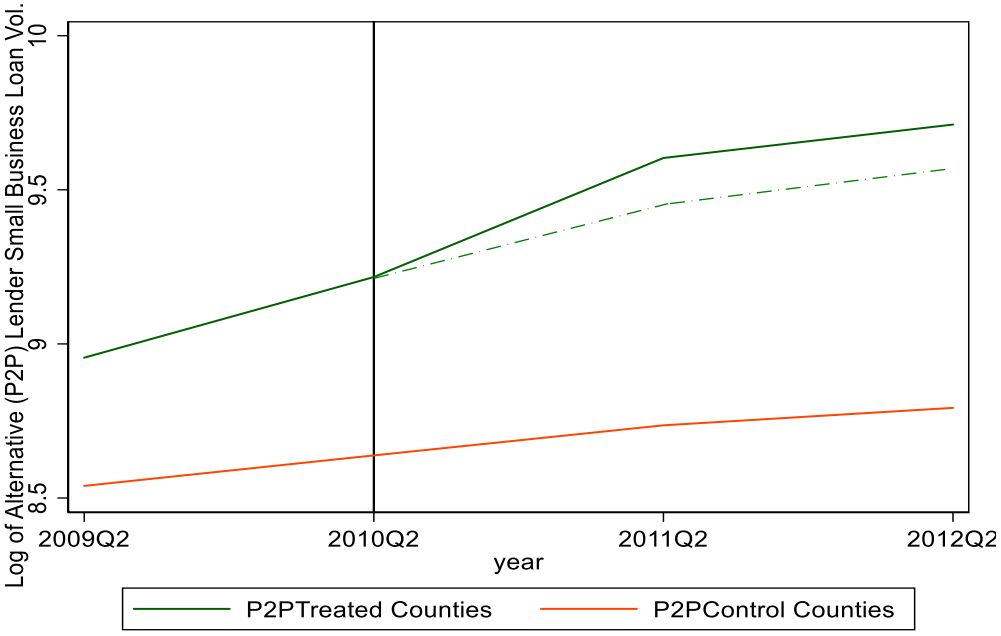


Figure 4 shows the trend of the annual mean values of small business loan volume of Alternative P2P lenders in treated and control counties before and after the introduction of the Dodd-Frank Act. Data Source: Lending Club

Table 1. Alternative P2P lender data (loan volumes, county, and loan numbers)

Alternative P2P Lender	2007	2008	2009	2010	2011	2012
Loan origination volume (in million $)	5	21	52	132	262	718
County number	110	379	676	987	1359	1836
Loan application number	601	2392	5280	12533	21715	53351

Source: Lending Club

Table 1 demonstrates the number of a total loan application, total loan origination volume of Lending Club and give details the total number of counties where it served between 2007 and 2012.

Table 2. Descriptive statistics of bank characteristics

Variable	Obs	Mean	Std.Dev.	25th	Median	75th
SBLvol($k)	21764	9.306	1.359	8.647764	9.382724	10.09371
SBLnmbr	21324	4.887	1.468	4.143135	4.905275	5.645447
Size($bil)	22504	12.071	1.283	11.21584	11.93074	12.74921
TRBCapital(%)	22480	18.587	10.131	13.06045	15.64785	20.19954
Core Capital(%)	22480	10.722	4.184	8.419788	9.667406	11.70716
CoreTier1(%)	22480	17.436	10.212	11.85806	14.46128	19.08427
Capital(%)	22480	11.271	4.183	8.893805	10.2911	12.43739
Deposits(%)	22504	82.665	8.264	79.74239	84.60511	88.10375
ROE(%)	22480	4.598	12.538	2.229953	6.268635	10.62173
ROA(%)	22480	.536	1.18	.2427241	.6774983	1.116585
NPL(%)	22334	2.595	2.939	.6097619	1.667152	3.451154
SBLtoTLoan(%)	22334	9.361	7.081	4.401148	8.064407	12.76499
SBLtoTA(%)	22504	5.758	4.561	2.557525	4.825758	7.89244
C&I Loans($mil)	22504	8.04	6.52	3.461009	6.612704	10.99003

This table presents the summary statistics of bank-level statistics. The main dependant variable *SBLvol* is the log amount of small business loan volume. *SBLnmbr* is the logarithm of small business loan number. *Size* is the logarithm of banks total asset. *TRBCapital* is a total risk-based capital ratio. *Core capital* is a leverage (core capital) ratio. *CoreTier1* is a Tier 1 risk-based capital ratio. *Capital* is the total bank capital to total assets. *Deposits* is the total deposits to total assets. *ROE* is the return on equity ratio. *ROA* is the return on assets ratio. *NPL* is the non-performing loans to total loans. *SBLtoTLoan* is the small business loan to total loans. *SBLtoTA* is the small business loan total assets. *C&I Loans* is the logarithm of commercial and industrial loans. The sample period is from the second quarter of 2009 until the second quarter of 2012. Variables are winsorized at the 1st and 99th percentile.

Table 3. Descriptive statistics of county characteristics

Variable	Obs	Mean	Std.Dev.	25th	Median	75th
SBLoan(%)	12952	8.664	1.73	7.599	8.735	9.857
SBLoan1(%)	12866	8.16	1.978	6.894	8.215	9.504
SBLoan2(%)	12897	8.317	2.07	7.005	8.284	9.700
Population	12572	10.266	1.439	9.313	10.159	11.111
DebtoIncome(%)	12553	1.815	.982	1.190	1.580	2.630
Income	12568	10.656	.23	10.500	10.641	10.794
Unemployment(%)	12550	8.743	3.026	6.620	8.540	10.610
BRNUM	12651	7.438	3.194	5.081	8.211	9.694
C3(%)	12556	71.838	19.186	54.010	68.390	89.250
HHI(%)	12522	7.737	.625	7.218	7.606	8.191
Domdep($k)	12826	18.87	3.496	15.975	19.693	21.451

This table shows the descriptive statistics of county-level variables. There are three main dependant variables. *SBLoan* is the log amount of loans to small businesses in each county. *SBLoan1* is the log amount of loans to small businesses for businesses with gross revenues less than $1 million in each county. *SBLoan2* is the log amount of loans to small businesses for businesses with gross revenues more than $1 million in each county. The sample also covers county level variables. *Population* is the county level population. *DebtoIncome* is the median household debt-to-income ratio by county. *Income* is the dollar amount of income per person by county. *Unemployment* is the ratio of jobless people by county. *BRNUM is* the number of branches per capita in the county. *C3* is the share of deposits of the three largest banks in the county. *HHI* is the Herfindahl-Hirschman index and HHI ratio accounts for the market share of banks in the county. *Domdep* is the sum of the dollar amount of banks' branch domestic deposits by county. Except for *DebtoIncome*, *Unemployment* and *C3*, all variables are logarithmic and is taken logarithm before they are applied. The sample period is from the second quarter of 2009 until the second quarter of 2012. Variables are winsorized at the 1st and 99th percentile.

Table 4. Descriptive statistics for alternative P2P lender at county-level

Variable	Obs	Mean	Std.Dev.	25th	Median	75th
Panel A. Alternative Peer-to-Peer lender loan characteristics						
P2PSBL	3584	9.307	.815	8.764	9.210	9.903
Term(months)	3584	3.737	.234	3.584	3.584	4.094
Int_rate (%)	3584	.13	.047	0.098	0.121	0.165
Loan_status	3584	1.738	.44	1	1	2
Annual_inc($)	3584	11.095	.533	10.779	11.156	11.462
Dti(%)	3584	13.022	7.471	6.970	13.060	18.510
Fico	3584	6.576	.051	6.532	6.561	6.616
Panel B. County control variables						
Population	3584	10.176	1.555	9.098	10.042	11.150
Income	3584	10.682	.24	10.524	10.668	10.821
Unemployment (%)	3580	8.034	2.7	6.09	7.78	9.60
C3(%)	3576	71.21	19.174	53.96	68.2	88.45
HHI (%)	3568	7.709	.604	7.21	7.568	8.168
BRNUM	3576	3.048	1.689	1.609	2.708	4.673
DebtoIncome(%)	3584	1.675	.975	1.01	1.58	2.16
Domdep($k)	3575	18.607	3.857	14.764	19.654	21.551

This table presents the summary statistics of alternative small business lender Lending Club. According to the Lending Club dictionary, the main dependant variable *P2PSBL is* the logarithm of amount of small business loan volume. *Term* is the payment numbers on loan. *Int_rate* is the interest rate on loan. *Loan_status* is a dummy variable and set to 1 if charged off, set to 2 for a fully paid loan. *Annual_inc* is the annual income provided by the borrower. *Dti* is the "ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested Lending Club loan, divided by the borrower's self-reported monthly income". *Fico* is the credit score of borrowers. *Term, Fico* and *Annual_inc* are logarithmic. The sample period is from the second quarter of 2009 until the second quarter of 2012. The county control variables are described in table 3. Variables are winsorized at the 1st and 99th percentile.

Table 5. Impact of Dodd-Frank Act on bank small business credit supply

	Bank Small Business Lending			
	(1)	(2)	(3)	(4)
	SBLoan	SBLoan	SBLoan	SBLoan
Treated*DFA	-0.628**	-0.346**	-0.333**	-0.116***
	(-4.607)	(-4.843)	(-5.368)	(-8.123)
Size	0.554***	0.692***	0.713***	0.947***
	(7.956)	(14.933)	(16.550)	(27.115)
TRBCapital	0.354***	-0.015	-0.006	0.030
	(12.225)	(-0.695)	(-0.229)	(1.556)
CoreCapital	0.029	0.089**	0.086*	0.045***
	(2.035)	(3.732)	(3.093)	(4.266)
CoreTier1	-0.432***	-0.040	-0.048	-0.067***
	(-13.811)	(-2.143)	(-1.865)	(-3.453)
Deposits	0.023***	-0.008	-0.009	0.005**
	(6.921)	(-1.632)	(-2.296)	(2.221)
NPL	-0.024**	-0.009	-0.008	-0.010***
	(-4.715)	(-1.937)	(-1.538)	(-3.836)
ROE	0.005**	-0.001	-0.000	-0.002*
	(3.501)	(-0.508)	(-0.226)	(-1.769)
ROA	-0.019	-0.005	-0.013	0.029*
	(-0.611)	(-0.222)	(-0.582)	(1.823)
Capital	0.084***	-0.023	-0.021	0.010
	(6.494)	(-1.356)	(-1.015)	(1.057)
Bank FE		Yes	Yes	Yes
County FE			Yes	Yes
Year FE				Yes
Obs.	21676	21584	21576	21576
Adj. R^2	0.430	0.878	0.885	0.898

Table 5 shows the difference-in-differences estimation results in equation (1). The dependant variable *SBLoan* is the bank level total loan volume. The variable *Treated* takes on the value 1 for the banks with assets over $10 billion and zero for the banks with assets right below $10 billion. *DFA* is the treatment dummy that takes the one from July 2010 onwards and zero prior to that date. The sample period is from the second quarter of 2009 until the second quarter of 2012. Standard errors are clustered at the bank level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 6. Impact of Dodd-Frank Act on aggregate county-level small business lending

	Total Small Business Loan Volume			Small business loan for businesses with gross revenues less than $1 million			Small business loan for businesses with gross revenues more than $1 million		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SBLoan	SBLoan	SBLoan	SBLoan1	SBLoan1	SBLoan1	SBLoan2	SBLoan2	SBLoan2
Treated*DFA	-0.941***	-0.928***	-0.586***	-0.235***	-0.234***	-0.033*	-0.195***	-0.196***	0.007
	(-51.388)	(-51.543)	(-32.475)	(-18.138)	(-19.054)	(-1.862)	(-16.862)	(-17.862)	(0.425)
Population	0.890***	0.893***	0.895***	0.881***	0.892***	0.892***	0.972***	0.978***	0.978***
	(56.357)	(54.393)	(53.690)	(53.577)	(50.847)	(50.861)	(66.149)	(64.003)	(63.756)
DebtoIncome	0.005	0.002	-0.020	0.059***	0.058***	0.050***	-0.075***	-0.074***	-0.082***
	(0.335)	(0.130)	(-1.284)	(3.944)	(3.823)	(3.244)	(-5.973)	(-5.562)	(-6.017)
Income	0.613***	0.569***	0.551***	0.430***	0.380***	0.376***	1.110***	1.088***	1.081***
	(8.181)	(7.389)	(7.015)	(5.305)	(4.569)	(4.498)	(15.434)	(14.688)	(14.511)
Unemployment	0.012*	0.012*	-0.004	-0.013**	-0.014**	-0.018***	-0.007	-0.009	-0.014**
	(1.932)	(1.884)	(-0.672)	(-2.189)	(-2.259)	(-2.944)	(-1.347)	(-1.592)	(-2.376)
BRNUM	0.034***	0.030***	0.021**	0.183***	0.176***	0.169***	0.156***	0.150***	0.144***
	(4.025)	(3.274)	(2.276)	(20.949)	(18.520)	(17.930)	(19.719)	(18.066)	(17.283)
C3	0.001	0.001	0.001	0.003	0.003	0.003*	0.003*	0.003*	0.004*
	(0.539)	(0.549)	(0.567)	(1.416)	(1.599)	(1.664)	(1.764)	(1.751)	(1.824)
HHI	-0.028	-0.057	-0.045	-0.053	-0.095	-0.094	-0.098*	-0.119**	-0.118**
	(-0.472)	(-0.953)	(-0.755)	(-0.866)	(-1.520)	(-1.505)	(-1.676)	(-2.037)	(-2.027)
Domdep	-0.003	-0.006*	-0.003	0.000	-0.002	-0.001	0.003	0.001	0.002
	(-0.843)	(-1.856)	(-0.800)	(0.065)	(-0.523)	(-0.285)	(1.084)	(0.287)	(0.542)
County FE		Yes	Yes		Yes	Yes		Yes	Yes
Year FE			Yes			Yes			Yes
Obs.	12183	12183	12183	12173	12173	12173	12183	12183	12183
Adj. R^2	0.670	0.663	0.681	0.824	0.824	0.827	0.857	0.856	0.859

Table 6 shows the difference-in-differences estimation results in equation (1). The variable *Treated takes* on the value 1 for the counties where there is a bank with $10 billion assets or over affected by the Dodd-Frank Act and there is low competition according to the concentration of the three largest banks (C3) and Herfindahl-Hirschman Index (HHI), which are in the top 75th. If the county has a bank asset below $10 billion, and there is high competition in the bottom 25th, it is defined as a control county and takes 0. Counties other than the 75th and 25th percentile are not included in the model. *DFA* is the treatment dummy that takes the one from July 2010 onwards and zero prior to that date. The sample period is from the second quarter of 2009 until the second quarter of 2012. There are three dependant variables. *SBLoan* is the county level total small business loan volume. *SBLoan1* is a total small business loan for businesses with gross revenues less than $1 million and *SBLoan2* is a total small business loan for businesses with gross revenues of more than $1 million. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 7. Impact of Dodd-Frank Act on aggregate alternative P2P lending

	(1)	(2)	(3)
	P2PSBL	P2PSBL	P2PSBL
Treated*DFA	0.674***	0.678***	0.863***
	(30.179)	(29.373)	(24.741)
Population	0.016	0.027*	0.027*
	(1.379)	(1.901)	(1.961)
Income	-0.385***	-0.470***	-0.456***
	(-5.265)	(-5.660)	(-5.515)
Unemployment	0.028***	0.043***	0.043***
	(5.068)	(6.743)	(6.770)
C3	-0.003	-0.004	-0.004
	(-1.324)	(-1.454)	(-1.225)
HHI	0.160**	0.166**	0.151*
	(2.316)	(2.044)	(1.849)
BRNUM	0.006	0.005	0.007
	(0.423)	(0.278)	(0.381)
DebtoIncome	0.046**	0.067***	0.070***
	(2.591)	(3.051)	(3.218)
Domdep	0.011***	0.013***	0.013***
	(2.996)	(3.089)	(3.105)
County FE		Yes	Yes
Year FE			Yes
Obs.	3555	3555	3555
Adj. R^2	0.189	0.175	0.191

Table 7 shows the difference-in-differences estimation results in equation (3). The dependant variable *P2PSBL* is the small business loan origination volume of alternative lenders in counties. The variable *Treated* takes on the value 1 for the treated counties where there is a bank with $10 billion assets or over and affected by Dodd-Frank Act and there is low competition according to the C3 and HHI, which are in the top 75th. If the county has a bank asset below $10 billion exempts from the Dodd-Frank Act and there is high competition in the bottom 25th, it is defined as a control county and takes the value of 0. Counties other than the 75th and 25th percentile are not included in the model. *DFA* is the treatment dummy that takes the one from July 2010 onwards and zero prior to that date. The sample period is from the second quarter of 2009 until the second quarter of 2012. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 8. Robustness results for bank level data

Bank Small Business Lending				
	(1)	(2)	(3)	(4)
	SBLvol	SBLvol	SBLvol	SBLvol
Treated*DFA	-0.453***	-0.272***	-0.275***	-0.336***
	(-23.314)	(-25.128)	(-24.707)	(-16.285)
Size	0.498***	0.677***	1.127***	1.056***
	(30.373)	(12.388)	(12.021)	(10.885)
TRBCapital	0.389***	-0.002	0.030	0.026
	(6.389)	(-0.067)	(0.855)	(0.753)
CoreCapital	-0.001	0.028	-0.010	-0.003
	(-0.062)	(1.368)	(-0.401)	(-0.117)
CoreTier1	-0.467***	-0.034	-0.069*	-0.069*
	(-7.753)	(-0.991)	(-1.870)	(-1.887)
Deposits	0.025***	0.006*	0.004	0.002
	(8.696)	(1.709)	(1.199)	(0.573)
NPL	-0.018***	-0.009*	-0.008	-0.007
	(-3.345)	(-1.729)	(-1.519)	(-1.347)
ROE	0.002	-0.006**	-0.005*	-0.005*
	(0.507)	(-1.985)	(-1.792)	(-1.655)
ROA	0.024	0.074**	0.061*	0.054
	(0.707)	(2.208)	(1.779)	(1.579)
Capital	0.108***	0.022	0.062***	0.060***
	(8.085)	(1.241)	(2.800)	(2.691)
Bank FE		Yes	Yes	Yes
County FE			Yes	Yes
Year FE				Yes
Obs.	11039	10922	10906	10906
Adj. R^2	0.414	0.881	0.878	0.879

Table 8 shows that by limiting the research period to one year before and after treatment, there is no change in banks' small lending activity and the effect of the Dodd-Frank Regulation is still significant. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 9. Robustness results for county level data

	Total Small Business Loan Volume	Small business loan for businesses with gross revenues less than $1 million	Small business loan for businesses with gross revenues more than $1 million
Treated*DFA	-0.591***	-0.068***	0.001
	(-17.942)	(-2.867)	(0.054)
Population	0.879***	0.891***	0.973***
	(34.882)	(46.980)	(58.192)
DebtoIncome	-0.027	0.057***	-0.081***
	(-1.084)	(3.460)	(-5.242)
Income	0.657***	0.296***	1.104***
	(4.945)	(3.270)	(12.696)
Unemployment	0.002	-0.023***	-0.013*
	(0.193)	(-3.182)	(-1.830)
BRNUM	0.014	0.175***	0.146***
	(1.140)	(16.431)	(16.599)
C3	-0.001	0.002	0.003
	(-0.342)	(0.969)	(1.501)
HHI	0.000	-0.039	-0.097
	(0.001)	(-0.583)	(-1.485)
Domdep	-0.006	-0.001	0.001
	(-1.306)	(-0.264)	(0.234)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	5589	5584	5589
Adj. R^2	0.739	0.842	0.867

Table 9 shows that by limiting the research period to one year before and after treatment, there is no change on county-level small business lending and the effect of Dodd-Frank Regulation is still significant except for small business loans businesses with gross revenues of more than $1 million. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 10. Robustness results for alternative P2P lending

	(1) P2PSBL	(2) P2PSBL	(3) P2PSBL
Treated*DFA	0.559***	0.515***	0.612***
	(8.664)	(5.952)	(4.737)
Population	0.023	-6.220	-5.910
	(0.841)	(-1.157)	(-1.094)
Income	-0.473**	-1.351	-1.279
	(-2.491)	(-1.033)	(-0.971)
Unemployment	0.047***	0.102	0.099
	(3.430)	(1.263)	(1.221)
C3	-0.000	0.102**	0.112**
	(-0.104)	(2.226)	(2.245)
HHI	0.445***	-0.800	-0.905
	(3.193)	(-0.448)	(-0.497)
BRNUM	0.123**	-3.612	-3.958
	(2.437)	(-0.923)	(-0.985)
DebtoIncome	0.046	0.251	0.240
	(1.326)	(1.303)	(1.235)
Domdep	-0.003	0.027	0.025
	(-0.321)	(0.260)	(0.226)
County FE		Yes	Yes
Year FE			Yes
Obs.	732	594	594
Adj. R^2	0.165	0.328	0.324

Table 10 shows that by limiting the research period to one year before and after treatment, there is no change on alternative (P2P FinTech) lending for small businesses and the effect of Dodd-Frank Regulation is still significant. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 11. Tests for Successive Shocks

Additional Controls

	Small Business Lending		
	Control of banks receiving TARP aid (1)	Control of banks receiving SBLF funding (2)	Control of TARP and SBLF (1)-(2) (3)
Dodd-Frank	-0.346***	-0.335***	-0.116***
	(-36.557)	(-35.446)	(-8.111)
TARP	0.041		-0.011
	(1.160)		(-0.372)
SBLF		0.107**	-0.043
		(2.013)	(-0.837)
Controls	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	21,584	21,576	21,576
Adj. R^2	0.876	0.885	0.898

Table 11 shows the result of additional tests for bank small business lending volume. In column 1, *TARP* is an indicator equal to one if a bank or its affiliated holding company participates in the TARP program and zero otherwise for years 2009-2012. In column 2, *SBLF* is an indicator equal to one if a bank or its affiliated holding company participates in the SBLF program and zero otherwise between 2009 and 2012. In column 3, all two potential successive shocks are controlled for. Standard errors are clustered at the bank level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Chapter 4

The impact of liquidity regulation on small business lending (Banks versus FinTechs)

This chapter reports on my study which investigates the impact of changes in banking regulation on the small business lending activities of the banking and the nascent FinTech sectors. The introduction of Basel III regulations tightened credit standards for regulated banks. Start-up FinTech lenders, however, were not subject to the same regulatory burden. In the post regulatory period, banks significantly reduced their lending to small businesses compared to their FinTech competitors. My comparative empirical results indicate that the Basel III and the associated U.S. Liquidity Coverage Ratio may have been a contributing reason for the decrease observed in lending from the banks. I conclude that, as the innovative peer-to-peer lenders were not affected by liquidity regulations, FinTechs obtained a regulatory advantage. Evidence that they capitalized on this opportunity is, however, inconclusive but positive for the long-term growth of this source of funding for small businesses.

4.1 Introduction

I investigate the effect of liquidity regulation on small business loans by the banking sector and the nascent "FinTech" lending industry. I define such FinTech lenders as alternative peer to peer start-ups that utilise an Internet based lending platform. One of the key motivations for my study is to understand the emerging role

of such FinTech's on small business lending. The other is to understand the impact of regulatory liquidity constraints on small business lending.

Small businesses are central to economic performance and are key contributors to employment and growth. However, small businesses face considerable constraints when accessing finance (Rao et al., 2021). When this is not available, it presents a problem as most need working capital and funding to run their operations. The access to such funding became even more limited after the introduction of recent financial regulations. As a result of the introduction of these, the growth of small and medium-sized firms was adversely affected (Moscalu et al., 2020).

The global financial crisis of 2007-2008 highlighted the importance of prudent regulation and supervision of banks. Particularly, the dangers of banks not having enough liquid assets and/or having an over-reliance on high-risk funding sources. There was a need for regulators address short-term liabilities and to mitigate liquidity risk (Bech and Keister, 2017). Therefore, the liquidity of banks caught the attention of banking supervisors, financial regulators, policy makers and also academics (Cornett et al., 2011; Acharya and Mora, 2015; Calomiris et al., 2015; Diamond and Kashyap, 2016; DeYoung and Jang, 2016; DeYoung et al., 2018).

At the same time, innovative FinTech lenders began to enter the market thanks to developments in regulation and technology (Giudici et al., 2021). By virtue of providing a peer-to-peer platform that was not regulated in the same way as traditional banks, these small new entrants gained an advantage. They provide a new source of funding for small businesses. I investigate the differential impact of both of

these phenomena, using a natural experiment based on the introduction of Basel III through the LCR framework in the U.S.

Using the DiD method, I find that there was a negative impact as a result of the liquidity regulations imposed on bank lending to small businesses. In the same period, there was no effect on FinTech lenders. This suggests that the later have an advantage. Thus, should prove useful to small businesses as such lenders grow in importance.

4.2 Background

By way of background, the Basel Committee on Bank Supervision (BCBS) published a new framework, known as Basel III. This pertained to regulated banks and not FinTech lenders. It mandated banking action to prevent the financial risks that may arise in the banking system (Rubio and Carrasco-Gallego, 2016). In addition, it strengthened the existing bank capital rules and presented a framework for regulation of the liquidity (Bonner and Eijffinger, 2016). The liquidity coverage ratio (LCR) is a major piece of regulation from a banking perspective. It requires regulated banks to have maintain adequate liquid asset levels, enabling a bank to survive a period of financial stress for at least 30 days (DeYoung and Jang, 2016). The LCR framework of the U.S. was finalized in October 2014. It became effective from January 2015 (Fuhrer et al., 2017). The LCR was applied to internationally active U.S. banks

with total assets of $ 250 billion or more[16] (Basel Committee on Banking Supervision, 2014). I test the impact on small business lending, using this event as a natural experiment, a method used by Roberts et al. (2021).

Advocates of this regulation contend that banks could fulfil their lending function even during sudden balance-sheet shocks and stressful periods, thanks to their total higher liquid assets ratio (Schmaltz et al. 2014; Hoerova et al., 2018). On the other hand, opponents claim that the regulations effectively reversed the inequality between assets and liabilities. They suggest this may have led to banks to reduce lending to firms (Cecchetti and Kashyap, 2018). My research shows this was particularly the case with smaller businesses. That said, I do not find evidence that FinTechs necessarily exploited this gap.

Alternative forms of entrepreneurial financing were emerging during the period under investigation. This was a result of technological advances (Giudici et al., 2021). There is a growing literature on these new smaller and nimbler FinTech lenders (e.g., Buchak et al., 2018; Tang, 2019; Fuster et al., 2019;). Supportive of my findings, Tang (2019) examines whether the new smaller FinTech lending platforms act as substitutes for traditional financial intermediaries. Additionally, whether FinTech lending is a substitute for bank lending.

[16] In addition, a modified version of the LCR has been applied to U.S. bank holding companies with USD 50 billion or more in consolidated assets (Basel Committee on Banking Supervision, 2014).

I therefore examine the impact of the regulatory changes on the small business lending activities of both the incumbent banks and alternative FinTech lenders. The fact that FinTechs and smaller banks were not subject to LCR regulations allows us to determine the effect of the regulation on small business lending by providing the presence of a control group.

4.2.1 Liquidity Coverage Ratio

Prior to the credit crisis, quantitative minimum requirements were applied by a few countries. The vast majority, including the United States, depended on subjective regulatory judgement to determine whether a bank's liquidity levels were so low that action should be taken (Elliott, 2014). FinTechs do not take deposits, so are not subject to these guidelines.

The disappearance of liquidity during the financial crisis gave the impetus for bank regulators to establish considerably more stringent bank liquidity requirements (Berger and Roman, 2020). Following that, in order to strengthen the liquidity risk framework, the Basel Committee established global liquidity standards as part of the Basel III accords. The rules are based on two ratios. The first is a "Liquidity Coverage Ratio (LCR), which was presented by the Basel Committee in December 2010 and finalised in January 2013 (Macchiavelli and Pettit, 2021). And the other one is a “Net Stable Funding Ratio (NSFR), which aims to verify that a bank's assets are appropriately backed by consistent sources of funding (Elliott, 2014).

The LCR is a “modelled stress test” designed to ensure that a bank has enough assets to withstand a month long market crisis. It was thought a window of this magnitude was substantial enough for governments and central banks to take the required emergency steps to calm a broad liquidity crisis (Basel Committee on Banking Supervision, 2013). The LCR is determined by dividing the bank's high-quality liquid assets by the expected cash demands over the next month. Basel III defines what constitutes a high-quality liquid asset (HQLA). According to liquidity rules of Basel III, banks will have to keep LCRs of 100 per cent or higher to cover their estimated withdrawals during a crisis term for up to 30-days (Berger and Roman, 2020).

The U.S. LCR framework was established by the Office of the Comptroller of the Currency (OCC), the Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve and became effective in 2015 (George and Mohan, 2015). Table 1 demonstrates the differences between Basel III LCR and U.S. LCR.

[Table 1]

Although U.S. LCR based on Basel III LCR standards, it is more conservative in its definition of HQLA. The privately issued mortgage-backed securities, for example, are classified as HQLA under Basel III but not under the U.S. LCR. Furthermore, securities issued by banks and securities issued by bondholders are not eligible under the U.S. regulation LCR. The LCR in the U.S. is also applied differently depending on the size of the bank (House et al., 2016).

The rules of U.S. LCR apply to banks with at least $10 billion foreign assets on-balance and/or those with total assets of at least $250 billion[17]. In 2015, these banks had to satisfy 80% of their LCR standards. Banks with assets of $50 billion to $250 billion are subject to a modified LCR (Cetina and Gleason, 2015). Smaller banks and FinTechs were outside of the remit of the LCR. I therefore take into account the U.S. LCR full rule on small business loans from a banking perspective and the absence of it from a FinTech perspective.

4.3 Literature on small business lending

The relationship between small business loans and bank size was investigated by Strathan and Weston (1998). Prior to the liquidity regulations, they found that level of small business lending rises monotonically with size. Since then, the nature of bank lending has changed. Agawal and Zhang (2020) review how new technology and innovative FinTech services and products have changed the competitive environment. These changes potentially improve the ability of smaller businesses to lend. The nature of how this has happened is explored by Broby (2021). He explains how peer to peer Internet lending does not require the same capital and liquidity as traditional banks.

[17] Quantitative liquidity requirements are less stringent for banks subject to this modified U.S. LCR rules. To reflect their reduced systemic importance and risk profile, their estimated net cash outflow is compounded by 70% (Cetina and Gleason, 2015). Furthermore, banks under to the complete rule must calculate their LCR on a daily basis, but those subject to the modified rule must do so just once a month. If a bank's LCR goes below 100%, it must inform its main regulator and may be forced to submit a compliance plan (House et al., 2016).

Although there is an extensive literature on capital regulations, there is a gap in liquidity regulation related studies (Diamond and Kashyap, 2016). It is noted by De Young and Jang (2016) that there is not much theoretical or empirical research on the impact of such liquidity standards, particularly in respect of bank liquidity risk or risk-taking behaviour. Although there are a number of notable studies which have analysed LCR regulation, to the best my knowledge, none have examined the impact of policy interventions on bank small business lending activity, particularly with respect to FinTech lenders.

The difference between banks that are marginally over or below their regulatory liquidity requirements is tested by Bonner (2012) and Bonner and Eijffinger (2016). They claim that banks who fall short on liquidity requirements pay higher interest rates for the interbank fund without collateral, despite the fact that this liquidity arrangement is not fully disclosed to the public. If this is the case, FinTechs enjoy another advantage over banks.

Ananou et al. (2021) test the effect of the liquidity regulation, which came into force only in the Netherlands in 2003, on bank loans with the same DiD method I use in my study. Comparing the Dutch banks with Eurozone banks, it was revealed that the liquidity regulations increased (rather than decreased) the loan volume of the banks in the Netherlands. This is contrary to what would be expected and indeed to my own results, suggesting perhaps that the new FinTechs might have had an additional impact on the lending results to small businesses. In another study, it has been revealed that there is a difference between the actual and the long-term liquidity ratio

that banks must meet (Duijm and Wierts, 2016). This finding is consistent with my own research, which indicated that banks cut their lending after tighter liquidity regulations.

Heterogeneity obscures the effects of liquidity adjustments for lending in the empirical literature. According to Banerjee and Mio (2018), individual liquidity guidance (ILG), which is similar in design to the LCR, did not affect lending but had negative impacts on short-term interbank borrowings and funding in the UK. Recent research, on the other hand, suggests that when liquidity grows, lending increases (Naceur, Marton, and Roulet (2018). These studies did not specifically look like small business lending.

Theoretical studies, on the other hand, consistently find that liquidity limits have a detrimental impact on lending. According to Perotti and Suarez (2011), liquidity rules constrain credit expansion when banks' incentives to take on risk differ. Kashyap et al. (2002) contend that the benefits of providing more liquidity while adjusting run risk of banks should be balanced by lower credit extension costs. They claim that a lending subsidy may be required to keep the LCR stable since banks would otherwise channel less deposits into loans.

My analysis of U.S. LCR and liquidity creation more closely relates to Roberts et al. (2021). They show a negative relation between U.S. LCR and bank lending. In line with the result of their paper, my research shows that banks small business loans decrease after the implementation of U.S. LCR during the research period. However, regarding county-level and the new smaller FinTech lender activity in the field of

small business loan, there is no significant results observed after the implementation of U.S. LCR.

I develop my hypothesis around the introduction of LCR in the United States. As stated, this compels banks to either enhance liquidity or reduce their volatile liabilities, short-term shares, or do both. If banks do not adjust their obligations, they have to reduce poor quality liquid assets, such as loans. Accordingly, I emphasize whether the banks affected by this regulation have affected their loans to small businesses.

Hypothesis 1: Ceteris paribus, regulated banks reduce their small business loan shares after the introduction of U.S. LCR, relative to exempt banks.

I argue that the new regulations applied on banks with U.S. LCR can affect the banks with a particularly large and high market share, and as a result, small business loans may decrease in the counties where these banks are located and there is low competition. This yields my first hypothesis:

Hypothesis 2: Ceteris paribus, after the LCR, aggregate small business lending declines in the county where the banks are affected by this legislation and there is low competition.

I also posit the view that while banks small business lending activity is slowing down, thanks to digital solutions such as digital tools for loan processing and credit underwriting, information asymmetry and searching cost is reduced. As a result, FinTech lenders can provide an alternative avenue for smaller businesses to access

funds easily. As a result, FinTechs can increase their lending market share those counties where the large and high market share banks are affected negatively by LCR. This yields the following hypothesis:

Hypothesis 3: Ceteris paribus, after the LCR, small business loans granted by FinTech lenders increase in those counties where the banks are affected by the liquidity legislation and there is low competition.

4.4 Data

My main source of data is the Federal Financial Institutions Examination Council's (FFIEC) Consolidated Reports of Condition and Income (Call Reports). These are filed by all U.S. banks. Regulators provide information on small business loans in the Call Report of June each year as required by this act. The Call Report data covers 2013 – 2017. Table 2 presents the summary statistics of bank-level data.

[Table 2]

The county level small business data is obtained from the FFIEC's Community Reinvestment Act (CRA) database. This piece of legislation was passed by Congress in 1977. In part, the regulations of CRA require that banks and other financial instructions report annual information on their lending to small businesses. Essentially, these institutions were required to report the number and size of loans that were originated with amounts less than $100,000, or alternatively in amounts more than $100,000 through $250,000 and amounts greater than $250,000 through to $1 million. In addition, they were required to report the number and amount of

loans that were originated to firms that had less than $1 million in revenues. I use annual CRA data covering the total amount and number of small business loans between 2013 and 2017.

In addition to county small business loan data, county level macro variables are collected from the U.S. Census Bureau, St. Louis and New York FED database, Bureau of Economic Analysis (BEA) and FDIC, which displayed with county level data in table 3.

[Table 3]

Lastly, the representative FinTech lender data is retrieved from comprehensive information on funded loans and loan volume sourced from Lending Club. As a U.S. based alternative lender, only Lending Club makes its data publicly. This data covers credit score of borrowers, payment information of funded loans, status of loan and all loan applications details from 2013 to 2017 is displayed in table 4.

[Table 4]

In order to make my analysis, the three different datasets are merged. To create a variable for the "treated bank" and "county and control bank" and "county", the unique 5-digit zip code is used. However, although bank and county small business data provided with a 5-digit zip code level, the representative FinTech lender data is identified at the 3-digit zip code level.

4.5 Method

In order to define the LCR effects, I investigate the small business loans originated by banks which were required to implement LCR, and the smaller banks that were not required to implement it. I do this from 2015, when the U.S. LCR regulations were finalised.

In order to differentiate the larger institutions from the smaller ones, I follow Degryse and Ongena (2007) and Chong et al (2013) in measuring the intensity of banking competition. I apply a concentration ratio on the big three banks (C3) and use the Herfindahl-Hirschman Index (HHI). This allows us to assess a banks' market share in terms of the number of bank branch number in the counties. Analysing data at the county level provides greater insights into how market dynamics work. It allows us to isolate the condition and to find a control, as well as treatment counties.

After the bank level analysis, I then analyze the small business loan changes in the control and treatment groups at the county level. I then observe the change in small business loans of FinTech alternative lenders between these two groups.

I categorize counties according to bank asset size. Treated counties are defined as counties if there is a bank with $250 billion assets or over which subject to LCR, and there is a low competition where banks at the 75th percentile of C3 and HHI. If there is a bank asset is below $250 billion, and there is a high competition where banks at the 25th percentile of C3 and HHI, it is defined as a control county to identify the impact of the LCR impact on (2) aggregate county-level small business lending and

(3) the new smaller FinTech lender activity in treated and control counties (may need to paraphrase).

4.6 Results

According to the bank-level analysis result, the regulation had a negative effect on the small business lending of the affected banks. That said, there was no significant effect observed on small business loans at the county-level. In addition, that there is no significant effect in the affected county or the control county of the representative FinTech lender's in respect of small business loans. This suggests that the FinTechs did not fully capitalize on the regulatory advantage.

In order to further isolate the regulatory impact, I apply a negative shock at county level to the supply of bank loans on those banks that had to tighten their lending criteria. In this respect, I isolate a possible exogenous shock to bank small business credit supply that would have been a result of the implementation of the LCR in 2015. This is described as the beginning point of the post-shock term. Using small business loan data at bank and county level in regard to the LCR, I use the method of Roberts et al. (2021).

I then use a difference-in-differences (DiD) model to compare the volume of small business lending during the one year before, the two years after 2015 (implementation date of LCR). This has the treatment group of "banks" and the control group is the representative FinTech lender Lending Club. In order to provide causal evidence, LCR is then used as an exogenous shock.

Firstly, by using equation one, I test and analyse the qualification of existing research related to the LCR impact on bank level small business lending activity.

$$(1)\ log(SBLoan)_{i,t,c} = \beta(Treated_i * LCR_t) + \lambda LCR_t + \rho Treated_i + C_{i,t} + \theta_{c,t} + \Pi_i + \epsilon_{i,t,c}$$

where $log(SBLoan)_{i,t,c}$ is originated small business loans (origination volume \$1 million or less) by bank i in year t. $Treated_i$ is a dummy variable that identifies the treatment group, one if the banks with assets over \$250 billion threshold which are subject to the LCR and zero for the banks with assets right below \$250 billion threshold and exempted from LCR. LCR_t is the treatment dummy that takes the value one from LCR enactment date (2015), and zero prior for this date. $C_{i,t}$ is a vector of bank-level control variables are defined in table 2. $\theta_{c,t}$ is a variable for the county-year fixed effects and Π_i is a variable for bank fixed effects and both are used to help remove unobserved heterogeneity such as variation in local loan demand due to (county-specific) business conditions and for unobservable bank characteristics. $\epsilon_{i,t,c}$ is an error term.

The four columns of table 5 report the LCR impact on bank small business loan volume. According to results, the coefficient of interaction term, $Treated_i \ x \ LCR_t$, is negative and highly in all estimations with bank, county and year fixed effects. The results show that small business lending volume in treated banks decrease.

[Table 5]

In order to check traditional banks responses to LCR in counties for small business loan application, I use the following equation:

$$(2)\ log(SBLoan)_{t,c} = \beta(Treated_c * LCR_t) + \lambda LCR_t + \rho Treated_c + C_{t,c} + \delta_c + \gamma_t + \epsilon_{t,c}$$

where $SBLoan_{t,c}$ is originated small business loans (loans origination volume $1 million or less) in county c in year t. $Treated_c$ is a dummy variable that identifies the treated counties and takes the value of 1, if there is a bank with $250 billion assets or over affected by the LCR and there is low competition according to the concentration of the C3 and HHI, which are in the top 75th. If the county has a bank asset below $250 billion, and there is high competition in the bottom 25th, it is defined as a control county and takes 0. Counties other than the 75th and 25th percentile are not included in the model. LCR_t is the treatment dummy that takes the value one from LCR enactment date (2015), and zero prior for this date. $C_{t,c}$ is a vector of county-level control variables. δ_c variable for the county fixed effect, and γ_t is a variable for time fixed effect. $\epsilon_{t,c}$ is an error term. The county level variables are defined in Table 3.

Table 6 reports the LCR effect on county small business lending activity. The first column shows the result for the aggregated small business loan activities county and the columns 6 and 9 show the small business loan for businesses with gross revenues less than $1 million and for businesses with gross revenues at least $1 million, respectively.

[Table 6]

According to my results, the coefficient of the interaction term, $Treated_c$ x LCR_t, is negative and deliver a high value in all predictions with county and time fixed effects.

The results show that there is no significant impact on businesses at the "county-level bank" on small business lending activity.

In order to check if the FinTech lender could increase lending in counties where small business lending decreased due to credit supply shock's effect on small business loan applications, I use the following equation:

$$(3)\ log(SBLoan_{t,c}^{P2P}) = a(Treated_c * LCR_t) + \lambda LCR_t + \rho treated_c + C_{t,c} + \delta_c + \gamma_t + \epsilon_{t,c}$$

where $SBLoan_{t,c}^{P2P}$ is small business loan origination volume of alternative lenders loan in county c in year t. $Treated_c$ is a dummy variable that identifies the treated counties and takes the value of 1 if there is a bank with $250 billion assets or over and affected by LCR and there is low competition according to the C3 and HHI, which are in the top 75th. If the county has a bank asset below $250 billion exempts from the LCR and there is high competition in the bottom 25th, it is defined as a control county and takes the value of 0. Counties other than the 75th and 25th percentile are not included in the model. LCR_t is the treatment dummy that other takes the value one from LCR enactment date (2015), and zero prior for this date. $C_{t,c}$ is a vector of county-level control variables. δ_c variable for the county fixed effect, and γ_t is a variable for time fixed effect. $\epsilon_{c,t}$ is an error term. All variables are defined in Table 4 with loan-level variables.

The main dependant variable measures lending volume of the new smaller FinTech lender. I used the dollar amount of the representative FinTech lender origination volumes from the loan book that is specified at the county level. Due to having limited

county-level data, instead of using normalized[18] variables similar as in Tang (2019) paper, the logarithm value of the small business loan origination is used in the analysis.

The results of equation (3) presented in Table 7. The results show that there was not any significant impact of LCR regarding between control and treated counties, in the representative FinTech lender loan volume after the enactment of LCR.

[Table 7]

In accordance with table 4, I could not find that treated counties experienced an increase or decrease in the FinTech lender small business loan applications compared to control counties.

The results on the volume of the new smaller FinTech lender loan reveal that, when although incumbents are affected by LCR cut lending in the small business credit market, there is not any clear observation for increasing demand to the new smaller FinTech lenders small business credit.

4.6.1 Parallel Trends Assumption and Robustness Test

To check the parallel-trends assumption, I present figure 1, which shows lending by banks overtime for the treated and control group.

[Figure1]

[18] Tang (2019) notes that there is no quantitative difference between the results of using the normalized or logarithmic dependant variable.

The figure 1 shows that in treated banks, new small business loan volume is similar to that in control banks before the LCR. This indicates that the parallel-trends assumption is valid. After the LCR, the new small business loan volume decreased for treated banks but remain stable for control banks. Regarding county level analysis, there is no similar trend between the treated and control counties so parallel-trends assumption is not valid which is presented in figure 2.

[Figure 2]

Similarly, I check the parallel-trends assumption with an the new smaller FinTech lender. Figure 3 shows that the FinTech lender's credit provision in treated and control counties. It shows that the volumes of new the new smaller FinTech lender small business loans in control and treated counties displayed there is no parallel trends prior to the LCR.

[Figure 3]

As a robustness check[19], I did DiD analyses for fictive shock one year before and after the real shock date which are 2014 and 2016. Also limited the research period the 2014-2016 and period. By using fictive shock dates and reducing the research period, I analyse whether the treatment is predicted, and the parallel trend assumption violated. The results are insignificant for fictive shock dates but still significant for limited period.

[19] As there were no banks included in TARP and SBLF programs in the sample of banks, additional tests could not be performed as in the Chapter 3.

However, at both the county bank lending and the new smaller FinTech small business lending, there is no significant result observed. Detailed results are reported in Tables 8, 9 and 10.

[Table 8]

[Table 9]

[Table 10]

4.7 Conclusion

I investigate the small business lending by banks and FinTech's. I do this through the lens of the impact of banking liquidity regulation on small business lending. I use the implementation of LCR to measure how it constrains loans to small businesses from banks and not by contrast from FinTechs.

I show the liquidity dynamics in the context of FinTech alternative lenders using a representative sample. In the context of county level data, I test the impact of the regulation as a negative shock on small business lending. With this data, I examine three main hypotheses that are the prediction of the empirical model.

I did this by investigating the impact on bank-level small business loan origination using a DiD appraoch. I classified treated banks as having $ 250 billion or more in assets. These were the banks affected by LCR. I then investigated county-level small business loan origination and documented that treated counties where there is a bank with $250 billion assets or over and affected by LCR, and there is low competition

according to the C3 and HHI. There is no significant impact of LCR observed at the county-level small business lending activity.

I also examined whether alternative lenders increase their lending in counties where small business lending decrease due to the credit supply shock's effect on small business lending. The analysis shows that there is not any change in demand for the representative FinTech lender volume of loan origination, although there is not a decline either. However, in a similar research period study, Cumming et al. (2019) explore the impact of Fintech deregulation covering some cities in the United States on the banking system and highlight the unexpected effect of the growing Fintech industry.

I conclude that unexpected regulatory reform like the LCR led regulators to make changes that impact financial institutions, especially banks. This caused them to reduce their lending to small businesses. Considering the importance of small businesses to the economy, policymakers should pay attention to the implications of changes to banks' liquidity requirements. My findings on FinTechs show that they are not impacted by such effects. I did not find evidence that FinTech lenders substitute this lending gap. I suggest this may change as the sector grows in importance.

Table 1. Comparison of Basel and U.S. LCR Regulation

Regulation	Basel LCR Framework (2013)	The U.S. LCR Framework (2014)
Regulation's Scope	The LCR was created with all international banking institutions in consideration.	There are two types of LCR: Full version for advanced methods financial organisations and some of their U.S. bank subsidiaries, Modified version for major regional bank holding companies and loan and savings holding organisations.
Cash Inflow and Outflow Rates that are Prescribed	All banking institutions must apply these prescriptive, quantitative cash inflow and outflow rates to compute their overall net cash outflow amount throughout a 30-day liquidity stress period. The entire cumulative amount at the end of the 30-day liquidity stress period is used to calculate the overall net cash outflow. Certain residential mortgage-backed securities (RMBS) are included in Level 2B assets and are subject to a 25% haircut. In Level 2B assets, some A+ to BBB- corporate debt instruments are susceptible to a 50% haircut.	Total net cash outflow amount is based on outflows and inflows over a 30-day liquidity stress period for the full version of the LCR, with a maturity mismatch add-on component based on the difference between net cumulative peak day and net cumulative outflow amount on the last day of the 30-day period for the full version of the LCR. Municipal securities are securities issued or guaranteed by PSEs (e.g., states, local governments, or other governmental subdivisions below the sovereign level). The criteria and characteristics used in the cash inflow and outflow categories differ from those used in the Basel Committee's LCR framework — for example, specific treatment for brokered deposits and no special treatment for trade financing commitments. In a number of ways, the prescribed cash input and outflow rates are comparable to the Basel Committee's LCR structure.
External Credit Ratings	External credit ratings are used to designate high-quality liquid assets.	References to external credit ratings are prohibited under federal rules under Dodd-Frank. External credit ratings are not included in the definition of high-quality liquid assets.
LCR decreasing under 100 per cent.	During instances of idiosyncratic or systemic stress, a banking institution may fall into its portfolio of high-quality liquid assets, lowering its LCR under 100 per cent. If a bank's LCR falls below 100 percent, or is projected to go below 100 percent, the regulator should be notified promptly.	When the banking organization's LCR <100 percent on any business day, it must inform the relevant federal banking regulator. If the banking organization's LCR is <100 percent for three consecutive business days, it must submit a liquidity compliance strategy.

Table 1 shows the requirements of the Basel III LCR Framework and the U.S. LCR Framework and their differences relative to each other.
Source: Basel Committee on Banking Supervision-Assessment of Basel III LCR regulations – United States of America

Table 2. Descriptive Statistics of Bank Characteristics

Variable	Obs	Mean	Std Dev	25th	Median	75th
SBLvol($k)	20287	9.032	1.582	8.166	9.068	9.912
SBLnmbr	20297	4.962	1.541	4.159	4.956	5.733
TLoansvol	21201	11.802	1.529	10.837	11.655	12.573
Size($bil)	21380	12.312	1.432	11.405	12.130	12.986
TRBCapital(%)	21345	12.103	7.375	9.406	10.782	12.763
Core Capital(%)	21345	11.763	7.403	9.125	10.362	12.288
CoreTier1(%)	21345	25.814	396.889	12.817	15.629	20.458
Deposits(%)	21380	83.018	9.847	80.689	85.165	88.254
Liquidity(%)	21380	1.073	25.609	0.612	0.770	0.903
ROE(%)	21345	8.333	13.928	4.702	7.802	11.349
ROA(%)	21345	1.053	4.198	0.535	0.864	1.234
NPL(%)	21201	1.443	2.071	0.280	0.823	1.797
SBLtoTLoan(%)	21201	8.467	7.15	3.923	7.171	11.313
SBLtoTA(%)	21380	5.113	4.534	2.233	4.238	7.008
C&I Loans($mil)	21201	12.744	10.387	5.834	10.626	17.006

This table presents the summary statistics of bank-level statistics. The main dependant variable *SBLvol* is the log amount of small business loan volume. *SBLnmbr* is the logarithm of small business loan number. *Size* is the logarithm of banks total asset. *TRBCapital* is a total risk-based capital ratio. *Core capital* is a leverage (core capital) ratio. *CoreTier1* is a Tier 1 risk-based capital ratio. *Deposits* is the total deposits to total assets. *Liquidity* is the total bank loans to deposits. *ROE* is the return on equity ratio. *ROA* is the return on assets ratio. *NPL* is the non-performing loans to total loans. *SBLtoTLoan* is the small business loan to total loans. *SBLtoTA* is the small business loan total assets. *C&I Loans* is the logarithm of commercial and industrial loans. The sample period is from the second quarter of 2013 until the second quarter of 2017. Variables are winsorized at the 1st and 99th percentile.

Table 3. Descriptive Statistics of County Characteristics

Variable	Obs	Mean	Std.Dev.	25th	Median	75th
SBLoan(%)	10791	9.28	1.892	8.018	9.182	10.533
SBLoan1(%)	10780	5.101	1.665	3.951	4.942	6.087
SBLoan2(%)	10791	9.262	1.898	8.003	9.170	9.700
Population	10791	10.275	1.467	9.306	10.154	11.113
DebtoIncome(%)	10791	1.57	.711	1.100	1.475	1.990
Income	10791	10.579	.231	10.418	10.555	10.714
Unemployment(%)	10791	5.744	2.188	4.150	5.408	6.983
BRNUM	10791	2.507	1.204	1.609	2.398	3.135
C3(%)	10791	77.632	17.838	63.250	78.180	95.950
HHI(%)	10791	7.895	.562	7.478	7.864	8.260
Domdep($k)	10791	13.158	1.485	12.193	12.976	13.886

This table shows the descriptive statistics of county-level variables. There are three main dependant variables. *SBLoan* is the log amount of small business loans in each county. *SBLoan1* is the log amount of small business loans for businesses with gross revenues less than $1 million in each county. *SBLoan2* is the log amount of small business loans for businesses with gross revenues more than $1 million in each county. The sample also covers county level variables. *Population* is the county level population. *DebtoIncome* is the median household debt-to-income ratio by county. *Income* is the dollar amount of income per person by county. *Unemployment* is the ratio of jobless people by county. *BRNUM is* the number of branches per capita in the county. *C3* is the share of deposits of the three largest banks in the county. *HHI* is the Herfindahl-Hirschman index and HHI ratio accounts for the market share of banks in the county. *Domdep* is the sum of the dollar amount of banks' branch domestic deposits by county. Except for *DebtoIncome*, *Unemployment* and *C3*, all variables are logarithmic and is taken logarithm before they are applied. The sample period is from the second quarter of 2013 until the second quarter of 2017. Variables are winsorized at the 1st and 99th percentile.

Table 4. Descriptive statistics for the new smaller FinTech Lender at county-level

Variable	Obs	Mean	Std.Dev.	25th	Median	75th
Panel A. The new smaller FinTech lender loan characteristics						
P2PSBL	2967	9.410	.736	8.936	9.518	9.962
Term(months)	2967	3.702	.216	3.584	3.962	4.188
Int_rate (%)	2967	.161	.051	0.127	0.158	0.192
Loan_status	2967	1.655	.538	1	1	2
Annual_inc($)	2965	11.236	.594	10.820	11.225	11.608
Dti(%)	2965	16.053	8.700	9.240	15.190	22.205
Fico	2967	6.552	.049	6.518	6.540	6.575
Panel B. County control variables						
Population	2967	10.272	1.454	9.299	10.133	11.092
Income	2967	10.577	.227	10.419	10.555	10.710
Unemployment (%)	2967	5.729	2.184	4.133	5.417	6.967
C3(%)	2967	74.659	17.376	60.630	74.370	88.310
HHI (%)	2967	7.812	.542	7.414	7.772	8.116
BRNUM	2967	2.677	1.194	1.946	2.565	3.332
DebtoIncome(%)	2967	1.569	.713	1.100	1.475	1.990
Domdep($k)	2967	13.348	1.474	12.412	13.170	14.092

This table presents the summary statistics of alternative small business lender LendingClub. According to the LendingClub dictionary, the main dependant variable *P2PSBL is* the logarithm of amount of small business loan volume. *Term* is the payment numbers on loan. *Int_rate* is the interest rate on loan. *Loan_status* is a dummy variable and set to 1 if charged off, set to 2 for a fully paid loan. *Annual_inc* is the annual income provided by the borrower. *Dti* is the "ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested LendingClub loan, divided by the borrower's self-reported monthly income". *Fico* is the credit score of borrowers. *Term, Fico* and *Annual_inc* are logarithmic. The sample period is from the second quarter of 2013 until the second quarter of 2017. The county control variables are described in table 3. Variables are winsorized at the 1st and 99th percentile.

Table 5. Impact of LCR on bank small business credit supply

	Bank Small Business Lending			
	(1)	(2)	(3)	(4)
	SBLoan	SBLoan	SBLoan	SBLoan
Treated*LCR	-0.050**	-0.045***	-0.043***	-0.039***
	(-1.970)	(-3.905)	(-3.684)	(-3.044)
Size	0.762***	0.702***	0.676***	0.704***
	(58.392)	(20.107)	(18.807)	(16.011)
Liquidity	0.040	0.920***	0.970***	1.006***
	(0.290)	(11.299)	(12.000)	(11.884)
TRBCapital	0.064***	0.010	0.009	0.010
	(4.230)	(1.415)	(1.204)	(1.345)
CoreCapital	0.015	-0.008	-0.007	-0.007
	(0.834)	(-1.127)	(-0.940)	(-0.873)
CoreTier1	-0.065***	-0.004*	-0.003	-0.003
	(-10.207)	(-1.798)	(-1.391)	(-1.329)
Deposits	0.024***	0.011***	0.011***	0.012***
	(6.879)	(5.327)	(5.558)	(5.641)
NPL	-0.014*	0.000	-0.001	-0.002
	(-1.905)	(0.057)	(-0.388)	(-0.708)
ROE	0.020**	0.001	0.002	0.002
	(2.446)	(0.504)	(0.827)	(0.789)
ROA	-0.004	-0.001	-0.012	-0.012
	(-0.045)	(-0.025)	(-0.419)	(-0.428)
Bank FE		Yes	Yes	Yes
County FE			Yes	Yes
Year FE				Yes
Obs.	20264	20253	20253	20253
Adj. R^2	0.648	0.972	0.973	0.973

Table 5 shows the difference-in-differences estimation results in equation (1). The dependant variable *SBLoan* is the bank level total loan volume. The variable *Treated* takes on the value 1 for the banks with assets over $250 billion and zero for the banks with assets right below $250 billion. *LCR* is the treatment dummy that takes the one from July 2015 onwards and zero prior to that date. The sample period is from the second quarter of 2013 until the second quarter of 2017. Standard errors are clustered at the bank level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 6. Impact of LCR on aggregate county-level small business lending

	Total Small Business Loan Volume			Small business loan for businesses with gross revenues less than $1 million			Small business loan for businesses with gross revenues more than $1 million		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SBLoan	SBLoan	SBLoan	SBLoan1	SBLoan1	SBLoan1	SBLoan2	SBLoan2	SBLoan2
Treated*LCR	-0.022	-0.009	0.009	-0.034	-0.024	-0.016	-0.022	-0.008	0.010
	(-0.380)	(-0.156)	(0.124)	(-0.648)	(-0.476)	(-0.267)	(-0.374)	(-0.146)	(0.135)
Population	-0.003	-0.005	-0.005	-0.005	-0.004	-0.004	-0.003	-0.005	-0.005
	(-0.259)	(-0.403)	(-0.413)	(-0.455)	(-0.359)	(-0.366)	(-0.256)	(-0.406)	(-0.416)
DebtoIncome	0.001	0.004	0.004	0.006	0.005	0.005	0.001	0.004	0.004
	(0.045)	(0.155)	(0.165)	(0.280)	(0.206)	(0.206)	(0.041)	(0.151)	(0.162)
Income	0.148	0.163*	0.161*	0.129	0.149*	0.147*	0.148	0.163*	0.162*
	(1.559)	(1.694)	(1.679)	(1.562)	(1.807)	(1.775)	(1.556)	(1.690)	(1.675)
Unemployment	0.015	0.010	0.010	0.012	0.009	0.009	0.015	0.010	0.010
	(1.530)	(1.055)	(1.050)	(1.345)	(1.023)	(1.011)	(1.535)	(1.058)	(1.053)
BRNUM	-0.040	-0.042	-0.042	-0.045	-0.058	-0.058	-0.040	-0.042	-0.042
	(-0.508)	(-0.528)	(-0.529)	(-0.643)	(-0.834)	(-0.835)	(-0.508)	(-0.526)	(-0.528)
C3	0.008**	0.002	0.001	0.006**	0.001	0.001	0.008**	0.002	0.001
	(2.488)	(0.481)	(0.431)	(1.972)	(0.322)	(0.281)	(2.493)	(0.479)	(0.430)
HHI	-0.220**	-0.047	-0.046	-0.172*	-0.027	-0.025	-0.220**	-0.047	-0.047
	(-2.126)	(-0.460)	(-0.456)	(-1.869)	(-0.309)	(-0.292)	(-2.127)	(-0.460)	(-0.457)
Domdep	0.056	0.033	0.033	0.050	0.043	0.043	0.057	0.033	0.033
	(0.977)	(0.569)	(0.577)	(0.957)	(0.857)	(0.863)	(0.980)	(0.569)	(0.577)
County FE		Yes	Yes		Yes	Yes		Yes	Yes
Year FE			Yes			Yes			Yes
Obs.	10510	10510	10510	10499	10499	10499	10510	10510	10510
Adj. R^2	0.001	0.385	0.385	0.001	0.409	0.409	0.001	0.385	0.385

Table 6 shows the difference-in-differences estimation results in equation (1). The variable *Treated takes* on the value 1 for the counties where there is a bank with $250 billion assets or over affected by the LCR and there is low competition according to the concentration of the three largest banks (C3) and Herfindahl-Hirschman Index (HHI), which are in the top 75th. If the county has a bank asset below $250 billion, and there is high competition in the bottom 25th, it is defined as a control county and takes 0. Counties other than the 75th and 25th percentile are not included in the model. *LCR* is the treatment dummy that takes the one from July 2015 onwards and zero prior to that date. There are three dependant variables. *SBLoan* is the county level total small business loan volume. *SBLoan1* is a total small business loan for businesses with gross revenues less than $1 million and *SBLoan2* is a total small business loan for businesses with gross revenues of more than $1 million. The sample period is from the second quarter of 2013 until the second quarter of 2017. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 7. Impact of LCR on aggregate the new small business FinTech lending

	(1) P2PSBL	(2) P2PSBL	(3) P2PSBL
Treated*LCR	0.601	0.003	0.006
	(1.352)	(0.027)	(0.055)
Population	0.068	-0.002	-0.003
	(0.863)	(-0.109)	(-0.217)
Income	(-0.225)	(-1.199)	(-1.181)
	-0.759	-0.118	-0.119
Unemployment	-0.057	0.012	0.011
	(-0.723)	(0.824)	(0.800)
C3	-0.019	0.007	0.007
	(-0.926)	(1.118)	(1.127)
HHI	0.519	-0.328*	-0.334*
	(0.721)	(-1.667)	(-1.714)
BRNUM	-0.759	-0.128	-0.127
	(-1.463)	(-0.888)	(-0.884)
DebtoIncome	(0.863)	(-0.109)	(-0.217)
	-0.036	-0.041	-0.041
Domdep	0.204	0.101	0.100
	(0.574)	(0.976)	(0.961)
County FE		Yes	Yes
Year FE			Yes
Obs.	1730	1730	1730
Adj. R^2	0.014	0.514	0.515

Table 7 shows the difference-in-differences estimation results in equation (3). The dependant variable *P2PSBL* is the small business loan origination volume of alternative lenders in counties. The variable *Treated* takes on the value 1 for the treated counties where there is a bank with $250 billion assets or over and affected by LCR and there is low competition according to the concentration of the three largest banks (C3) and Herfindahl-Hirschman Index (HHI), which are in the top 75th. If the county has a bank asset below $250 billion exempts from the LCR and there is high competition in the bottom 25th, it is defined as a control county and takes the value of 0. Counties other than the 75th and 25th percentile are not included in the model. *LCR* is the treatment dummy that takes the one from July 2015 onwards and zero prior to that date. The sample period is from the second quarter of 2013 until the second quarter of 2017. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 8. Robustness results for bank level data

	Bank Small Busines Lending		
	(1)	(2)	(3)
	SBLvol (2014)	SBLvol (2016)	SBLvol (2014-2016)
Treated*LCR	0.074	0.082	-0.023*
	(0.851)	(1.522)	(-1.856)
Size	-1.437***	-1.226***	0.681***
	(-4.868)	(-7.048)	(11.058)
Liquidity	-2.171***	-4.187***	-0.000
	(-4.126)	(-12.342)	(-0.049)
TRBCapital	-0.041	-0.007	0.012
	(-0.872)	(-0.247)	(1.262)
CoreCapital	0.029	0.010	0.002
	(0.606)	(0.368)	(0.190)
CoreTier1	-0.009	-0.014**	-0.010***
	(-0.609)	(-2.184)	(-3.685)
Deposits	-0.008	0.052***	0.001
	(-0.710)	(7.979)	(0.335)
NPL	-0.048**	-0.008	-0.003
	(-2.048)	(-0.613)	(-0.841)
ROE	0.008	0.004	0.001
	(0.411)	(0.339)	(0.426)
ROA	-0.008	0.053	0.008
	-2.171***	-4.187***	-0.000
Bank FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	21163	21163	12127
Adj. R^2	0.916	0.922	0.983

Table 8 shows that by there is no impact of LCR using fictive dates as a shock year 2014 and 2016. However, by limiting the research period to one year before and after treatment, there is no change in banks' small lending activity and the effect of the LCR is still significant. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 9. Robustness results for county level data

	Total Small Business Loan Volume 2014	Total Small Business Loan Volume 2016	Total Small Business Loan Volume 2014-2016
Treated*LCR	-0.378	-0.161	0.101
	(-1.547)	(-0.546)	(0.297)
Population	-0.036	-0.036	-0.041
	(-0.958)	(-0.949)	(-0.847)
DebtoIncome	0.089	0.086	-0.006
	(1.176)	(1.132)	(-0.059)
Income	-0.090	-0.088	-0.198
	(-0.348)	(-0.338)	(-0.535)
Unemployment	0.013	0.014	0.013
	(0.488)	(0.518)	(0.363)
BRNUM	-0.857**	-0.861**	-0.995**
	(-2.130)	(-2.144)	(-2.051)
C3	-0.010	-0.007	-0.011
	(-0.835)	(-0.553)	(-0.751)
HHI	-0.151	-0.124	-0.316
	(-0.360)	(-0.294)	(-0.581)
Domdep	0.204	0.204	0.291
	-0.036	-0.036	-0.041
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	10409	10409	6245
Adj. R^2	0.356	0.356	0.364

Table 9 shows that by using fictive shock dates 2014 and 2016 and limiting the research period to one year before and after treatment, there is no change on county-level small business lending and the effect of LCR is insignificant. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Table 10. Robustness results for the FinTech data

	(1) P2PSBL 2014	(2) P2PSBL 2016	(3) P2PSBL 2014-2016
Treated*LCR	-0.041	-0.042	-0.121
	(-0.470)	(-0.746)	(-1.544)
Population	0.001	0.001	-0.000
	(0.116)	(0.086)	(-0.002)
Income	-0.094	-0.095	-0.130
	(-1.119)	(-1.129)	(-1.242)
Unemployment	-0.002	-0.002	-0.002
	(-0.211)	(-0.210)	(-0.195)
C3	-0.000	-0.000	0.001
	(-0.137)	(-0.058)	(0.313)
HHI	-0.052	-0.048	-0.022
	(-0.545)	(-0.497)	(-0.176)
BRNUM	-0.087	-0.087	-0.113
	(-1.285)	(-1.280)	(-1.234)
DebtoIncome	(0.116)	(0.086)	(-0.002)
	0.017	0.017	0.014
Domdep	0.060	0.060	0.093
	(1.211)	(1.205)	(1.380)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	2804	2804	1605
Adj. R^2	0.229	0.230	0.300

Table 10 shows that by using fictive shock dates 2014 and 2016 and limiting the research period to one year before and after treatment, is no change on the new smaller FinTech lending for small businesses and the effect of LCR is insignificant. Standard errors are clustered at the county level. Statistical significance at the 10%, 5% and 1% levels is denoted by*,** and ***, respectively.t-statistics are presented in parentheses.

Figure 1 Bank level small business loan -Parallel-Trends

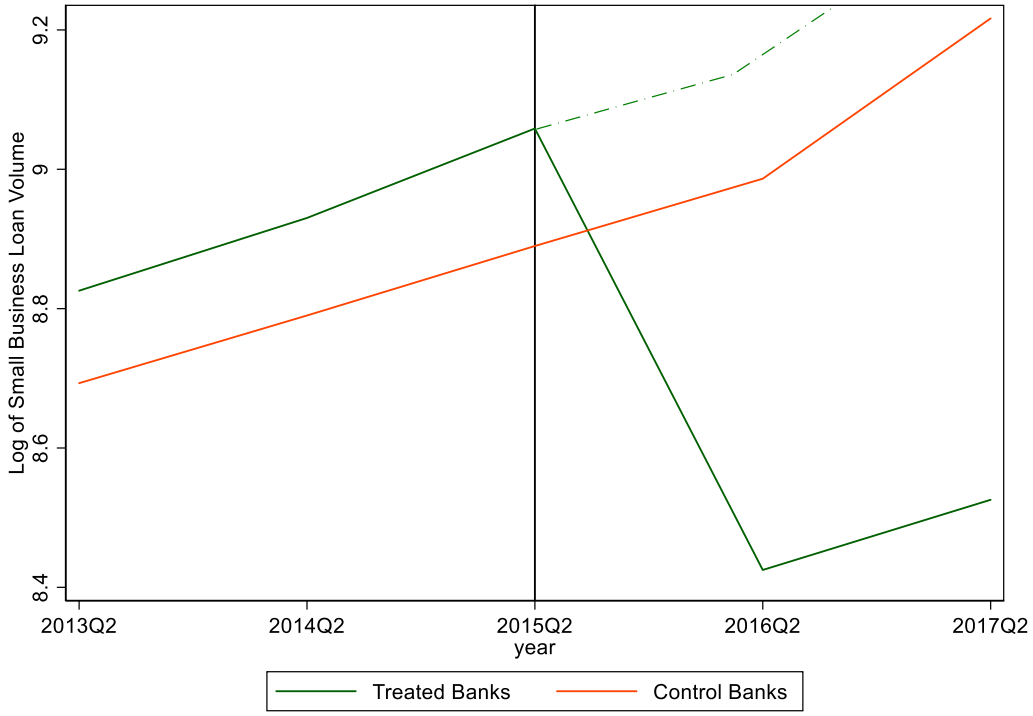


Figure 1 shows the trend of the annual mean values of small business loan volume of treated and control banks before and after the introduction of the U.S. LCR. Data Source: FFIEC.

Figure 2 County level small business loan - Parallel-Trends

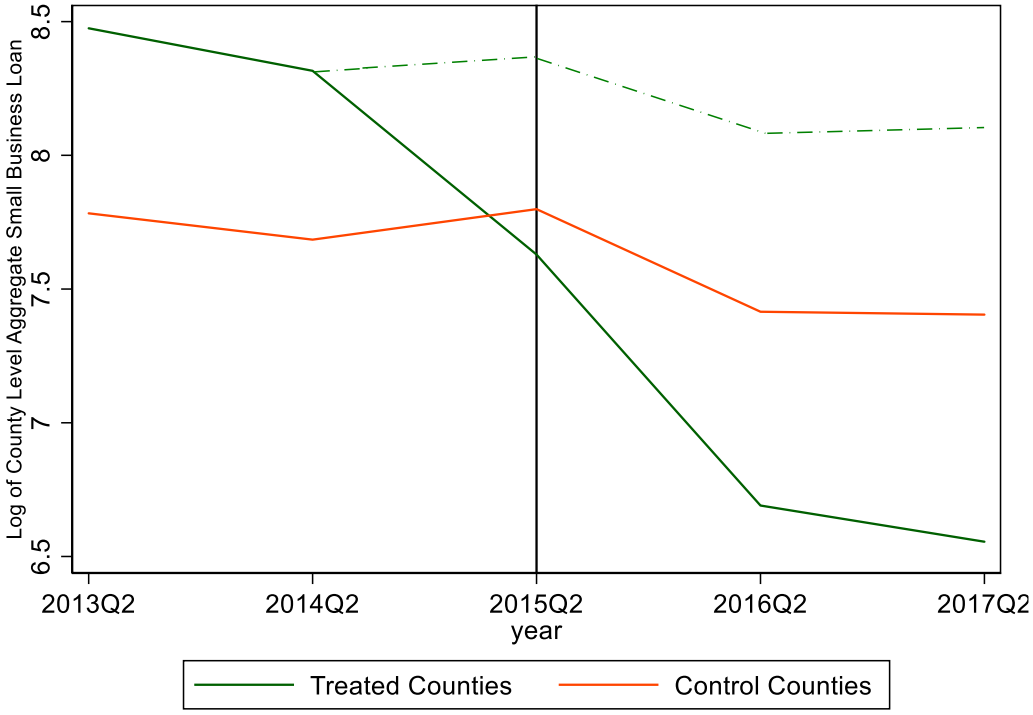


Figure 2 shows the trend of the annual mean values of small business loan volume of treated and control banks before and after the introduction of the U.S. LCR. Data Source: FFIEC.

Figure 3 FinTech lender small business loan -Parallel-Trends

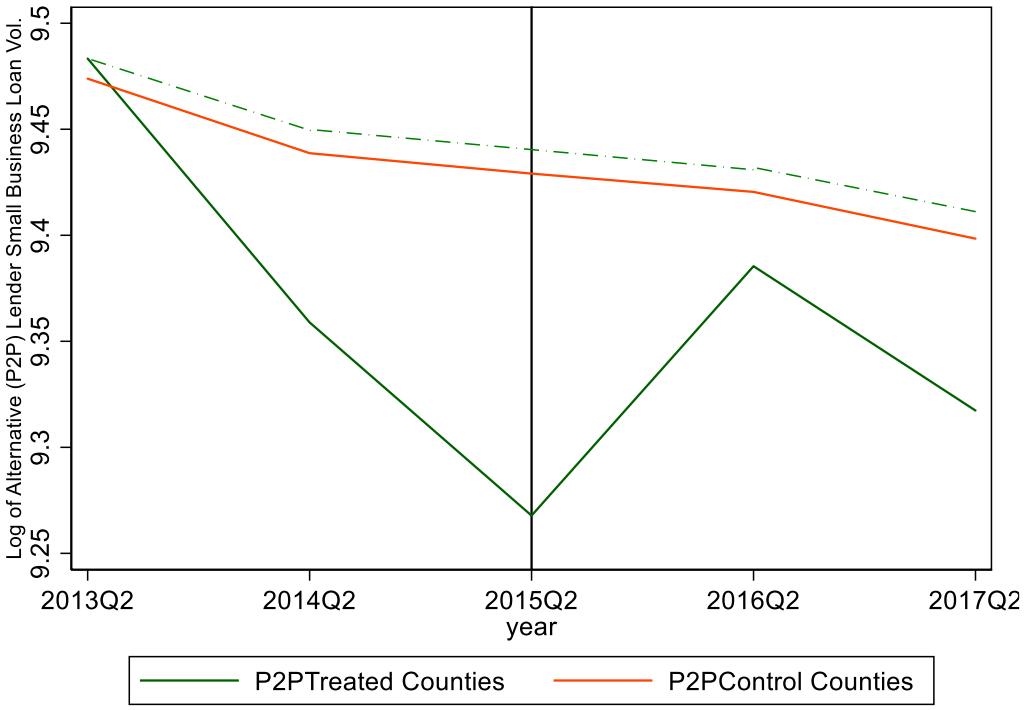


Figure 3 shows the trend of the annual mean values of small business loan volume of the new smaller FinTech lenders in treated and control counties before and after the introduction of the Dodd-Frank Act. Data Source: LendingClub

Chapter 5

Conclusion

This thesis addresses an important research question related to financial mediation and contributes to our understanding of FinTech lenders. Over the past few decades, the development of digital technology has profoundly altered the world. As more and more digital services are created, old business models are being displaced, and consumer behaviour is constantly changing. Numerous businesses have adopted the trend, but the financial sector has been most affected. Since the advent of FinTech, it has also been moving in the direction of digital services. FinTech has made a variety of financial services easier to use and less expensive by employing technological progress. Despite just recently developing, this technical field has laid the foundation for future financial goods.

The development of FinTech has given rise to a diverse industry that unquestionably changed the financial industry and effect somehow the intermediary role of incumbents. However, at the same time, it has substantially improved the flexibility and accessibility of financial services, especially for small businesses. This has clearly resulted in considerable problems for traditional banking, particularly for incumbents' lending function. These were investigated in respect of financial mediation and the changing dynamics that peer-to-peer FinTech lenders bring to the banking marketplace.

Two empirical studies on the function of FinTech lenders (Banks versus Peer-to-Peer) are included in this thesis; they draw on a comprehensive literature study

and provide information on the nature of financial intermediation and the contribution of FinTech to its disintermediation.

The present study was designed to determine how post-crisis regulations, as mediated through the relevant alternative lenders, affect traditional banking, especially in the financing of small businesses.

Two distinct research questions have been presented and are tested in the empirical chapters to address and assess concerns about FinTech lending in comparison to traditional lending.

In the first empirical chapter, I examine if innovative Peer-to-Peer lending by FinTechs has a regulatory edge over the banks in regard to small business loans. I employ a difference-in-difference technique and view this through the perspective of the rules imposed by the Dodd-Frank Act. The Act tightened conventional bank credit criteria for business loans, particularly for small businesses. The new FinTech lenders, though, weren't burdened by the same regulations. In comparison to their FinTech rivals, I found that traditional banks dramatically lowered their lending to small businesses. One of the more significant findings to emerge from this study is that while the Dodd-Frank Act restricted lending to small firms, novel new lending models benefited from a regulatory edge, and FinTech lender took advantage of this.

In the second empirical chapter, I critically examine how changes in banking regulations have affected the lending to small businesses conducted by the banking and emerging FinTech industries. Basel III laws strengthened credit criteria for banks subject to oversight. However, start-up FinTech lenders were exempt from

the same regulatory burden. Compared to their FinTech rivals, banks dramatically cut their lending to small firms during the post-regulatory period. My comparative empirical findings suggest that Basel III and the related U.S. Liquidity Coverage Ratio may have had a role in the observed decline in bank small business lending.

An important conclusion is that, although FinTech lenders are currently exempt from financial regulation, similar to the Dodd-Frank Act, they have advantages over incumbents in U.S. liquidity regulation. I find that no significant FinTech activity was observed in small business loans after U.S. LCR regulation, unlike the result of the Dodd-Frank Act.

This thesis provides a deeper insight into the extent to which FinTech has mediated established financial institutions, particularly in financing small business loans, and it has confirmed the findings of Tang (2019) and De Roure et al. (2022), which found that suggest P2P FinTechs' are becoming an alternative source of lending to traditional banks. The study contributes to our understanding that FinTech can gain an advantage over incumbents thanks to developing innovative technologies and exemption from financial regulations.

My contribution is to demonstrate how FinTech lenders have a competitive advantage over traditional banks because there is less regulation in the industry. The significant conclusion of my study's results is that more regulatory oversight of banks and greater capital requirements may cause regulated banks to scale back their lending to small businesses, giving P2P lenders a chance to increase their market share.

Although my findings align with previous academic studies, the approach I take has some limitations. The most critical limitation is related to the lack of data. I address this in the same way that prior authors have addressed it, namely focusing on that data that is in the public domain and concentrating on high market share rather than full market coverage. The data I use is therefore from a company operating in the U.S. and holding a large part of the market share, since FinTechs are not subject to regulations, and almost most of them are unlisted, the data used in our analyzes prevented me from making detailed analyzes due to the fact that the data it provides publicly is not very comprehensive and includes limited time periods.

Another limitation is that there are not enough articles written in the academic literature, as it is a newly developing finance research field, unlike traditional finance research topics. Notwithstanding the limited data set, this thesis offers valuable contributions to the FinTech literature thanks to the statistically significant results obtained as a result of empirical analysis. Small business loan volume was used as the main dependent variable, as bank small business loans and total loan data were not available at the county level due to data limitation.

As a limitation of this research, I did not have access to secondary data in the form of financial statements and FinTech datasets in order to carry out FinTech and bank comparative profitability and efficiency analysis. Suppose there is an opportunity to access these data in the future. In that case, the research can be expanded in this direction, more comprehensive results can be obtained, and new contributions can be made to the literature. Moreover, this thesis is limited to the

United States. Therefore, a replication of this study in other nations would aid in generalizing the results and allowing for the development of more firm conclusions.

Since the Dodd-Frank law came into force immediately after the global financial crisis as an inclusive and detailed law, the effect of this can be seen directly from the analysis results. However, due to the fact that the LCR regulation was announced about four years before it came into force, different results were obtained in the analyses made at the bank level and the county level, as can be seen from the analysis results. Due to the data constraint, no inference could be made to reveal the reason for this. Possibly, as Allen and Saunders (1992) noted in their study, there can be an element of window dressing because banks' LCR is endogenously determined and can be manipulated to comply with reporting dates.

As it is noted, small businesses that create the vast majority of new jobs and contribute to about half of the economic activity are very dependent on external financing during the establishment and business development stages, so banks, which may hesitate to lend to small businesses due to strict regulations or whose loan terms are complex, will be the first financing option for small businesses. Policy issuers should take careful decisions, and these businesses can be prevented from applying to non-regulated institutions for financing needs in a difficult situation. These findings suggest several courses of action for policymakers should think about whether the regulatory advantage is fair and/or desirable. It is obvious that FinTech lenders might be subject to the same regulations as traditional banks, but they would then lose their competitive edge.

Due to data constraints, in this thesis, only U.S. based analyses were made to observe the activities of FinTech and traditional lenders. If there is access to broader and more inclusive FinTech data in the future, it can be included in the analysis in other countries and regions in order to make inferences on a global scale or for comparison purposes. In addition, research can be conducted on whether Fintech affects banking disintermediation in other types of loans.

In summary, this thesis presents important insights into the nature of FinTech lending. It makes a contribution in respect of how that lending is influenced by changes in capital and liquidity controls.

References

Acharya, V.V., Berger, A.N. and Roman, R.A. (2018) Lending implications of US bank stress tests: Costs or benefits?. *Journal of Financial Intermediation*, 34, pp.58-90.

Acharya, V.V. and Mora, N. (2015) A crisis of banks as liquidity providers, The Journal of Finance, 70 (1), pp.1-43.

Agarwal, S. and Hauswald, R. (2010) Distance and private information in lending. The Review of Financial Studies, 23 (7), pp.2757-2788.

Akhigbe, A., Martin, A.D. and Whyte, A.M. (2016) Dodd–Frank and risk in the financial services industry. *Review of Quantitative Finance and Accounting*, 47 (2), pp.395-415.

Allen, K.D., Cyree, K.B., Whitledge, M.D. and Winters, D.B. (2018) An event study analysis of too-big-to-fail after the Dodd-Frank act: Who is too big to fail?. *Journal of Economics and Business*, 98, pp.19-31.

Allen, L., Shan, Y. and Shen, Y. (2019) Do fintech lenders fill the credit gap? Evidence from local mortgage demand shocks. *SSRN Electronic Journal*, *7*, pp.1-61. doi:10.2139/ssrn 3625325.

Allen, F. (1990) The market for information and the origin of financial intermediation. *Journal of financial intermediation*, 1(1), pp.3-30.

Allen, F. (2012) Trends in financial innovation and their welfare impact: an overview. *European Financial Management*, 18 (4), pp.493-514.

Allen, F. and Gale, D. (1999) Diversity of opinion and financing of new technologies. *Journal of financial intermediation*, 8 (1-2), pp.68-89.

Allen, F. and Walther, A. (2021) Financial architecture and financial stability. *Annual Review of Financial Economics*, 13, pp.129-151.

Allen, F., Gu, X. and Jagtiani, J. (2022) FinTech, cryptocurrencies, and CBDC: Financial structural transformation in China. *Journal of International Money and Finance*, 124, p.102625.

Allen, L. and Saunders, A. (1992) Bank window dressing: Theory and evidence. *Journal of Banking & Finance*, 16(3), pp.585-623.

Anagnostopoulos, I. (2018) FinTech and regtech: Impact on regulators and banks. *Journal of Economics and Business*, 100, pp.7-25.

Anagnostopoulos, Y. and Kabeega, J. (2019) Insider perspectives on European banking challenges in the post-crisis regulation environment. *Journal of Banking Regulation*, 20 (2), pp.136-158.

Ananou, F., Chronopoulos, D. K., Tarazi, A. and Wilson, J. O. (2021) Liquidity regulation and bank lending. *Journal of Corporate Finance*, 69, p.101997.

Andriosopoulos, K., Chan, K.K., Dontis-Charitos, P. and Staikouras, S.K. (2017) Wealth and risk implications of the Dodd-Frank Act on the US financial intermediaries. *Journal of Financial Stability*, 33, pp.366-379.

Ang, J.S. (1991) Small business uniqueness and the theory of financial management. *Journal of small business finance*, 1 (1), pp.1-13.

Bachmann, A., Becker, A., Buerckner, D., Hilker, M., Kock, F., Lehmann, M., Tiburtius, P. and Funk, B. (2011) Online peer-to-peer lending-a literature review. *Journal of Internet Banking and Commerce*, 16 (2), p.1.

Bakhtiari, S., Breunig, R., Magnani, L. and Zhang, J. (2020) Financial constraints and small and medium enterprises: A review. *Economic Record*, 96 (315), pp.506-523.

Balasubramnian, B. and Cyree, K.B. (2014) Has market discipline on banks improved after the Dodd–Frank Act?. *Journal of Banking & Finance*, *41*, pp.155-166.

Balla, E., Carpenter, R.E. and Robinson, B.L. (2017) The other capital infusion program: The case of the Small Business Lending Fund. *Review of Financial Economics*, 34, pp.99-108.

Balyuk, T. (2016) *Financial innovation and borrowers: Evidence from peer-to-peer lending*. Toronto, ON, Canada: University of Toronto-Rotman School of Management.

Balyuk, T. and Davydenko, S. (2019) Reintermediation in FinTech: Evidence from online lending. *Michael J. Brennan Irish Finance Working Paper Series Research Paper*, (18-17).

Banerjee, R.N. and Mio, H. (2018) The impact of liquidity regulation on banks. *Journal of Financial intermediation*, 35, pp.30-44.

Barczak, G., Ellen, P.S. and Pilling, B.K. (1997) Developing typologies of consumer motives for use of technologically based banking services. *Journal of business research*, 38 (2), pp.131-139.

Basel Committee on Banking Supervision (2013) Basel III: The liquidity coverage ratio and liquidity risk monitoring tools. *Bank for International Settlements*.

Basel Committee on Banking Supervision (2014) Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III regulations–United States of America. *Bank for International Settlements*.

Basha, S.A., Elgammal, M.M. and Abuzayed, B.M. (2021) Online peer-to-peer lending: A review of the literature. *Electronic Commerce Research and Applications*, 48, p.101069.

Bassett, W., Demiralp, S. and Lloyd, N. (2020) Government support of banks and bank lending. *Journal of Banking & Finance*, 112, p.105177.

Bavoso, V. (2020) The promise and perils of alternative market-based finance: the case of P2P lending in the UK. *Journal of Banking Regulation*, 21 (4), pp.395-409.

Beaumont, P., Tang, H. and Vansteenberghe, E. (2022) The role of fintech in small business lending. *Available at SSRN 4260842*.

Bech, M. and Keister, T. (2017) Liquidity regulation and the implementation of monetary policy. *Journal of Monetary Economics*, 92, pp.64-77.

Beck, T. (2013) Bank financing for SMEs–lessons from the literature. *National institute economic review*, 225, pp.R23-R38.

Beck, T. (2021) Digital technology and financial innovation: A literature survey. *Fostering FinTech for Financial Transformation.*

Beck, T. and Frame, W.S. (2018) Technological change, financial innovation, and economic development. *Handbook of finance and development*, pp.369-390.

Beck, T. (2020) *Fintech and financial inclusion: Opportunities and pitfalls* (No. 1165). ADBI Working Paper Series.

Beck, T., Chen, T., Lin, C. and Song, F.M. (2016) Financial innovation: The bright and the dark sides. *Journal of Banking & Finance*, 72 , pp.28-51.

Begley T.A. and Srinivasan K. (2021) Small bank lending in the era of FinTech and shadow banking: a sideshow ?. *Northeastern U. D'Amore-McKim School of Business Research Paper*, 3317672.

Berg, T., Fuster, A. and Puri, M. (2022) Fintech lending. *Annual Review of Financial Economics*, *14*, pp.187-207.

Berger, A.N. and Black, L.K. (2011) Bank size, lending technologies, and small business finance. *Journal of Banking & Finance*, 35 (3), pp.724-735.

Berger, A.N., Bonime, S.D., Goldberg, L.G. and White, L.J. (2004) The dynamics of market entry: The effects of mergers and acquisitions on entry in the banking industry. *The Journal of Business*, 77(4), pp.797-834.

Berger, A.N., Cerqueiro, G. and Penas, M.F. (2015) Market size structure and small business lending: Are crisis times different from normal times?. *Review of Finance*, 19(5), pp.1965-1995.

Berger, A.N., Klapper, L.F. and Udell, G.F. (2001) The ability of banks to lend to informationally opaque small businesses. *Journal of Banking & Finance*, 25(12), pp.2127-2167.

Berger, A.N., Makaew, T. and Roman, R.A. (2019) Do business borrowers benefit from bank bailouts? : The effects of tarp on loan contract terms. *Financial Management*, 48(2), pp.575-639.

Berger, A.N., Roman, R.A. and Sedunov, J. (2020) Did TARP reduce or increase systemic risk? The effects of government aid on financial system stability. *Journal of Financial Intermediation*, 43, p.100810.

Berger, A.N., Rosen, R.J. and Udell, G.F. (2007) Does market size structure affect competition? The case of small business lending. *Journal of Banking & Finance*, 31(1), pp.11-33.

Berger, A.N., Saunders, A., Scalise, J.M. and Udell, G.F. (1998) The effects of bank mergers and acquisitions on small business lending. *Journal of financial Economics*, 50(2), pp.187-229.

Berger, A.N. and Udell, G.F. (1995) Relationship lending and lines of credit in small firm finance. *Journal of business*, pp.351-381.

Berger, A.N. and Udell, G.F. (1996) `Universal banking and the future of small business lending' ,in (A. Saunders and I. Walter, eds.) Financial

System Design: The Case for Universal Banking, pp. 559±627. Burr Ridge, IL: Irwin Publishing.

Berger, A.N. and Roman, R.A. (2020) *TARP and other bank bailouts and bail-ins around the world: Connecting Wall Street, Main Street, and the financial system*. Academic Press.

Berger, A.N. and Bouwman, C.H. (2013) How does capital affect bank performance during financial crises ?. *Journal of financial economics*, 109 (1), pp.146-176.

Berger, A.N. and Frame, W.S. (2007) Small business credit scoring and credit availability. *Journal of small business management*, 45 (1), pp.5-22.

Berger, A.N. and Roman, R.A. (2018) Finance and the real economy: Evidence from the US. *Handbook of finance and development*, pp.261-288.

Berger, S.C. and Gleisner, F. (2009) Emergence of financial intermediaries in electronic markets: The case of online P2P lending. *Business Research*, 2 (1), pp.39-65.

Berger, A.N., Rosen, R.J. and Udell, G.F. (2007) Does market size structure affect competition? The case of small business lending. *Journal of Banking & Finance*, 31 (1), pp.11-33.

Besanko, D. and Thakor, A.V. (1992) Banking deregulation: Allocational consequences of relaxing entry barriers. *Journal of Banking & Finance*, 16 (5), pp. 909-932.

Best, R. and Zhang, H. (1993) Alternative information sources and the information content of bank loans. *The Journal of Finance*, 48(4), pp.1507-1522.

Betz, F., Oprică, S., Peltonen, T.A. and Sarlin, P. (2014) Predicting distress in European banks. *Journal of Banking & Finance*, 45, pp.225-241.

Bhattacharya, S. and Thakor, A. V. (1993) Contemporary banking theory. *Journal of financial Intermediation*, 3 (1), pp.2-50.

Bindal, S., Bouwman, C.H. and Johnson, S.A. (2020) Bank regulatory size thresholds, merger and acquisition behavior, and small business lending. *Journal of Corporate Finance*, 62, p.101519.

Black, L.K. and Hazelwood, L.N. (2013) The effect of TARP on bank risk-taking. *Journal of Financial Stability*, 9(4), pp.790-803.

Bollaert, H., Lopez-de-Silanes, F. and Schwienbacher, A. (2021) FinTech and access to finance. *Journal of corporate finance*, 68, p.101941.

Bonner, C. (2012) Liquidity regulation, funding costs and corporate lending. *De Nederlandsche Bank Working Paper*, No 361.

Bonner, C. and Eijffinger, S.C. (2016) The impact of liquidity regulation on bank intermediation. *Review of Finance*, 20(5), pp.1945-1979.

Bons, R.W., Alt, R., Lee, H.G. and Weber, B. (2012) Banking in the Internet and mobile era. *Electronic markets*, 22(4), pp.197-202.

Boot, A.W. and Thakor, A.V. (2000) Can relationship banking survive competition?. *The journal of Finance*, 55(2), pp.679-713.

Boot, A.W. and Thakor, A.V. (1994) Moral hazard and secured lending in an infinitely repeated credit market game. *International economic review*, pp.899-920.

Boot, A., Hoffmann, P., Laeven, L. and Ratnovski, L. (2020) Financial Intermediation and technology: What's old, What's new? *IMF Working Paper*, WP/20/161.

Boot, A.W. and Thakor, A.V. (1997a) Financial system architecture. *The Review of Financial Studies*, 10 (3), pp.693-733.

Boot, A.W. and Thakor, A.V. (1997b) Banking scope and financial innovation. *The Review of Financial Studies*, 10 (4), pp.1099-1131.

Boot, A.W. and Thakor, A.V. (2000) Can relationship banking survive competition ?. *The journal of Finance*, 55 (2), pp.679-713.

Bordo, M.D. and Duca, J.V. (2018) *The impact of the Dodd-Frank Act on small business* (No. w24501). National Bureau of Economic Research.

Bouwman, C.H. and Johnson, S.A. (2018) Differential bank behaviors around the Dodd–Frank Act size thresholds. *Journal of Financial Intermediation*, 34, pp.47-57.

Boyd, J.H. and Prescott, E.C. (1986) Financial intermediary-coalitions. *Journal of Economic theory*, 38 (2), pp.211-232.

Breidbach, C.F., Keating, B.W. and Lim, C. (2020) FinTech: research directions to explore the digital transformation of financial service systems. *Journal of Service Theory and Practice*, 30 (1), pp.79-102.

Brill, A. (2010) Peer-to-peer lending: Innovative access to credit and the consequences of dodd-frank. *Legal Backgrounder*, 25(35), pp.1-4.

Broby, D. (2021) Financial technology and the future of banking. *Financial Innovation*, 7(1), pp.1-19.

Buchak, G., Matvos, G., Piskorski, T. and Seru, A. (2018) Fintech, regulatory arbitrage, and the rise of shadow banks. *Journal of financial economics*, 130(3), pp.453-483.

Calem, P., Correa, R. and Lee, S.J. (2020) Prudential policies and their impact on credit in the United States. *Journal of Financial Intermediation*, 42, p.100826.

Calomiris, C.W., Heider, F. and Hoerova, M. (2015) A theory of bank liquidity requirements. *Columbia Business School Research Paper*, (14-39).

Cecchetti, S. G. and Kashyap, A. (2018) What Binds? Interactions between Bank Capital and Liquidity Regulations. *The changing fortunes of central banking*, p.192.

Cetina, J. and Gleason, K. (2015) The difficult business of measuring banks' liquidity: Understanding the liquidity coverage ratio. *Office of Financial Research Working Paper*, (15-20).

Cetorelli, N. and Strahan, P.E. (2006) Finance as a barrier to entry: Bank competition and industry structure in local US markets. *The Journal of Finance*, 61(1), pp.437-461.

Chittenden, F., Hall, G. and Hutchinson, P. (1996) Small firm growth, access to capital markets and financial structure: Review of issues and an empirical investigation. *Small business economics*, 8(1), pp.59-67.

Choi, J.W. (2012) The effectiveness of the Small Business Lending Fund (SBLF) program during the 2007–2010 financial crisis. *The Journal of Economic Asymmetries*, 9(2), pp.59-76.

Choi, S.Y. and Whinston, A.B. (2000) The future of the digital economy. *Handbook on electronic commerce*, pp.25-52.

Chong, T.T.L., Lu, L. and Ongena, S. (2013) Does banking competition alleviate or worsen credit constraints faced by small-and medium-sized enterprises? Evidence from China. *Journal of Banking & Finance*, 37(9), pp.3412-3424.

Chu, Y., Zhang, D. and Zhao, Y.E. (2019) Bank capital and lending: Evidence from syndicated loans. *Journal of Financial and Quantitative Analysis*, 54(2), pp.667-694.

Claessens, S. and Perotti, E. (2007) Finance and inequality: Channels and evidence. *Journal of comparative Economics*, 35 (4), pp.748-773.

Claessens, S., Frost, J., Turner, G. and Zhu, F. (2018) FinTech credit markets around the world: size, drivers and policy issues. *BIS Quarterly Review September.*

Claessens, S., Glaessner, T. and Klingebiel, D. (2002) Electronic finance: reshaping the financial landscape around the world. *Journal of Financial Services Research*, 22 (1), pp.29-61.

Clower, R. W. (1977) The anatomy of monetary theory. *The American Economic Review*, 67 (1), pp.206-212.

Cole, R.A. (1998) The importance of relationships to the availability of credit. *Journal of Banking & Finance*, 22(6-8), pp.959-977.

Cole, R.A. and Damm, J. (2020) How did the financial crisis affect small-business lending in the United States?. *Journal of Financial Research*, 43(4), pp.767-820.

Cornaggia, J., Wolfe, B., and Yoo, W. (2018) Crowding out banks: Credit substitution by peer-to-peer lending. SSRN doi: org/10.2139/ssrn.3000593.

Cornelli, G., Frost, J., Gambacorta, L., Rau, P.R., Wardrop, R. and Ziegler, T. (2020) FinTech and big tech credit: a new database.

Cornett, M.M., Li, L. and Tehranian, H. (2013) The performance of banks around the receipt and repayment of TARP funds: Over-achievers versus under-achievers. *Journal of Banking & Finance*, 37(3), pp.730-746.

Cornett, M.M., McNutt, J.J., Strahan, P.E. and Tehranian, H. (2011) Liquidity risk management and credit supply in the financial crisis. *Journal of financial economics*, 101(2), pp.297-312.

Cortés, K.R., Demyanyk, Y., Li, L., Loutskina, E. and Strahan, P.E. (2020) Stress tests and small business lending. *Journal of Financial Economics*, 136(1), pp.260-279.

Craig, S.G. and Hardee, P. (2007) The impact of bank consolidation on small business credit availability. *Journal of Banking & Finance*, 31(4), pp.1237-1263.

Cressy, R. and Olofsson, C. (1997) European SME financing: an overview. *Small Business Economics*, pp.87-96.

Crouhy, M., Galai, D. and Wiener, Z. (2021) The Impact of FinTechs on Financial Intermediation: A Functional Approach. *The Journal of FinTech*, 1 (01), p.2031001.

Cumming, D. J., Farag, H., Koirala, S. and McGowan, D. (2019) The Unintended Consequences of Fintech Regulation on Banking. *Available at SSRN 3398843*.

De Roure, C., Pelizzon, L. and Thakor, A. (2022) P2P lenders versus banks: Cream skimming or bottom fishing?. *The Review of Corporate Finance Studies*, 11(2), pp.213-262.

Degryse, H. and Ongena, S. (2007) The impact of competition on bank orientation. *Journal of Financial Intermediation*, 16(3), pp.399-424.

Degryse, H. and Ongena, S. (2002) Bank-firm relationships and international banking markets. *International Journal of the Economics of Business*, 9(3), pp.401-417.

Dell'Ariccia, G. and Marquez, R. (2004) Information and bank credit allocation. *Journal of financial Economics*, 72 (1), pp.185-214.

Deloitte (2017) Connected Small Businesses US. https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-connected-small-businesses-google-051016.pdf. Accessed 15 Nov 2021.

Deloitte (2020) FinTech. On the brink of further disruption, Deloitte Financial Advisory Netherlands.https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/financial-services/deloitte-nl-fsi-FinTech-report-1.pdf

DeYoung, R., Goldberg, L.G. and White, L.J. (1999) Youth, adolescence, and maturity of banks: Credit availability to small business in an era of banking consolidation. *Journal of Banking & Finance*, 23(2-4), pp.463-492.

DeYoung, R. and Jang, K.Y. (2016) Do banks actively manage their liquidity?. *Journal of Banking & Finance*, 66, pp.143-161.

DeYoung, R., Distinguin, I. and Tarazi, A. (2018) The joint regulation of bank liquidity and bank capital. *Journal of Financial Intermediation*, 34, pp.32-46.

Di Maggio, M. and Yao, V. (2021) FinTech borrowers: lax screening or cream-skimming ?. *The review of financial studies*, 34 (10), pp.4565-4618.

Diamond, D.W. and Kashyap, A.K. (2016) Liquidity requirements, liquidity choice, and financial stability. In *Handbook of macroeconomics* (Vol. 2, pp. 2263-2303). Elsevier.

Diamond, D.W. (1984) Financial intermediation and delegated monitoring. *The review of economic studies*, 51 (3), pp.393-414.

Dicuonzo, G., Donofrio, F., Fusco, A. and Dell'Atti, V. (2021) Blockchain technology: Opportunities and challenges for small and large banks during

COVID-19. *International Journal of Innovation and Technology Management*, 18 (04), p.2140001.

Dimitrov, V., Palia, D. and Tang, L. (2015) Impact of the Dodd-Frank act on credit ratings. *Journal of Financial Economics*, 115(3), pp.505-520.

Duijm, P. and Wierts, P. (2016) The effects of liquidity regulation on bank assets and liabilities. *International Journal of Central Banking (IJCB)*.

Ediagbonya, V. and Tioluwani, C. (2022) The role of FinTech in driving financial inclusion in developing and emerging markets: issues, challenges and prospects. *Technological Sustainability*, (ahead-of-print).

Elliott, D.J. (2014) Bank liquidity requirements: An introduction and overview. *The Brookings Institution.*

Elsaid, H.M. (2021) A review of literature directions regarding the impact of FinTech firms on the banking industry. *Qualitative Research in Financial Markets.*

Ely, D.P. and Robinson, K.J. (2001) Consolidation, technology, and the changing structure of banks' small business lending. *Economic and financial review-Federal Reserve Bank of Dallas*, (1), pp.23-32.

Elyasiani, E. and Goldberg, L.G. (2004) Relationship lending: a survey of the literature. *Journal of Economics and Business*, 56 (4), pp.315-330.

Erel, I. and Liebersohn, J. (2020) *Does FinTech substitute for banks? evidence from the paycheck protection program* (No. w27659). National Bureau of Economic Research.

Fama, E.F. (1985) What's different about banks?. *Journal of monetary economics*, 15 (1), pp.29-39.

Evanoff, D.D. and Moeller, W.F. (2012) Dodd–Frank: Content, purpose, implementation status, and issues. *Economic Perspectives*, 36 (Q III), pp.75-84.

Feyen, E., Frost, J., Gambacorta, L., Natarajan, H. and Saal, M. (2021) Fintech and the digital transformation of financial services: implications for market structure and public policy. *BIS Papers*.

Frost, J. (2020) The economic forces driving FinTech adoption across countries. *The technological revolution in financial services: how banks, FinTechs, and customers win together*, 70.

Fuhrer, L.M., Müller, B. and Steiner, L. (2017) The liquidity coverage ratio and security prices. *Journal of Banking & Finance*, 75, pp.292-311.

Fuster, A., Plosser, M., Schnabl, P. and Vickery, J. (2019) The role of technology in mortgage lending. *The Review of Financial Studies*, 32 (5), pp.1854-1899.

Gallo, S. (2021) Fintech platforms: Lax or careful borrowers' screening?. *Financial Innovation*, 7(1), pp.1-33.

George, R. and Mohan, T. (2015) Liquidity coverage ratio requirement increases cost of securitization for US banks. *The Journal of Structured Finance*, 20 (4), pp.13-21.

Giudici, G., Sannajust, A. and Van Auken, H.E. (2021) Special issue on small business financing: New actors, new opportunities, new challenges. *Journal of Small Business Management*, 59(2), pp.219-222.

Gomber, P., Kauffman, R.J., Parker, C. and Weber, B.W. (2018) On the FinTech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of management information systems*, 35 (1), pp.220-265.

Gomber, P., Koch, J.A. and Siering, M. (2017) Digital Finance and FinTech: current research and future research directions. *Journal of Business Economics*, 87 (5), pp.537-580.

Gopal, M. and Schnabl, P. (2022) The rise of finance companies and fintech lenders in small business lending. *The Review of Financial Studies*, 35 (11), pp.4859-4901.

Greenbaum, S.I., Thakor, A.V. and Boot, A. (2015) *Contemporary financial intermediation*. Academic press.

Greenstone, M., Mas, A. and Nguyen, H.L. (2020) Do credit market shocks affect the real economy? Quasi-experimental evidence from the great recession and" normal" economic times. *American Economic Journal: Economic Policy*, 12(1), pp.200-225.

Gurley, J.G. and Shaw, E.S. (1956) Financial intermediaries and the saving-investment process. *The Journal of Finance*, 11 (2), pp.257-276.

Harris, O., Huerta, D. and Ngo, T. (2013) The impact of TARP on bank efficiency. *Journal of International Financial Markets, Institutions and Money*, 24, pp.85-104.

Harrison, R., Li, Y., Vigne, S.A. and Wu, Y. (2022) Why do small businesses have difficulty in accessing bank financing?. *International Review of Financial Analysis*, 84, p.102352.

Havrylchyk, O., Mariotto, C., Rahim, T. and Verdier, M. (2020) The Expansion of Peer-to-Peer Lending. *Review of Network Economics*, 19(3), pp.145-187.

Havrylchyk, O. and Verdier, M. (2018) The financial intermediation role of the P2P lending platforms. *Comparative Economic Studies*, 60(1), pp.115-130.

Hodula, M. (2022) Does Fintech credit substitute for traditional credit? Evidence from 78 countries. *Finance Research Letters*, 46, p.102469.

Hoerova, M., Mendicino, C., Nikolov, K., Schepens, G. and Van den Heuvel, S. (2018) Benefits and costs of liquidity regulation. *European Central Bank Working Paper Series*, 2169.

Hogan TL (2019) What Caused the Post-crisis Decline in Bank Lending?'. *Rice University's Baker Institute for Public Policy Issue brief*, no.01.10.19.

House, M., Sablik, T. and Walter, J.R. (2016) Understanding the new liquidity coverage ratio requirements. *Richmond Fed Economic Brief*, (Jan).

Hughes, J.P., Jagtiani, J. and Moon, C.G. (2022) Consumer lending efficiency: Commercial banks versus a fintech lender. *Financial Innovation*, 8(1), pp.1-39.

International Monetary Fund (2021), World Economic Outlook.

Ioannou, I. and Demirel, G. (2022) Blockchain and supply chain finance: a critical literature review at the intersection of operations, finance and law. *Journal of Banking and Financial Technology*, pp.1-25.

Jagtiani, J. and Lemieux, C. (2018) Do fintech lenders penetrate areas that are underserved by traditional banks?. *Journal of Economics and Business*, 100, pp.43-54.

Jagtiani, J. and Lemieux, C. (2015) Small Business Lending: Challenges and Opportunities for Community Banks–Before, During and After the Financial Crisis. *In Community Banking in the 21st Century Research and Policy Conference, Federal Reserve Bank of St. Louis, St. Louis, MO.*

Jagtiani, J. and Lemieux, C. (2016) Small business lending after the financial crisis: A new competitive landscape for community banks. *Economic perspectives*, 40(3), pp.1-30.

James, C. (1987) Some evidence on the uniqueness of bank loans. *Journal of financial economics*, 19 (2), pp.217-235.

Johnson, S., Ashta, A. and Assadi, D. (2010) Online or Offline?: The Rise of "Peer-to-Peer" Lending in Microfinance. *Journal of Electronic Commerce in Organizations (JECO)*, 8(3), pp.26-37.

Käfer, B. (2018) Peer-to-Peer lending–a (financial stability) risk perspective. *Review of Economics*, 69 (1), pp.1-25.

Kim, M., Zoo, H., Lee, H. and Kang, J. (2018) Mobile financial services, financial inclusion, and development: A systematic review of academic literature. *The Electronic Journal of Information Systems in Developing Countries*, 84 (5), p.e12044.

Kou, G., Olgu Akdeniz, Ö., Dinçer, H. and Yüksel, S. (2021b) Fintech investments in European banks: a hybrid IT2 fuzzy multidimensional decision-making approach. *Financial Innovation*, 7(1), pp.1-28.

Kou, G., Xu, Y., Peng, Y., Shen, F., Chen, Y., Chang, K. and Kou, S. (2021a) Bankruptcy prediction for SMEs using transactional data and two-stage multiobjective feature selection. *Decision Support Systems*, 140, p.113429.

Kowalewski, O., Pisany, P. and Slazak, E. (2021) What determines cross-country differences in FinTech and bigtech credit markets?.

Krainer, R.E. (2012) Regulating wall street: The dodd–frank act and the new architecture of global finance, a review. *Journal of Financial Stability* 8(2):121-33.

Leland, H.E. and Pyle, D.H. (1977) Informational asymmetries, financial structure, and financial intermediation. *The journal of Finance*, 32 (2), pp.371-387.

Lerner, J. and Tufano, P. (2011) The consequences of financial innovation: a counterfactual research agenda. *Annu. Rev. Financ. Econ.*, 3 (1), pp.41-85.

Li, H., Liu, H., Siganos, A. and Zhou, M. (2016) Bank regulation, financial crisis, and the announcement effects of seasoned equity offerings of US commercial banks. *Journal of Financial Stability*, 25, pp.37-46.

Li, L. (2013) TARP funds distribution and bank loan supply. *Journal of Banking & Finance*, 37(12), pp.4777-4792.

Li, T., Kou, G., Peng, Y. and Philip, S.Y. (2021) An integrated cluster detection, optimization, and interpretation approach for financial data. *IEEE Transactions on Cybernetics*.

Lin, T.C. (2016) Compliance, technology, and modern finance. *Brook. J. Corp. Fin. & Com. L.*, 11, p.159.

Llewellyn, D.T. (1993) Secular pressures on banking in developed financial systems: is traditional banking an industry in secular decline?. In *The New Europe: Evolving Economic and Financial Systems in East and West* (pp. 169-192). Springer, Dordrecht.

Llewellyn, D.T. (1999) *The new economics of banking* (No. 5). SUERF studies.

Llewellyn, D.T. (2002) Technology and the new economics of banking: a UK perspective. In *Technology and Finance* (pp. 62-78). Routledge.

Loureiro, Y.K. and Gonzalez, L. (2015) Competition against common sense: insights on peer-to-peer lending as a tool to allay financial exclusion. *International Journal of Bank Marketing*.

Lu, B., Hao, S., Pinedo, M. and Xu, Y. (2021) Frontiers in Service Science: Fintech Operations—An Overview of Recent Developments and Future Research Directions. *Service Science*, 13(1), pp.19-35.

Lutz, C. (2016) Systematically important banks and increased capital requirements in the Dodd-Frank era. *Economics Letters*, 138, pp.75-77.

Macchiavelli, M. and Pettit, L. (2021) Liquidity regulation and financial intermediaries. *Journal of Financial and Quantitative Analysis*, 56(6), pp.2237-2271.

Maskara, P.K., Kuvvet, E. and Chen, G. (2021) The role of P2P platforms in enhancing financial inclusion in the United States: An analysis of peer-to-peer lending across the rural–urban divide. *Financial Management*, 50 (3), pp.747-774.

McNulty, J.E., Murdock, M. and Richie, N. (2013) Are commercial bank lending propensities useful in understanding small firm finance?. *Journal of Economics and Finance*, 37 (4), pp.511-527.

Merton, R.C. (1992) Financial innovation and economic performance. *Journal of applied corporate finance*, 4 (4), pp.12-22.

Milian, E.Z., Spinola, M.D.M. and de Carvalho, M.M. (2019) FinTechs : A literature review and research agenda. *Electronic Commerce Research and Applications*, 34, p.100833.

Miller, M.H. (1986) Financial innovation: The last twenty years and the next. *Journal of financial and quantitative analysis*, 21(4), pp.459-471.

Mills, K. and McCarthy, B. (2014) The state of small business lending: Credit access during the recovery and how technology may change the game. *Harvard Business School General Management Unit Working Paper*, (15-004).

Mills, K.G. (2018) *Fintech, small business & the American dream: How technology is transforming lending and shaping a new era of small business opportunity*. Springer International Publishing.

Milne, A. and Parboteeah, P. (2016) The Business Models and Economics of Peer-to-Peer Lending. *ECRI Research Report*.

Mishkin, F.S. and Strahan, P. (1999) What will technology do to financial structure ?. *NBER working paper*, 6892.

Morse, A. (2015) Peer-to-peer crowdfunding: Information and the potential for disruption in consumer lending. *Annual Review of Financial Economics*, 7, pp.463-482.

Moscalu, M., Girardone, C. and Calabrese, R. (2020) SMEs' growth under financing constraints and banking markets integration in the euro area. *Journal of Small Business Management*, 58(4), pp.707-746.

Murinde, V., Rizopoulos, E. and Zachariadis, M. (2022) The impact of the FinTech revolution on the future of banking: Opportunities and risks. *International Review of Financial Analysis*, 81, p.102103.

Niehans, J. (1983) Financial innovation, multinational banking, and monetary policy. *Journal of banking & Finance*, 7 (4), pp.537-551.

Ongena, S. and Smith, D.C. (2000) Bank relationships: a review. *Performance of financial institutions: Efficiency, innovation, regulation*, 221.

Palladino, L. (2018) Small Business Fintech Lending: The Need for Comprehensive Regulation. *Fordham J. Corp. & Fin. L.*, 24, p.77.

Palladino, L.M., (2021) The impacts of FinTech on small business borrowing. *Journal of Small Business & Entrepreneurship*, 33(6), pp.639-661.

Peek, J. and Rosengren, E. S. (2013) The role of banks in the transmission of monetary policy, *Public Policy Discussion Paper 13-5*, Federal Reserve Bank of Boston.

Peek, J. and Rosengren, E.S. (1998a) Bank consolidation and small business lending: It's not just bank size that matters. *Journal of Banking & Finance*, 22(6-8), pp.799-819.

Peek, J. and Rosengren, E.S. (1998b) The evolution of bank lending to small business. *New England Economic Review*, pp.27-36.

Perotti, E. and Suarez, J. (2011) A Pigovian Approach to Liquidity Regulation. *International Journal of Central Banking*, vol. 7(4), pages 3-41, December.

Petersen, M.A. and Rajan, R.G. (1994) The benefits of lending relationships: Evidence from small business data. *The journal of finance*, 49(1), pp.3-37.

Petersen, M.A. and Rajan, R.G. (1995) The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics*, 110(2), pp.407-443.

Pettit, R.R. and Singer, R.F. (1985) Small business finance: a research agenda. *Financial management*, pp.47-60.

Philippon, T. (2016) *The FinTech opportunity* (No. w22476). National Bureau of Economic Research.

Philippon, T. (2019) *On FinTech and financial inclusion* (No. w26330). National Bureau of Economic Research.

Ramakrishnan, R.T. and Thakor, A.V. (1984) Information reliability and a theory of financial intermediation. *The Review of Economic Studies*, 51(3), pp.415-432.

Rao, P., Kumar, S., Chavan, M. and Lim, W.M. (2021) A systematic literature review on SME financing: Trends and future directions. *Journal of Small Business Management*, pp.1-31.

Revest, V. and Sapio, A. (2012) Financing technology-based small firms in Europe: what do we know?. *Small Business Economics*, 39 (1), pp.179-205.

Roberts, D., Sarkar, A. and Shachar, O. (2021) The Costs and Benefits of Liquidity Regulations. *FRB of New York Staff Report*, (852).

Rochet, J.C. and Vives, X. (2004) Coordination failures and the lender of last resort: was Bagehot right after all?. *Journal of the European Economic Association*, 2 (6), pp.1116-1147.

Ross, S.A. (1989) Institutional markets, financial marketing, and financial innovation. *The Journal of Finance*, 44 (3), pp.541-556.

Rubio, M. and Carrasco-Gallego, J. A. (2016) The new financial regulation in Basel III and monetary policy: A macroprudential approach. *Journal of Financial Stability*, 26, pp.294-305.

Sahin, A., Kitao, S., Cororaton, A. and Laiu, S. (2011) Why small businesses were hit harder by the recent recession. *Current Issues in Economics and Finance*, 17(4).

Santomero, A.M. (1984) Modeling the banking firm: A survey. *Journal of money, credit and banking*, 16(4), pp.576-602.

Sapienza, P. (2002) The effects of banking mergers on loan contracts. *The Journal of finance*, 57(1), pp.329-367.

Schmaltz, C., Pokutta, S., Heidorn, T. and Andrae, S. (2014) How to make regulators and shareholders happy under Basel III. *Journal of Banking & Finance*, 46, pp.311-325.

Scholtens, B. (1999) Analytical issues in external financing alternatives for SBEs. *Small Business Economics*, 12 (2), pp.137-148.

Scholtens, B. and Van Wensveen, D. (2000) A critique on the theory of financial intermediation. *Journal of Banking & Finance*, 24(8), pp.1243-1251.

Segal, M. (2015) Peer-to-peer lending: A financing alternative for small businesses. *Issue Brief*, 10.

Serrano-Cinca, C., Gutiérrez-Nieto, B. and López-Palacios, L. (2015) Determinants of default in P2P lending. *PloS one*, 10 (10), p.e0139427.

Siaw, I. and Yu, A. (2004) An analysis of the impact of the internet on competition in the banking industry, using Porter's five forces model. *International Journal of Management*, 21 (4), p.514.

Silber, W.L. (1983) The process of financial innovation. *The American Economic Review*, 73 (2), pp.89-95.

Stulz, R.M. (2019) FinTech, bigtech, and the future of banks. *Journal of Applied Corporate Finance*, 31 (4), pp.86-97.

Takáts, E. (2004) Banking consolidation and small business lending. *Available at SSRN 601027.* doi:10.2139/ssrn.601027

Tang, H. (2019) Peer-to-peer lenders versus banks: substitutes or complements?. *The Review of Financial Studies*, 32(5), pp.1900-1938.

Teply, P. and Polena, M. (2020) Best classification algorithms in peer-to-peer lending. *The North American Journal of Economics and Finance*, 51, p.100904.

Thakor, A.V. (2018) Post-crisis regulatory reform in banking: Address insolvency risk, not illiquidity!. *Journal of Financial Stability*, 37, pp.107-111.

Thakor, A.V. (2020) FinTech and banking: What do we know?. *Journal of Financial Intermediation*, 41, p.100833.

Tufano, P. (2003) Financial innovation. *Handbook of the Economics of Finance*, 1, pp.307-335.

Udell, G.F. (1998) The consolidation of the banking industry and small business lending. In *Bank Mergers & Acquisitions* (pp. 221-235). Springer, Boston, MA.

US. Small Business Administration, Office of Advocacy (2020) *Economic Bulletin, Small Business at a Glance*.

US. Small Business Administration, Office of Advocacy (SBA) (2018) *Small Business Lending in the U.S.* D.C: US Small Business Administration, Office of Advocacy.

Weihs, D.C. (2018) *Online Peer-to-Peer Lending as an Alternative to Traditional Lending for Small Business Financing* (Doctoral dissertation, Capella University).

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N. and Haenlein, M. (2021) Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, pp.889-901.

Vives, X. (2017) The impact of FinTech on banking. *European Economy*, (2), pp.97-105.

Vives, X. (2019) Digital disruption in banking. *Annual Review of Financial Economics*, 11, pp.243-272.

Wang, H., Chen, K., Zhu, W. and Song, Z. (2015) A process model on P2P lending. *Financial Innovation*, 1(1), pp.1-8.

Wang, H., Kou, G. and Peng, Y. (2021) Multi-class misclassification cost matrix for credit ratings in peer-to-peer lending. *Journal of the Operational Research Society*, 72(4), pp.923-934.

Weston, J. and Strahan, P.E. (1996) Small business lending and bank consolidation: Is there cause for concern?. *Current issues in Economics and Finance*, 2(3).

Wille, D., Hoffer, A. and Miller, S.M. (2017) Small-business financing after the financial crisis–lessons from the literature. *Journal of Entrepreneurship and Public Policy*, 6(3), pp.315–339.

Wilson, L. (2013) TARP's deadbeat banks. *Review of Quantitative Finance and Accounting*, 41(4), pp.651-674.

Yan, J., Yu, W. and Zhao, J. L. (2015) How signaling and search costs affect information asymmetry in P2P lending: the economics of big data. *Financial Innovation*, 1 (1), pp.1-11.