Bank Market Structure, Earnings Quality and Syndicated Loan

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Declaration

According to the Rules for Submission of Theses for Research Degrees, Section 8(a), the candidate is required to include in each copy of the thesis (including the electronic copy), a signed declaration of original authorship. I hereby declare my contribution to a co-authored publication that will be included in my PhD dissertation.

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which will be included in the following dissertation:

Chapter 3: Bank market concentration and syndicated loan prices

The degree of **Biao Mi**'s contribution to the publication is 70%.

Dissertation author's signature

Date: 24/06/2019 Signature: Biao Mi

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Abstract

With three empirical essays, this thesis aims to offer additional empirical evidence on syndicated loans. Specifically, the first two essays focus on the role played by bank market structure in determining syndicated loan prices (Chapter 3) and syndicate structure (Chapter 4) by using US data. The third essay (Chapter 5) further investigates the determination of loan prices and syndicate structure in an emerging market, China, where corporate borrowers carry unique characteristics, such as low information transparency and state-ownership. I show supporting evidence to market power hypothesis that syndicated loan prices are positively associated with the concentration of both borrower's and lead arranger's markets but not that of participant lenders' markets. In addition, loan prices are more sensitively to the concentration of lead arranger's market than to borrower's market. In a sharp contrast, loan prices are negatively associated with bank concentration if a loan syndication is led by an investment bank or non-bank financial institution. The thesis also provides novel evidence on the role of market power on syndicate structure where a lead arranger with a greater bank market power would effectively alleviate the asymmetric information problem between lead arranger and the participant banks by performing more ex-ante screen and ex-post monitor activities leading to a more dispersed syndicate structure. Finally, I study how earnings quality and state-ownership affect loan terms, syndicated structure and foreign lender participation in leading loan syndication in China. I show that earnings quality has little impact on syndicate structure but it has a stronger impact on the spreads of loans issued to state-

owned enterprises (SOEs) and loans led by foreign lenders. State-ownership, instead, alleviates the problems of adverse selection and moral hazards in loan syndication and motivates foreign bank to participate.

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Chapter 1 Introduction

The syndicated loan normally involves the lead arranger, who originates the loan, and the participant group, who takes the majority percentage of the credit balance. During the last few decades, the syndicated loan market has increased dramatically and surpassed the bond and equity market in terms of trading volume (Chui et al., 2010, Drucker and Puri, 2007). The element that determines the contract terms in syndicated loan is an important issue that has been subject to extensive research in the finance literature. Not only because syndicated loan market plays an essential role in the global financial markets, but also it has a distinct characteristic which allows researchers to investigate the asymmetric information among financial institutions. In syndication, the lead arranger behaves as the agent to collect borrower's information and monitor after syndication, leading to information inequality between lead arrangers and participants, known as adverse selection and moral hazard problems (Ivashina, 2009).

This thesis focuses on the role played by the lender (bank market structure) and borrower (earnings quality) in determining the syndicated loan contract terms. I examined how bank market structure influences syndicated loan prices (Chapter 3) and loan structure (Chapter 4) in the first two empirical chapters, and tested how borrower's earnings quality determines syndicated loan terms (Chapter 5) in the last empirical chapter.

Banks, as the key financial intermediary, play an important role in providing finance and financial services to corporate customers. Therefore, a well-developed banking sector plays a pivotal role in allocating resources more efficiently across all sectors in the economy to meet the long-term investment needs (Berger et al., 2005, Berger et al., 1998). In addition, banks determine the information efficiency because they perform as an information collector and monitor in the lending process. For example, relationship lending may ease the lending condition by reducing information asymmetries and ensuring efficient monitoring (e.g. Ongena and Smith, 2001, Degryse and Van Cayseele, 2000, Petersen and Rajan, 1994).

1.1 Development of research questions and objectives

Bank market structure would be an influential factor in determining syndicated loan terms. In the traditional view of 'concentration-price' relationship, there are two contrasting theories. The traditional market power hypothesis suggests that banks with greater market power would charge higher prices due to their cost inefficiency (Ariss, 2010, Delis and Tsionas, 2009) and profit maximising behaviour (e.g. Pagano, 1993, Guzman, 2000). On the other hand, the structure-efficient model (SE) proposes that banks with a higher market share would charge lower prices on loans due to their improved productivity technology and efficient management, which have helped them reduce costs, gain higher profits and take over a bigger market share (Demsetz, 1973). The

effects of bank market structure on syndicated loan prices remain a matter of debate. Therefore, I firstly aim to fill the gap and provide empirical evidence in this direction.

In Chapter 3 (First essay), I empirically examine the relation between syndicated loan prices and bank market concentration, in order to draw a general picture between these two. To relax the traditional assumption which 'price-concentration' is solely focused on the influence of borrower's bank market (e.g., Lian, 2017, Cyrnak and Hannan, 1999), I explore the 'price-concentration' relation in a wider scope by considering the structure in the markets of all players, including borrower, lead arranger and the participant lenders. I employ the CR_{50} (concentration ratio) to measure bank market structure, and proxy syndicated loan pricing by considering spread and fee respectively. After carefully addressing the endogeneity issue, I show supporting evidence to market power hypothesis where syndicated loan prices increase with both lead arranger's and borrower's bank market concentration. I also find that such a positive 'price-concentration' relationship is determined by the market concentration of lenders, rather than that of the borrower's market. This chapter also explores the heterogeneity of such a 'price-concentration' relationship over lender type (Commercial bank vs. non-Commercial bank) and in a sharp contrast, loan prices are negatively related to the bank market concentration if lead arranger is an investment bank or a non-bank financial institution.

In Chapter 4, I proceed to explore the relationship between bank market power and syndicated loan structure. Syndicated loan normally contains multiple lenders where one or more lead arrangers originate the loan and sell the left part to the participant banks (Ivashina, 2009). This specific process allows us to explore the asymmetric information between lenders during syndication. In the second essay (Chapter 4), I investigate the effects of bank market power on the structure of the syndicated loan. On the basis of bank market theory, banks with a greater market power are more likely to screen loan applicants and monitor borrowers (von Thadden, 2004, Besanko and Thakor, 1993, Caminal and Matutes, 2002). I hypothesize that lead arranger with a greater market power would face alleviated adverse selection and moral hazard problems, thus constructing a more disperse loan structure. By following Delis et al. (2017), I use Lerner index to measure the bank market power, which can be estimated at the bank-year level. After controlling for a rich of characteristics from lender, borrower and loan facilities, the regression results show that a lead arranger with a greater market power would attract more participant lenders, sell more shares to the participants and thus originate a syndicated loan with disperse structure. This result suggests that lead arranger's bank market power effectively reduces the asymmetry information among lenders. I further investigate the ex-ante screen and ex-post monitoring mechanism in such a 'bank market power - loan structure' relationship. I show evidence that bank market power reduces the information asymmetries between lead arranger and the participant in adverse selection (via ex-ante screen) and moral hazard (via ex-post monitor). I further test the factors which may

influence the relation between lead arranger's bank market power and loan structure, e.g. distance and financial crisis. All the results are consistent with the hypothesis.

Apart from the effects of lenders characteristics on loan terms, those of borrowers' characteristics have been widely examined, such as corporate ownership (Lin et al., 2012), IFRS adoption (e.g. Chan et al., 2015, Chin et al., 2014) and earnings quality (e.g. Bharath et al., 2008, Francis et al., 2005). Among these borrower's related factors, earnings quality provides the lender with an ability to predict corporate borrower's future earnings number. Based on the literature, a higher earnings quality enables accounting information users, e.g. lenders, to better predict borrower's future earnings and to reduce future cash flow uncertainties, thus better predict borrower's future repayment ability ((Easley and O'Hara, 2004, Leuz and Verrecchia, 2005). There has been a large body of literature that examines the role played by earnings quality in syndicated loan terms in developed countries (e.g. Pappas et al., 2019, Bharath et al., 2008), few of them examine how earnings quality determine syndicated loan terms in developing countries, such as in China, where lenders suffer a greater degree of asymmetric information problems. The syndicated loan market in China has developed significantly over the last decade, with a total amount of $923 billion[1] in the first half of 2016, accounting for 11.35% of total loans, compared to 1.72% in 2006 (CBS, 2016). At the same time, Chinese financial market also bears the problems, such as more

[1] On average, USD$1 is equivalent to RMB¥6.50.

opaque accounting information compared with that of businesses in developed markets (Li et al., 2014), less credible borrowers (Wang and Wu, 2011) and the agency problem reflected in state ownership (Boubakri et al., 2008). It is possible that the effects of earnings quality on syndicated loan characteristics could be economically insignificant where corporate accounting information is less credible and investor protection is insufficient in China (Ball et al., 2000). The effects of state ownership on loan terms are also inconclusive. On one hand, state ownership has been identified as an implicit guarantee for loan repayment by government (Liu et al., 2016) and on the other, it also bears the risk of pursuing political objectives (Borisova et al., 2015).

Hence, in the last essay of this thesis (Chapter 5), first, I further investigate the 'price – concentration' relation and the relationship between bank market power and loan structure in a developing market, China. I show that the positive relation between 'price – concentration' still applies to Chinese syndicated loan market. However, I find little evidence that in Chinese market, syndicated loan structure is affected by bank market power. Second, as the key objective of the Chapter, I examine the impacts of Chinese corporate borrower's earnings quality and state ownership on syndicated loan characteristics. After controlling a rich set of characteristics and considering endogeneity problems, I show that earnings quality has little impact on syndicate structure but it determines the spreads of loans issued to state-owned enterprises (SOEs) and loans led by foreign lenders. State-ownership is taken as a favourable signal for an implicit guarantee of loan repayment and hence, it alleviates the problems of adverse selection and moral hazards in

loan syndication and motivates foreign banks to participate. The results also show that loans issued to SOEs have more concentrated shareholding and lead arrangers do not have to hold more share to signal loan quality or to perform monitoring and due diligence when lending SOEs.

1.2 Contribution

This study is expected to deepen our understanding of the determinants of syndicated loan terms from lender and borrower's perspectives. It contributes to the existing literature in three important ways. Firstly, in terms of research methodology, I examine the bank market structure on syndicated loan terms by using not only the U.S. state branching deregulation, but also a continuous measure – Lerner index (Lerner, 1934) – to capture bank market power at the individual bank year level. Secondly, this study explores the mechanisms underlying the linkage between bank market structure and syndicated loan terms, especially from the role of lead bank's bank market in dealing with asymmetric information among lenders. In my second essay, I provide a full explanation that lead arranger with bank market power can reduce adverse selection and moral hazard problem by applying more ex-ante screen and ex-post monitor activities. It sheds light on future research regarding how bank market structure influencing bank collaboration. Finally, this study adds new empirical evidence from the syndicated loan markets in an emerging economy, China. My third essay shows that borrower's earnings quality is unable to determine syndicated

loan structure, maturity and foreign bank share, compared with its function in the developed market (e.g., Bharath et al., 2008, Pappas et al., 2019, Wasan et al., 2013). Overall, this study relates to the literature on syndicated loan terms from both lenders' perspective (e.g., Lian, 2017, Lim et al., 2014, Ivashina, 2009, Giannetti and Laeven, 2012, Delis et al., 2017, Harjoto et al., 2006) and borrower's perspective (e.g., Chan et al., 2015, Chin et al., 2014, Lin et al., 2013, Lin et al., 2012, Bharath et al., 2009, Bharath et al., 2008).

In sum, this chapter provides an overview of the three essays in this thesis. The subsequent four chapters have the following structure. Chapter 2 provides literature review regarding syndicated loan and bank market structure[2]. Using U.S data, Chapter 3 examines the relationship between bank market concentration and syndicated loan prices; Chapter 4 investigate how bank market power affects syndicated loan structure. By using data from Chinese syndicated loan market, Chapter 5 further investigate, from the borrowers' perspective, how earnings quality, state-ownership affect syndicated loan terms and structure in China. Finally, Chapter 6 concludes.

[2] I also provide more detailed literature review in each of empirical chapter. In case of duplicate, I will not repeat the literature regarding market power hypothesis, information based hypothesis, earnings quality and state ownership in Chapter 2.

Chapter 2 Literature review

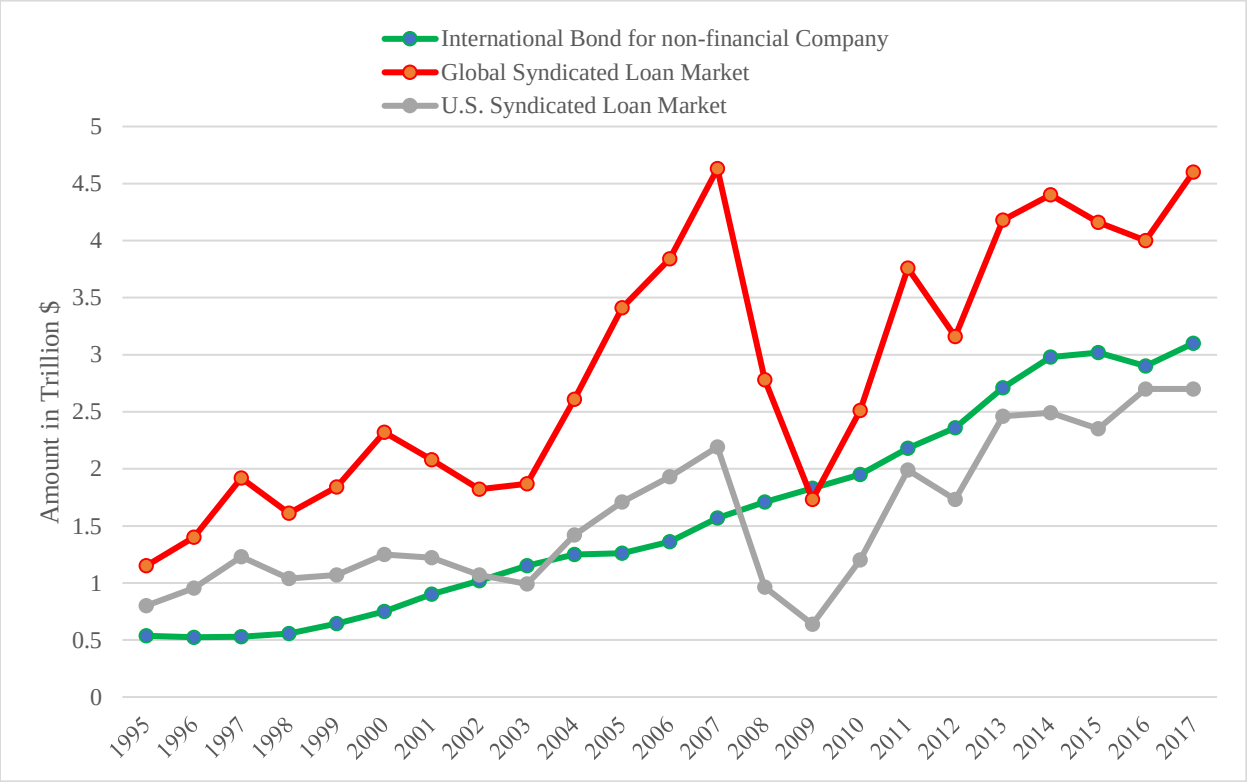
2.1 Syndicated loan

2.1.1 Syndicated loan: an introduction

Syndicated credit is one that two or more financial institutions contract with a borrower to provide credit based on common terms and conditions regulated by a common document (Campbell et al., 2013). It starts from the 1960s and takes advantage of the development of the cross border interbank market which allowed bringing together lenders from different geographical locations into syndicate a loan to the same borrower with common terms and conditions. Since then, the amount of syndicated loan has increased remarkably in the international markets during the last few decades. International total syndicated lending amounted to $251,019 billion in 2004, increased from $9,343 billion in 1991 (Godlewski and Weill, 2008). The syndicated lending credit amounted to $1.8 trillion in 2009, surpassing the $1.5 trillion of corporate borrowing in global bond markets (Chui et al., 2010). This suggests that syndicated loan has been playing an important role in the global financial markets, as it has exceeded, for example, bond and equity market in trading volume (Drucker and Puri, 2007). In particular, syndicated loan as one of the most important financial sources in the US, reached nearly $1.3 trillion in the second quarter of 2007,

compared to $400 billion at the beginning of 2002. Figure 1 shows the trading volume of syndicated loan market (International and U.S.) and its comparison with the bond market. Based on the data from Dealscan, the trading volume of syndicated loan increased to the peak of over $4.5 trillion in 2007 and recovered in recent years after a reduction during the crisis (**Figure 1-1**).

Figure 1-1: The development of syndicated loan market

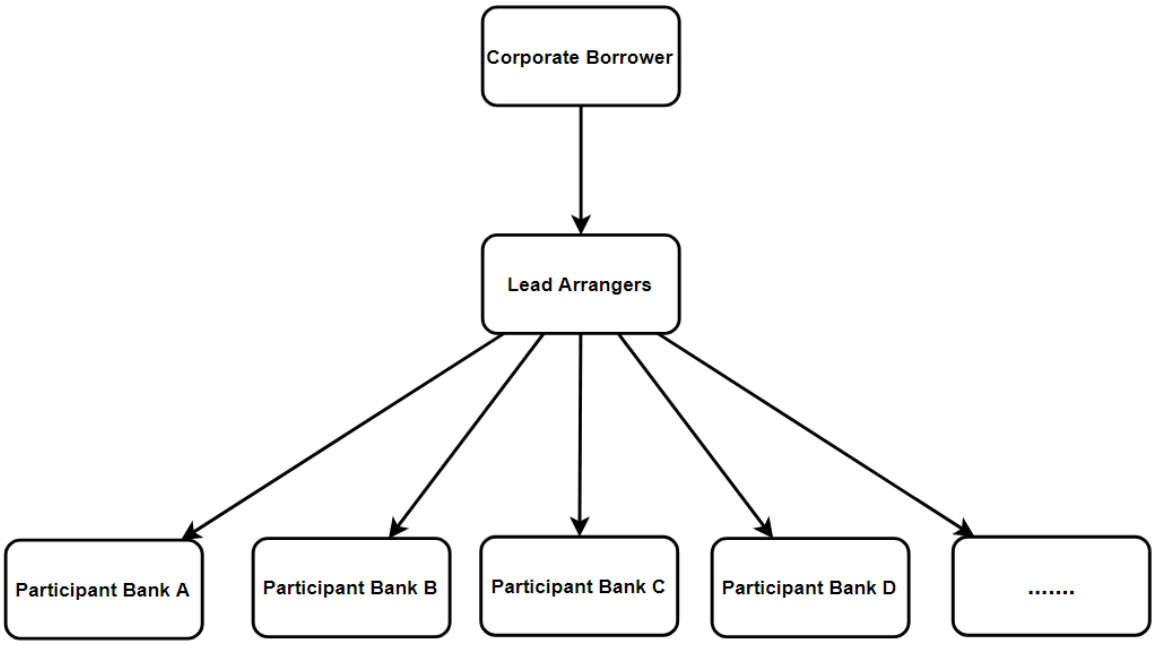


2.1.2 Syndication process

The syndicate starts from the borrower to select a lead arranger to advise and manage the syndication. Usually, the borrower will select the lead arranger based on competitive binding from borrower's relationship banks or other banks who have relevant expertise experience. The lead arranger is responsible for analysing borrower's credit quality, negotiating key terms and covenants with the borrower before inviting the participant banks to share the loan (Esty, 2001). Before the general syndication, the chosen lead arranger needs to prepare an initial draft of the loan documentation, structure the syndication in tiers[3] based on commitment amount and to decide which participant banks to invite. Then, the lead arranger holds a bank meeting to negotiate the contract terms, such as bank's commitment, closing fees and timetable for commitment. A usual practice is that the lead arranger is responsible for due diligence and monitoring. However, a typical syndicated loan agreement contains an extensive disclaimer which states that lead arranger owes no fiduciary duties to any participants (Ivashina, 2009), and each participant is responsible for its own assessment of borrower's credit risk (Esty, 2001). Participant banks have no resource against the lead arranger if the borrower default (Gopalan et al., 2011, Wight et al., 2009).

[3] The syndicate lenders are commonly named, in descending order of loan amount, Lead arranger, Mandated arranger, Arranger, Co-arranger, lead Manager and Manager.

Figure 1-2: The Process of Syndicated loan



2.1.3 Syndicated loan terms description

In the syndicated loan market, there are varies titles for lenders, such as agent, admin agent, book runner, co-manager, dealer, lead arranger, lead manager and so forth. In each of syndicated loan, there is usually one agent bank and multiple participant banks. To simplify, we name the lender as lead arranger if it is titled as ‘administrative agent’, ‘agent’, ‘arranger’, ‘bookrunner’,

‘lead arranger’, ‘lead bank’, ‘lead manager’ or ‘Mandated lead arranger’ in syndication. We name lenders with other titled roles as the participant banks thereafter.

In syndicated loans, one loan package may contain several loan facilities (tranching) issued to the same borrower. These facilities may vary with size, maturity, spread and other non-price terms even in the same package (Lim et al., 2014), therefore, we use syndicated loan at facility level thereafter.

Most common used loan types are as follows: term loan, other term loan (B, C, D, E and F), revolver credit facility, 364-Day facility, standby letter of credit. For the term loan, it is an installment loan and contains a specific amount of money that need to be fully repaid by the scheduled date. Term loans (B, C, D, E and F) normally have higher spread due to longer maturity. Same as term loan, the revolver credit facility is also the specified amount of money that need to be fully repaid by the scheduled data. However, the revolver credit facility gives the borrower the right to repay, redrawn and drawdown based on its preference. 364-Day facility is a specific type of revolver credit facility. It is structured as 364 days to reduce the pressure of lenders to make on unfunded commitment. Standby by letter of credit is a guarantee from syndicate lenders to pay off debt or obligation, such as commercial paper, leveraged leases and private placements, if the borrower cannot.

Apart from the spread over LIBOR, lenders normally receive various fees in syndication (Allen, 1990). Corporate borrowers need to pay *arrangement fee* to lead arranger group, *underwriting fee* to underwriter for guaranteeing the availability of funds, *legal fee* to legal advisor and *participation fee* to participant group for agreeing to join the facility. After establishing the credit, corporate borrowers also need to pay *commitment fee* or *facility fee* to syndicate members in order to compensate cost of regulatory capital which needs to be set aside against the commitment. Once the facility is drawn, syndicate members may receive *utilization fee* per annum based on the drawn proportion. At the same time, agent banks may receive *agency fee* annually to cover the administering costs. Sometimes, corporate borrowers will need to pay *prepayment fee* if they decide to reimburse any drawn amount prior to the defined term.

2.1.4 Advantages and disadvantages of syndicated loan

Syndicated loan invovles a group of lenders in which a lead arranger originates the loan and performs due diligence and monitoring, and the participant banks fund parts of the loan (Esty, 2001). The loan syndication helps lead arranger circumvent excessive single-name exposure and share risk with participant banks (Dennis and Mullineaux, 2000). Moreover, through syndication process, participants could approach certain markets and type of transactions in which they lack capabilities and build a long-term relationship with the lead bank in return for future more

profitable cooperation (Altunbaş and Gadanecz, 2004, Allen, 1990). At the same time, syndicated loan lending can also improve bank's loan portfolio in return and credit quality (Howcroft et al., 2014). Altunbaş and Kara (2011) showed that banks use syndicated loan to boost their margin when they face lower net interest margin.

Existing literature (Allen, 1990, Altunbaş and Gadanecz, 2004) has acknowledged the ways how borrowers benefit from loan syndication. First, comparing to bond or equity market, borrowers can raise large amounts of money from the syndicated loan market during the limited time. Second, it is less costly to originate a syndicated loan than bond. Third, the cancellation of syndicated loan commitment is easier and has less subsequent effect, where such action in securities market could result in the loss of investor's confidence. Fourth, comparing with bilateral loan, borrowers can raise the same amount of money in a lower spread in syndicate loan market instead of a series of bilateral loan arrangements with multiple banks. Finally, syndicated loan commitment can also provide borrowers flexible funding structure (such as currency choice), stable future funds and relationships with multiple banks. Moreover, for those firms in the extreme condition, such as very large, high credibility, profitability, but fewer growth opportunities, they prefer syndicated loan (Altunbas et al., 2010).

At the same time, syndicated loan also bears with disadvantages. Because syndicated loan has one or two lead arrangers and multiple participant banks. The delay in communication between

lead arrangers and participant banks or administrative errors would cause delayed money transfer, which may negatively affect corporate borrowers. At the same time, lead arrangers also meet free-riding problems from participant banks because they only take small part of syndicated loan (Altunbas and Gadanecz, 2004). For participant banks, they are facing adverse selection and moral hazard problems from lead arrangers.

2.1.5 Recently literature reviews on syndicated loan

This section reviews relevant literature from five aspects: syndicated loan characteristics, lender's perspective, firm characteristics of borrowers, characteristics of macroeconomic and local markets and others.

From the syndicated loan characteristics aspect, firstly, controlling for other factors, loan facilities marked as Term-loan B usually have higher spreads than Term-loan A or revolvers (Nandy and Shao, 2008). Compared with Term-loan A or revolver, Term-loan B generates a higher risk because of the uncertainty of default risk in a longer maturity (Lim et al., 2014). For the default rate of the syndicated loans, Altman and Suggitt (2000) show that it is significantly similar to that of corporate bonds over the five years after issuance; while the default rate for the loan is likely to be higher than the bond in the first two-years.

Secondly, due to the existence of multiple lenders for one single loan, there is a problem of asymmetric information between participating banks. As the originator of a syndicated loan, lead arranger holds more information about the borrower and the loan and has the incentive to syndicate bad or risky loans, known as adverse selection problem. Lead arranger is also the main party to perform due diligence, but after selling part of loan to participants, lead arranger has less incentive to continue costly and unobservable monitoring, which influences the benefits of participant banks (Ivashina, 2009). Therefore, participant banks usually require lead arranger to retain a large fraction of loan, the proportion of loan held is not only a credible commitment from lead to perform monitoring and due diligence, but also evidence of the borrower quality (Sufi, 2007, Ivashina, 2009). Ivashina (2009) also points out that, even though the increased proportion held by lead bank would reduce information asymmetries, moral hazard and adverse selection problems between lead and participants, further to reduce the premium required by participant banks. At the same time, however, increased share of lead bank will increase the risk of lead's loan portfolio, thus a higher premium charged by lead arranger. Meanwhile, such syndicated loans are also more likely to be lent by a smaller number of participating banks (Lin et al., 2012).

From the aspect of lenders, in loan syndication, lenders could be either bank investor (commercial bank and investment bank) or no-bank investor (including insurance company, finance company, hedge fund, private equity, mutual fund and other small type of investors) (Lim et al., 2014). The latter, such as hedge funds and private equity investors, would charge higher loan

premium to compensate considerable fee charged by fund manager (Lim et al., 2014), especially when banks lack capital or borrowing firms face financial constraints. Compared with commercial banks, investment banks usually charge a higher premium as they lack special and sustainable fund to syndicate. In contrast, commercial banks usually have sufficient deposit to fund syndicate. Furthermore, the favour of less profitable and high leveraged firms is another reason for high premium charged by investment banks (Harjoto et al., 2006).

When foreign institutions participant in the syndication process, the interest rates are normally higher because they are often treated unfairly and more likely to take risky loans. Haselmann and Wachtel (2011) point out different motivation for foreign institutions entering large and small countries. The main market in large countries is high leveraged and risky loans for foreign participants because fewer opportunities left for them in such a developed financial market. While the absence of domestic borrowing opportunities in small countries, foreign banks tend to syndicate with local banks to enter this foreign market.

When banks exert some control over the borrower firms or act as equity market maker, they are more likely to act as lead arrangers to syndicate loans to alleviate the problems of information asymmetries (Allen et al., 2012, Ferreira and Matos, 2012). This is the extreme condition in which bank can minimise the problem of private information than relationship-lending, as the bank charges higher interest rates than the firm’s quality warrants where information

asymmetries between firms and new lenders enlarge additional switching costs and prevent firms changing banks instantly (Ioannidou and Ongena, 2010). This 'bank-lock-in' problem is consistent with the findings of Ferreira and Matos (2012) that firms pay a higher interest rate when involving bank governance.

From the perspective of borrowers, bank lenders usually use firm's quantitative (hard) information to evaluate the viability of borrowers, even though it cannot completely overcome the asymmetry information problem between borrowers and lenders without soft information (such as lending relationship; cultural and ethical behaviour). Quantitative information, such as IFRS (International Financial Reporting Standards) and industry audit expertise, plays as an information cost reduction tool and is found to be associated with lower loan spread, longer loan maturity and larger number of foreign lenders (Chan et al., 2015, Chin et al., 2014).

Lending relationship, as one of the major soft information sources, has been investigated by extensive literature which has shown that a long-term bank-borrower relationship is helpful for lenders to acquire private information (Boot, 2000, Bharath et al., 2007, Bharath et al., 2011). With longer banking relationships, firms have a greater probability to get funds from their relation-banks and the spread would be generally 10-17 bps lower especially when borrower transparency is low (Bharath et al., 2011, Bharath et al., 2007). Giannetti and Yafeh (2012) also find that cultural distance enlarges loan spread, reduces loan amount and increases the likelihood of requiring

guarantees by third-party. Furthermore, the borrower's ethical behaviour could help them access lower loan rates from the bank (Kim et al., 2014). For public and private firms, Cumming et al. (2011) show that public companies have substantially more tranches and less variation spreads in their syndicated loans as transparent information reduces information asymmetries.

From the aspect of macroeconomic, during the financial crisis, syndicated loan markets experienced a sharp decline of amount and an increase in loan spread (Ivashina and Scharfstein, 2010) in U.S. This phenomenon can be explained by flight to home effect and flight to quality effect, as fund prefers home market and quality market when facing the recession (Bernanke et al., 1994, Lang and Nakamura, 1995, Giannetti and Laeven, 2012). **For local market**, such as legal system, it has proved that lenders usually create more concentrated syndicates to facilitate monitoring and low cost contracting in countries with strong creditor rights and reliable legal enforcement, and if borrower and lender are in common law countries, the tranching is more frequent and spreads are narrower (Esty and Megginson, 2003, Cumming et al., 2011).

2.1.6 Syndicated loan market in China

The syndicated loan market in China has developed significantly over the last decade, with a total amount of $923 billion[4] in the first half of 2016, accounting for 11.35% of total loans,

[4] On average, USD$1 is equivalent to RMB¥6.50.

compared to 1.72% in 2006 (CBS, 2016). Earlier, Chinese syndicated loan market is dominated by foreign banks (Pessarossi and Weill, 2013). In recent years, the importance of Chinese local banks has increased, and Chinese domestic banks participated nearly half of Chinese syndicated loan during the period of 1999 to 2002 (McCauley et al., 2002). After 2009 financial crisis, the role of local banks has increased considerably, and more than half of loans issued in China were participated by the Big Four Banks, Agricultural Bank of China, The Bank of China, Construction Bank of China and Industrial and Commercial Bank of China (Korkeamaki et al., 2014). In the financial crisis period, the volume of syndicated loans grew steadily in Chines, in contrast to other countries (Caporale et al., 2018). Apart from trading volume, loan currency also changed dramaticaly. In 2009, the proportion of foreign currency loan in total chinese syndicated loan is less than 5% (Chui et al., 2010), while, this ratio was 80% in the year of 2006 (Pessarossi and Weill, 2013). In 2007, China Banking Regulatory Commission (CBRC) also put regulation to standardize the practices in Chinese syndicated loan market.

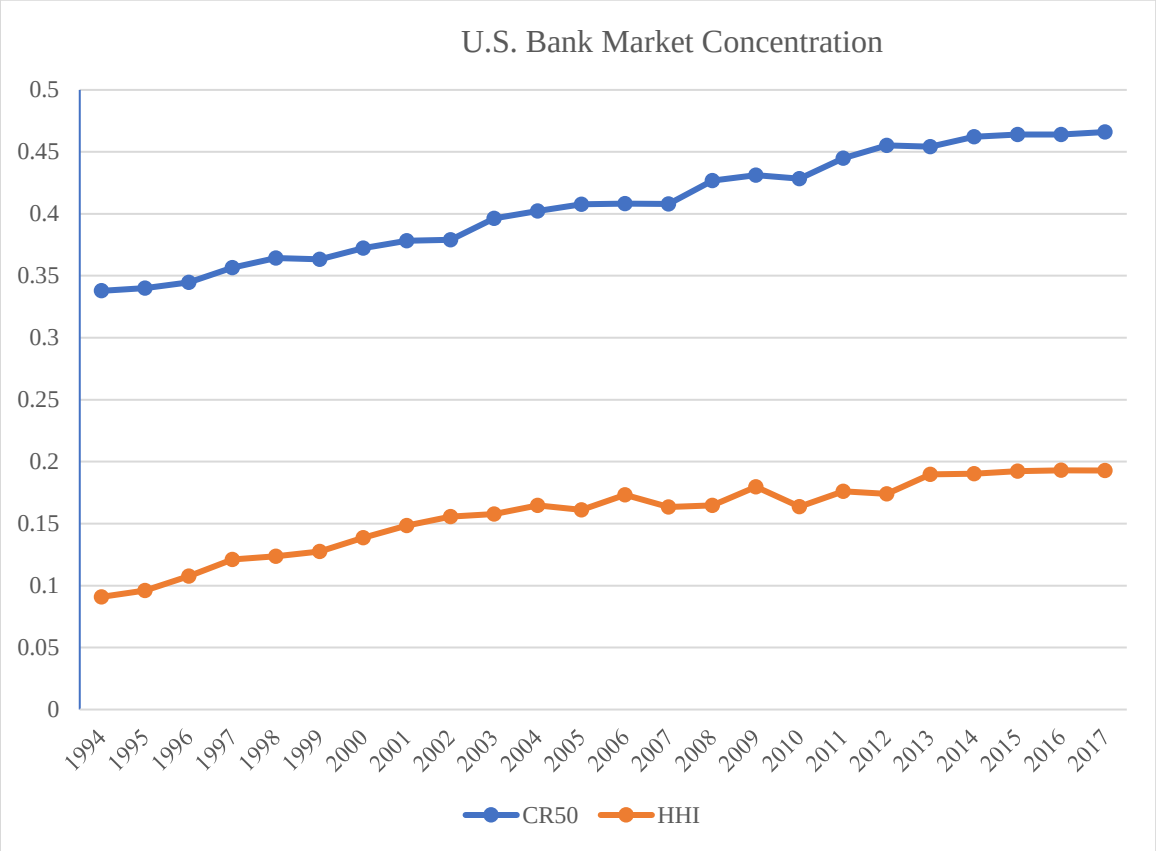
2.2 Bank market structure

2.2.1 The importance of bank market structure

As one of the most important suppliers of external finance to firms, banks play an essential role in supplying credit, determining the cost of finance and maintaining bank-firm relationship.

Changes of bank market structure would matter for the cost of finance, corporate innovation, economic growth and social welfare (Claessens and Laeven, 2005, Cetorelli and Gambera, 2001, Cornaggia et al., 2015). **Figure 1-2** maps the changes of bank market structure in U.S. from 1994 to 2017. The bank market structure refers to the level of concentration or competition in the bank industry. It has been assessed through the concentration ratios (e.g., CRn, HHI) based on the structural approaches. The level of concentration demonstrates the extent to which the largest banks contribute to the specific product market (e.g. deposit market). Normally, the higher level of concentration indicates that those largest banks have more market power and less competition.

Figure 1-3: The U.S. bank market structure



2.2.2 Measures of bank market structure

There are two approaches to measure bank market structure, structural approach (such as number of firms, HHI and CRn) and non-structural approach (such as H-statistic, Lerner index) (Leon, 2015).

The structural approach, developed from structure-conduct-performance (SCP) paradigm, explains conduct and performance of banks in terms of their market structural characteristics. Based on the structural-characteristics of market, such as number of firms and relative and absolute size of interested companies, researchers developed three widely used measures of concentration, Herfindahl-Hirschman Index (HHI), concentration ratio and number of firms.

The major advantage of structural approach concentration measures is low-level data requirement. Even for the less-developed financial markets, concentration measures could be calculated at national level. The main critics of structural approach concentration measures can be summarised from three aspects. The first debate is about the linkage between conduct and structure. Some studies propose that high concentration may not lead to non-competitive price conduct. Such as in a duopoly market, Bertrand outcome is also possible and the price competition could be efficient (Perrakis, 1982, Bernheim and Whinston, 1990). The second debate is the notion of efficient-structure hypothesis, which suggests efficient company operation could take over higher market share and thus increase market concentration. Therefore, the concentration measures

represent the difference in efficiency instead of the competitive situation (Demsetz, 1973, Peltzman, 1977, Ergungor, 2001). Finally, the main practical problem is how to appropriately define relevant geographical market and type of product market (Shaffer, 2004, Leon, 2015). For example, out-state bank or foreign banks may participant in the local market and same loan can be exercised by investment banks rather than commercial banks.

The non-structural approach measures seek to evaluate competitive pressure by analysing the conduct of a company in the market. Here below present advantages and shortcomings of two commonly-used non-structural measures (Lerner-Index and H-statistic) in banking related literature.

Lerner Index is based on the theory of firm market power, which can be reflected by the divergence between firm's marginal cost and product price (Lerner, 1934). Because of its unique features, such as simplicity, straightforward interpretation, non-stringent data requirement, reflected changes over time and unnecessity of defining relevant market, Lerner Index has become one of the most widely used market structure measures. However, Lerner Index still suffers critics on theoretical and practical limitations. For example, Boone (2008) shows that Lerner Index is a proxy for pricing market power rather than a competition measure. In addition, recent studies have shown the changes in the degrees of market power do not follow Lerner Index (Boone et al., 2012, Boone, 2008). Lerner Index also does not fully reflect the degree of product substitutability

appropriately (Vives, 2008). To some degree, Lerner index overestimates bank market power, because it does not account for bank's risk-taking. In banking sector, banks do not benefit from higher margins when they take greater risks and spend more of their resources granting credits (Oliver et al., 2006, Turk Ariss, 2010, Beck et al., 2013). The third critic is about its assumption on perfect technical and allocative efficiency. Indeed, banks rarely operate under perfect efficiency, because efficiency and operating costs of banks change with their economic environment and relative products (Chaffai et al., 2001).

H-Statistic carries the similar advantages as Lerner Index, but attracts more critics than Lerner Index. First type of debate is from its econometric identification. Based on the definition, H-statistic equals one if a sample firm is from a long-run competitive equilibrium, and H-statistic is less than or equal to zero if sample firms are from profit-maximising monopoly market. However, in practice, H-statistic can be positive in a monopoly market and negative in a competitive market (Bikker et al., 2012, Leon, 2015). Continuous nature of H-statistic, which is the important characteristic of H-statistic, has raised doubt (Shaffer, 2004). Vesala (1995) proved that H-statistic is only continuous under certain conditions. There are additional critics on the assumptions of H-statistic, market equilibrium, demand elasticity and cost function (Shaffer, 1993, Vesala et al., 1985, Bikker et al., 2012).

2.2.3 Banking market deregulation in U.S. and China

The U.S. commercial banking market was heavily regulated and banks were restricted to open new branches outside local state boundaries. This situation was eased until the 1970s. From then on, the U.S. banking market witnessed a wave of deregulation until the middle of 1990s (Johnson and Rice, 2008). In 1982, state Maine firstly passed an interstate banking deregulation and then the U.S. begun to remove the regulation on expansion. During this period, two classes of restrictions were eased, intrastate branching and interstate banking. Intrastate branching deregulation allows banks to expand within the local state through acquiring other branches or setting up new branches (Strahan, 2003). This deregulation has largely increased the banking market efficiency because efficient banks can take the market share and acquire inefficient local bank branches operated as subsidiaries. Interstate banking deregulation permits banks from other states to set up banks chartered in the deregulating states. By the mid-1990s, the assets held by out-of-state banks rose to 23% comparing with 0% in the mid-1970s. In the year of 1995, the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) removed all restrictions on interstate banking and allowed banks (national or state banks) to engage in interstate branching.

Chinese bank market went through a contiunous and dramatic reform during the last 40 years. Prior to 1978, People's Bank of China (PBC) is the only bank in China, it served both as

central bank and commercial bank. Then, from 1978 to 1980s, government seperated the function of PBC and established four stated-owned bank: Agricultural Bank of China, The Bank of China, Construction Bank of China and Industrial and Commercial Bank of China. These four banks served for different economic sectors, therefore , the chinese bank market is extremely concentred until the early of 1990s. In 1994, three policy banks were established to takeover the policy-lending role of Big Four Banks. In 1995, with the enactmenting of China's Central Bank Law and Commercial Bank Law, the banks, like city commercial banks, foreign bank branches, rural cooperatives and joint-equity banks are allowed to enter the Chinese market. In the late of 1990s, the Big Four Banks began to transfer non-performing loans to the four state-owned asset management companies. After WTO accession in 2001, chinese governement carried out a series of liberalization in areas such as interest rate, ownership takeover and geographic scope both for foreign and local banks. In 2005, state-owned banks started to be listed in stock market, such as HongKong and ShangHai stock exchanges. Then in 2006, city commerical banks were allowed to eatablish branches in other provices, and a formal regulation was issued by China Banking Regulatory Commission to remove restriction of bank cross-regional branching. After 40 years of reforming, chinese market market is constructed by policy banks, state-onwed banks, national joint-equity commercial banks, city commercial banks, rural commercial banks, foreign banks and other non-bank financial institutions (Xie et al., 2019).

Chapter 3 Bank Market Concentration and Syndicated Loan Prices

3.1 Background

There has been ample empirical evidence on the 'price-concentration' relationship in banking and bilateral loans where on one hand, corporate loan rates are found to be positively associated with banking market concentration in U.S. (Cyrnak and Hannan, 1999), Italy (Sapienza, 2002) and Belgium (Degryse and Ongena, 2005), supporting market power hypothesis. On the other hand, bank-efficiency model and information-based hypothesis conjecture a negative 'price-concentration' relationship (Demsetz, 1973a, Fungáčová et al., 2017). Compared with bilateral loans, syndicated loans carry a nature of 'three-party' game and in additional to lead arranger and borrower, participant lenders also play an important role in loan syndication. Hence, such a 'three party' game involves additional adverse selection and moral hazards problems (Ivashina, 2009) and lenders from different bank markets may have different pricing mechanisms in loan syndication. Whereas, there has been little empirical evidence on the 'price-concentration' relationship in a syndicated loan setting, except for Lian (2017) and Hasan et al. (2017) which have investigated such a relationship in borrower's market only. To advance our understanding on such a relationship in syndicated loan, we consider the effects of bank competition from all three markets (lead arranger, participant lenders and borrower) on syndicated loan prices and in addition,

we also investigate the moderating effects of lender types on such a 'price-concentration' relationship where non-commercial banks and non-bank institutions usually charge higher prices than commercial banks (Lim et al., 2014).

We test the 'price-concentration' relationship between syndicated loan prices and bank market concentration at a state level in U.S. which, first, is ideal for the scenario where a lead arranger headquarters in a different bank market from the borrower, enabling us to investigate the effects of the difference of bank concentration from two different markets on syndicated loan prices. We expect that the concentration of both borrower's and lead arranger's markets would affect loan prices and lenders of different types (e.g., banks vs. non-banks) would have different sensitivities to bank market concentration in pricing syndicated loans due to the heterogeneity of their liquidity, costs and lending portfolio risk. To this end, we identify the location (state) and measure the bank market concentration where both the borrower and the lead arranger headquarter. Both of them may face the same market concentration if they headquarter in the same states (12% of our samples) and they may face different bank market structure where a lead arranger comes from a more competitive (39%) or a more concentrated bank market (49%) than the borrower's market. Second, we use share-weighted bank market concentration to capture the bank market power of participant lenders and finally, we identify the type of lead arranger (87% commercial banks and 13% investment banks or non-banks) to examine the heterogeneity of the price sensitivity to banking market concentration.

Consistent with Lian (2017), our results show that the bank concentration in borrower's market increases syndicated loan prices, in terms of fees, spread and overlibor. By adding new evidence to literature, we also show that syndicated loan prices are more sensitive to the bank concentration of lender's market than that of borrower's market. Hence, borrowers will benefit from lower syndicated loan prices if they are located in a less concentrated bank market than the lead arranger's. This result is consistent with the 'auction' nature of loan syndication where loan prices charged in borrower's market reflect an equilibrium of lenders' markets (Lim et al., 2014). We find little evidence that the bank concentration of participant lenders have any impacts on syndicated loan prices.

In sharp contrast to commercial banks, investment bank and non-bank lead arrangers charge lower prices if they face a stronger bank concentration, supporting the structure-conduct-performance paradigm in bank markets. Our results are robust to various bank concentration measures (e.g. CR_k, HHI and number of branches), model specifications and endogeneity check. The effects of bank concentration on syndicated loan prices are economically significant and overall, for example, a standard deviation increase of bank concentration ratio in lead arranger's market (CR_{50}^{Lead}) would raise the *overlibor* of a typical syndicated loan ($366 million) by 4.15 base points, equivalent to around $152,000 additional costs for a corporate borrower.

The remainder of the paper is structured as follows. In Section 2, we review literature on the relationship between bank concentration and loan prices and develop hypotheses. We describe our data, variables and baseline model specification in Section 3 and report the empirical results in Section 4. Finally, we conclude our findings with implications in Section 5.

3.2 Literature review and developing hypothesis

In recent years, syndicated credit continuously performs its crucial role in the global financial system, with a total volume of $4.7 trillion in 2015, compared with $3.02 trillion in the international bond market for non-financial companies. U.S dominates the global syndicated loan market with $938.6 billion in the first half of 2016 out of $1.8 trillion globally[5]. Syndicated loans provide corporate borrowers a large sum and stable funds at relatively lower interest rates than bilateral loans, bonds and equities (Altunbaş and Gadanecz, 2004) and enable them to build and keep business relationships with multiple lenders. Moreover, syndicated loans provide lenders an efficient mechanism to diversify loan risk via dispersing portfolio into multiple lenders and to bypass regulations on the maximum size of a single loan[6].

[5] The information is collected from Thomson Global Syndicated Loans Reviews and Bank for International Settlements (BIS).
[6] The lending limits as defined in FDIC law, §32.3, where the maximum size of loan to single borrower is 15% of the bank's or savings association's capital and surplus.

There has been ample empirical evidence on the determination of syndicated loan prices in terms of the participation of non-bank lenders (Lim et al., 2014), foreign banks (Haselmann and Wachtel, 2011), the roles played by ethical behavior (Kim et al., 2014), corporate social responsibility (Bae et al., 2018) and asymmetric information (Ivashina, 2009). However, what is less understood is the effects of bank market concentration on syndicated loan prices. Such a 'price-concentration' relationship could be understood within three competing theoretical frameworks: structure-conduct-performance paradigm (SCP), structure-efficient hypothesis (SE) and information-based hypothesis (IB).

SCP, also known as market power hypothesis, proposes that banks with a greater market power would charge higher prices on loans for two reasons. First, due to their market power, banks maximize profits by charging higher rates on loans and paying lower interests on deposits, leading to credit rationing (e.g. Pagano, 1993, Guzman, 2000). Second, banks with a greater market power charge higher prices on loans because of their cost inefficiency (Ariss, 2010, Delis and Tsionas, 2009). In contrast, the structure-efficient model (SE) proposes that banks with a higher market share would charge lower prices on loans due to their improved productivity technology and efficient management, which have helped them reduce costs, gain higher profits and take over a bigger market share (Demsetz, 1973). The information-based hypothesis (IB), instead, indicates that banks with a greater market power would have stronger incentives to acquire private information from borrowers and to improve credit availability, especially to those financially

constrained borrowers. Hence, banks with monopoly power could help firms by providing loans at a relatively lower prices (Fungáčová et al., 2017, Jackson and Thomas, 1995) and extract rent in the future from those who are eventually successful (Sharpe, 1990, Petersen and Rajan, 1995b, Cetorelli and Gambera, 2001, von Thadden, 2004).

To examine the 'bank concentration – loan price' relationship, recent empirical studies have focused on the structure (HHI or Lerner Index) of borrower's bank market (e.g. Lian, 2017, Hasan et al., 2017). Such an investigation has become increasingly important since the removal of interstate banking and branching restrictions by Interstate Banking and Branching Efficiency Act (IBBEA) in 1990s. Banking market deregulation, especially on interstate banking, has enabled banks to geographically diversify risk across state borders (Amore et al., 2013) so that distant banks (e.g. headquartered in another state) would compete against local banks and borrowers can borrow from 'distant' banks locally. The empirical evidence of (Lian, 2017) is in favor of market power hypothesis (Cetorelli and Strahan, 2006) where in borrower's market, bank competition drives up credit supply and therefore reduces loan prices. This is in sharp contrast to the conjecture of asymmetric information hypothesis (Petersen and Rajan, 1995b) that bank competition reduces relationship banking. We credit the originality of such an investigation to Lian (2017) which considers the scenario where borrowers borrow locally from either local lenders or distant lenders which run branches in borrower's market. In addition, we also propose that borrower's market concentration matters for loan pricing even they borrow from distant markets. This is because

distant lenders need to offer a more competitive price to compete with local lenders (Degryse and Ongena, 2005) and to compensate borrower's additional costs incurred in accessing distant finance, such as transportation. Therefore, we hypothesize that

Hypothesis 1: Syndicated loan prices are positively associated with bank concentration in borrower's market.

Lian (2017) comprehensively examines how the bank concentration of borrower's market affects syndicated loan prices. We hypothesize that the bank concentration of lead arranger's market also matters in pricing loans and this applies to both scenarios where either distant banks enter borrower's market to compete with local lenders or borrowers reach out distant credit in distant location. In the former scenario, bank concentration of lead arranger's market matters for loan price because it determines the costs of capital for banks. It has been widely acknowledged that according to SCP, banks would have lower costs of deposits if they have a greater power in a deposit market (e.g. Pagano, 1993, Guzman, 2000) and for risk diversification reasons (Amore et al., 2013), distant banks who operate branches locally may channel deposits from their headquarter location to the new market they enter. In such a scenario, the syndicated loan price would be negatively related to lead arranger's bank market concentration if the lead arrangers have lower costs of capital. It is also possible that syndicated loan prices increase with lead arranger's bank market concentration if lead arrangers charge comparable price to both local and distant borrowers.

The latter scenario proposes a possibility that borrowers reach out to raise funds from distant market directly because of the overlap between industrial and financial markets (Asker and Ljungqvist, 2010) and the development of information technologies in financing businesses even distant banks do not have local branches in the market where borrower locates (Petersen and Rajan, 2002). Theoretically, borrowers may do so because of the indirect competition theory in banking sector (Osborne, 1988) where the geographical span of the industrial markets in which borrowers operate affect their demand for credit in distant market (Bellon, 2014). Therefore, a borrower would not be financially disadvantaged if its key competitor locates in a distant location. The spatial price discrimination theory (Degryse and Ongena, 2005) also states that distance between lender and borrower and the distance between borrower and competing banks would mitigate the bank market concentration effects on loan prices. Recent literature has offered both theoretical justification (e.g. Bellon, 2014) and empirical evidence (e.g. Tian and Han, 2018), supporting the 'reach-out' scenario[7]. In such a scenario, the 'price-concentration' relationship would be positive and distant borrowers would be charged higher prices on loans if the lead arranger has a greater market power in its own market. Therefore, we hypothesize that

[7] Our data and information from FDIC also provide empirical evidence to support such a possibility. For example, FDIC shows that only 2 banks headquartered in Arizona operate interstate banking and branching in another 4 states. These two banks, however, lead syndicated loans for borrowers from 26 states in total.

Hypothesis 2: Syndicated loan prices are associated with bank concentration in lead arranger's market.

Apart from borrower and lead arranger, participant lenders also play an important role in loan syndication. This is because first, in additional to the agency problem between lenders and borrowers, participant lenders may face further adverse selection and moral hazard problems when syndicating loans with lead arrangers (Ivashina, 2009). Second, participant lenders have an information disadvantage against lead arrangers on the creditability of borrowers due to their weaker incentives to invest in costly private information collection[8]. Above mentioned theories may also apply to participant's market where loan prices could be associated with participant's market concentration. Another possibility is that loan prices would not be sensitive to participant's market concentration because in the syndication process, the prime loan terms (loan size, maturity, price, etc.) have been set before lead arrangers invite participant lenders (Esty, 2001, Dennis and Mullineaux, 2000). Even though, participant lenders can require the lead arranger to reset the loan terms especially when the loan is undersubscribed or the request is raised by all participant lenders. Hence, we hypothesize

[8] A lead arranger may face a free-riding problem by participant lenders in information collection and monitoring (Lee and Mullineaux, 2001) if participant lenders hold a small portion of loans (9.6% averagely for each participant in our data).

Hypothesis 3: Syndicated loan prices are associated with the bank market concentration of participant lenders.

There has been ample empirical evidence on the determinant roles played by the type of lenders in pricing loans due to the heterogeneity of their liquidity, costs, and lending portfolio risk. Syndicated loans issued by non-commercial bank and non-bank lenders are usually charged higher prices than those issued by commercial banks only in loan syndication. This is especially prominent for loans issued by hedge funds and private equity investors, loans raised by financial constrained borrowers and when loans are less available from commercial banks (Lim et al., 2014). Higher loan prices are charged by non-bank lenders to compensate for their liquidity and usual fees charged on financial services. In addition, for asymmetric information reasons, non-bank institutional investors may charge a higher spread on syndicated loans when they have less information about the loan quality than the lead arranger who conducts borrower's due diligence. As a result, "adverse selection could delay the syndication process and make institutional investors demand a higher spread" (Ivashina and Sun, 2011, p.501). Also due to the information disadvantages, loans with participating non-bank lenders are more difficult to be restructured in financial distress than bank loans (Demiroglu and James, 2015). Empirical studies have suggested that non-bank institutions and investment banks participate in loan syndication especially when commercial banks lack of funds or borrowing firms are facing financial constraints (Lim et al., 2014). Therefore, non-bank financial institutions usually charge higher prices on syndicated loans

because of their higher managing fee, less special and sustainable funds to syndicate and being in favor of less profitable and high leveraged firms (Harjoto et al., 2006).

In addition to the above conjectured 'price-concentration' relationship, we propose that such a relationship may vary between loan issued by commercial banks and non-commercial bank financial institutions (e.g. investment banks and non banks). Based on SCP, commercial banks will pay lower interests on deposits and charge higher interests on loans issued to corporate borrowers (e.g. Pagano, 1993, Guzman, 2000). Thereofore, those non-commercial bank financial institutions will be able to obtain funds from commerical banks with lower costs (Ahmed et al., 2015) and to offer more competitve syndicated loan prices to borrowers (Gropp et al. 2014) in a more concentrated bank market. Hence, we hypothesize

Hypothesis 4: The 'price-concentration' relationship may vary over lender type.

3.3 Data and methodology

3.3.1 Data

We collect data on syndicated loans from DealScan and bank data from Federal Deposit Insurance Corporation (FDIC) between 1994 and 2012[9]. Firm-level information on borrowers is collected from Compustat and macroeconomic data are from Federal Reserve Bank of St. Louis. DealScan provides detailed information on loan characteristics (e.g. spread, maturity, amount, and purpose), borrower's information (e.g. name, location, and industry) and lender's characteristics (e.g. name, location, share allocation, type, and lender role in syndication). We use Compustat-DealScan linking table (Chava and Roberts, 2008) to match syndicated loans and borrowers' information. We match bank concentration to syndicated loan based on the location of the borrower and lenders (lead arranger and the participant lenders) at state level. We focus on syndicated loan samples so as we have a full set of information for borrowers, lenders, and local (state level) banking concentration. After matching bank concentration and syndicated loan, we have 54,243 observations in total. We further exclude sample loans issued to foreign borrowers (3,624), those with missing location information (2,457) and those raised by financial institutions

[9] The information on bank market structure from FDIC covers a period since 1994 and the Compustat-DealScan table covers a period until 2012 (Chava and Roberts 2008).

(15,139) and in total, we use 33,023 syndicated loan samples between 1994 and 2012 in the following empirical analysis[10].

3.3.2 Syndicated loan price and facility characteristics

We measure syndicated loan price by *fees*, *overlibor* and *spread*. Fees (commitment fee and annual fee) are used to price options[11], *overlibor* – rate over the London Interbank Offered Rate (LIBOR) - is to measure syndicated loan rate and *spread* (all-in-drawn spread) is the total of the annual fee and *overlibor* (Chan et al., 2015). To examine the effects of banking market concentration on syndicated loan prices, we follow (Lim et al., 2014) and control for loan facility characteristics, such as loan size, maturity, number of lenders, term loan, having covenants and performance price features. To further investigate the heterogeneity of banking market concentration effects, we follow Lim et al. (2014) and control for the type of lead arranger as

[10] Because of the missing value in pricing variables, we only have 28,198 observations, 18,225 observations and 14,470 observations in our baseline regression model (Model 1, 2 and 3 in Table 3).

[11] Fees are used to price cancellation and drawdown options and to screen borrowers who possess private information to exercise the fee options by which lenders could learn the likelihood of borrower's future credit line usage by the combination of loan spread options and commitment fee options (Berg et al., 2016). Commitment fee also enhances bank reputation by keeping its promise, prevents bank from extracting extra rents by intimidating to withhold credit, and weakens the effects of moral hazard. Borrowers have an option to draw on a line of credit and each line of credit provides the borrower with an option to draw at a pre-specified spread. Borrowers would be more likely to draw down their lines of credit when spot market spreads are high (Berg et al., 2016). With different combinations of fee and spread, lender can predict future behavior of borrower. For example, if borrowers choose contracts with low fee and high spread, they are more likely to draw down their credit lines.

commercial banks and non-commercial bank lenders (investment bank and other non-bank financial institutions, e.g., hedge funds). We define the lead arranger as the key lender who plays a role as 'administrative agent', 'agent', 'arranger', 'bookrunner', 'lead arranger', 'lead bank', 'lead manager' or 'Mandated lead arranger' in loan syndication (Ivashina, 2009, Taylor and Sansone, 2007) and exclude loan samples (2% of total samples) with multiple lead arrangers by following (Ivashina and Scharfstein, 2010).

3.3.3 Measuring banking market concentration

We follow Lian (2017) and use structural measures, such as concentration ratio (CR_k) and Herfindahl-Hirschman Index (HHI), at a state level in U.S to evaluate the concentration of local banking market where the borrower and the lead arranger located, respectively[12]. We calculate the state level market concentration of the participant lenders based on the loan shares they hold[13]. We use state-level bank concentration instead of bank level market power in the analysis because whether a lending bank exercises its market power is mainly dependent on local bank market

[12] We measure market concentration at a state level for three reasons. (1) Banks operating in multiple MSAs usually set uniform-prices which are independent from MSA market concentration (e.g. Heitfield and Prager, 2004, Heitfield, 1999, Radecki, 1998). (2) States still have considerable leeway to decide the rules in governing entry by out-of-state banks since IBBEA (e.g.Rice and Johnson, 2007, Rice and Strahan, 2010b). (3) Due to the size of syndicated loan (averaged at $366 m) and borrower (averaged asset value of $5.02 billion), it is highly likely that syndicated loans are raised 'distantly' across county and MSA. Therefore, defining the local market at county or metropolitan area is no longer evident and instead, state boundaries seem to be appropriate for bank market (e.g. Radecki, 1998).

[13] We do not have information on foreign banks and only consider U.S banks in participating loan syndication, accounting for 70% of total participant lenders in U.S syndicated loan markets.

structure (Hasan et al., 2017). CR_k has been widely used in measuring bank market concentration (Bikker and Haaf, 2002b) and in specific, we make a distinction between the banking market where a borrower locates ($CR_k^{Borrower}$) and that where the lead arranger headquarters (CR_k^{Leader}). If both borrower and lenders are in the same state, they will face the same banking market structure. We use CR_{50} in the main tests and HHI, CR_{20}, CR_{10} and other concentration ratios in robustness tests to fully capture the bank market concentration effects on syndicated loan prices. In addition, we use deposit CR_k and HHI at state branch level in our main tests and deposit HHI at state bank level and MSA (Metropolitan Statistical Area) branch level (Lian, 2017) in robustness tests.

3.3.4 Control variables and baseline model specification

In the following empirical analysis, we follow Ivashina (2009) and control for borrower's characteristics by assets, tangibility, profitability and credit risk by S&P credit rating. We also control for macroeconomic conditions at state level, such as annual personal income and state gross domestic product (Gelos et al., 2011, Schuermann, 2004). We report the definition and source of each variable used in Table 3-A1. To examine the effects of banking market concentration on syndicated loan price, we have the baseline model specification (Eq.3-1) as follows:

$$Syndicated\ loan\ price_t = \partial + \beta \times banking\ market\ concentration_{t-1} + \gamma \times Loan\ characteristics_t + \theta \times Other\ controls_{t-1} + \varepsilon \cdots\cdots \text{(Eq. 3-1)}$$

where syndicated loan price is measured by *fees*, *spread* and *overlibor*, banking market concentration is measured by CR_k and HHI at branch level and control variables are the characteristics of loan facility (e.g. loan size, maturity, number of lenders, term loan indicator, covenants indicator, performance pricing indicator), borrower chateratersitics (e.g. assets, tangibility, profitability and S&P rating indicator) and macroeconomic condition (personal income and GDP at state level), where we match firm financial data from the fiscal year (t-1) prior to the loan issue year (t). Definition of control variables is presented by Table 3-A1. In addition, we also control for the aggregate trends in year, loan purpose (such as Corporation purpose, lease finance purpose, real estate purpose, debt repayment purpose, infrastructure purpose and so forth) and lender type to eliminate the effects driven by such factors.

3.4 Empirical results

3.4.1 Descriptive statistics and correlation

Table 3-1 presents the descriptive statistics for all variables used in the empirical analysis and on average, a syndicated loan is charged for fees at 30 base points (bps), overlibor at 174 bps and spread at 189 bps. In the state where the borrower (lead arranger) locates, top 50 bank branches

own 31% (37%) market share of deposits. Averagely, a state in U.S has branch (bank) deposit HHI of 0.01 (0.11), indicating that first, there is a big variation between the branch concentration and bank concentration in a specific state. Second, banking market is concentrated in U.S. Table 3-1 also shows that overall, syndicated loans are more likely to be raised from more concentrated bank markets ($CR_{50}^{Difference} = CR_{50}^{Borrower} - CR_{50}^{Lead} < 0$). Averagely, there are about 3,300 branches per state, equivalent to 0.3 per 1,000 population and 0.03 per km^2.

An average syndicated loan size is $366 million with 46 months maturity and 9 lenders participating in the loan syndication. A quarter of our loan samples are term loans, 62% have covenants and 48% have performance pricing features. In terms of the characteristics of syndicated loan borrowers, an average borrower has an asset value of $5 billion and its tangible assets account for 32% of total assets with a profitability (net income/total assets) of -1% and 54% of facilities have a S&P credit rating between AAA and BBB. Table 3-2 reports Pearson's correlation matrix between the key variables and it shows that overall, syndicated loan price is positively correlated with banking market concentration measures for both lead arranger's and borrower's bank market.

Table 3-1: Descriptive statistics

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by *spread*, *fees* and *overlibor*. Banking market concentration is measured by concentration ratio (top 50, 20 and 10) in the state where borrower, lead arranger and participant lenders located, respectively and HHI on deposit at branch and bank level respectively.

	Mean	Std. Dev	Median	Min	Max
Syndicated loan Price					
Fees (base points)	30.494	24.091	25	25	425
Overlibor (base points)	174.340	112.244	175	0.25	750
Spread (base points)	189.257	115.837	175	5	1050
Bank market concentration					
$CR_{50}^{Borrower}$	0.305	0.121	0.279	0.113	0.976
CR_{50}^{Lead}	0.369	0.116	0.362	0.113	0.976
$CR_{50}^{Participant}$	0.311	0.125	0.326	0	0.864
$CR_{50}^{Difference}$	-0.067	0.142	-0.068	-0.708	0.761
$CR_{20}^{Borrower}$	0.245	0.118	0.219	0.071	0.965
$CR_{10}^{Borrower}$	0.210	0.116	0.181	0.052	0.947
HHI (Branch) ^{Borrower}	0.013	0.028	0.006	0.001	0.654
HHI (Bank) ^{Borrower}	0.108	0.108	0.075	0.016	0.911
Number_Branch ^{Borrower}	3297.45	2314.226	3150	14	13662
Branch density by population (1,000) ^{Borrower}	0.304	0.271	0.243	0.024	9.988
Branch density by km^2 ^{Borrower}	0.031	0.042	0.023	0.001	0.083
$HHI(MSA, Branch)^{Borrower}$	0.13	0.07	0.12	0.033	0.214
Facility Characteristics					
Loan size (USD$ m)	366.355	793.145	150.067	100.366	30000
Loan maturity (months)	46.9	24.165	50	0	366
Total number of lenders	8.522	9.035	6	1	290
Term loan (0,1)	0.261	0.439	0	0	1
Secured indicator (0,1)	0.723	0.448	1	0	1
Covenant indicator (0,1)	0.624	0.484	1	0	1
Performance pricing feature (0,1)	0.483	0.5	0	0	1
Borrower Firm Characteristics					
Asset (USD$ m)	5026.32	8464.284	1382.822	82.970	34741
Tangibility	0.324	0.251	0.263	0.000	0.993
Profitability	-0.007	0.537	0.029	-49.874	2.201
S&P Rating (0,1)	0.721	0.448	1	0	1
Macroeconomic Factors					
State personal yearly income (USD$ 000)	33.276	7.532	32.777	16.663	75.95
State Gross Domestic Product (USD$ b)	539.412	448.433	392.132	103.244	1224.136

Table 3-2: Correlation Table

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by *spread*, *fees* and *overlibor*. Banking market concentration is measured by concentration ratio (top 50, 20 and 10) in the state where borrower, lead arranger and participant lenders located, respectively and HHI on deposit at branch and bank level respectively.* denotes statistical significance level of 5%.

	Spread	*Fees*	Overlibor	$CR_{50}^{Borrower}$	CR_{50}^{Lead}	$CR_{50}^{Participant}$	$CR_{50}^{Difference}$	$CR_{20}^{Borrower}$	$CR_{10}^{Borrower}$	$HHI(Branch)^{Borrower}$
Spread	1									
Fees	0.7186*	1								
Overlibor	0.9061*	0.7250*	1							
$CR_{50}^{Borrower}$	0.0620*	0.0342*	0.0305*	1						
CR_{50}^{Lead}	0.0272*	0.0135	0.0700*	0.2701*	1					
$CR_{50}^{Participant}$	-0.1145*	-0.1264*	-0.0699*	0.2611*	0.2999*	1				
$CR_{50}^{Difference}$	0.0155*	0.0090	-0.0359*	0.6166*	-0.5915*	-0.0394*	1			
$CR_{20}^{Borrower}$	0.0675*	0.0325*	0.0372*	0.9778*	0.2854*	0.2768*	0.5847*	1		
$CR_{10}^{Borrower}$	0.0670*	0.0295*	0.0373*	0.9525*	0.2818*	0.2753*	0.5656*	0.9942*	1	
$HHI(Branch)^{Borrower}$	0.0444*	0.0444*	0.0244*	0.0186*	0.6393*	0.1511*	001517*	0.6528*	0.6478*	1
$HHI(Bank)^{Borrower}$	0.0595*	0.0176*	0.0223*	0.4289*	0.1285*	0.1288*	0.2541*	0.4282*	0.4337*	0.2967*

3.4.2 Baseline Results

We employ the baseline model (Eq. 3-1) to investigate the effects of banking market concentration on syndicated loan price and the results are reported in Table 3-3. In specific, Models 1-3 consider the effects of bank concentration of borrower's market (**H1**) and Models 4-6 consider the effects of lead arranger's market (**H2**) where the lead arranger is possibly from a different state with different bank concentration from that of the borrower. Overall, Table 3-3 shows that after controlling for a rich set of variables and fixed effects, syndicated loan borrowers would pay a higher cost, in terms of fees, spread and overlibor, in a more concentrated banking market with higher CR_{50}, supporting *market power hypothesis*. In particular, borrowers would be charged higher prices, such as fees (commitment fee and annual fee) and overlibor, if they locate in a more concentrated bank market, supporting both **H1** and **H2**. Specifically, a standard deviation increase in borrower's market bank concentration ($CR_{50}^{Borrower}$) would increase *fees* by 3%, consisting with Lian (2017) and Hasan et al. (2017). A standard deviation (0.12) increase in CR_{50}^{Lead} would raise the *overlibor* of a typical syndicated loan by 4.15 base points, equivalent to around $152,000 additional costs for a borrower with an average size of syndicated loan ($366 million)

Table 3-3: Baseline results: banking market concentration and syndicated loan price

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by spread, fees and overlibor. Banking market concentration is measured by concentration ratio (top 50) in the state where borrower and lead arranger located, respectively. 'Performance pricing indicator' is defined as a dummy and coded as 1 if overlibor spread of a sample loan is based on borrower's subsequent performance; therefore, we do not consider it in overlibor models (3 and 6). We also control for the fixed effects of loan type, lender type and year. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

	Model 1 Spread	**Model 2** Fees	**Model 3** Overlibor	**Model 4** Spread	**Model 5** Fees	**Model 6** Overlibor
Banking Market concentration						
$CRK_{50}^{Borrower}$	22.672***	7.103***	14.574*			
	(6.133)	(1.792)	(8.273)			
CRK_{50}^{Lender}				21.642***	10.903***	34.612***
				(7.373)	(1.872)	(9.504)
Loan facility						
Log (Loan size)	-13.524***	-3.262***	-14.412***	-14.643***	-3.501***	-14.352***
	(0.691)	(0.252)	(1.022)	(0.783)	(0.281)	(1.091)
Loan maturity	0.283***	0.173***	0.642***	0.253***	0.151***	0.601***
	(0.031)	(0.013)	(0.052)	(0.042)	(0.013)	(0.052)
Total number of lenders	0.031	0.063**	0.013	0.142*	0.103***	0.123
	(0.072)	(0.034)	(0.102)	(0.102)	(0.033)	(0.112)
Term loan dummy	52.802***	13.011***	34.873***	52.102***	11.733**	34.392***
	(1.341)	(4.072)	(1.833)	(1.543)	(5.224)	(2.001)
Secured indicator	91.313***	17.973***	102.853***	91.323***	17.701***	100.301***
	(6.672)	(0.393)	(1.874)	(1.813)	(0.414)	(2.052)
Covenants indicator	18.343***	3.841***	0.732	20.683***	3.462***	0.853
	(1.681)	(0.501)	(3.011)	(1.913)	(0.551)	(3.334)
Performance pricing indicator	-35.211***	-3.292***		-35.923***	-3.092***	
	(1.482)	(0.493)		(1.682)	(0.552)	
Borrower's characteristics						
Log (Asset)	-12.802***	-1.303***	-21.842***	-12.522***	-1.361***	-22.272***
	(0.621)	(0.233)	(0.972)	(0.702)	(0.263)	(1.001)
Tangibility	0.091	3.253***	-6.073*	-0.943	2.1844***	-8.411**
	(2.503)	(0.652)	(3.293)	(2.823)	(0.723)	(3.652)
Profitability	-8.053**	-2.842***	-4.893	-8.093**	-2.731***	-4.152
	(3.572)	(0.782)	(3.333)	(3.773)	(0.662)	(2.602)
S&P Rating	-19.491***	-4.022***	-15.474***	-19.233***	-4.2323***	-14.173***
	(1.461)	(0.423)	(1.911)	(1.641)	(0.464)	(2.123)
State macroeconomics factors						
State personal income	-0.842***	-0.103**	-1.301***	-0.771***	-0.102**	-1.424***
	(0.142)	(0.043)	(0.191)	(0.161)	(0.053)	(0.212)
Log (GDP)	1.733**	0.493**	3.271***	1.393*	0.082	1.841*
	(0.782)	(0.253)	(1.032)	(0.803)	(0.252)	(1.072)
Constant	589.812	71.863	694.732***	782.131***	109.734***	615.934***
	(538,656)	(16,244)	(32.15)	(27.253)	(24.963)	(34.614)
Observations	28,198	18,225	14,470	21,963	14,563	11,320
R-squared	0.516	0.325	0.520	0.525	0.327	0.533
Year FE	YES	YES	YES	YES	YES	YES
Purpose FE	YES	YES	YES	YES	YES	YES
LenderType FE	YES	YES	YES	YES	YES	YES

3.4.2.1 Bank concentration: borrower's market vs. lead arranger's market

With the development of new information and communication technologies, banks have become able to lend to borrowers locating farther away from them (Felici and Pagnini, 2008). Even though, the geographic distance between them would cause high costs for banks to *ex ante* screen and *ex post* monitor borrowers and therefore, syndicated loans are more likely to be led by domestic banks which are geographically close to borrowers (Lin et al., 2012). However, it is not intuitively straightforward to predict the sensitivity of syndicated loan price to banking market concentration. Because of the cost efficiency for lenders to monitor borrowers in the same state, one possibility could be that loan prices would be less sensitive to banking market concentration where borrowers could share the cost savings for lenders by paying lower prices (Degryse and Ongena, 2005). In contrast, market power hypothesis suggests that same-state lenders would create rents from geographic proximity by charging higher prices from local borrowers who would have to undertake greater costs (e.g. transportation) to approach alternative lenders farther away from them (Degryse and Ongena, 2005). Rent creation would be possibly associated with the market share of local lenders and therefore, syndicated loan prices could be more sensitive to banking market concentration.

To address this issue, we categorize our samples into two groups and re-run Eq. (3-1). We report the results in Table 3-4 where we consider same-state lending relations (borrower and lead

arranger locating in the same state) in Models 1-3 and different state relations in Models 4-6[14]. Table 3-4 shows that, first, our key result still holds that banking market concentration raises syndicated loan price in terms of fees, spread and overlibor. Second, if the borrower and lender locate in the same state, syndicated loan price would be more sensitive to banking market concentration than in different states, supporting above market power hypothesis. In specific, with a same-state lending relationship, a syndicated loan borrower would pay 5 more bps on spread, 2 more bps on fees and 6 more bps on overlibor with a standard deviation increase (0.12) in CR_{50} (Models 1-3). This is equivalent to additional costs of $186,000 on spread, $66,000 on fees and $234,000 on overlibor for an average loan.

Table 3-4 also shows that when a borrower raises syndicated loans led by a lead arranger from a different states, loan prices are associated with the concentration of both lender's and borrower's market but slightly more sensitive to the concentration of lead arranger's banking market. For example, controlling for lender's market concentration (CR_{50}^{Lead}), a standard deviation (0.12) increase of borrower's banking market concentration ($CR_{50}^{Borrower}$) would raise the spread, fees and overlibor by 1.9, 0.68 and 1.5 bps respectively (Models 1-3), supporting **H1**. In contrast,

[14] We also use endogenous switching regression model corresponding to the possible endogenous selection between same-state lead arranger and out-state lead arranger. The results are consistent with Table 3-4 and available on request from authors.

holding $CR_{50}^{Borrower}$ at constant, a standard deviation increase of CR_{50}^{Lead} would raise the spread by 2.0 bps, fees by 1.2 bps and overlibor by 3.0 bps (Models 4-6), supporting **H2**.

Table 3-4: Banking market concentration and syndicated loan price: borrowing from same-state or out-of-state lead arrangers

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by *spread*, *fees* and *overlibor*. Banking market concentration is measured by concentration ratio (top 50) in the state where borrower and lead arranger located, respectively. We also control for the fixed effects of loan type, lender type and year and the results for control variables are not reported but available on request from the authors. In the 'same state' group, we consider sample syndicated loans if the borrower and lead arranger locate in the same state and therefore, both borrower and lender face the same banking market concentration measured by $CR_{50}^{Borrower}$. In the 'different states' group, we consider samples if the borrower and lead arranger locate in different states and therefore, we examine the effects of banking market concentration in borrower's market and lender's market respectively. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

	Same state			Different states		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	Spread	Fees	Overlibor	Spread	Fees	Overlibor
$CRK_{50}^{Borrower}$	42.312*	14.953**	53.283*	16.173**	5.673***	12.211
	(23.463)	(7.192)	(30.562)	(7.612)	(2.183)	(10.391)
CRK_{50}^{Lender}				17.271**	10.042***	25.282**
				(7.962)	(1.991)	(10.352)
Constant	330.101***	17.262	782.53***	390.634	72.553***	390.62***
	(97.463)	(28.221)	(119.43)	(270,730)	(11.522)	(39.133)
Other Controls	YES	YES	YES	YES	YES	YES
Observations	3,233	2,186	1,664	18,730	12,377	9,656
R-squared	0.502	0.295	0.511	0.536	0.345	0.546
Year FE	YES	YES	YES	YES	YES	YES
Purpose FE	YES	YES	YES	YES	YES	YES
LenderType FE	YES	YES	YES	YES	YES	YES

3.4.2.2 Is it beneficial to borrow from out-of-state lenders with lower bank concentration?

Since banking market deregulation in the U.S (e.g. IBBEA) in 1990s, the proportion of syndicated loan deals with both lead arranger and borrower locating in the same state decreases from 25% in 1994 to 8% in 2011. During the same period, deals led by arrangers from less concentrated banking market ($CR_{50}^{Difference} = CR_{50}^{Borrower} - CR_{50}^{Lead} > 0$) increase from 35% to 50% and in 2011, 42% of deals were raised from lead arrangers headquartered in more concentrated market ($CR_{50}^{Difference} < 0$; Panel A Figure 3-1). The value of deals of syndicated loan has also changed in a similar pattern where the total volume of deals raised in the same state has reduced and a greater volume of deals was raised from less concentrated banking markets (Panel B Figure 3-1).

In this section, we further investigate the 'price-concentration' relationship be considering the effects of the difference of bank concentration between borrower's and lead arranger's markets, $CR_{50}^{Difference}$. We start with descriptive statistics and Table 3-5 shows that borrowers may access out-of-state lead arranger for loan availability reasons when loan size is particularly big. For example, 18% of loans in first size quartile were raised from home-state leader arrangers and the proportion reduces to 7.7% for loans in the 4^{th} size quartile. In addition, borrowers may also borrow from out-of-state lead arrangers for price reasons, especially when lead arrangers are non-banks.

For example, Table 3-5 shows that out-of-state non-bank lead arrangers charge lower spread (by 46bps), fees (by 12bps) and overlibor (by 43bps).

Table 3-6 reports the results that we regress loan prices on borrower's market concentration ($CRK_{50}^{Borrower}$) and its difference with lead arranger's market concentration ($CR_{50}^{Difference}$) by controlling for the same set of control variables used in the baseline model (Eq. 3-1). First, our baseline result still holds where loan prices increase with borrower's bank market concentration, supporting **H1**. Second, it supports above predication that borrowers borrow from less concentrated bank market to reduce loan prices. For example, holding $CR_{50}^{Borrower}$ constant, if the lead arranger headquarters in a state with a less concentrated banking market by one standard deviation (0.14), a typical borrower with an average loan size of $366 million would have cost savings of $88,000 on spread, $51,000 on fees and $130,000 on overlibor, compared with those borrowers who borrower locally in the same state, supporting **H2**.

Figure 3-1: Borrowing from banks headquartering in the same state?

Figure 3 shows the % of deals in numbers (Panel A) and value (Panel B) raised from banks headquartering in the same state as the borrower ($CR_{50}^{Difference}=0$), in other states with more concentrated market ($CR_{50}^{Difference}<0$) or in other states with less concentrated market ($CR_{50}^{Difference}>0$) between 1994 and 2011.

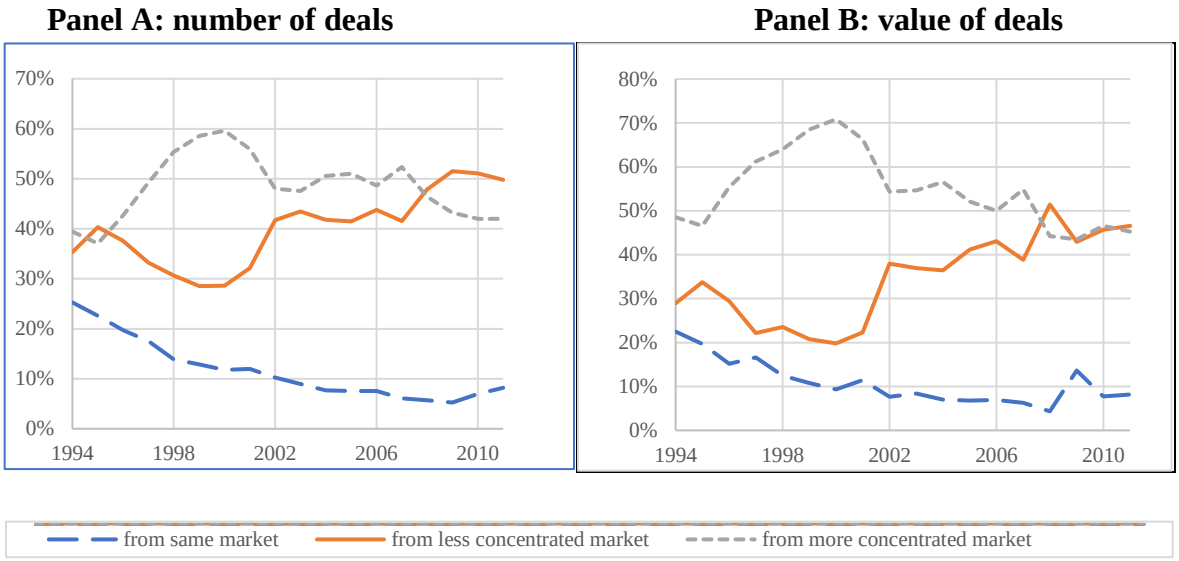


Table 3-5: Borrowing from home state lender vs. out-of-state lender

Samples collected are between 1994 and 2012 with 33,023 observations. We consider three possible scenarios – borrowing from local (home state) lead arranger, borrowing from out-of-state lead arrangers with less concentrated banking market ($CR_{50}^{Difference}>0$) and borrowing from out-of-state lead arrangers with more concentrated banking market ($CR_{50}^{Difference}<0$).

	Mean	Same state	Out of state	Less concentrated market ($CR_{50}^{Difference}>0$)	More concentrated market ($CR_{50}^{Difference}<0$)
Loan size quartile ($m and % of deals)					
1st quartile	$26	17.92%	82.08%	41.98%	40.11%
2nd quartile	$103	11.76%	88.24%	39.75%	48.49%
3rd quartile	$251	8.37%	91.63%	38.07%	53.56%
4th quartile	$1,110	7.66%	92.34%	36.52%	55.82%
Spread (bps)					
Non-bank	246.33	291.16	245.02	237.21	275.83
Bank	178.81	173.46	179.62	188.38	174.58
Commercial bank	174.32	171.02	174.82	187.21	167.26
Investment bank	258.70	235.74	261.01	248.53	262.79
Fees (bps)					
Non-bank	40.08	51.46	39.76	38.87	43.42
Bank	29.10	27.72	29.31	30.94	28.40
Commercial bank	28.49	27.56	28.63	20.70	27.44
Investment bank	46.96	33.92	48.45	48.18	48.49
Overlibor (bps)					
Non-bank	216.82	259.24	215.79	204.29	257.87
Bank	168.32	164.93	168.82	172.66	166.42
Commercial bank	165.12	162.98	165.44	172.42	160.82
Investment bank	233.66	214.55	235.90	188.93	242.04

Table 3-6: Borrowing from out-of-state lenders

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by *spread*, *fees* and *overlibor*. Banking market concentration is measured by concentration ratio (top 50) in the state where borrower and lead arranger located, respectively. $CR_{50}^{Difference}$ is defined as the difference of CR_{50} between borrower and lead arranger's market, i.e. $CR_{50}^{Difference} = CR_{50}^{Borrower} - CR_{50}^{Lead}$. Therefore, $CR_{50}^{Difference} > 0$ (<0) suggests that a borrower borrows from a less (more) concentrated banking market. In our data, there are no two markets have the same CR_{50} and therefore a borrower borrows from the same state if $CR_{50}^{Difference} = 0$. We also control for the fixed effects of loan type, lender type and year and the results for control variables are not reported but available on request from the authors. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

	Model 1 Spread	**Model 2** Fees	**Model 3** Overlibor
$CRK_{50}^{Borrower}$	33.443***	15.722***	37.501***
	(11.252)	(2.813)	(14.731)
$CRK_{50}^{Difference}$	-17.271**	-10.042***	-25.283**
	(7.962)	(1.991)	(10.352)
Constant	665.401***	75.222***	390.601***
	(29.652)	(11.522)	(39.13)
Other Controls	YES	YES	YES
Observations	18,730	12,377	9,656
R-squared	0.536	0.345	0.546
Year FE	YES	YES	YES
Purpose FE	YES	YES	YES
LenderType FE	YES	YES	YES

3.4.3 Does the participant's market power determine syndicated loan price?

To test **H3**, we regress loan prices on weighted participant's market concentration ($CRK50^{Participant}$)[15] and lead arranger's market concentration ($CRK50^{Lead}$) by controlling for the

[15] This ratio bears with the limitation: 1, we exclude the effect of foreign banks due to data limit; 2, we do not have detail share allocation in each loan facility because of the missing value.

same set of control variables used in the baseline model (Eq.3-1). Rejecting **H3**, Table 3-7 shows little evidence on the impacts of bank concentration on syndicated loan prices. Therefore, our empirical results so far suggest that syndicated loan prices are sensitive to bank concentration of both borrower's market (**H1**) (e.g. Lian, 2017, Hasan et al., 2017) and lead arranger's market (**H2**) but not participant lenders' market (**H3**).

Table 3-7: Participants market power

Samples collected are between 1994 and 2012 with 33,023 observations. Syndicated loan price is measured by *spread*, *fees* and *overlibor*. Banking market concentration is measured by concentration ratio (CR_{50}) in the borrower's market and the weighted participant bank market respectively. We control for the fixed effects of loan type, lender type and year. Results for control variables are not reported but available from the authors on request. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	Spread	Fees	Overlibor	Spread	Fees	Overlibor
$CRK50^{Lead}$				46.242***	9.203***	37.314***
				(11.441)	(2.841)	(13.042)
$CRK50^{Participant}$	-6.851	-6.951	-5.721	-1.962	-7.402	-2.871
	(10.782)	(8.282)	(12.822)	(10.971)	(8.712)	(12.982)
Constant	1,037.472**	86.632***	774.493***	765.211***	125.834***	428.672***
	(43.673)	(13.343)	(81.661)	(47.692)	(12.671)	(63.081)
Observations	8,088	6,445	6,025	7,230	5,738	5,350
R-squared	0.540	0.345	0.586	0.545	0.352	0.590
Year FE	YES	YES	YES	YES	YES	YES
Loan Purpose FE	YES	YES	YES	YES	YES	YES
Lender Type FE	YES	YES	YES	YES	YES	YES

3.4.4 Robustness tests

Overall, our earlier empirical results support both **H1** and **H2** that bank concentration of both borrower's and lender's market have an impact on syndicated loan prices and loan prices are not sensitive to participant lender's market concentration (**H3**). We run a rich set of additional tests to examine the robustness of our results. First, we use alternative bank concentration measures, such as $CR_{20}^{Borrower}$ (Model 1), $CR_{10}^{Borrower}$ (Model 2), HHI Branch deposit (Model 3), HHI Bank deposit (Model 4), Log(number of Branches) (Model 5), branch density by state size (Model 6) and HHI MSA (Model 7), and our results still hold. Second, we exclude samples in the financial crisis period, i.e. 2007-2009 (Model 8) and third, we consider sample loans with a type of revolver only (Model 9). Again, our earlier results are still robust[16]

[16] The robustness tests for the participant's bank market are also available from the authors on request.

Table 3-8: Robustness test: alternative measures of banking market concentration

This table reports the results of 8 robustness tests by using alternative measures of bank concentration (Models 1-7), samples excluding financial crisis period (Model 8) and sample loans with a type of revolver only (Model 9). We only report the estimate of the key variables and results for all other results are available from the authors on request. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

		Borrower's market			*Lead Arranger's market*			*Difference*		
Models		*Spread*	*Fees*	*Overlibor*	*Spread*	*Fees*	*Overlibor*	*Spread*	*Fees*	*Overlibor*
1	CR_{20}	21.772***	5.964***	10.074	20.794***	11.163***	33.924***	-20.314***	-11.002***	-33.852***
		(6.111)	(1.783)	(8.351)	(7.382)	(1.941)	(9.682)	(7.382)	(1.452)	(9.692)
2	CR_{10}	21.743***	5.432***	7.692	15.382**	10.291***	29.291***	-14.982**	-10.173***	-29.353***
		(6.172)	(1.811)	(8.324)	(7.282)	(1.902)	(9.532)	(7.281)	(1.921)	(9.543)
3	*HHI Branch deposit*	87.651***	21.823***	59.49	259.691***	65.733***	138.212**	-252.542***	-64.384***	-131.291*
		(26.092)	(7.012)	(37.212)	(57.502)	(19.451)	(69.313)	(57.921)	(19.642)	(69.742)
4	*HHI Bank deposit*	14.082**	1.302	3.612	12.941***	0.502	4.152	-10.362**	-0.652	-2.272
		(6.062)	(1.763)	(7.782)	(4.963)	(1.291)	(6.131)	(4.143)	(0.962)	(5.103)
5	*Log(number of Branches)*	-5.532**	-1.082	-10.841***	-1.634	-0.934***	-2.012	1.562	0.921***	1.834
		(2.463)	(0.673)	(3.033)	(1.062)	(0.241)	(1.291)	(1.062)	(0.242)	(1.292)
6	*Density by size* (number of branches per km^2)	-10.311	-9.284**	-68.874***	-35.192**	3.631	-4.672	35.123**	-3.992	2.612
		(19.933)	(4.693)	(24.903)	(31.851)	(3.722)	(18.933)	(16.342)	(3.733)	(19.073)
7	*HHI (MSA)*	125.241***	7.902*	141.893***	108.432***	4.024	135.763***	-104.202***	-4.384	-116.134***
		(17.222)	(4.531)	(21.441)	(18.792)	(3.982)	(21.282)	(20.163)	(4.362)	(22.543)
8	$CR_{50}^{Borrower}$ (excluding samples from 2007-09 financial crisis)	23.583***	7.713***	12.402	28.383***	12.394***	39.052***	-27.483***	-12.141***	-38.881***
		(6.592)	(1.831)	(9.052)	(7.862)	(1.921)	(10.072)	(7.852)	(1.933)	(10.091)
9	$CR_{50}^{Borrower}$ (loan type: revolver only)	23.862***	6.933***	22.161**	17.472**	10.182***	38.661***	-16.732**	-9.953***	-37.833***
		(6.731)	(1.764)	(9.014)	(7.501)	(1.901)	(9.744)	(7.512)	(1.912)	(9.761)

3.4.5 Does lender type matter to the 'price-concentration' relationship?

We group sample loans according to the lead arranger's types, commercial banks vs. non-commercial banks (investment banks and non-banks). Our data (Table 3-9) shows that about 4.25% of our sample deals are led by investment banks and 15.8% by non-bank lenders. The univariate test results show that compared with commercial bank lenders, investment banks and non-bank lenders are more likely to charge higher loan prices and issue term loans and loans with longer maturity.

To test **H4**, we regress loan prices on borrower's market concentration ($CRK_{50}^{Borrower}$), leader arranger's market concentration (CRK_{50}^{Lead}) and the difference between them, $CR_{50}^{Difference}$ (= $CRK_{50}^{Borrower}$ - CRK_{50}^{Lead}), by controlling for the same set of control variables used in the baseline model (Eq. 3-1). We report the results in Table 3-10[17]. Our results on loans led by commercial banks are consistent with our earlier findings where loan prices increase with bank concentration in both borrower's and lead arranger's markets, and loans raised in less concentrated out-of-state markets ($CR_{50}^{Difference}>0$) are charged lower prices. In sharp contrast, the prices (spread and overlibor) of syndicated loans led by non-commercial banks, such as investment banks and non-

[17] We also perform endogenous switching regression model to control for the selection basis arising from choices between commercial lead arranger and non-commercial lead arranger. The results are consistent with Table 3-10 and are available from the authors on request.

bank lenders[18], decrease with bank market concentration (Models 2 and 6). Such a result could be driven by the structure-conduct-performance (SCP) model where in a more concentrated bank market, it will decrease the cost of funds for investment banks and non-banks. This is because financial institutions obtain funds from commercial banks with lower prices than corporate borrowers (Ahmed et al., 2015) and with a greater market power, commercial banks pay lower interest rate to depositors and charge higher prices on loans, according to SCP. Hence, financial institutions could raise cheaper funds and offer more competitive prices to borrowers (Gropp et al. 2014) when banking market is concentrated. Results in Panel B support this finding where non-commercial banks would have higher costs in less concentrated markets ($CR_{50}^{Difference}>0$) and hence charge higher prices on loans (Model 8).

[18] This simple classification bears with the limitation that investment banks and other non-banks financial institutions are very different in nature. We have this classification because of two reasons: 1, the observation of investment banks and no-bank financial institutions is very low, therefore we combine them together to increase the number of observations; 2, in this part, we focus on the difference between financial institutions with and without deposit service. This classification meets our standard.

Table 3-9: Does lender type matter? Evidence from univariate analysis

In this table, we compare the characteristics of loans across types of lead arrangers and identify the type of lenders by following (Lim et al., 2014b). We run univariate tests (commercial vs. investment banks; banks vs. non-banks) and ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

	All Lenders	*Bank lenders*	*Commercial Bank lenders*	*Investment bank lenders*	*Non-bank lenders*
Number of observations	33023	27736	26268	1468	5287
Spread	186.56	178.812	174.321	258.701***	246.333***
Fees	29.87	29.101	28.492	46.962***	40.083***
Overlibor	172.73	168.322	165.123	233.662***	216.823***
Loan size (USD$ m)	378	374	373	406	320***
Loan maturity (months)	46.191	46.323	45.693	57.792***	49.883***
Total number of lenders	8.462	8.89	8.951	7.893***	6.603***
Term loan (0,1)	0.253	0.243	0.232	0.482***	0.361***
Covenant indicator (0,1)	0.612	0.633	0.623	0.682***	0.612**
Performance pricing feature (0,1)	0.471	0.502	0.511	0.441***	0.383***

Table 3-10: Does lender type matter?

Samples collected are between 1994 and 2012 with a total number of observations of 33,023. Dependent variable is syndicated loan price measured by *spread*, *fees* and *overlibor*. According to the type of lead arranger, we group sample loans into 'commercial bank' loans and 'non-commercial bank' loans and non-commercial banks include both investment banks and non-bank lenders (e.g. hedge funds). In Panel A, banking market concentration is measured by concentration ratio ($CR_{50}^{Borrower}$ and CR_{50}^{Lead}) in the borrower's and lender's market. In Panel B, banking market concentration is measured by concentration ratio ($CR_{50}^{Borrower}$) in the borrower's market. $CR_{50}^{Difference}$ is defined as the difference of CR_{50} between borrower and lead arranger's market, i.e. $CR_{50}^{Difference} = CR_{50}^{Borrower} - CR_{50}^{Lead}$. Therefore, $CR_{50}^{Difference} > 0$ (or <0) suggests that a borrower borrows from a less (or more) concentrated banking market. In our data, there are no two markets have the same CR_{50} and therefore a borrower borrows from the same state if $CR_{50}^{Difference} = 0$. We also control for the fixed effects of loan type and year and the results for control variables are not reported but available on request from the authors. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

	Spread		**Fees**		**Overlibor**	
	Commercial Banks	Non-Commercial Banks	Commercial Banks	Non-Commercial Banks	Commercial Banks	Non-Commercial Banks
Panel A	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
$CR_{50}^{Borrower}$	15.592**	-38.263**	3.301*	11.051	18.413*	-87.072***
	(7.623)	(18.942)	(1.981)	(9.481)	(10.272)	(28.982)
CR_{50}^{Lead}	34.111***	-131.12***	12.173***	4.812	38.061***	-63.853
	(7.572)	(24.163)	(1.791)	(13.192)	(9.651)	(43.472)
Constant	492.32***	654.03***	92.723***	88.233**	528.801***	729.804***
	(28.023)	(70.083)	(10.453)	(36.941)	(37.922)	(116.705)
Other Controls	YES	YES	YES	YES	YES	YES
Observations	19,169	2,794	13,243	1,320	10,141	1,179
R-squared	0.493	0.427	0.321	0.207	0.523	0.402
Year FE	YES	YES	YES	YES	YES	YES
Loan Purpose FE	YES	YES	YES	YES	YES	YES
Lender Type FE	NO	NO	NO	NO	NO	NO
Panel B	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**	**Model 12**
$CR_{50}^{Borrower}$	49.703***	-171.43***	15.273***	15.862	56.473***	-150.901***
	(10.471)	(31.622)	(2.491)	(17.122)	(13.452)	(53.223)
$CR_{50}^{Difference}$	-34.112***	133.112***	-12.172***	-4.81	-38.062***	63.852
	(7.573)	(24.162)	(1.791)	(13.192)	(9.653)	(43.472)
Constant	492.334***	654.012***	92.722***	88.232**	528.83***	729.805***
	(28.022)	(70.083)	(10.451)	(36.492)	(37.923)	(116.704)
Other Controls	YES	YES	YES	YES	YES	YES
Observations	19,169	2,794	13,243	1,320	10,141	1,179
R-squared	0.493	0.427	0.321	0.207	0.523	0.402
Year FE	YES	YES	YES	YES	YES	YES
Loan Purpose FE	YES	YES	YES	YES	YES	YES
Lender Type FE	NO	NO	NO	NO	NO	NO

3.4.6 Endogeneity

An endogeneity issue may exist in our analysis and there is a particular concern on the 'reverse causality' effect where states differ in their syndicated loan prices and such differences may trigger the change of bank market concentration in a specific state[19]. This effect could be more pronounced when we consider 'same-state' lending relationships. Hence, we employ Eq. 3-2 to test if there is a reverse causality between bank market structure and syndicated loan prices:

$$Banking\ market\ concentration_t = \beta_0 + \beta_1 \times Banking\ market\ concentration_{t-1} + \beta_2 \times Syndicated\ loan\ prices_t + \beta_3 \times State\ control_{t-1} + \varepsilon \quad \cdots\cdots\cdots\cdots \text{Eq.(3-2)}$$

The results reported in Panel A Table 3-11 show little evidence on the existence of the reverse causality issue where syndicated loan prices do not affect banking market concentration at a statistically significant level[20].

The other possible reason for endogeneity is the 'omitted variables' effects. For example, unobservable state-level factors varying across states may influence the timing of deregulation and have further impacts on bank market structure in different states. To address this issue, we follow

[19] In Eq(1), we use one-year lagged concentration to overcome the possible reverse causality issue.

[20] We also consider loan prices (e.g. spread, overlibor) at time t-1 and our results still hold.

Cornaggia et al. (2015) to perform a placebo test to investigate if our results are driven by those unobservable and omitted state specific factors. We run the placebo test by randomly reordering banking market concentration within same state where a syndicated loan is raised. We replace $CR_{50}^{Borrower}$ by a $\textit{fake-}CR_{50}^{Borrower}$ and re-run the baseline model (Eq. 3-1). Panel B (Table 3-11) shows that the coefficients of $\textit{fake-}CR_{50}^{Borrower}$ are statistically insignificant in all loan price models. Therefore, our earlier results are robust and not subject to endogeneity.

Table 3-11: Tests of endogeneity

Samples collected are between 1994 and 2012 with a total number of observations of 33,023. In Panel A, the dependent variable is $CR_{50}^{Borrower}$ when loan was raised in year t. $CR_{50,t-1}^{Borrower}$ is borrower's market concentration in year t-1. In Panel B, dependent variable is syndicated loan price measured by *spread*, *fees* and *overlibor*. We use a fake concentration measure (fake-$CR_{50}^{Borrower}$) and run a placebo test. We also control for the fixed effects of loan type and year and the results for control variables are not reported but available on request from the authors. Standard errors are clustered at lender-firm year level and reported in parentheses. ***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

Panel A	**Model 1**	**Model 2**	**Model 3**
	$CR_{50,t}^{Borrower}$	$CR_{50,t}^{Borrower}$	$CR_{50,t}^{Borrower}$
$CR_{50,\ t-1}^{Borrower}$	1.013***	1.012***	1.023***
	(0.000)	(0.000)	(0.000)
Spread	-8.61e-07		
	(0.000)		
Fee		6.99e-07	
		(0.000)	
Overlibor			-2.44e-06
			(0.000)
Constant	-0.071***	-0.081***	-0.093***
	(0.021)	(0.011)	(0.012)
State controls	YES	YES	YES
Observations	30,389	19,036	15,174
R-squared	0.957	0.957	0.957
Year FE	YES	YES	YES
Loan purpose FE	YES	YES	YES
Lender type FE	YES	YES	YES
Panel B	**Model 4**	**Model 5**	**Model 6**
	Spread	Fees	Overlibor
fake-$CR_{50}^{Borrower}$	0.632	-1.412	0.522
	(3.463)	(0.923)	(4.582)
Constant	521.202	160.102***	636.201***
	(102209.301)	(7.852)	(30.462)
Other controls	YES	YES	YES
Observations	28,198	18,225	14,470
R-squared	0.516	0.325	0.520
Year FE	YES	YES	YES
Loan purpose FE	YES	YES	YES
Lender type FE	YES	YES	YES

3.5 Summary and conclusion

There have been both theoretical and empirical studies on the 'price-concentration' relationship in existing literature on both banking (e.g. bilateral loan) and product markets. However, there has been little evidence on such a relationship in a syndicated loan setting. Focusing on borrower's bank market concentration, recent evidence (e.g. Lian, 2017, Hasan et al., 2017) shows a positive relationship between bank market concentration and syndicated loan prices. What is little known, however, is how bank concentration of lead arranger's market, participant lenders' market and lender type moderate such a 'price-concentration' relationship. To fill in this gap, this paper empirically investigates how syndicated loan prices, in terms of spread, fees and overlibor, react to bank concentration of the markets where borrower (H1), lead arranger (H2) and participant lenders (H3) locate. We show supporting evidence to market power hypothesis where syndicated loan prices are positively associated with bank concentration of both borrower's and lead arranger's markets but not participant lenders' markets. Our results also show that if a borrower raises syndicated loan led by a lead arranger from a different state, loan prices are more sensitive to the bank concentration of lender's market than to that of borrower's market. In addition, we show borrowers could reduce loan prices by borrowing from less concentrated bank markets.

In sharp contrast, syndicated loan prices are negatively associated with bank market concentration if the lead arranger is a non-commercial bank (H4). Our empirical findings imply

that corporate borrowers could pay lower loan prices if they borrow from commercial banks in a less concentrated bank market. If they face a concentrated bank market, it would be beneficial to borrow from non-commercial banks

Table 3-A1: Definition and source of variables

Variables	Definition	Sources
Bank market concentration		
$CR_{50}^{Borrower}$	Top 50 branch deposit concentration ratio in borrower's bank market at state level.	FDIC
CR_{50}^{Lead}	Top 50 branch deposit concentration ratio in lender's bank market at state level.	FDIC
$CR_{50}^{Participant}$	Share weighted average of participants' bank market concentration, based on top 50 branch deposit concentration ratio at state level.	FDIC
$CR_{50}^{Difference}$	$CR_{50}^{Difference} = CR_{50}^{Borrower} - CR_{50}^{Lead}$	FDIC
CR_{20}	Top 20 branch deposit concentration ratio in bank market at state level.	FDIC
CR_{10}	Top 10 branch deposit concentration ratio in bank market at state level.	FDIC
HHI Branch	Herfindahl-Hirschman Index of branch deposit at state level.	FDIC
HHI Bank	Herfindahl-Hirschman Index of bank deposit at state level.	FDIC
HHI MSA	Herfindahl-Hirschman Index of branch deposit at MSA level.	FDIC
Number of Branches	The total number of deposit branches at state level.	FDIC
Branch density by population	Number of branches per 1000 population.	Federal Reserve Bank of ST. Louis
Branch density by state size	Number of branches per km^2.	FDIC
Syndication Price		
Spread	All-in-drawn-spread: basis point spread over LIBOR plus the annual fee and the up-front	DealScan
Fees	All-in-undrawn-spread: commitment fee plus annual fee, i.e., the amount a borrower pays for each dollar available under a commitment.	DealScan
Overlibor	Basis point over LIBOR for the first run of loan.	DealScan
Facility Characteristics		
Log(Loan size)	Natural Log of loan amount in $m	DealScan
Log(Loan maturity)	Natural Log of loan maturity in months	DealScan
Total number of lenders	Number of participating lenders in the facility syndicate	DealScan
Term loan dummy	= 1 if the facility type is term loan facility (including term loan A, term loan B….), and 0 otherwise	DealScan
Secured indicator	=1 if the loan has collateral	DealScan
Convents indicator	= 1 if the loan has convents, and 0 otherwise	DealScan
Performance pricing dummy	= 1 if the loan has performance pricing features, and 0 otherwise	DealScan
Borrower Firm Characteristics		
Log(Asset)	Natural Log of the total asset in £m of the borrower at the end of fiscal year prior to the loan originated.	Compustat
Tangibility	The sum of net property, equipment and pant, divided by total asset	Compustat
Profitability	Net income/total asset	Compustat
S&P rating	=1 if the company has a S&P rating from "AAA" to "BBB".	Compustat
Macroeconomic Factors		
State personal annual income($000)	The average personal annual income in state.	Federal Reserve Bank of ST. Louis
State Gross Domestic Product ($bn)	The annual gross domestic product by state	Bureau of Economic

Chapter 4 Bank Market Power and Syndicated Loan Structure

4.1 Introduction

Over the last three decades, the syndicated loan market has been playing a crucial role in the global financial system (Lin et al., 2012), with a total volume of $4.7 trillion in 2015, compared with $3.02 trillion in international bond market as a source of corporate financing. The syndicated loan market in the U.S dominates the global market with a total value of $938.6 billion in the first half of 2016 out of $1.8 trillion globally[21]. Unlike a typical bilateral loan which usually involves only one lender, a syndicated loan involves a group of lenders and hence, in addition to the typical agency problems between the borrower and the lender in a bilateral lending relationship, additional adverse selection and moral hazard problems may occur in a loan syndicate. Participant lenders have weaker motives than lead arranger to collect information from the borrower and rely on the shares held by lead arranger as a signal to mitigate the adverse selection problem (Ivashina, 2009). Moreover, lead arranger performs due diligence and monitoring after loan origination, and they may shirk if their efforts are costly to be observed by participant lenders, causing a moral hazard problem. What is little known, however, is "how loan syndicates are structured to address and

[21] Source: Thomson Global Syndicated Loans Reviews and Bank for International Settlements (BIS).

mitigate adverse selection and moral hazard problems both at the borrowing firm and within the syndicate" (Lin et al., 2012, p. 1).

Deviating from existing literature[22] which has offered ample evidence on the effects of borrower, lender and loan, in this paper, we focus on bank market structure to explore how bank market power affects loan syndicate structure. Since deregulation, the U.S banking market has become more competitive and the effects of bank power on corporate finance have been widely captured[23]. The change of bank market structure also has strong impacts on syndicated loan market in U.S. For example, Mi and Han (2018) and Lian (2017) provide evidence that bank market structure determines syndicated loan prices where banks with a greater market power charge higher prices on syndicated loans. Moreover, bank market structure also influences the location of syndicated loans, and our data from DealScan and FDIC show that since bank market deregulation, more and more borrowing firms raise syndicated loans from more competitive bank markets and

[22] There has been ample empirical evidence on the determinant effects of loan terms, such as maturity (Dennis and Mullineaux, 2000) and loan purpose (Esty and Megginson, 2003), borrowing firm characteristics accounting information, Sufi (2007), (ownership structure, Lin et al., 2012) and lender characteristics (asset, Simons, 1993) on loan syndicate structure.

[23] There has been supporting evidence on the favourable effects of improved bank competition on promoting corporate innovation (Corgannia et al., 2015) and lowering financial costs (Rice and Strahan, 2010).

the number of deals raised from the same market (i.e. borrower and lead arranger headquarter in the same state) decreased from 25% of total deals in 1994 to 8% in 2011[24].

To evaluate how lead arranger's market power influences their syndication structure in syndication process, we use a sample of 17,367 facilities syndicated by 42,563 lender observations between 1994 and 2017 in the U.S market. We focus on the syndicated loan market, because it can provide the detail information of share-allocation by each lender, which is a natural platform to research asymmetric-information between co-investing lenders.

Our empirical results suggest that lead arranger's bank market power effectively reduces information asymmetries between lead arranger and participant banks where bank market power triggers information collection behaviour before syndication, motivating participant lenders to take more shares in syndication. Furthermore, the bank market power of lead arranger also increases the participant lenders' wiliness to take more shares because lead arranger would perform more monitor activities after syndication. Our estimates imply that the lead arranger would be able to

[24] Our data show that in the first decade of the new century, the proportion of deals raised in more competitive (concentrated) market increased (decreased) from 29% (60%) to 51% (42%). In terms of the value of deals, during the same period, the proportion of deals raised in more competitive (concentrated) market increased (decreased) from 20% (71%) to 46% (47%).

take 7.5% (equals to US$10 million) of less syndicate shares if their bank market power increases by one standard deviation. This result is statistically significant and economically important.

One potential source of concern in our empirical analysis is the endogeneity problem. Our results may be suffered from reverse-causality concern, where the syndicate structure may drive the lender market structure at the same time. Even though this is unlikely happening, we replace our concentration ratio by its one year lagged value and the results are consistent with our baseline results. Another endogeneity concern is the omitted variable issue where the syndicate structure is driven by other factors which determine syndicate structure and the bank market power simultaneously. We apply state-level fixed effect and a high-dimension fixed effect (Lin et al., 2012) approach to address this potential issue and our baseline results are also robust to alternative deposit concentration ratio (CR_{50}, CR_{20} and HHI).

We further examine the mechanisms by which bank market power affects loan syndicate structure. We hypothesise that lead arranger's bank market power would alleviate the problems of asymmetric information between the lenders and each participant lender would obtain more loan shares after controlling for the number of lenders. We use the participant share observations to re-run the baseline model and the results further support our hypothesis that participant lender's share allocation behaviour is positively related to bank market power themselves and negatively related to the lead arranger's bank market power. Such a result implies that lead arranger's bank market

power can effectively reduce the asymmetric information problem between lead arranger and participant lenders.

The lead arranger's bank market power can affect the asymmetric information between lenders through two channels: ex-ante screen and ex-post monitoring. For ex-ante screen, lead arranger's bank market power reduces information asymmetries via investing more resources in screening loan applicants. We expect this relation is more sensitive if loan applicants are more opaque, such as those with low S&P rating and those first appearing in the syndicated loan market. For loans without collateral and first-time collaborating between lead arranger and borrower, these loans need more ex-post monitor after syndication. We also test the ex-post monitor channel to examine if these loans are more sensitive to lead arranger's bank market power indicator. The results show that lead arranger's bank market power can effectively reduce the information asymmetries between lenders through both ex-ante screen behaviour and ex-post monitor activities.

We also examine factors that influence the relationship between the bank market power and the syndicate structure. We find that if the lead arranger has a strong reputation in the syndicated loan market, the relation between lead arranger's bank market power and syndication structure is stronger. Where borrower and lead arranger are not in the same state, it is more costly for lead arranger to screen and monitor the borrowers and our empirical results support the conjecture and in such a scenario, the relation between lead arranger's bank market power and

syndication structure is more sensitive. Similarly, we also examine this relation in the financial crisis period. Finance crisis is an exogenous shock which requires more ex-ante and ex-post monitor activities to secure the return on investment (Johnson and Mitton, 2003, Lin et al., 2012). Consistent with this notion, we find that the effect of lead arranger's bank market power is stronger during the period of financial crisis.

Our results show that lead arranger's bank market power can effectively reduce the information asymmetries between lenders during syndication which further influences the syndicate structure. We also prove that the lead arranger's bank market power could motivate the participant banks to obtain more shares. Overall, our results add to existing literature on the determinants of syndicated loan structure, such as corporate ownership (Lin et al., 2012), performance pricing indicator[25] (Roberts and Panyagometh, 2002), borrower debt rating (Dennis and Mullineaux, 2000), whether borrower is a listed company (Jones et al., 2005), previous loans by firms & previous relationship with borrower (Ivashina, 2009, Bosch and Steffen, 2011), etc. Our results are also consistent with the previous literature regarding the function of the bank in screening and monitoring (e.g., Guzman, 2000, Petersen and Rajan, 1994, Delis et al., 2017). Finally, these findings provide a new channel in the relation between bank market power and

[25] Performance Pricing indicator: Under performance pricing, loan pricing will fluctuate with borrower's subsequent performance.

syndicate structure and how bank market power influence the information asymmetries between banks during collaboration.

The remainder of this paper is structured as follows. Section 2 reviews relevant literature. We describe our data, variables and baseline model specification in Section 3 and report the empirical results in Section 4. Finally, we conclude our findings with implications in Section 5.

4.2 Related literature and hypothesis development

4.2.1 Syndicated loan structure

In recent years, the syndicated loan makes great success in the global financial markets, with a total volume of $4.7 trillion in 2015, compared with $3.02 trillion in the international bond market for non-financial companies. Averagely, each syndicate facility amounts to USD$376 million based on our US database. Apart from the importance of syndicated loan, its unique characteristics, such as structure, have already been a popular research topic.

There already have been many research papers examining the determinants of syndicate structure, such as, lead share, share concentration ratio and number of lenders. In the earlier 1990s, Simons (1993) examined agent bank behaviour in syndication process using the U.S. syndicated

loan sample in the year 1991, which firstly discloses the importance the syndicate structure and shows agent bank's capital, loan purpose (such as construction and commercial real-estate) and loan quality may influence its loan share. Dennis and Mullineaux (2000) using 3,410 loan transactions (both including syndicated loan and non-syndicated loan from 1987 to 1995) proved that a rated firm or listed firm could be more easily to be syndicated and lead arranger hold less shares in its loan portfolio because of less asymmetric information for those firms. Apart from borrower information, agent bank's reputation and loan maturity could also influence syndication probability and syndication structure. Furthermore, the author also points out that agent arranger could hold less share if it is a "bank" as a signal of reputational institution. Roberts and Panyagometh (2002) revalidated Dennis and Mullineaux's test with a larger sample (samples from 1987 to 1999) and two new proxies associated with agency problem and bank reputation and the finding of syndicate structure is same as before.

Esty and Megginson (2003) explored the relationship between creditor rights and syndicated loan structure, and the sample spans across 61 different countries from 1980 to 2000. They found syndicated loan structure would be more concentrated if borrower from countries with strong credit rights and reliable legal enforcement, because small number of lenders could generate low cost contracting and ease of monitoring. However, lenders intend to create dispersed syndicates with more lenders to protect their claims when they cannot rely on enforcement

mechanisms to deter default. Lee and Mullineaux (2001) used 3,410 transactions from 1987 to 1995, their findings are similar as those of previous studies, and tested the determinant effects of borrower information transparent, lead arranger reputation, loan resale activity and loan maturity. It is noteworthy that this paper is the first one to consider syndicate size (number of lenders) as determinants of syndicated loan structure, authors use predicted syndicate size in loan composition model. To investigate the agent bank behaviour after originating syndicated loan, Jones et al. (2005) used a set of panel data to test determinants for dynamic changes in lead arranger's shares. The authors suggested that lead arranger are more likely to diffuse syndicated loan with other investors when lead arranger faces financial constraints. Sufi (2007) used a sample of 12,672 syndicated facilities which covering 6,687 U.S. non-financial firms from 1992 to 2003, he aims to investigate the characteristics of syndicated participants and information asymmetries between lenders and borrowers. He finds that server information asymmetry would force lead arranger to take a larger share and construct more concentrated syndicate, and both borrower and agent bank reputation can circumvent this problem but not eliminate it.

In addition, Ivashina (2009) investigates the relation between syndicated loan spread and lead arranger retained share and his result shows that asymmetric information causes lead arranger to hold more shares, which further increase the spread required by lead. Lin et al. (2012) shows that firm's ownership structure, such as control rights and cash-flow rights which would indicate

the default risk of borrower, have a significant influence on firm's syndicate. Bosch and Steffen (2011) compare ratings and stock exchange listing on which of them can be more effectively reduce information asymmetries based on 1,989 syndicated loan facilities for 661 UK borrowers from 1966 to 2007. The result highlights the important role of rating agencies in reducing information asymmetries. Champagne and Coggins (2012) employed 40 structure-related variables for a sample of 20,336 syndicated loan from 1998 to 2009 to capture all the major characteristics of a syndicate structure. Guo and Zhang (2015) tested the determinants of syndicate structure of securitised loans and found that the lead arrangers tend to collect smaller share in securitised syndicated loans because lead arrangers are more likely to securitise the loan if they have some negative private information about borrower.

Among these papers, the topic of asymmetric information between lenders and borrower and between lead arranger and participant investors has received extensive attention which plays an important role in determining the structure of the syndicated loan. For asymmetric information between lender and borrower, existing studies have tested many issues to mitigate this problem, such as performance pricing indicator (Roberts and Panyagometh, 2002), borrower debt rating (Dennis and Mullineaux, 2000), whether borrower is a listed company (Jones et al., 2005), previous loans by firms and previous relationship with borrower (Ivashina, 2009, Bosch and Steffen, 2011), and etc. The useful tool to attenuate information asymmetries between lead

arranger and participants is the reputation of lead arranger, which can be demonstrated by repeated transactions between lead bank and participants (Dennis and Mullineaux, 2000), deal number (Roberts and Panyagometh, 2002) and market share of lead in prior year (Sufi, 2007), bank dummy (Preece and Mullineaux, 1994). Yet, as far as we are aware, little evidence is available on the factors which can directly influence the loan allocation behaviour of each lender and how bank market structure circumvents this asymmetric information problem

4.2.2 Bank market structure

In early 1980s, the essential role of financial institutions as delegated monitors was gained a particular attention and it has been found that the interest rates charged on corporate borrowers would influence the actions of borrowers and sort potential borrowers, affecting the risk of loan portfolio (Stiglitz and Weiss, 1981, Diamond, 1984, Ramakrishnan and Thakor, 1984, Boyd and Prescott, 1986). Then later in the decade, Besanko and Thakor (1993) examined the exact question of how financial institutions circumvent problem rising by asymmetric information about borrower quality. They suggested that greater bank market competition would decrease information rents resulting from less relation lending, leading to higher risk taking. A conventional wisdom to explain less relationship lending in market with greater competition could be the fact that borrowers might switch to other banks or markets (e.g. bond and stock markets), reducing

incentive for banks to obtain private information from borrowers (Marquez, 2002, Cetorelli and Peretto, 2001, Petersen and Rajan, 1995).

In contrast, the stronger the market power is, the stronger the incentive of these banks to acquire costly private information, leading to an improved credit availability for credit-constrained firms since risky borrowers at the beginning of the relationship and for banks to extract the rents in the future from those who are eventually successful (Sharpe, 1990a, Petersen and Rajan, 1995, Cetorelli and Gambera, 2001, von Thadden, 2004). In other words, finance-constrained firms are more likely to be funded in a concentrated bank markets, because creditors are easier to internalise the benefits of funding these firms by facing a lower risk of borrowers leaving for another bank. It is also proved by Jackson and Thomas (1995) that banks with a monopoly power could help the development of firms by providing loans at a relatively lower price.

Additional evidence has also shown there is a non-monotonic effect of local banking market structure on relationship lending, suggesting that there should be a non-consistent relationship between banking concentration and the likelihood of a relation bank-firm tie. Elsas (2005) used Hausbank data in German during 1992-1996 to prove that relationship loan can improve bank access to borrower's information and influence on borrower management, while only in low and intermediate concentration market, and the Hausbank relations are positively associated with competition, i.e. U-shape relationship.

4.2.3 Hypothesis development

Bank market structure could influence loan syndicate structure in two ways, ex-ante screen and ex-post monitor. On the one hand, for the ex-ante information asymmetries (screening activities), based on the traditional view, screening incentive may be affected by the overall payoff. As banks charge higher loan prices in more concentrated markets (Mi and Han, 2018), we expect banks tend to invest more screen activities in a concentrated market. However, traditional literature stated that banks have stronger incentives to engage in screening in a more competitive market if the screening is not too costly (Schnitzer, 1999), where screening serves as a protection mechanism for banks with a shield against bad loans (Papanikolaou, 2019, Papanikolaou, 2018).

On the other hand, Chan et al. (1986) stated that deregulation of bank market has distorted the economic rents from information reusability; banks, therefore, devote less resources in a competitive market. Moreover, based on the information-based hypothesis, banks with a greater market power would have stronger incentives to acquire private information from borrowing firms and extract rents by developing a longer lending relationship (von Thadden, 2004, Besanko and Thakor, 1993). In contrast, lenders in competitive markets have weaker incentives because the information they have acquired could easily flow to competitors, known as a ‘free-riding’ problem associated with the competitive market (Cetorelli and Peretto, 2000; Marquez, 2002; Petersen and Rajan, 1995).

From the ex-post information asymmetries (monitoring activities), traditional theories suggest that a monopoly bank is more likely to generate costly-monitor activities than competitive banks because market power allows banks to create rents created by monitoring no matter if monitoring is contractible (Caminal and Matutes, 2002). In Guzman (2000)'s model, monopoly banks would exercise excessive monitoring activities as an alternative method to credit rationing. Recent literature has also indirectly proved the market power and monitor relation. In a concentrated bank market, a stronger bank-firm relation would improve borrower's corporate governance by inducing better monitoring (Dass and Massa, 2011). The bank market power also increases the borrower's firm future performance based on the explanation of bank market power increasing the monitoring activities (Delis et al., 2017). Therefore, bank market power induces more ex-post monitoring activities[26].

In loan syndication, the lead arranger invites participant lenders to co-invest to the same borrower. Apart from traditional agency problems between lender and borrower, there are two main extra problems existing in syndication process, adverse selection problem and moral hazard problem between lead arranger and participants where lead arranger has information advantage

[26] Another possible for bank market power and efficient monitor and screen explanation is through deposit relation (Ahn and Choi, 2009). As banks with market power are more likely to have deposit services with the borrower, banks can access to borrower's cash flow information which is not available to other lenders.

and incentives to syndicate risky loans and is less likely to continue to monitor the loan after selling parts of loan to participants (Ivashina, 2009), affecting the observed structure of syndicated loans.

First of all, credit-risk diversification is the main reason for the bank to syndicate loans by which lead arranger expects to share risk with multiple lenders (Ivashina, 2009, Demsetz, 1999). Whereas, participant banks would rely on the loan fraction held by lead arranger as a signal to reduce the moral hazard selection problem and to signal the quality of borrowers (Lin et al., 2012). Therefore, we hypothesize as follows:

HI: ***Lead arranger's bank market power would effectively reduce the information asymmetries between lead arranger and participant lenders.***

4.3 Data and variables

4.3.1 Sample construction

We start building our sample from four main data sources - Thomson Reuter Dealscan, Federal Deposit Insurance Corporation (FDIC), Compustat and Federal Reserve Bank of St. Louis. Dealscan provides detailed information for loan characteristics (e.g. spread, maturity, amount, and purpose), borrower information (e.g. name, location, and industry) and lender characteristics (e.g. name, location, share allocation, type, and lender role in syndication). We have 153,836

observations originally. We exclude sample loans issued to foreign borrowers (50,367), those with missing location information (23,179) and those loans issued to financial institutions (36,789). We define the lead arranger as the key lender who plays a role as 'administrative agent', 'agent', 'arranger', 'bookrunner', 'lead arranger', 'lead bank', 'lead manager' or 'Mandated lead arranger' in loan syndication (Ivashina, 2009, Taylor and Sansone, 2007) and exclude loan samples (2% of total samples) with multiple lead arrangers (4,987) by following (Ivashina and Scharfstein, 2010). We further rule out sample loans are led by foreign lead arrangers and those total bank allocations are greater than 100 per cent (by mistakes) (1,224). FDIC provides the financial report and the summary of deposit for every bank under U.S. jurisdiction, enabling us to quantify the bank market structure at a state level. Firm-level information on borrowers is collected from Compustat, and macroeconomic data are from Federal Reserve Bank of St. Louis.

We then use the algorithm[27] to match the Dealscan and Compustat to obtain detailed financial information of borrowers (9,723 missing). We also match the DealScan and FDIC to obtain the lender's financial data and location information (9,320 missing). Finally, we have a

[27] I use "fuzzy match" method to match databased based on name, location and industry.

sample of 18,247[28] loan facilities and 77,183 loan share allocation samples by all lenders between 1994 and 2017 in the following empirical analysis[29].

4.3.2 Measurement of syndicate structure

The key objective of this paper is to investigate the impacts of bank market power on the loan syndicate structure. We follow Lin et al. (2012) to measure the syndicate structure by, *LeadShare* (loan percentage held by lead arranger), *Players* (total number of lenders) and *ShareHHI* (Herfindahl-Hirschman Index of loan share). Increasing with the information asymmetry between lead arranger and participant, the participant will require lead arranger to obtain more share (*LeadShare*), total number of lenders will decrease (*Players*) and the structure of syndication (*ShareHHI*) will be more concentrated. We expect that lead arranger's bank market power can effectively reduce asymmetric information between lead arranger and participant banks, therefore, resulting in less *LeadShare*, more *Players* and less *ShareHHI*.

[28] Because of the missing value of control variables, such as bank characteristics, borrower characteristics, we have smaller number of observations in regression than the number stated above.

[29] FDIC database begins from 1994.

4.3.3 Measures of Bank Market power

We use the Lerner index as the main measurement of bank market power. The Lerner index (Lerner, 1934) has been a popular measurement of bank market power which derives from the competition between pricing and marginal cost. We follow (Delis et al., 2017) to define Lerner index as:

$$Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \qquad \text{(Eq. 4-1)}$$

where P_{it} is the price of bank *i*'s output at time *t*. MC_{it} is the marginal cost of the production of this product for bank *i* at time t. We follow Delis et al. (2017) to calculate the marginal cost by estimating a translog cost function and taking its derivative.

In the following robustness tests, we also use structural measures[30] of bank market structure, such as concentration ratio (CR_n) and Herfindahl-Hirschman Index (HHI), at a state level in U.S to evaluate the concentration of local banking market where the lead arranger headquarters (Lian, 2017). We use state-level bank concentration instead of bank level market power, because

[30] According to Leon (2015), the main critics on structural measures of banking market concentration (CRn and HHI) focuses on three aspects. First, there could be a gap between bank's conduct and market structure where for example, in a duopoly market, Bertrand outcome is still possible and price competition could be efficient. Second, efficient operation could help banks obtain greater market shares and increase market concentration. Therefore, structural measures of market concentration would represent the difference in efficiency instead of market competition. Finally, such measures may have a problem to define relevant geographical markets and types of product market where for example, out-of-state banks and foreign banks may participate in the local banking markets and one single syndicated loan could be exercised by non-bank financial institutions rather than banks.

whether a lending bank exercises its market power is mainly dependent on local bank market structure (Hasan et al., 2017). CR_n has been widely used in measuring bank market concentration (e.g., Bikker and Haaf, 2002).

4.3.4 Control variables and baseline model specification

To capture various characteristics and factors other than bank market power of banks, we control for the characteristics of borrowing firms[31] (Ivashina, 2009; Bosch and Steffen, 2011), lenders (Delis et al., 2017), loan facilities (Lim et al., 2014). We report the sources and detailed descriptions of these variables as well as all other variables used in Table 4-A1.

To examine the effects of banking market structure on loan syndicate structure, we have the baseline model specification (Eq.4-2) as follows:

$$Syndicated\ loan\ structure_t = \partial + \beta \times banking\ market\ power_{t-1} + \gamma_1 \times loan\ control_t + \gamma_2 \times borrower\ control_{t-1} + \gamma_3 \times lender\ control_{t-1} + \varepsilon \cdots\cdots \text{(Eq. 4-2)}$$

[31] We use the modified Altman Z-score (Altman, 1968) to control the corporate default risk. As suggested, Altman's Z-score measures the financial health of corporation and is negatively related to default risk.

where syndicated loan structure is measured by *Leadshare, Players* and *ShareHHI*, banking market power is measured Lerner and control variables are the characteristics of loan facility, borrower and lender, where we match firm financial data from the fiscal year (t-1) prior to the loan issue year (t). In addition, we also control for the aggregate trends in year, borrower's industry fixed effects to eliminate the effects driven by time, industry characteristics.

4.4 Results

4.4.1 Summary statistics

Table 4-1 presents the descriptive statistics for all variables used in the following empirical analysis. On average, the lead arranger (the participant) holds 44.14% (8.65%) in loan syndication comparable to the results in Sufi (2007) and Ivashina (2009). An average syndicated loan has an amount of $306 million with 43.8 months maturity and 7.5 lenders participating in the loan syndication. There are about 48.4% of the syndicated loan facilities secured by collateral. The bank market power index (Lerner) for lead arranger (the participant) is 0.439 (0.336). Averagely, HHI and CR_{50} (CR_{20}) based on the deposit market share where the lead arranger's headquarter locates are 0.01 and 0.350 (0.298), comparable to those samples used by Mi and Han (2018). In terms of the characteristics of syndicated loan borrowers, an average borrower has an asset value of $5.4

billion and tangibility of 33% and a profitability (net income/total assets) of 1%. On average, lenders have an asset value $ 333 billion, Tier1-asset ratio 13.7% and loan to deposit ratio 83.54%.

Table 4-1: Summary statistics

This table presents the observation, mean standard deviation and median for all the variables used in this paper. Information on U.S. syndicated loan facilities is collected between 1994 and 2017.

	Obs	Mean	Std. Dev	Median	Min	Max
Syndicated Structure						
Share (Lead arranger)	6449	44.140	36.104	28.000	0.000	100.000
Share (Participant)	32893	8.646	7.562	6.667	6.667	100.000
Players	18247	7.454	8.695	5.000	1.000	162.000
ShareHHI	6449	0.408	0.376	0.218	0.000	1.000
Bank market concentration						
Lerner (Lead arranger)	18247	0.439	0.245	0.528	0.015	0.768
Lerner (Participant)	77183	0.336	0.301	0.444	0.001	0.768
CR_{50} (Lead arranger)	16828	0.350	0.134	0.349	0.113	0.971
CR_{20}(Lead arranger)	16828	0.298	0.132	0.299	0.071	0.959
HHI (Lead arranger)	16828	0.010	0.014	0.005	0.001	0.379
Facility Characteristics						
Loan size (USD$ m)	18247	306	698	110	0.005	240000
Loan maturity (months)	16722	43.806	24.876	47.000	1.000	360.000
Secured indicator (0,1)	18247	0.484	0.500	0.000	0.000	1.000
Term loan (0,1)	18247	0.097	0.296	0.000	0.000	1.000
Corporate purpose (0,1)	18247	0.337	0.473	0.000	0.000	1.000
Debt repayment (0,1)	18247	0.198	0.398	0.000	0.000	1.000
Take over (0,1)	18247	0.104	0.306	0.000	0.000	1.000
Borrower Firm Characteristics						
Asset (USD$ b)	18247	5.448	29.318	1.067	0.001	18600
Leverage	18184	0.175	4.880	0.044	-291.014	192.191
ROA	18180	0.009	0.251	0.035	-12.000	7.745
Tangibility	17364	0.330	0.247	0.266	0.000	0.990
Z-Score	15400	1.533	8.757	1.668	-19.900	11.948
Lender characteristics						
Bank size (USD$ b)	17752	333	404	176	0.025	1730
Tier1-asset ratio	17752	0.137	0.114	0.119	0.037	5.370
ROA	17752	1.082	0.689	1.147	-7.238	6.722
ROE	17752	13.433	9.730	14.469	-102.982	64.229
Efficiency ratio	17750	60.760	10.924	59.252	-366.667	283.514
Loss Allowance ratio	17752	2.006	0.939	1.804	0.060	8.536
Loan to deposit ratio	17752	83.541	20.611	83.530	9.463	306.952

4.4.2 Baseline result

We employ the baseline model (Eq. 4-2) to investigate the effects of banking market power on loan syndicate structure and report the results in Table 4-2. The dependent variables are different measures of syndicate loan structure: the percentage of loan kept by lead arranger (Column 1), the total number of lenders (Column 2) and the Herfindahl-Hirschman Index of lender's share in the loan (Column 3). Overall, Table 4-2 shows that after controlling for a rich set of variables and fixed effects, lead arranger's with a greater market power can originate the syndicate loan with a more dispersed structure, i.e. the lead arranger holds a smaller share of the loan, more lenders participate in the syndicate and lender's share in the loan overall have a more dispersed distribution (a lower Herfindahl-Hirschman Index). The effect of lead arranger's bank market power on syndicate structure is not only statistically significant but also has an economic significance. For example, a standard deviation increases in Lerner (0.245) would reduce the loan percentage held by lead arranger by 7.5%, increases the total number of lenders by 3% and decreases the Herfindahl-Hirschman Index of lender share concentration by 8%.

Overall, the baseline results from the multivariate regression analyses suggest that the lead arranger's bank market power has a significant effect on the syndicate structure. Specifically, lead arranger with a greater market power would attract more participant banks, sell more shares to the participants and therefore construct a less concentrated loan structure. These results are consistent

with our hypothesis that lead arranger with bank market power will invest more resources in screening loan applicants and monitor after loan issued. This would effectively reduce the ex-ante and ex-post asymmetric information between lead banks and the participant lenders, leading to less adverse selection and moral hazard problems. Consequently, these syndicates are relatively dispersed, with the lead arranger retaining less share, more lenders and low Herfindahl-Hirschman Index.

Table 4-2: The effect of bank market power on syndicate structure

This table presents the ordinary least squares regression on the effect of the lead arranger's bank market power on syndicate structure. The dependent variables are the percentage of the loan held by the lead arranger (Column 1), the total number of lenders (Column 2) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3). The lead arranger's bank market power is measured in Lerner ratio. We also control for the fixed effects of borrower industry and year. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively

	(1)	(2)	(3)
VARIABLES	LeadShare	Players	ShareHHI
Lerner	-13.524***	0.766*	-0.131***
	(2.186)	(0.443)	(0.023)
Ln(Loan size)	-10.909***	2.176***	-0.119***
	(0.302)	(0.065)	(0.003)
Maturity	-0.189***	0.018***	-0.002***
	(0.013)	(0.003)	(0.000)
Secured (0,1)	-2.751***	1.461***	-0.028***
	(0.669)	(0.146)	(0.007)
Term loan (0,1)	1.957	1.269***	-0.002
	(1.427)	(0.217)	(0.015)
Corporation Purpose (0,1)	2.831***	-0.478***	0.030***
	(0.739)	(0.156)	(0.008)
Debt Repayment (0,1)	-0.287	0.517***	-0.006
	(0.761)	(0.177)	(0.008)
Take over (0,1)	-1.214	2.603***	-0.010
	(1.012)	(0.212)	(0.011)
Ln (Asset)	-4.214***	0.964***	-0.037***
	(0.293)	(0.060)	(0.003)
Leverage	0.120	-0.007	0.001
	(0.091)	(0.013)	(0.001)
ROA	0.748	-0.936***	0.002
	(1.991)	(0.285)	(0.021)
Tangibility	-3.731***	-0.771**	-0.047***
	(1.431)	(0.304)	(0.015)
Z-score	-0.089	-0.001	-0.002
	(0.252)	(0.008)	(0.003)
Ln (Bank size)	-0.056	-0.306***	-0.001
	(0.197)	(0.044)	(0.002)
Tier1_Asset ratio	2.540	-0.864	0.023
	(2.237)	(0.606)	(0.023)
ROA	-2.935**	-1.180***	-0.034**
	(1.387)	(0.313)	(0.014)
ROE	0.247***	0.096***	0.003***
	(0.096)	(0.021)	(0.001)
Efficiency ratio	-0.197***	-0.014*	-0.002***
	(0.037)	(0.007)	(0.000)
Loss Allowance ratio	-0.554	0.021	-0.004
	(0.360)	(0.082)	(0.004)
Loan to deposit ratio	0.005	-0.027***	-0.000
	(0.015)	(0.004)	(0.000)

Observations	5,189	13,696	5,189
R-squared	0.710	0.371	0.707
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES

4.4.3 Endogeneity

Our empirical analysis may suffer from endogeneity problems caused by omitted variables and reverse-causality effect[32]. In Eq(4-2), we have controlled for various borrower, lender and loan facility factors, while it is also unlikely that the borrower firm or loan facility itself determines the bank market power as a direct function of the syndicate structure. The most possible omitted factors could be those at the state level. There may exist unobservable or accounted for factors in our baseline model, which could jointly determine the bank market power and syndicate structure. To address this issue, we introduce lead arranger's local (state) fixed and use a higher-order fixed effect model (Lin et al., 2012). In Table 4-3, we re-estimate the baseline model by using industry × state high dimension fixed effects (Column 1-3), industry × year high dimension fixed effects

[32] The reverse causality concern is that the syndicate loan structure may determine the lender's bank market power; meanwhile, theoretically, this is less likely to happen. Because a single loan facility is impossible to influence the bank's market power. However, we employ lagged Lerner index in our model to address this issue thoroughly.

(Column 4-6) and year × state high dimension fixed effects (Column 7-9). As state in Table 4-3, all results are consistent with our baseline results with similar magnitude.

Table 4-3: Endogeneity test

This table presents the ordinary least squares regression on the effect of the lead arranger's bank market power on syndicate structure, with industry * state (Column 1to 3), industry * year (Column 3 to 6) and year * state fixed effects (Column 7 to 9). The dependent variables are the percentage of the loan held by the lead arranger (Column 1, 4 and 7), the total number of lenders (Column 2, 5 and 8) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3, 6 and 9). The lead arranger's bank market power is measured in Lerner ratio. We also control for the fixed effects of borrower industry, state and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively

VARIABLES	(1) Lead	(2) Players	(3) ShareHHI	(4) Lead	(5) Players	(6) ShareHHI	(7) Lead	(8) Players	(9) ShareHHI
LeadLerner	-7.778***	1.596***	-0.069**	-12.021***	0.570*	-0.108***	-8.766**	1.589*	-0.060**
	(2.925)	(0.584)	(0.030)	(3.596)	(0.272)	(0.038)	(4.357)	(0.801)	(0.026)
Ln(Loan size)	-10.356***	2.209***	-0.113***	-10.403***	2.192***	-0.114***	-10.140***	2.235***	-0.110***
	(0.312)	(0.067)	(0.003)	(0.310)	(0.066)	(0.003)	(0.316)	(0.067)	(0.003)
Maturity	-0.182***	0.018***	-0.002***	-0.181***	0.018***	-0.002***	-0.166***	0.018***	-0.002***
	(0.013)	(0.003)	(0.000)	(0.013)	(0.003)	(0.000)	(0.014)	(0.003)	(0.000)
Secured (0,1)	-3.229***	1.467***	-0.034***	-2.868***	1.479***	-0.030***	-2.991***	1.492***	-0.032***
	(0.681)	(0.149)	(0.007)	(0.682)	(0.148)	(0.007)	(0.689)	(0.150)	(0.007)
Term loan (0,1)	2.454*	1.262***	0.002	3.454**	1.224***	0.008	3.486**	1.131***	0.015
	(1.418)	(0.220)	(0.015)	(1.452)	(0.219)	(0.015)	(1.434)	(0.222)	(0.015)
Corportion Purpose (0,1)	3.060***	-0.545***	0.032***	3.032***	-0.529***	0.031***	2.752***	-0.417**	0.030***
	(0.754)	(0.159)	(0.008)	(0.756)	(0.159)	(0.008)	(0.766)	(0.162)	(0.008)
Debt Repayment (0,1)	-0.182	0.567***	-0.006	-0.301	0.558***	-0.006	-0.409	0.647***	-0.006
	(0.770)	(0.180)	(0.008)	(0.769)	(0.179)	(0.008)	(0.774)	(0.182)	(0.008)
Take over (0,1)	-1.114	2.671***	-0.009	-1.334	2.620***	-0.011	-1.026	2.750***	-0.006
	(1.016)	(0.215)	(0.011)	(1.024)	(0.214)	(0.011)	(1.032)	(0.217)	(0.011)
Ln (Asset)	-4.242***	0.962***	-0.037***	-4.186***	0.977***	-0.036***	-4.216***	0.987***	-0.037***
	(0.304)	(0.063)	(0.003)	(0.303)	(0.062)	(0.003)	(0.307)	(0.063)	(0.003)
Leverage	0.063	-0.009	0.000	0.101	-0.010	0.001	0.056	-0.011	0.000
	(0.093)	(0.013)	(0.001)	(0.091)	(0.013)	(0.001)	(0.092)	(0.013)	(0.001)
ROA	0.982	-1.005***	0.001	1.167	-0.985***	0.004	1.824	-1.013***	0.014
	(2.022)	(0.294)	(0.021)	(2.009)	(0.292)	(0.021)	(2.034)	(0.308)	(0.021)
Tangibility	-2.882*	-0.747**	-0.033**	-3.794**	-0.746**	-0.046***	-2.618*	-0.847***	-0.035**
	(1.489)	(0.316)	(0.016)	(1.474)	(0.312)	(0.015)	(1.468)	(0.314)	(0.015)
Z-score	-0.242	0.000	-0.003	-0.204	-0.000	-0.002	-0.144	-0.002	-0.002

	(0.258)	(0.008)	(0.003)	(0.256)	(0.008)	(0.003)	(0.258)	(0.008)	(0.003)
Ln (Bank size)	0.421*	-0.296***	0.004	0.533**	-0.284***	0.005*	0.457	-0.307***	0.004
	(0.249)	(0.057)	(0.003)	(0.257)	(0.059)	(0.003)	(0.302)	(0.072)	(0.003)
Tier1_Asset ratio	2.654	-0.966	0.024	4.399*	-0.767	0.040*	2.819	-1.009	0.022
	(2.259)	(0.621)	(0.024)	(2.314)	(0.627)	(0.024)	(2.474)	(0.659)	(0.026)
ROA (Bank)	-3.921***	-1.437***	-0.044***	-3.508**	-1.394***	-0.042***	-2.501	-1.566***	-0.031
	(1.503)	(0.344)	(0.016)	(1.469)	(0.339)	(0.015)	(1.919)	(0.447)	(0.020)
ROE	0.272***	0.109***	0.003***	0.211**	0.102***	0.002**	0.064	0.109***	0.001
	(0.102)	(0.023)	(0.001)	(0.103)	(0.023)	(0.001)	(0.129)	(0.030)	(0.001)
Efficiency ratio	-0.162***	-0.015*	-0.002***	-0.196***	-0.016**	-0.002***	-0.188***	-0.021**	-0.002***
	(0.040)	(0.008)	(0.000)	(0.041)	(0.008)	(0.000)	(0.049)	(0.009)	(0.001)
Loss Allowance ratio	-0.563	-0.125	-0.005	-0.551	-0.156	-0.005	-0.595	-0.232*	-0.006
	(0.431)	(0.095)	(0.004)	(0.432)	(0.097)	(0.005)	(0.524)	(0.123)	(0.005)
Loan to deposit ratio	-0.039**	-0.029***	-0.001***	-0.032*	-0.029***	-0.001***	-0.016	-0.030***	-0.000*
	(0.018)	(0.004)	(0.000)	(0.018)	(0.004)	(0.000)	(0.022)	(0.005)	(0.000)
Observations	5,158	13,623	5,158	5,158	13,623	5,158	5,158	13,623	5,158
R-squared	0.728	0.379	0.727	0.728	0.386	0.726	0.741	0.387	0.741
YEAR FE	YES	YES	YES						
INDUSTRY*STATE FE	YES	YES	YES						
INDUSTRY FE							YES	YES	YES
YEAR*STATE FE							YES	YES	YES
STATE FE				YES	YES	YES			
INDUSTRY*YEAR FE				YES	YES	YES			

4.4.4 Robustness test

In this subsection, we conduct a series of robustness tests to further examine the relationship between lead arranger's bank market power and syndicated structure. We replace the Lerner index by concentration ratios, $CR_{50,}$ CR_{20} and HHI, which measure the lead arranger's deposit concentration at state level. We re-estimate the baseline model by excluding the bank characteristics[33] because the concentration is measured at the state level instead of bank individual level[34]. The results are presented in the Table 4-4 and consistent with our baseline results.

[33] Bank market concentration measure is based on state level, instead of bank individual level. If we include the bank characteristics in the model, the explanation power of bank market concentration is absorbed by these bank specific characteristics.

[34] We normally assume that banks in the concentrated bank market have a greater market power than those in a competitive bank market. This relation is more evident for lead arrangers who originate the syndicated loan, because averagely loan size of syndicated loan is $306 million, only the 'big bank' has the ability to be a lead arranger.

Table 4-4: Robustness test

This table presents the ordinary least squares regression on the effect of the lead arranger's bank market power on syndicate structure by using different measurement of lead arranger's bank market power, with LeadCR50 (Column 1to 3), LeadCR20 (Column 3 to 6) and LeadHHI (Column 7 to 9). The dependent variables are the percentage of the loan held by the lead arranger (Column 1, 4 and 7), the total number of lenders (Column 2, 5 and 8) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3, 6 and 9). We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

VARIABLES	(1) Lead	(2) Players	(3) ShareHHI	(4) Lead	(5) Players	(6) ShareHHI	(7) Lead	(8) Players	(9) ShareHHI
LeadCR50	-2.445**	1.431**	0.023						
	(1.171)	(0.629)	(0.032)						
LeadCR20				-2.853**	1.413**	-0.007			
				(1.372)	(0.689)	(0.034)			
LeadHHI							-46.225***	10.627**	0.329
							(9.782)	(4.249)	(0.255)
Ln(Loan size)	0.344**	1.848***	-0.118***	0.346**	1.849***	-0.117***	0.344**	1.840***	-0.118***
	(0.167)	(0.080)	(0.004)	(0.167)	(0.081)	(0.004)	(0.166)	(0.080)	(0.004)
Maturity	0.014**	0.022***	-0.002***	0.014**	0.022***	-0.002***	0.013**	0.022***	-0.002***
	(0.006)	(0.003)	(0.000)	(0.006)	(0.003)	(0.000)	(0.006)	(0.003)	(0.000)
Secured (0,1)	0.970***	0.923***	-0.001	0.972***	0.922***	-0.001	0.952***	0.923***	-0.001
	(0.262)	(0.150)	(0.007)	(0.262)	(0.150)	(0.007)	(0.261)	(0.150)	(0.007)
Term loan (0,1)	7.728***	0.655***	-0.009	7.740***	0.654***	-0.009	7.761***	0.645***	-0.010
	(0.975)	(0.244)	(0.014)	(0.974)	(0.244)	(0.014)	(0.973)	(0.243)	(0.014)
Corportion Purpose (0,1)	-0.045	-0.565***	0.032***	-0.045	-0.564***	0.031***	-0.017	-0.549***	0.031***
	(0.269)	(0.149)	(0.007)	(0.269)	(0.149)	(0.007)	(0.270)	(0.149)	(0.007)
Debt Repayment (0,1)	0.181	-0.055	-0.004	0.182	-0.054	-0.004	0.180	-0.052	-0.004
	(0.305)	(0.179)	(0.008)	(0.305)	(0.179)	(0.008)	(0.305)	(0.179)	(0.008)
Take over (0,1)	0.481	1.935***	0.002	0.489	1.936***	0.002	0.480	1.932***	0.002
	(0.516)	(0.308)	(0.012)	(0.516)	(0.308)	(0.012)	(0.515)	(0.308)	(0.013)
Ln (Asset)	-0.176	1.112***	-0.026***	-0.171	1.113***	-0.026***	-0.143	1.117***	-0.026***
	(0.131)	(0.073)	(0.004)	(0.131)	(0.073)	(0.004)	(0.132)	(0.073)	(0.004)
Leverage	0.094	0.001	0.002*	0.094	0.001	0.002*	0.094	0.001	0.002*
	(0.072)	(0.004)	(0.001)	(0.072)	(0.004)	(0.001)	(0.072)	(0.004)	(0.001)

ROA	0.210	-0.858**	0.008	0.195	-0.865***	0.008	0.230	-0.888***	0.008
	(0.572)	(0.335)	(0.020)	(0.573)	(0.335)	(0.020)	(0.568)	(0.335)	(0.020)
Tangibility	-0.238	-0.985**	-0.052***	-0.247	-0.988**	-0.052***	-0.330	-0.999**	-0.051***
	(0.626)	(0.441)	(0.017)	(0.627)	(0.442)	(0.017)	(0.631)	(0.441)	(0.017)
Z-score	-0.037	-0.005	-0.005*	-0.037	-0.005	-0.005*	-0.049	-0.005	-0.005*
	(0.070)	(0.008)	(0.003)	(0.070)	(0.008)	(0.003)	(0.070)	(0.008)	(0.003)
Ln (GDP)	-0.312**	-0.032	0.008*	-0.303**	-0.028	0.007*	-0.309**	-0.024	0.008*
	(0.149)	(0.100)	(0.004)	(0.148)	(0.100)	(0.004)	(0.146)	(0.099)	(0.004)
Ln(Personal Income)	1.076	0.498	0.038	1.091	0.478	0.042	1.423	0.482	0.036
	(1.157)	(0.763)	(0.031)	(1.157)	(0.762)	(0.031)	(1.136)	(0.760)	(0.031)
Observations	8,179	23,625	8,179	8,179	23,625	8,179	8,179	23,625	8,179
R-squared	0.943	0.335	0.687	0.943	0.335	0.687	0.944	0.335	0.687
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

4.4.5 Mechanism test

We previously examined the relation between bank market power and syndicate structure in terms of lead arranger's sample (*Leadshare*) and loan structure as a whole (total number of lenders and Herfindahl-Hirschman Index of loan share). Based on our hypothesis, a lead arranger with a greater market power will invest more resource in ex-ante screen and ex-post monitor activities, reducing the adverse selection and moral hazard between lead arranger and participant banks. We expect that lead arranger's bank market power would be positively related to the participant bank's loan share. To examine this effect, we have the model specification (Eq.4-3) as follows:

$$Participant\ loan\ share_t = \partial + \beta \times Participant\ bank's\ market\ power_{t-1} + \theta \times Lead\ arranger's\ market\ power_{t-1} + \gamma_1 \times loan\ control_t + \gamma_2 \times borrower\ control_{t-1} + \gamma_3 \times lender\ control_{t-1} + \varepsilon \cdots\cdots \text{(Eq. 4-3)}$$

where participant loan share is measured by the loan percentage held by each participant bank, participant bank's market power and lead arranger's bank market power are measured by *LeadLerner* and *ParLerner* respectively. The follow the same process to calculate *LeadLerner* and *ParLerner*. Control variables are the characteristics of loan facility, borrower and lender, where

we match firm financial data and lender's characteristics from the fiscal year (t-1) prior to the loan issue year (t). In addition, we also control for the aggregate trends in year, borrower's industry fixed effects to eliminate the effects driven by time, industry characteristics. We also control for the total number of lenders fixed effect, which removes the influences of lending size so that we can better observe each of bank-allocation behaviour caused by their bank market power within the fixed lending group.

Table 4-5 shows that the loan shares held by participant lenders are positively associated with and their market power, suggesting that participant banks are likely to obtain more loan shares if they have a greater market power and a greater ability in screening loan applicants. Moreover, the lead arranger's bank market power also encourages the participants to obtain more share because these loan facilities have less adverse selection and moral hazard. For example, the coefficients in Column 2, one standard deviation increase in *ParLerner* and *LeadLerner* would increase the loan percentage held by each participant by 7% and 1.5% respectivel

Table 4-5: Mechanism test

This table presents the ordinary least squares regression on the effect of the lead arranger's bank market power and each participant's bank market power on participant's share allocation behavior. The dependent variables are the percentage of the loan held by each participant bank. The bank market power is measured by Lerner index. We also control for the fixed effects of borrower industry and year. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

	(1)	(2)
VARIABLES	Participant	Participant
ParLerner	1.767***	2.029***
	(0.156)	(0.276)
LeadLerner		0.529*
		(0.310)
Ln(Loan size)	-0.360***	-0.283***
	(0.032)	(0.048)
Maturity	-0.003***	-0.002
	(0.001)	(0.002)
Secured (0,1)	-0.155***	-0.002
	(0.057)	(0.085)
Term loan (0,1)	-0.204**	-0.190
	(0.095)	(0.173)
Corportion Purpose (0,1)	0.034	0.066
	(0.060)	(0.095)
Debt Repayment (0,1)	0.053	0.060
	(0.077)	(0.097)
Take over (0,1)	-0.148*	-0.077
	(0.078)	(0.110)
Ln (Asset)	-0.108***	-0.024
	(0.027)	(0.042)
Leverage	0.010	-0.008
	(0.010)	(0.018)
ROA	0.219	-0.198
	(0.258)	(0.483)
Tangibility	-0.032	0.156
	(0.121)	(0.167)
Z-score	0.051**	0.130***
	(0.025)	(0.041)
Ln (Bank size)	0.810***	0.796***
	(0.016)	(0.023)
Tier1_Asset ratio	0.026	-0.223
	(0.077)	(0.146)
ROA (Bank)	0.081	0.085
	(0.085)	(0.127)
ROE	-0.049***	-0.058***
	(0.007)	(0.011)
Efficiency ratio	-0.002	-0.007**
	(0.002)	(0.003)
Loss Allowance ratio	-0.017	-0.089**
	(0.030)	(0.043)
Loan to deposit ratio	0.003***	0.003**
	(0.001)	(0.001)
Observations	25,357	11,364
R-squared	0.783	0.799
PLAYERS	YES	YES
YEAR FE	YES	YES
INDUSTRY FE	YES	YES

4.4.6 Ex-ante & Ex-post

This chapter particularly addresses the relevant issues around the effects of market power on the problem of asymmetric information. Such effects would diminish (become stronger) if there is no (more severe) asymmetric information problem. We test this conjecture from two perspectives:

4.4.6.1 Ex-ante information asymmetry

Early results suggest that market power serves as a mitigating factor on ex ante information asymmetries, alleviating adverse selection problem. It is therefore expected that such a favourable effect should be stronger when lending to more informationally opaque borrowers. Hence, we conduct additional tests and define borrowers without credit rating or first appear[35] in the syndicated loan market as being more informationally opaque. Credit rating is given by an independent third party and observable to both lead arranger and participant lenders ex ante and therefore, we define a borrowing firm with a credit rating as being informationally transparent; opaque otherwise. Borrowers who first appear in the syndicated loan market normally are more informationally opacity because lenders are unable to predict their repayment ability through

[35] We calculate the times of repeated loan on the 'package-level'. In syndicated loan, one package level may contain multiple facilities where one bank may enter all facilities contract within a package. In this case, we define all these loan facilities are the first loan for this borrower if this syndicated loan package for this borrower is the first time (Sufi, 2007). Because of the data limit, we are unable to track bank-firm relationship from other sources, such as deposit relationship and bilateral loan relationship. This is one shortage of this paper.

previous successful loan repayment[36]. We test this conjecture by including the measures of information opacity and their interaction with the lead arranger's bank market power in the baseline. Table 4-6 Panel A shows that the interaction terms between bank market power and credit rating are statistically significant and bear the opposite signs of the corresponding coefficients on bank market power. This means that bank market power-syndicated structure sensitivities are lower for borrower with credit rating. For instance, the coefficient in Column 1 implies that, for a syndicated loan to borrower without credit rating, a one standard deviation increase in the lead arranger's bank market power reduces the loan percentage held by lead arranger by 250% more than for a syndicated loan to borrower with credit rating. Similarly, the interaction terms between bank market power and 'first appear' are statistically significant and bear the same signs of the corresponding coefficients on bank market power. This indicates that the bank market power-syndicate structure are more sensitive to borrowers in their first-time syndication.

[36] DealScan data covers almost of U.S. large loan data from the early 20th century. We define the first appear dummy based on the whole DealScan database.

Table 4-6 Panel A: Ex-ante screen

This table presents the regression result on the effect of borrowing firm informational opacity on the relation between the bank market power and syndicate structure .The dependent variables are the percentage of the loan held by the lead arranger (Column 1 and 4), the total number of lenders (Column 2 and 5) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3 and 6). The bank market power is measured by Lerner index. Rating equals to one if the firm has a credit rating. First appear equals to one if the company is the first time appearing in the syndicated loan market in this loan package. We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

VARIABLES	(1) Lead	(2) Players	(3) ShareHHI	(4) Lead	(5) Players	(6) ShareHHI
LeadLerner	-9.417***	-0.741	-0.088***	-17.258***	1.024**	-0.168***
	(2.882)	(0.603)	(0.030)	(2.395)	(0.472)	(0.025)
Rating (0,1)	-4.073**	0.751**	-0.044***			
	(1.616)	(0.309)	(0.017)			
Rating *leadLerner	6.733**	-2.227***	0.071**			
	(3.065)	(0.594)	(0.032)			
First appear (0, 1)				3.439*	0.448	0.028
				(1.803)	(0.371)	(0.019)
First appear*LeadLerner				-15.461***	-1.173	-0.157***
				(3.483)	(0.719)	(0.036)
Ln(Loan size)	-10.916***	2.177***	-0.119***	-10.864***	2.174***	-0.118***
	(0.302)	(0.065)	(0.003)	(0.301)	(0.065)	(0.003)
Maturity	-0.190***	0.018***	-0.002***	-0.188***	0.018***	-0.002***
	(0.013)	(0.003)	(0.000)	(0.013)	(0.003)	(0.000)
Secured (0,1)	-2.704***	1.492***	-0.028***	-2.618***	1.462***	-0.027***
	(0.669)	(0.146)	(0.007)	(0.666)	(0.146)	(0.007)
Term loan (0,1)	1.997	1.287***	-0.002	1.925	1.268***	-0.003
	(1.427)	(0.217)	(0.015)	(1.421)	(0.217)	(0.015)
Corporation Purpose (0,1)	2.886***	-0.492***	0.031***	2.859***	-0.477***	0.031***
	(0.739)	(0.156)	(0.008)	(0.736)	(0.156)	(0.008)
Debt Repayment (0,1)	-0.215	0.501***	-0.006	0.123	0.507***	-0.002
	(0.762)	(0.177)	(0.008)	(0.762)	(0.177)	(0.008)
Take over (0,1)	-1.253	2.592***	-0.010	-0.963	2.599***	-0.007
	(1.012)	(0.212)	(0.011)	(1.009)	(0.212)	(0.011)
Ln (Asset)	-4.249***	0.955***	-0.037***	-3.998***	0.961***	-0.034***
	(0.294)	(0.060)	(0.003)	(0.295)	(0.060)	(0.003)
Leverage	0.121	-0.007	0.001	0.107	-0.007	0.001

	(0.091)	(0.013)	(0.001)	(0.091)	(0.013)	(0.001)
ROA	0.895	-0.946***	0.003	0.719	-0.912***	0.002
	(1.992)	(0.285)	(0.021)	(1.983)	(0.285)	(0.021)
Tangibility	-3.646**	-0.778**	-0.046***	-3.833***	-0.764**	-0.048***
	(1.431)	(0.304)	(0.015)	(1.426)	(0.304)	(0.015)
Z-score	-0.107	-0.000	-0.002	-0.135	-0.001	-0.002
	(0.252)	(0.008)	(0.003)	(0.251)	(0.008)	(0.003)
Ln (Bank size)	-0.105	-0.289***	-0.002	-0.111	-0.298***	-0.001
	(0.198)	(0.044)	(0.002)	(0.197)	(0.044)	(0.002)
Tier1_Asset ratio	2.612	-0.818	0.024	2.594	-0.869	0.023
	(2.238)	(0.606)	(0.023)	(2.229)	(0.606)	(0.023)
ROA (Bank)	-3.153**	-1.104***	-0.036**	-3.279**	-1.149***	-0.037**
	(1.390)	(0.313)	(0.014)	(1.385)	(0.314)	(0.014)
ROE	0.262***	0.090***	0.003***	0.269***	0.094***	0.003***
	(0.096)	(0.021)	(0.001)	(0.096)	(0.021)	(0.001)
Efficiency ratio	-0.195***	-0.013*	-0.002***	-0.198***	-0.014*	-0.002***
	(0.037)	(0.007)	(0.000)	(0.037)	(0.007)	(0.000)
Loss Allowance ratio	-0.499	0.002	-0.004	-0.519	0.012	-0.004
	(0.361)	(0.082)	(0.004)	(0.359)	(0.083)	(0.004)
Loan to deposit ratio	0.005	-0.027***	-0.000	0.007	-0.027***	-0.000
	(0.015)	(0.004)	(0.000)	(0.015)	(0.004)	(0.000)
Observations	5,189	13,696	5,189	5,189	13,696	5,189
R-squared	0.710	0.372	0.707	0.712	0.371	0.710
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES

4.4.6.2 Ex-post information asymmetry

We test the role of bank market power in alleviating moral hazard problem by a same approach. We define a certain type of borrowing firms to need more intense monitoring and due diligence, such as those who borrow for the first time with lead arranger and those who borrowed without collateral. In contrast, those repeated relational borrowers for lead arranger and loans secured with collateral need less monitoring and due diligence. It is expected that the effects of bank market power are to be stronger in those borrowers who need more monitoring. Table 4-6 Panel B shows supporting evidence to our conjecture. For lead arrangers who lend to the borrower for the first time or issues loan without collateral, they would perform more intensive monitoring and therefore, they would be able to sell more share to participant banks, attract more participants and originate a syndicate with a dispersed structure if they have a greater market power and stronger motives to perform monitor after syndication. For example, in Column 1, one standard deviation increase in lead arranger's bank market power would reduce lead arranger's loan shareholding by 32.7% more on uncollateralised loans compared with collateralised loans.

Table 4-6 Panel B: Ex-post Monitor

This table presents the regression result on the effect of borrowing firm monitor activities needed after syndication on the relation between the bank market power and syndicate structure .The dependent variables are the percentage of the loan held by the lead arranger (Column 1 and 4), the total number of lenders (Column 2 and 5) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3 and 6). The bank market power is measured by Lerner index. Secured equals to one if the firm provided collateral in this loan facility. Old borrower to one if the has the repeated lending relationship with the lead arranger in the syndicated loan market. We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

VARIABLES	(1) Lead	(2) Players	(3) ShareHHI	(4) Lead	(5) Players	(6) ShareHHI
LeadLerner	-16.237***	-0.259	-0.161***	-10.225***	-0.018	-0.114***
	(2.748)	(0.548)	(0.029)	(2.760)	(0.530)	(0.029)
Secured (0,1)	-4.718***	0.756***	-0.050***	-2.678***	1.472***	-0.027***
	(1.381)	(0.265)	(0.014)	(0.666)	(0.146)	(0.007)
Secured * LeadLerner	4.224*	-1.601***	0.047*			
	(2.133)	(0.504)	(0.027)			
Old borrower (0,1)				1.254	-0.134	0.017
				(1.453)	(0.276)	(0.015)
Old borrower * LeadLerner				8.000***	-1.379***	0.070***
				(2.601)	(0.532)	(0.027)
Ln(Loan size)	-10.876***	2.183***	-0.118***	-10.840***	2.166***	-0.118***
	(0.303)	(0.065)	(0.003)	(0.301)	(0.065)	(0.003)
Maturity	-0.189***	0.017***	-0.002***	-0.193***	0.018***	-0.002***
	(0.013)	(0.003)	(0.000)	(0.013)	(0.003)	(0.000)
Term loan (0,1)	1.869	1.249***	-0.003	1.654	1.272***	-0.005
	(1.428)	(0.217)	(0.015)	(1.422)	(0.217)	(0.015)
Corportion Purpose (0,1)	2.825***	-0.479***	0.030***	2.712***	-0.476***	0.029***
	(0.739)	(0.156)	(0.008)	(0.737)	(0.156)	(0.008)
Debt Repayment (0,1)	-0.311	0.501***	-0.007	0.240	0.449**	-0.001
	(0.761)	(0.177)	(0.008)	(0.763)	(0.177)	(0.008)
Take over (0,1)	-1.270	2.579***	-0.010	-1.109	2.573***	-0.008
	(1.012)	(0.212)	(0.011)	(1.008)	(0.212)	(0.011)
Ln (Asset)	-4.238***	0.963***	-0.037***	-3.904***	0.928***	-0.033***

	(0.294)	(0.060)	(0.003)	(0.297)	(0.061)	(0.003)
Leverage	0.119	-0.007	0.001	0.106	-0.006	0.001
	(0.091)	(0.013)	(0.001)	(0.091)	(0.013)	(0.001)
ROA	0.731	-0.971***	0.002	0.515	-0.913***	-0.001
	(1.991)	(0.285)	(0.021)	(1.983)	(0.285)	(0.021)
Tangibility	-3.676**	-0.771**	-0.046***	-3.528**	-0.790***	-0.045***
	(1.431)	(0.304)	(0.015)	(1.426)	(0.304)	(0.015)
Z-score	-0.097	-0.001	-0.002	-0.087	-0.001	-0.002
	(0.252)	(0.008)	(0.003)	(0.251)	(0.008)	(0.003)
Ln (Bank size)	-0.084	-0.319***	-0.001	-0.081	-0.305***	-0.001
	(0.198)	(0.044)	(0.002)	(0.197)	(0.044)	(0.002)
Tier1_Asset ratio	2.662	-0.854	0.024	2.111	-0.799	0.019
	(2.238)	(0.606)	(0.023)	(2.229)	(0.606)	(0.023)
ROA (Bank)	-3.140**	-1.236***	-0.036**	-2.870**	-1.182***	-0.033**
	(1.392)	(0.313)	(0.015)	(1.381)	(0.313)	(0.014)
ROE	0.260***	0.101***	0.003***	0.265***	0.094***	0.003***
	(0.096)	(0.021)	(0.001)	(0.095)	(0.021)	(0.001)
Efficiency ratio	-0.197***	-0.013*	-0.002***	-0.186***	-0.015**	-0.002***
	(0.037)	(0.007)	(0.000)	(0.037)	(0.007)	(0.000)
Loss Allowance ratio	-0.547	0.033	-0.004	-0.539	0.018	-0.004
	(0.360)	(0.082)	(0.004)	(0.359)	(0.082)	(0.004)
Loan to deposit ratio	0.005	-0.027***	-0.000	-0.000	-0.026***	-0.000
	(0.015)	(0.004)	(0.000)	(0.015)	(0.004)	(0.000)
Observations	5,189	13,696	5,189	5,189	13,696	5,189
R-squared	0.710	0.371	0.707	0.712	0.372	0.710
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES

4.4.7 Reputation

The traditional literature has highlighted the importance of lender's reputation in the lending behaviours and banks with a better reputation are more likely to invest in monitoring in order to sustain their reputation (Chemmanur and Fulghieri, 1994). Therefore, lead arrangers' good reputation can signal their skills and the lack of shirking from screening loan applicants and monitoring after syndication (Demiroglu and James, 2010, Diamond, 1989, Booth and Smith, 1986). Therefore, we expect that the lead arranger's reputation will strengthen the link between bank market power and the syndicate structure. One concern for this test is raised from the fact that banks with market power always have reputation[37]. The impact of bank market power may channel through the reputation which leads to the endogeneity. In this case, we expect that the coefficient of lead arranger's bank market power would not be significant anymore.

To test this hypothesis, we include the measure of lead arranger's reputation and its interaction with its bank market power in the baseline model. The results for this hypothesis are presented in the Table 4-7. We use *High reputation* to measure the reputation of lead arranger and it equals to one if the lead arranger is ranked at the top ten lenders in the syndicated loan market in terms of total loan facilities from previous five years. As shown in Table 4-7, the coefficients on the interaction terms between bank market power and high reputation are statistically significant

[37] Based on our observations, bank market power and bank reputation are highly correlated.

and bear the same signs of corresponding coefficients on bank market power. This means that the bank market power - syndicate structure relationship becomes more sensitive for lead arranger with good reputation. For example, the coefficients in Column 1 imply that, for a reputable lead arranger, one standard deviation increase in the lead arranger's bank market power will reduce the loan percentage held by lead arranger by approximately 82.8% more than for a syndicated loan originated by a lead arranger without reputation.

Table 4-7: Reputation

This table presents the regression result on the effect the lead arranger's reputation on the relation between the bank market power and syndicate structure .The dependent variables are the percentage of the loan held by the lead arranger (Column 1), the total number of lenders (Column 2) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3). The bank market power is measured by Lerner index. High Reputation equals to one if the lead arranger is ranked at the top ten lenders in the syndicated loan market in terms of total loan facilities from previous five years. We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

	(1)	(2)	(3)
VARIABLES	Lead	Players	ShareHHI
LeadLerner	-9.489***	0.068	-0.087***
	(2.287)	(0.470)	(0.024)
High Reputation	-0.037	0.054	0.001
	(1.599)	(0.300)	(0.017)
High Reputation * LeadLerner	-7.866***	1.257**	-0.089***
	(2.949)	(0.560)	(0.031)
Ln(Loan size)	-10.824***	2.164***	-0.118***
	(0.302)	(0.065)	(0.003)
Maturity	-0.185***	0.017***	-0.002***
	(0.013)	(0.003)	(0.000)
Secured (0,1)	-2.591***	1.464***	-0.026***
	(0.667)	(0.146)	(0.007)
Term loan (0,1)	2.127	1.275***	-0.000
	(1.424)	(0.217)	(0.015)
Corporation Purpose (0,1)	2.711***	-0.455***	0.029***
	(0.737)	(0.156)	(0.008)
Debt Repayment (0,1)	-0.444	0.538***	-0.008
	(0.759)	(0.177)	(0.008)
Take over (0,1)	-1.227	2.622***	-0.010
	(1.009)	(0.212)	(0.011)
Ln (Asset)	-4.129***	0.947***	-0.036***
	(0.293)	(0.060)	(0.003)
Leverage	0.125	-0.007	0.001
	(0.091)	(0.013)	(0.001)
ROA	1.001	-0.883***	0.005
	(1.985)	(0.285)	(0.021)
Tangibility	-3.977***	-0.708**	-0.049***
	(1.427)	(0.304)	(0.015)
Z-score	-0.168	-0.001	-0.003
	(0.251)	(0.008)	(0.003)
Ln (Bank size)	0.440**	-0.386***	0.004*
	(0.215)	(0.048)	(0.002)
Tier1_Asset ratio	0.743	-0.525	0.004
	(2.252)	(0.611)	(0.023)
ROA (Bank)	-2.108	-1.271***	-0.025*
	(1.389)	(0.313)	(0.014)
ROE	0.198**	0.099***	0.002**
	(0.096)	(0.021)	(0.001)
Efficiency ratio	-0.223***	-0.011	-0.002***
	(0.038)	(0.007)	(0.000)
Loss Allowance ratio	-0.603*	0.051	-0.005

	(0.358)	(0.083)	(0.004)
Loan to deposit ratio	-0.017	-0.023***	-0.000**
	(0.016)	(0.004)	(0.000)
Observations	5,189	13,696	5,189
R-squared	0.712	0.372	0.709
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES

4.4.8 Local vs. non-local

Our data show that at facility level, 19.6% of loan facilities are led by local lead arrangers. In this subsection, we investigate the variation of bank market power effects on syndicate structure of loans either raised locally or distantly. With the development of transaction and communication technologies, borrowers are able to search fund locating farther away from them (Felici and Pagnini, 2008, Berger and Deyoung, 2001). Even though, the geographic distance between them causes a slightly higher cost for banks to ex ante and ex post monitor borrowers. As proved by (Jones et al., 2005), lenders are willing to obtain more shares if they are in the same state with borrowers because of lower information collecting cost and easier monitoring in this syndication process. Distant lending involves costs for lenders to collect information from borrowers and monitor them. If lead arranger bank market power works as a signal of more intense monitoring and due diligence performed by lead arranger, we expect that lending locally will weaken the link between bank market power and syndicate structure because local lenders are easier and less costly to perform ex-ante screen and ex-post monitor activities.

To test this conjecture, we rerun the baseline model by including the distance between lead arranger and borrower and its interaction with the lead arranger's bank market power. We use *Same state* to measure the distance between lead arranger[38] and the borrower and it equals to one if lead arranger and borrower locate in the same state[39]. The results are presented in Table 4-8 which shows that the coefficients on the interaction terms between bank market power and 'same state' are statically significant and bear the opposite signs of the corresponding coefficients on the lead arranger's bank market power. These results are consistent with our conjecture that the link between the bank market power and syndicate structure will be weakened if the lead arranger and the borrower are in the same state.

[38] We use the headquarter location of lead arranger in our sample.

[39] Same state not only means a close in geographic distance, but also means a close in policy distance (Rice and Strahan, 2010a).

Table 4-8: Local vs. Non-local

This table presents the regression result on the effect the distance between lead arranger and borrower on the relation between the bank market power and syndicate structure .The dependent variables are the percentage of the loan held by the lead arranger (Column 1), the total number of lenders (Column 2) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3). The bank market power is measured by Lerner index. Samestate equals to one if the lead arranger and the borrower are in the same state. We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

VARIABLES	(1) Lead	(2) Players	(3) ShareHHI
LeadLerner	-14.461***	0.847*	-0.136***
	(2.392)	(0.481)	(0.025)
Samestate	0.990	0.056	0.016
	(1.631)	(0.326)	(0.017)
Samestate*LeadLerner	5.755*	-0.295	0.045**
	(3.223)	(0.650)	(0.021)
Ln(Loan size)	-10.769***	2.186***	-0.117***
	(0.304)	(0.066)	(0.003)
Maturity	-0.186***	0.017***	-0.002***
	(0.013)	(0.003)	(0.000)
Secured (0,1)	-2.618***	1.487***	-0.026***
	(0.670)	(0.147)	(0.007)
Term loan (0,1)	2.146	1.291***	0.001
	(1.427)	(0.219)	(0.015)
Corporation Purpose (0,1)	3.017***	-0.491***	0.032***
	(0.741)	(0.157)	(0.008)
Debt Repayment (0,1)	-0.210	0.504***	-0.005
	(0.761)	(0.178)	(0.008)
Take over (0,1)	-1.171	2.625***	-0.009
	(1.010)	(0.213)	(0.011)
Ln (Asset)	-4.186***	0.964***	-0.037***
	(0.295)	(0.061)	(0.003)
Leverage	0.118	-0.007	0.001
	(0.091)	(0.013)	(0.001)
ROA	0.721	-0.956***	0.002
	(1.991)	(0.287)	(0.021)
Tangibility	-3.517**	-0.821***	-0.043***
	(1.436)	(0.307)	(0.015)
Z-score	-0.174	-0.001	-0.002
	(0.253)	(0.008)	(0.003)
Ln (Bank size)	0.115	-0.306***	0.001
	(0.201)	(0.046)	(0.002)
Tier1_Asset ratio	2.590	-0.826	0.025
	(2.235)	(0.610)	(0.023)
ROA (Bank)	-2.706*	-1.122***	-0.032**
	(1.385)	(0.317)	(0.014)
ROE	0.221**	0.093***	0.003***
	(0.096)	(0.021)	(0.001)
Efficiency ratio	-0.190***	-0.013*	-0.002***
	(0.037)	(0.007)	(0.000)
Loss Allowance ratio	-0.449	0.022	-0.003
	(0.361)	(0.083)	(0.004)
Loan to deposit ratio	0.008	-0.027***	-0.000

	(0.015)	(0.004)	(0.000)
Observations	5,144	13,579	5,144
R-squared	0.711	0.370	0.710
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES

4.4.9 Financial Crisis

Early studies have suggested that financial crisis, as an exogenous shock, reduced the investment returns on all firms and made it difficult for investors to generate the costly screen and monitor activities (Johnson and Mitton, 2003, Lin et al., 2012). As the participant banks, they may require more screen and monitor activities from the lead arranger to reduce the default risk during the financial crisis. Therefore, we expect to observe a greater effect of the lead arranger's bank market power on syndicate structure during the financial crisis than during normal periods.

Therefore, we re-estimate the baseline model by adding the financial crisis dummy and its interaction with the lead arranger's bank market power. We define the financial crisis equals to one if the loan facilities are originated between 2007 and 2009. The results are presented in the Table 4-9 which shows that loan structure during financial crisis becomes more concentrated, more loan share held by lead arranger and higher Herfindahl-Hirschman Index of loan share. More importantly, the coefficients on the interaction between the bank market power and financial crisis suggest that the lead arranger's bank market power would play a more important role during the financial crisis which are consistent with our estimate. For example, the coefficients in Column 1

imply that, during the financial crisis, one standard deviation increase in the lead arranger's bank market power will reduce the loan percentage held by lead arranger by approximately two times more than the syndicated loan originated during the normal time.

Table 4-9: Financial Crisis

This table presents the regression result on the effect the financial crisis on the relation between the bank market power and syndicate structure .The dependent variables are the percentage of the loan held by the lead arranger (Column 1), the total number of lenders (Column 2) and the Herfindahl-Hirschman index of lenders' shares in the loan (Column 3). The bank market power is measured by Lerner index. Financial crisis equals to one if the loan originated between 2007 and 2009. We also control for the fixed effects of borrower industry and year level. Standard errors are clustered at borrower's firm level and reported in parentheses. ***, **, and * denotes statistical significance level of 1%, 5% and 10% respectively.

	(1)	(2)	(3)
VARIABLES	Lead	Players	ShareHHI
LeadLerner	-13.143***	0.759*	-0.125***
	(2.198)	(0.452)	(0.023)
Financial Crisis	22.110**	-1.970	0.303***
	(9.857)	(1.207)	(0.103)
Financial Crisis*LeadLerner	-30.347*	0.164	-0.458**
	(18.245)	(2.058)	(0.190)
Ln (Loan size)	-10.914***	2.176***	-0.119***
	(0.302)	(0.065)	(0.003)
Maturity	-0.189***	0.018***	-0.002***
	(0.013)	(0.003)	(0.000)
Secured (0,1)	-2.742***	1.461***	-0.028***
	(0.669)	(0.146)	(0.007)
Term loan (0,1)	2.027	1.269***	-0.001
	(1.427)	(0.217)	(0.015)
Corporation Purpose (0,1)	2.862***	-0.478***	0.031***
	(0.739)	(0.156)	(0.008)
Debt Repayment (0,1)	-0.279	0.517***	-0.006
	(0.761)	(0.177)	(0.008)
Take over (0,1)	-1.243	2.603***	-0.010
	(1.012)	(0.212)	(0.011)
Ln (Asset)	-4.200***	0.964***	-0.036***
	(0.294)	(0.060)	(0.003)
Leverage	0.119	-0.007	0.001
	(0.091)	(0.013)	(0.001)
ROA	0.800	-0.936***	0.003
	(1.991)	(0.285)	(0.021)
Tangibility	-3.757***	-0.771**	-0.047***
	(1.431)	(0.304)	(0.015)
Z-score	-0.097	-0.001	-0.002
	(0.252)	(0.008)	(0.003)
Ln (Bank size)	-0.096	-0.306***	-0.002
	(0.199)	(0.044)	(0.002)
Tier1_Asset ratio	2.494	-0.861	0.022
	(2.237)	(0.607)	(0.023)
ROA (Bank)	-3.083**	-1.181***	-0.036**
	(1.389)	(0.313)	(0.014)
ROE	0.270***	0.096***	0.003***
	(0.097)	(0.021)	(0.001)
Efficiency ratio	-0.193***	-0.014*	-0.002***
	(0.038)	(0.007)	(0.000)
Loss Allowance ratio	-0.516	0.021	-0.004
	(0.360)	(0.082)	(0.004)
Loan to deposit ratio	0.006	-0.027***	-0.000
	(0.015)	(0.004)	(0.000)

Observations	5,189	13,696	5,189
R-squared	0.710	0.371	0.707
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES

4.5 Conclusion

There have been both theoretical and empirical studies on the screen and monitor roles performed by banks with greater market power (e.g., Marquez, 2002, Delis et al., 2017). These roles would reduce the information asymmetries between banks and corporate borrowers, further resulting in a less risky loan. What is little know, however, is how bank market power influences collaboration amongst banks when facing greater information asymmetries. By using the specific characteristic of syndicated loan, this chapter examines an under-studied research area on the relationship between bank market power and syndicated loan structure. Such an investigation is important to deepen our understanding on the roles played by bank market power in financial institutions' collaboration.

To sum up, our results show that lead arranger with greater market power would effectively alleviate the problem of asymmetric information between lead arranger and the participant lenders. Reflecting in the syndicated loan structure, lead arranger's bank market power is negatively related to loan share held by lead arranger, positively related to number of participants and negatively related to the Herfindahl-Hirschman Index of loan share. This result supports the notion that banks

with greater market power would generate more ex-ante screen and ex-post monitor activities to reduce the default risk (e.g., Caminal and Matutes, 2002, Petersen and Rajan, 1994). In addition, a participant bank would also obtain more syndicate share if they have a stronger market power. We further test ‘ex-ante screen’ and ‘ex-post monitor’ channels, and we find both two channels determine the ‘bank market power-loan structure’ relationship. Finally, our results are robust to different measurements of bank market power and different conditions when facing more or less asymmetric information, such as financial crisis and distant lending.

Table 4-A1: Variable description

Variables	Definition	Sources
Bank market power		
LeadLerner	The Lerner index for Lead arranger	FDIC
ParLerner	The Lerner index for the participant bank	FDIC
CR_{50}	Top 50 bank deposit concentration ratio in lead arranger's bank market at state level.	FDIC
CR_{20}	Top 20 bank deposit concentration ratio in lead arranger's bank market at state level.	FDIC
HHI	Herfindahl-Hirschman Index at bank deposit level in lead arranger's market.	FDIC
Syndicate Structure		
Share (Lead arranger)	Loan share held by each lender	Dealscan
Share (Participant)	Loan share held by each participant bank	Dealscan
Players	The total number of lenders	Dealscan
ShareHHI	The Herfindahl-Hirschman Index of loan share	Dealscan
Facility Characteristics		
Log(Loan size)	Natural Log of loan amount in $m	Dealscan
Log(Loan maturity)	Natural Log of loan maturity in months	Dealscan
Secured indicator	=1 if the loan has collateral	Dealscan
Term loan	= 1 if the facility type is term loan facility (including term loan A, term loan B….), and 0 otherwise	DealScan
Repayment	=1 if the syndication is for repayment purpose, and 0 otherwise	Dealscan
Cor_purpose	=1 if the syndication is for corporation purpose, and 0 otherwise	Dealscan
Take over	=1 if the syndication is for take over purpose, and 0 otherwise	DealScan
Borrower Firm Characteristics		
Log(Asset)	Natural Log of the total asset in £m of the borrower at the end of fiscal year prior to the loan originated.	Compustat
Tangibility	The sum of net property, equipment and pant, divided by total asset	Compustat
ROA	Net income/total asset	Compustat
Leverage	Total debt/Total asset	
Z-score	Modified Altman (1968) Z score = (1.2 working capital + 1.4 retained earnings + 3.3 EBIT + 0.999 sales)/total assets, which excludes the ratio of market value of equity to book value of total debt.	Compustat
First appear	=1 if the borrower is first time appearing in the syndicated loan market in the DealScan database	DealScan
Rating	=1 if the company has a S&P rating from "AAA" to "BBB".	Compustat
Old borrower	=1 if the lead arranger and borrower have previous loan facilities based on DealScan database	DealScan

Lender Characteristics		
Ln (Bank size)	Natural Log of the total asset of individual bank.	FDIC
Tier 1-asset ratio	Tier 1 core capital/Total asset	FDIC
ROA	Net income /total asset	FDIC
ROE	Net income/total equity	FDIC
Efficiency ratio	Noninterest expense less amortization of intangible assets as a percent of net interest income plus noninterest income. This ratio measures the proportion of net operating revenues that are absorbed by overhead expenses, so that a lower value indicates greater efficiency.	FDIC
Loss Allowance ratio	Allowance for loan and lease losses as a percent of total loan and lease financing receivables, excluding unearned income.	FDIC
Loan to deposit ratio	Total loan/Total deposit	FDIC
High Reputation	=1 if the lead arranger is ranked at the top ten lenders in the syndicated loan market in terms of total loan facilities from previous five years, 0 otherwise	FDIC
Samestate	=1 if the lead arranger and borrower are in the same state, 0 otherwise	FDIC
Macroeconomic Factors		
State personal annual income($000)	The average personal annual income in state.	Federal Reserve Bank of ST. Louis
State Gross Domestic Product ($bn)	The annual gross domestic product by state	Bureau of Economic Analysis

Chapter 5 Earnings Quality, State ownership and Syndicated Loan

5.1 Introduction

Asymmetric information is central to understanding a debt contract and empirical studies have attempted to examine how loan terms are specified to mitigate particular information problems lenders have to face when issuing either bilateral or syndicated loans. For example, empirical evidence has shown that debt contract issued to borrowers with better earnings qualities usually have more favourable loan terms[40] because high earnings quality enables lenders to better predict the future cash flow and operating performance of borrowers (Dechow, 2004). Whereas, the asymmetric information problem could be much more severe in contracting syndicated loans in developing markets with weak institutional environment and legal protection. For example, Chinese businesses have more opaque accounting information compared with that of businesses in developed markets (Li et al., 2014) and lenders could rely less on accounting information disclosed by Chinese corporate borrowers if it is less credible (Wang and Wu, 2011) or with a poor

[40] Such favourable loan terms include lower prices, less collateral, longer maturity (Ball et al., 2008, Bharath et al., 2008, Armstrong et al., 2010, Costello and Wittenberg-Moerman, 2011). From a borrower's perspective, instead of improving earnings quality to benefit from favourable loan terms, borrowers which rely heavily on debt finance might be willing to bear higher costs of borrowing because they benefit more from avoiding penitential debt covenant violations (Ghosh et al., 2010).

quality (He et al., 2012). Although state-ownership of Chinese corporate borrowers has been taken as a favourable signal of implicit guarantee for loan repayment (e.g., Boubakri et al., 2008), lenders could face even more severe moral hazard issues, ineffective monitoring and pursuit of political goals when lending to state-owned enterprises (SOEs) (e.g., Borisova et al., 2015).

In addition to the information asymmetries between a lender and a borrower in a bilateral loan, there are additional information asymmetries between lead arranger and participant lenders in loan syndicates in a different format of adverse selection and moral hazards where lead arranger has incentives to syndicate risky loans and is less likely to continue monitor the loan after selling parts of loan to participants (Ivashina, 2009). This is especially prominent in loan syndicates led by foreign banks which have a information disadvantage compared with domestic banks and in emerging markets, such as China, with institutional weakness, underdeveloped legal investor protection, lower transparency and poorly developed corporate governance (Korkeamaki et al., 2014).

In this paper, we collect publicly available data on syndicated loan facilities issued to Chinese listed companies between 1998 and 2016 to examine the effects of earnings quality and state-ownership on syndicated loan terms (spread and maturity), structure (share concentration) and foreign bank participation. Such an investigation enables us to better understand how earnings

quality and state-ownership contribute to the alleviation of adverse selection and moral hazard problems in loan syndication and the asymmetric information problem with corporate borrowers.

First, by following existing literature on the favourable roles of earnings quality in alleviating information asymmetries (Dechow, 2004) for lenders and evidence on state-ownership as an implicit guarantee for loan repayment (Boubakri et al., 2008), we conjecture that higher earnings qualities and state-ownership would be associated with more favourable loan terms, such as lower loan spreads and longer maturities. We employ a modified Jones' Model (Dechow et al., 1995) to measure earnings quality. Controlling for a set of firm and loan characteristics, we show that borrowers with a higher earnings quality would be charged lower spreads, supporting the information risk hypothesis (Francis et al., 2005) where earnings quality helps lender better map the current accounting earnings into future cash flow and, therefore, decreases information risk. For example, a decrease of abnormal accruals by one standard deviation would reduce loan spread by 18.6 basis points (bps) averagely, equivalent to a saving of 10% in interest payment for borrowers who have an average syndicated loan spread of 188.44 bps. In contrast to those empirical studies on bilateral loans (Liu et al., 2016, Borisova and Megginson, 2011), we show little evidence that state-ownership affects syndicated loan prices in Chinese market. State-ownership, however, has a strong impact on non-pricing loan terms, such as maturity, and our results show that SOEs are more likely to have syndicated loans with longer maturities. Whereas, earnings quality plays a less significant role in non-pricing terms in contracting Chinese syndicated

loans, in contrast to those findings in developed market (e.g., Francis et al., 2005, Ball et al., 2008, Bharath et al., 2008).

Our second hypothesis is based on the problems of adverse selection and moral hazards in loan syndication, or amongst lenders. To overcome such problems, participant lenders would expect lead arranger to hold more shares in loan syndication to signal loan quality *ex ante* and to perform due diligence and monitoring *ex post*. We hypothesise that earnings quality and state-ownership would alleviate the adverse selection problems when a lead arranger sells part of the loans to participant lenders and therefore, loans issued to SOE borrowers and those with high earnings quality would be associated with greater shares held by participant lenders in loan syndicates. Our results show that state-ownership helps lead arranger organise a more concentrated loan syndicate and lead arrangers sell more shares when they lead SOE loans. Our results suggest that state-ownership plays a much more important role than earnings quality in overcoming both adverse selection and moral hazard problems amongst lenders.

Similar to Korkeamaki et al. (2014), about 70% of our sample syndicated loan facilities are originated by foreign lenders and finally, we investigate the effects of earnings quality and state-ownership on syndicated loans led by foreign lenders. Earnings quality and state-ownership may play an even more important role for foreign lenders than for domestic lenders for two reasons. First, foreign lenders have information disadvantages compared with domestic banks (e.g., Ahn

and Choi, 2009) and would face a more severe problem of asymmetric information when financing local borrowers. Second, in a market with weak legal protection, foreign lenders could be more concerned with default risk and rely more heavily on state-ownership as a signal of implicit guarantee of repayment, rather than credit ration SOEs to mitigate the politically-oriented investment problem for SOEs (Tsai et al., 2014). Our results are consistent with our conjecture that facilities originated by foreign lead arrangers are more sensitive to the earnings quality in price determination and to state-ownership in syndicate structuring than the loans led by domestic banks.

This paper contributes to existing literature in the areas of accounting practice and debt contracting. Differing from existing evidence from developed market (Ball et al., 2008), our results suggest that even earnings quality contributes to the alleviation of information asymmetries on borrowers, it plays a less important role in contracting syndicated loans, reflecting its poor quality amongst Chinese corporate borrowers. Its role is mainly on pricing loans, especially those loans issued to SOEs or led by foreign banks, but fails to contribute to the alleviation of adverse selection and moral hazard problems amongst lenders in loan syndicate. Different from its role in a bilateral debt contract (e.g., Shailer and Wang, 2015), state-ownership has little impact on pricing syndicated loans but plays an important role in alleviating adverse selection and moral hazards in loan syndication. Hence, participant lenders and foreign lenders are more willing to syndicate or lead loans to SOEs. Our results are robust to a rich set of tests with alternative measures of earnings quality, different model specifications (e.g. switching model) and removal of financial crisis period

when Chinese companies had greater discretionary accruals than usual. We also control for the potential reverse-causality endogeneity issue by applying lagged values on earnings quality and state-ownership and placebo test results also confirm that our empirical models do not suffer from omitted variable endogeneity.

The remainder of the paper is structured as follows. Section 2 provides research background, reviews relevant literature and develops hypotheses, followed by Section 3 on the description of data, variables and model specification. Then, we report the empirical results with additional and robustness tests in Section 4 and finally, Section 5 summarizes and concludes.

5.2 Background, related literature and hypothesis development

5.2.1 Background

Syndicated loans provide corporate borrowers a large sum and stable funds at relatively lower costs than bilateral loans, bonds and equities (Altunbaş and Gadanecz, 2004) and enable borrowers to build and keep banking relationships with multiple lenders. Over the past decades, syndicated loan market has grown rapidly and continuously performs its crucial role in global financial system (Fang et al., 2016). The syndicated loan market in China has developed

significantly over the last decade, with a total amount of $923 billion[41] in the first half of 2016, accounting for 11.35% of total loans, compared to 1.72% in 2006 (CBS, 2016). In addition, it has been acknowledged that foreign banks have been playing an increasingly important role in credit supply in Chinese bank market and, for example, 65% of syndicated loan participant lenders are foreign banks (Pessarossi et al., 2012), contributing to mitigating the politically-oriented investment problem for state-owned enterprises (Tsai et al., 2014).

A syndicated loan usually starts with a signed loan agreement between the borrower and the lead arranger to specify the primary loan factors, such as amount, covenants, maturity, and spread (Dennis and Mullineaux, 2000). Then, the lead arranger invites potential lenders to participate in the syndication process. These invited lenders will bid for their role (e.g., co-lead, co-agent, and participant) and loan share they would invest in. Unlike bilateral loans, syndicated loans are generally originated by several lenders and within a loan syndication where one or more lead arrangers sell parts of the loan to participant lenders. Apart from the typical agency problems[42] between lender and borrower, the problems of adverse selection and moral hazard between lead arrangers and participant lenders become a unique feature of loan syndication where lead arranger has an information advantage and incentives to syndicate risky loans (adverse selection) and is less

[41] On average, USD$1 is equivalent to RMB¥6.50.

[42] In a typical bilateral loan, the agency problem may arise with information asymmetries or no-alignment of goals. For example, borrower may be risker than believed or borrower may take risky projects during the loan contract term which will influence their repayment behaviour (Beshouri and Nigro, 1995).

likely to continue to monitor the loans after selling parts of them to participants (moral hazards) (Ivashina, 2009). Such issues would have strong impacts on the key loan features and syndicate structure, such as the participation of non-bank lenders (Lim et al., 2014) and foreign banks (Haselmann and Wachtel, 2011).

5.2.2 Related literature

Lenders are mainly concerned with the certainty of the future cash flows generated by borrowers and the capability of predicting future cash flows by current earnings quality (Dechow, 1994). Accounting accruals, the non-cash part of earnings, have been widely used to adjust future cash flows (Francis et al., 2005) and known to be generally more uncertain due to the enlarged deviation between earnings and cash flows and the recognition of uncertain future cash flows by recording receivables[43] (Dechow and Dichev, 2002). However, it is a common practice for a manager to temporarily boost or reduce reported earnings by using accruals[44] (Bergstresser and Philippon, 2006) for three main reasons. First, to benefit from capital market transactions, managers manipulate earnings to influence the company's share price or to pursue personal

[43] Accrual process is generally based on the assumption that the future accrual and earnings must be correct. Recording an uncertain receivable reduces the future net proceeds from receivables (Dechow and Dichev, 2002).

[44] Manager can use both accrual-based earnings management and real-based earnings management. We focus on accrual-based earnings management in this paper because syndicated loan borrowers generate more accrual-based earnings management rather than real-based earnings management (El Mahdy and Cheng, 2016).

interests from insider trading. Indeed, there has been ample evidence on the association between earnings manipulation and initial public offering, seasoned equity offering (DuCharme et al., 2016) merger and acquisition activities (Erickson and Wang, 1999) and management buyouts (Perry and Williams, 1994). Second, managers manage earnings to meet specific targets or expectations from investors and analysts (Dechow et al., 1996). Third, contracting arrangements, such as debt covenants, generally contain specific regulations which are functions of earnings. For example, negative covenants preclude or limit certain investment and financing activities unless certain accounting-based conditions are met, such as minimum net worth and working capital restriction. Debt contracts normally contain covenants based on accounting numbers or ratios. In order to avoid costly violation of debt covenants, managers would engage in income-increasing behaviour (Sweeney, 1994). With such arrangements, managers have incentives to engage in earnings management in order to avoid costs or to gain benefits (Dichev and Skinner, 2002, Jaggi and Lee, 2016, Ghosh et al., 2010).

For the above reasons, existing literature has taken accrual-based earnings management as a negative proxy for accounting information quality and shown evidence on the association between accounting information quality and the costs of both debt (Wasan et al., 2013) and equity (Bhattacharya et al., 2012). For example, corporate borrowers with greater accounting information qualities would be charged lower prices on loans and the average price gap is about 126bps for the loans issued to borrowers with highest vs. lowest accounting information quality in U.S. (Francis

et al., 2005). In addition, in U.S syndicated loan market, lower accounting information quality has also been found to be associated with more stringent non-price loan terms, such as shorter maturity and more collateral (Bharath et al., 2008). The importance of accounting information quality in debt contracting is consistent and robust to a variety of alternative measures to accruals, such as conservatism (Chen et al., 2013), internal control weakness (Costello and Wittenberg-Moerman, 2011), timely-loss recognition (Wittenberg-Moerman, 2008) and etc. For example, a greater financial statement comparability could improve both the quantity and quality of information available to public and reduce the cost of acquiring and processing information (Fang et al., 2016). Overall, better accounting information quality has been found to be positively associated with lower costs of debt finance and more favourable non-pricing terms and covenants.

Compared with that in developed economies, the information environment in China is relatively more opaque (Li et al., 2014) and its capital markets are more volatile (Allen et al., 2005). Such an institutional feature is driven by the strict regulations on media and internet which make analysts and media coverage less thorough (Cheng et al., 2015, Chen et al., 2011) and by the ineffective law enforcement which makes the standards and regulations less binding (Piotroski and Wong, 2012). Due to the unique institutional feature and the increasingly important role played by syndicated loan market in China, recent empirical studies have attempted to investigate how institutional and corporate factors determine the key features of syndicated loans. State-ownership, for example, has been found to play important roles in the selection of sources of debt finance, e.g.

bond vs. syndicated loan markets (Pessarossi and Weill, 2013), and local vs. cross-border borrowing (Korkeamaki et al., 2014). This is because on one hand, state-ownership has served as an implicit guarantee by government on the debt raised by SOEs and hence, it reduces the cost of debt finance (Sapienza, 2004, Boubakri et al., 2008). On the other hand, there are severe problems of moral hazards, ineffective monitoring and pursuit of political goals[45] in SOEs (Borisova et al., 2015, Ben-Nasr et al., 2012). In addition, with the transition of government function and the absence of direct government bail outs, corporate defaults by SOEs have emerged[46]. Nevertheless, there lacks of thorough investigations on the effects of earnings quality and state-ownership on syndicated loans in China. This paper aims to fill in such a research gap.

5.2.3 Hypothesis development

A syndicated loan contract always specifies both pricing (spread) and non-pricing (e.g. maturity, collateral) terms which are used as substitutes in a risk-return mechanism (Fang et al., 2016, Bharath et al., 2008). These substitutes are especially important in China where interest rates are tightly regulated by Chinese government[47] and non-pricing terms become essential for lenders

[45] The political goals, such as improving employment and domestic investment, could lower risk-adjusted performance of state-owned enterprises which finally increase the cost of debt. The moral hazard problem arises because the insured repayment by government will benefit shareholders and managers from risk taking (Stiglitz, 1993).

[46] For example, Desai (2017) estimates defaults grew from RMB¥1 billion in 2014 to RMB¥18 billion in 2015 and to RMB¥53.9 billion in 2017.

[47] Chinese government relaxed the upper limit on interest rates in October 2004 and it is still believed that loan pricing remains undifferentiated in Chinese market (Koivu, 2009, Podpiera, 2006).

to manage loan risk (Pessarossi and Weill, 2013). The favourable role of high earnings quality has been acknowledged both empirically (Patricia M Dechow, 1994) and theoretically ((Easley and O'Hara, 2004, Leuz and Verrecchia, 2005) where higher earnings quality enables accounting information users, e.g. lenders, to better predict future earnings and to reduce future cash flow uncertainties. Meanwhile, as one of the key non-pricing terms, maturity affects lender's costs of monitoring and risk exposure. Loans with a shorter maturity are more likely to be renewals and to induce frequent monitoring (Dennis and Mullineaux, 2000). High earnings quality could effectively reduce such monitoring costs and improve *ex post* monitoring efficiency for lenders (Bharath et al., 2008). Therefore, taking maturity as a risk control mechanism, lenders usually issue loans with short maturity to borrowers with low credit quality and opaque information. Nevertheless, Chinese market is characterised as being under-developed in legal, institutional and information environment and having weak penalties for earnings manipulation (Cheng et al., 2015). Therefore, it is also likely that the effects of earnings quality on syndicated loan spread and maturity could be economically insignificant where corporate accounting information is less credible and investor protection is insufficient in China (Ball et al., 2000).

In a similar way, corporate state-ownership could also affect loan price and maturity in different ways. State-ownership could be taken as an implicit guarantee for loan repayment by government (Liu et al., 2016) and hence SOEs could benefit from lower prices and longer maturity when accessing syndicated loans. However, it is also likely that SOEs could be 'penalised' for

pursuing political objectives by being charged higher prices (Borisova et al., 2015). As stated above, both earnings quality and state-ownership can signal the future repayment ability. Unlike earnings quality which can predict the future cash flow and operating performance (Dechow, 2004), state-ownership is only a signal of implicit guarantee of loan repayment (Liu et al., 2016) where government will participate in loan repayment once SOE borrowers are unable to repay their loans (Khwaja and Mian, 2005). Even the loan can be repaid ultimately, government involvement may generate more cost or delay of repayment for lenders. With inconclusive evidence derived mainly from bilateral debt market, we hypothesize that

Hypothesis 1a**:** *Earnings quality of Chinese corporate borrowers would affect the price and maturity of syndicated loans.*

Hypothesis 1b**:** *State-ownership of Chinese corporate borrowers would affect the price and maturity of syndicated loans.*

In a loan syndication, lead arranger holds a portion of the loan and sells the rest to a number of participating lenders. Typically, lead arranger prefers a more concentrated syndication structure with a smaller number of participants to reduce the managing costs, especially when borrowers experience financial distress and all lenders have to approve any changes of loan terms (Lee and

Mullineaux, 2001). Moreover, lead arranger may also expect to sell a greater proportion to participant lenders to avoid free riding problems in information collection and monitoring. Unlike bilateral loan contracts where the key agency problems exist between the lender and borrower, contracting syndicated loans is also subject to the problems of adverse selection and moral hazards where lead arranger has incentives to syndicate risky loans and is less likely to continue monitor the loan after selling parts of loan to participants (Ivashina, 2009). The information asymmetries on borrowers between lead arranger and participant lenders could result in a dispersed syndication structure and lending to corporate borrowers with higher earnings quality would help lead arranger create a more concentrated syndication by mitigating the problems of adverse selection and moral hazard (Ball et al., 2008).

State-ownership could play two competing roles in determining loan syndication structure. On one hand, potential lenders could take it as a favourable signal for an implicit guarantee of repayment and information transparency, similar to public bond rating (Boubakri et al., 2008, Sapienza, 2004). Hence, there could be more lenders willing to participate in loan syndication to SOE borrowers, resulting in a more dispersed syndication structure. On the other hand, to benefit from such favourable signals by internalising more interests generated and to minimise the managing costs, lead arrangers could invite only a small number of participants to syndicate loans to SOEs and therefore, SOE loan syndication structure could be alternatively characterised as

having a smaller number of participating lenders and more concentrated structure. With competing possibilities, we hypothesize

Hypothesis 2a**:** *Earnings quality would affect the loan syndication structure.*

Hypothesis 2b**:** *State-ownership would affect the loan syndication structure.*

Foreign lenders play an active role in Chinese syndicated loan market, accounting for about 60% of total lenders (Korkeamaki et al., 2014, Pessarossi et al., 2012). Compared with domestic lenders, foreign lenders, especially those foreign lead arrangers, face even more severe asymmetric information problems due to the lack of local knowledge, little information collected from deposit channel and weak ex-post monitoring (Ahn and Choi, 2009). Foreign lenders also rely more heavily on verifiable hard information[48] which is easy to collect; whilst, domestic lenders have an advantage to collect more time-costly and local-knowledge based information (Frame et al., 2001). Indeed, empirical studies have shown that the lending decision of foreign banks, including World

[48] There are two types of information for lenders to formulate lending decisions, hard information (e.g., financial statement) and soft information (e.g., lending relationship, cultural and ethical behaviour) (Petersen and Rajan, 2002).

Bank, is dependent heavily upon accounting comparability (Chan et al., 2015a) and quality (Lamoreaux et al., 2014). Therefore, foreign lenders would be more likely to lead loan syndication for those borrowers with a better information quality. On the contrary, it is also likely that foreign lenders may not take earnings quality of Chinese borrowers as a valuable signal in syndication-leading decision due to the low quality and less credible accounting information in China (He et al., 2012, Ball et al., 2000).

Empirical studies have shown little evidence on the role of state-ownership in motivating foreign bank to participate syndicated loans in China (e.g. Pessarossi et al. (2012) Korkeamaki et al. (2014). However, we expect that state-ownership plays a favourable role in encouraging foreign lenders to lead syndicated loans due to the implicit guarantee of repayment. Meanwhile, it is also possible that foreign lenders treat state-ownership as a negative signal because SOEs are more likely to pursue political objectives (Borisova et al., 2015). Even though, we hypothesize

Hypothesis 3a**:** *Foreign lenders are more willing to lead syndicated loans issued to corporate borrowers with better earnings quality.*

Hypothesis 3b**:** *Foreign lenders are more willing to lead syndicated loans issued to corporate borrowers with state-ownership.*

5.3 Data and Research design

5.3.1 Data and Samples

We collect detailed information on syndicated loans issued to Chinese corporate borrowers from DealScan[49] on primary loan terms, such as price, maturity, amount, syndication structure and etc. In total, we have 5,033 loan facilities[50] raised by Chinese companies between 1998 and 2016 and 3,017 facilities are excluded because they are either non-syndicated loan facilities, issued to financial institutions or the type (financial or non-financial) of borrower is missing. Second, we manually match the borrower's information (name, industry and location) to Compustat to collect firm level specific information, such as size, leverage, and tangibility. We exclude additional 1,653 sample facilities issued to private borrowers whose firm level information is not available from Compustat. Finally, we follow Pessarossi and Weill (2013) and manually identify corporate state-ownership from China Security Index Co. website[51]. In total, we have full set of information on both syndicated loan facilities and firm characteristics, e.g. earnings quality and state-ownership,

[49] We also verify our data by accessing Bloomberg as a supplementary source of syndicated loan facilities.

[50] In syndicated loans, one loan package may contain several loan facilities issued to the same borrower. Following Lim et al. (2014), our samples are based on facilities level where they vary with size, maturity, spread and other non-price terms even in the same package.

[51] http://www.csindex.com.cn/sseportal_en/csiportal/indexquery.do

for 363 loan facilities raised by Chinese public firms between 1998 and 2016 for the following empirical tests on the hypotheses derived above.

5.3.2 Measuring earnings quality

We employ the modified Jones' model and use abnormal accruals to measure earnings quality of corporate borrowers. The total accruals consist of normal accruals and abnormal accruals where the latter is used to detect the levels of earnings management and therefore reflects earnings quality (Dechow et al., 1995). We use the absolute value of abnormal accruals to measure the magnitude of earnings quality and the greater the abnormal accruals, the lower the earnings quality. We define total accruals for firm i in year t as:

$$Total\ Accruals_{i,t} = TA_{i,t} = EBXI_{i,t} - CFO_{i,t} \quad \text{.....(Eq. 5-1)}$$

where $EBXI_{i,t}$ is the earnings before extraordinary items and discontinued operations and $CFO_{i,t}$ is the operating cash flows from statement of cash flows. Then, we run the following regression for each combination of industry (Fama and French, 1997) and year groups:

$$\frac{TA_{i,t}}{AT_{i,t-1}} = \partial_1 \frac{1}{AT_{i,t-1}} + \partial_2 \frac{\Delta REV_{i,t}}{AT_{i,t-1}} + \partial_3 \frac{PPE_{i,t}}{AT_{i,t-1}} + \varepsilon_{i,t} \quad \text{.....(Eq. 5-2)}$$

where $AT_{i,t-1}$ is firm i's total assets in year $t-1$, $\Delta REV_{i,t}$ is the change of revenue between year t and year $t-1$, and $PPE_{i,t}$ is the gross value of property, plant and equipment. We use the coefficients estimated in Eq. (5-2) to estimate the normal accruals by the following equation:

$$Normal\ Accrual_{i,t} = \hat{\partial}_1 \frac{1}{AT_{i,t-1}} + \hat{\partial}_2 \frac{(\Delta REV_{i,t} - \Delta AR_{i,t})}{AT_{i,t-1}} + \hat{\partial}_3 \frac{PPE_{i,t}}{AT_{i,t-1}} + \varepsilon_{i,t} \text{.....(Eq. 5-3)}$$

where $\Delta AR_{i,t}$ is the change in accounts receivable between year t and year $t-1$ and then abnormal accrual is derived by

$$Abnormal\ Accrual_{i,t} = \frac{TA_{i,t}}{AT_{i,t-1}} - Normal\ Accrual_{it} \text{ .....(Eq. 5-4).}$$

In the following robustness tests, we also use two alternative measures of earnings quality, *Accrual 2* and *Accrual 3*, by following Francis et al. (2005) and Dechow and Dichev (2002), respectively. We provide their derivation in Appendix 1.

5.3.3 Model specification and variables

In the baseline models to test the hypotheses developed above, we regress syndicated loan indicators on corporate earnings quality, state-ownership and a set of control variables for firm and loan specific characteristics as below:

$$Syndicated\ loan_{i,t} = \partial + \beta_1 \times earnings\ quality_{i,t-1} + \beta_2 \times state - onwership_{i,t-1} + \beta_3 \times Loan\ Specific\ Controls_{i,t} + \beta_4 \times Firm\ Specific\ Controls_{i,t-1} + Year\ Fixed\ Effect + \varepsilon \text{.....(Eq. 5-5)}$$

where syndicated loan indicators are loan spread and maturity (**H1**), loan structure in terms of share concentration, lead arranger's shareholding and number of lenders in loan syndicates (**H2**) and foreign lender participation as lead arrangers (**H3**). We also consider the possible heterogeneity of earnings quality effects between SOEs and non-SOEs and include an interaction term, *earnings quality×state-ownership,* to capture such a variation.

To test H1, we use All-In-Drawn, the total spread paid over LIBOR (London Interbank Offered Rate) on the drawn amount for each facility, to measure loan spread (*spread*). Loan maturity (*maturity*) is measured as the number of months when the loan becomes mature. We measure the loan syndication structure by (1) Herfindahl-Hirschman Index (HHI) of loan shares

obtained by each lender within a loan facility (*ShareHHI*), (2) the number of lenders (*No. of lenders*) and (3) share held by lead arrangers (*Leadshare*) to test H2. In testing H3, we capture foreign lender participation by a dummy variable (*All-Foreign*) which is coded as 1 if all lead arrangers[52] are foreign lenders and *Foreign-Fraction* to capture the degree of participation in leading loan syndication where *Foreign-Fraction* is defined as the proportion of foreign lead arrangers in all lead arrangers.

Consistent with the previous studies (e.g., Sufi, 2007, Bharath et al., 2011, Fang et al., 2016, Bharath et al., 2008), we include several firm-level and loan-facility-level factors as control variables. At firm-level, we use abnormal accruals as derived above (Eqs 5-1 t4) to measure earnings quality and a dummy variable, *state-ownership*, to define state-owned enterprises (SOEs=1). We control for firm size by assets[53] (*Ln(Asset)*), default risk by leverage (*Leverage*) and modified Altman's Z-score (*Zscore*) (Altman, 1968), profitability by return on assets (*ROA*) and tangibility by the tangible assets ratio (*Tangibility*).

At loan-facility level, we include loan amount, *Ln*(*Loan Amount*), in U.S dollars[54] to control for the economies of scale in lending practices (Lian, 2017), loan collateral (*secured*) which

[52] We define a lead arranger as the key lender who plays a role as 'administrative agent', 'agent', 'arranger', 'bookrunner', 'lead arranger', 'lead bank', 'lead manager' or 'mandated lead arranger' in loan syndication (Ivashina, 2009, Taylor and Sansone, 2007).

[53] We also convert firm asset value into U.S. dollars and if the value is in other currencies, we use exchange rate on the date of financial statement becoming available.

[54] We use exchange rate provided by DealScan to convert the loan amount into U.S. dollars if it is in other currencies.

is coded as one if the facility has collateral, and loan purpose[55] (*Repayment*). We also control for the year fixed effect to eliminate the influence driven by time. All variables are defined in Table 5-A1 and their descriptive statistics are reported in Table 5-1.

5.4 Empirical results

5.4.1 Descriptive statistics

Table 5-1 presents the descriptive statistics for all variables used in the following empirical analysis. On average, the spread charged on syndicated loans issued to Chinese public borrowers is 188 bps over LIBOR with a standard deviation of 127 bps. This is comparable to the price charged on U.S syndicated loan borrowers (Fang et al., 2016). An average syndicated loan has an amount of $230 million with 59 months maturity and 6 lenders participating in the loan syndication. There are about 14% of the syndicated loan facilities secured by collateral. Table 5-1 also shows that foreign lenders play an important role in Chinese loan syndication where 62% of the loan facilities are led by all foreign lenders and about three quarters of the lead arrangers are foreign lenders, comparable to the results reported by Pessarossi et al. (2012). Syndicated loan borrowers have an averaged abnormal accruals of 0.076 and more than a quarter (27.5%) of them are state-owned enterprises (SOEs), comparable to those samples used by Wang and Yung (2011) and

[55] Debt repayment is the most frequently quoted loan purpose and accounts for over 20% of our total samples.

Korkeamaki et al. (2014), respectively. Chinese syndicated loan borrowers have an average asset value at $10 billion, 48% of tangibility and 6.2% return on assets[56].

[56] These results are comparable with the descriptive statistics from Korkeamaki et al. (2014), Pessarossi and Weill (2013) and Pessarossi et al. (2012).

Table 5-1: Descriptive statistics

Variables	N	Mean	SD	Median	Min	Max
Syndicated loan facilities						
Spread (bps)	186	188.444	127.343	155	27.000	550.000
Maturity (months)	341	59.349	40.497	36	4.000	240.000
Loan Amount (USD$ m)	360	229.5	1041	70	0.001	18,500
No. of Lenders	363	5.981	5.001	4	1.000	23.000
Repayment (0,1)	363	0.207	0.405	0	0.000	1.000
Secured (0,1)	363	0.138	0.345	0	0.000	1.000
ShareHHI	203	28.071	23.653	18.750	0.771	100.000
Leadshare (%)	301	37.475	39.113	25	0.000	100.000
All Foreign (0,1)	341	0.619	0.486	1	0.000	1.000
Foreign Fraction	341	0.755	0.371	1	0.000	1.000
Chinese corporate borrowers						
Abnormal Accruals	363	0.076	0.085	0.050	0.000	0.521
Accrual2	337	0.082	0.079	0.050	0.001	0.733
Accrual3	336	0.060	0.077	0.042	0.001	0.582
State-ownership	363	0.275	0.447	0	0.000	1.000
Asset (USD$ m)	363	10,279	24,208	3,381	84.070	374,000
Leverage	363	0.602	1.222	0.369	-11.056	7.606
Zscore	363	1.742	1.130	1.802	-0.985	6.581
ROA	363	0.062	0.075	0.053	-0.570	0.316
Tangibility	363	0.479	0.240	0.517	0.010	0.857

This table provides the descriptive statistics of the variables used in the following empirical analysis. Information on syndicated loan facilities and Chinese corporate borrowers is collected between 1998 and 2016 with a total number of 363 samples.

5.4.2 The effects of earnings quality and state-ownership on loan prices and maturity (H1)

We run Eq. 5-5 to test the effects of earnings quality and state-ownership on primary loan terms, i.e. loan spread and maturity[57] (H1) and report the results in Table 5-2 (spread) and Table 5-3 (maturity), respectively. We consider their independent effects (Models 1 and 2), combined effects (Models 3) and possible interaction effect (Model 4) when testing H1 by employing OLS models. Table 5-2 shows that after controlling for a rich set of control variables and fixed effects, Chinese corporate borrowers with greater abnormal accruals, i.e. lower earnings quality, would be charged higher spreads on their syndicated loans, consistent with existing evidence (e.g., Bharath et al., 2008). Such a result reflects the role played by earnings quality in alleviating information asymmetries on borrower and in reducing costs of monitoring for lenders. Such a favourable effect (Model 4) is economically significant in the syndicated loan market in China and an increase of abnormal accruals by one standard deviation would raise the loan spread by 18.6 bps on average, equivalent to around 10% increase in interest payment for a typical Chinese corporate borrower with an average loan spread (188.44 bps). Such an effect is much greater than that in U.S syndicated loan markets which is about 5.5bps increase with a standard deviation increase in

[57] We do not test the effects of earnings quality and state-ownership on other non-pricing terms, such as amount, collateral and covenants. This is because we do not have data on covenants and loan amount is taken as exogenous and independent on earnings quality and state-ownership. In addition, there are a large number of missing values on collateral. Our results still hold when applying a multiple imputation approach to replace the missing values in collateral.

abnormal accruals (Wasan et al., 2013), reflecting the lower earnings quality (greater abnormal accruals) and a much stronger favourable effect of earnings quality improvement in China.

Table 5-2: The effects of earnings quality and state-ownership on syndicated loan prices

	(1)	(2)	(3)	(4)
Abnormal Accruals	219.369**		219.354**	187.704**
	(94.074)		(94.416)	(94.808)
State-ownership		-5.805	0.798	-57.496
		(24.492)	(26.381)	(39.429)
Abnormal Accrual × State-Ownership				930.022*
				(471.400)
Ln(LoanAmount)	7.924	5.097	7.893	8.923
	(6.187)	(6.051)	(6.295)	(6.252)
Maturity	-0.751**	-0.717**	-0.751**	-0.897**
	(0.347)	(0.320)	(0.349)	(0.353)
Secured	107.231***	100.561***	107.327***	107.595***
	(20.111)	(18.957)	(20.433)	(20.223)
No. of Lenders	-1.486	-0.684	-1.478	-1.429
	(1.495)	(1.444)	(1.519)	(1.504)
Repayment	43.528***	44.831***	43.567***	38.428**
	(15.350)	(14.791)	(15.459)	(15.520)
Ln(Asset)	-26.654***	-28.540***	-26.656***	-27.227***
	(4.674)	(4.448)	(4.691)	(4.652)
ROA	-242.234*	-176.488	-243.100*	-190.642
	(132.487)	(128.499)	(136.018)	(137.216)
Leverage	36.997**	46.808***	36.932**	33.375**
	(16.435)	(14.915)	(16.635)	(16.562)
Zscore	7.551	10.964	7.669	2.920
	(8.038)	(8.599)	(8.960)	(9.188)
Tangibility	27.963	23.590	27.883	29.886
	(35.687)	(34.528)	(35.913)	(35.557)
Constant	221.097*	270.173**	189.732	202.215
	(132.663)	(129.261)	(137.163)	(135.895)
Observations	180	180	180	180
R-squared	0.674	0.670	0.674	0.683
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.
Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan spread measured by *spread* (All in Drawn Spread). We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-2 shows little evidence that state-ownership affects syndicated loan prices and such a result is in contrast to those empirical studies on bilateral loans (Liu et al., 2016, Boubakri et al., 2008, Borisova and Megginson, 2011). This is because, unlike bilateral loans whose risks are relevant to only one lender and price serves as the key factor to compensate the exposure to risk of the lender, syndication loan lenders could adjust risk factors by managing loan syndicate structure by sharing risks with other participant lenders. Therefore, the divergent distribution of loan terms may mitigate the individual effect of state-ownership on loan spread. In addition, our test on H1 also shows that SOE loan spreads are more sensitive to earnings quality than non-SOE loans (Model 4). This is because managers in SOEs usually have less pressure to manage earnings than those in non-SOEs (Wang and Yung, 2011) and therefore, accounting information users are more concerned with SOE earnings management which makes a bigger difference than that of non-SOEs.

Maturity is associated with monitoring costs and risk exposure of lenders and we propose earnings quality and state-ownership would also affect loan maturity (H1). Table 5-3 shows that loan maturity is independent on earnings quality but SOE loans would averagely have a longer maturity than loans issued to non-SOEs[58], by 12 months after controlling for other variables, such

[58] One may concern with the result that SOE loans have longer maturity because they have better earnings quality and earnings quality affects loan maturity indirectly via state-ownership. This is plausible because managers in SOEs have less pressure to manipulate firm-specific information (L. Wang and Yung, 2011). This concern is, however, irrelevant to our results because first, earnings quality itself does not affect loan maturity (Model 1, Table 5-3). Second, according

as loan size and purposes. Combining earlier results on loan prices, **H1** is partially supported where earnings quality reduces loan spread and state-ownership increases loan maturity. Different from empirical evidence that earnings quality and state-ownership determine *both* pricing *and* non-pricing loan terms in bilateral loans, our results show that, in syndicated loans, earnings quality and state-ownership determine price and non-pricing terms *respectively*, reflecting more risk-return mechanisms available for lenders when contracting syndicated loans. Our results imply that, in determining loan spread and maturity, lenders are concerned with both information asymmetries and the ability of corporate borrowers to repay. Higher earnings quality reduces information asymmetries on borrower and hence, lenders would reward borrowers with higher earnings quality by charging lower prices.

to Lee Ray (2016), increasing R^2 over models suggests that state-ownership is a complementary explanatory factor, rather than a competing factor, in loan maturity models.

Table 5-3: The effects of earnings quality and state-ownership on syndicated loan maturity

	(1)	(2)	(3)	(4)
Abnormal Accruals	-19.886		-19.416	-18.051
	(23.773)		(23.554)	(23.739)
State-ownership		11.881**	14.470**	17.306**
		(5.515)	(5.758)	(8.040)
Abnormal Accrual × State-Ownership				-51.569
				(101.873)
Ln(LoanAmount)	2.714**	2.828**	2.378*	2.420*
	(1.295)	(1.226)	(1.290)	(1.294)
Secured	9.164	12.308**	10.677*	10.460*
	(5.800)	(5.267)	(5.778)	(5.802)
No. of Lenders	-0.398	-0.314	-0.185	-0.182
	(0.415)	(0.398)	(0.420)	(0.421)
Repayment	-19.040***	-17.160***	-17.725***	-17.665***
	(4.503)	(4.375)	(4.492)	(4.499)
Ln(Asset)	0.650	0.205	0.220	0.137
	(1.382)	(1.317)	(1.380)	(1.392)
ROA	64.496*	37.250	52.908	50.437
	(34.459)	(32.247)	(34.450)	(34.840)
Leverage	4.067**	3.532*	3.609*	3.914*
	(2.020)	(1.857)	(2.009)	(2.100)
Zscore	-14.063***	-11.389***	-11.851***	-11.615***
	(2.176)	(2.207)	(2.329)	(2.378)
Tangibility	24.909***	26.192***	19.660**	19.729**
	(9.503)	(9.267)	(9.644)	(9.657)
Constant	48.024	11.163	52.896	52.354
	(40.213)	(32.055)	(39.887)	(39.955)
Observations	337	337	337	337
R-squared	0.439	0.468	0.473	0.473
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.
Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan maturity in months. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

5.4.3 The effects of earnings quality and state-ownership on loan syndication structure (H2)

We follow the logic in testing H1 to regress loan syndication structure, measured by loan share HHI (Models 1-4), number of lenders (Models 5 and 6) and share held by lead arranger (Models 7 and 8) on earnings quality, state-ownership and controls. Partially supporting H2, Table 5-4 shows that state-ownership but not earnings quality have a significant impact on loan syndicate structure. Loans issued to SOEs usually have more concentrated share holdings, fewer lenders and less lead arranger shareholding than those loans issued to non-SOEs. The state-ownership effects are economically sizable. For example, having a SOE borrower reduces the number of lenders by 9%, decreases lead arranger shareholding from 37% at mean to 19%, and increases share HHI from 28% at mean to 43%. Overall, on one hand, our findings suggest that state-ownership, but not earnings quality, alleviates adverse selection and moral hazards by reducing lead arranger shareholding. On the other, state-ownership reduces monitoring costs for lead arrangers by constructing a more concentrated loan syndicate (Lee and Mullineaux, 2001). The insignificant role of earnings quality could simply represent that earnings quality is not as important as state-ownership in reducing asymmetric information between lenders in Chinese syndicated loan market.

Table 5-4: The effects of earnings quality and state-ownership on loan syndication structure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	ShareHHI	ShareHHI	ShareHHI	ShareHHI	No. of Lenders	No. of Lenders	Leadshare	Leadshare
Abnormal Accrual	-13.961		-13.241	-9.790	0.383	0.369	-24.958	-27.573
	(18.129)		(17.929)	(18.189)	(0.311)	(0.314)	(30.467)	(30.435)
State-ownership		9.613**	10.090**	15.143**	-0.484***	-0.517***	-17.961**	-29.348***
		(4.639)	(4.713)	(6.575)	(0.083)	(0.121)	(7.989)	(10.986)
Abnormal Accrual × State-ownership				-87.575		0.597		248.477
				(79.505)		(1.589)		(165.034)
Ln(LoanAmount)	-5.379***	-6.028***	-5.748***	-5.757***	0.171***	0.171***	-0.565	-0.673
	(1.006)	(1.004)	(1.010)	(1.009)	(0.018)	(0.018)	(1.553)	(1.551)
Maturity	0.006	0.010	0.010	0.018	-0.002**	-0.002**	-0.246***	-0.256***
	(0.047)	(0.046)	(0.047)	(0.047)	(0.001)	(0.001)	(0.076)	(0.076)
Secured	5.946	5.555	7.785*	7.134	-0.093	-0.091	-3.122	-2.916
	(4.592)	(4.388)	(4.621)	(4.656)	(0.081)	(0.081)	(7.144)	(7.126)
Repayment	-2.175	-0.920	-1.082	-1.298	0.266***	0.266***	0.716	0.290
	(2.994)	(3.039)	(3.004)	(3.008)	(0.053)	(0.053)	(5.970)	(5.960)
Ln(Asset)	0.449	0.440	0.491	0.481	0.023	0.024	7.947***	8.209***
	(1.049)	(1.000)	(1.037)	(1.037)	(0.018)	(0.018)	(1.782)	(1.786)
ROA	-3.507	-16.800	-13.743	-15.879	-0.115	-0.091	18.248	23.635
	(26.821)	(26.138)	(26.947)	(26.999)	(0.440)	(0.444)	(46.138)	(46.155)
Leverage	2.655	1.848	2.347	2.407	-0.105***	-0.107***	-0.544	-2.225
	(1.830)	(1.684)	(1.815)	(1.815)	(0.037)	(0.038)	(2.478)	(2.712)
Z-Score	-3.853**	-2.329	-2.203	-1.959	0.037	0.035	-1.411	-2.252
	(1.932)	(2.013)	(2.060)	(2.071)	(0.032)	(0.033)	(3.059)	(3.102)
Tangibility	11.739*	10.891	10.177	10.719	-0.137	-0.138	-4.641	-5.175
	(6.967)	(6.970)	(6.928)	(6.940)	(0.117)	(0.117)	(12.542)	(12.514)
Constant	106.447***	107.381***	109.708***	109.079***	-1.805***	-1.794***	-32.929	-30.522
	(24.732)	(21.724)	(24.502)	(24.492)	(0.397)	(0.398)	(48.649)	(48.545)
Observations	201	201	186	186	312	312	266	266
R-squared	0.439	0.490	0.503	0.503			0.221	0.228

Pseudo R2					0.187	0.187		
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan structure represented by *No. of Lenders*, *Leadshare* and *ShareHHI*. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

5.4.4 The effects of earnings quality and state-ownership on foreign lender participation (H3)

Foreign lenders have an information disadvantage against domestic lenders who may have developed long-term banking relations with borrowers (Frame et al., 2001) and therefore, foreign lenders may rely more heavily on 'hard' information in lending decision making. We propose that foreign lenders would be more likely to lead loan syndication for corporate borrowers with higher earnings quality and more favourable signals, such as state-ownership. To measure foreign lender participation, we construct two variables: *All Foreign*[59] (=1 if all lead arranges are foreign lenders; 0 otherwise) and *Foreign Fraction* (= the proportion of foreign lenders in all lead arrangers). We employ Probit models (Models 1 and 2) and OLS (Models 3 and 4) and report the results in Table 5-5.

Table 5-5 shows that higher earnings quality does not significantly motivate foreign lenders to lead or to participate the leading of loan syndication and again, foreign lenders take state-ownership as a favourable signal of implicit guarantee of repayment by more actively leading the syndicated loans issued to SOEs. After holding other factors constant, state-ownership increases the likelihood of a loan syndication to be led by all foreign lenders by 32.4% (Model 1) and the

[59] We use the variable *All Foreign* to group loan facilities into foreign group and domestic group. If all lead arrangers are foreign lenders, they would have more severe asymmetric information problem than domestic lenders.

proportion of foreign lead arrangers by 26.6% (Model 3). Therefore, our results reported in Table 5-5 partially support H3.

Table 5-5: The effects of earnings quality and state-ownership on foreign lender participation

Variables	(1) All Foreign	(2) All Foreign	(3) Foreign Fraction	(4) Foreign Fraction
Abnormal Accruals	-0.222	0.130	-0.283	-0.234
	(1.686)	(1.742)	(0.258)	(0.268)
State-ownership	1.586***	1.901***	0.266***	0.302***
	(0.474)	(0.605)	(0.063)	(0.082)
Abnormal Accrual × State-Ownership		-5.253		-0.590
		(6.104)		(0.870)
Ln(LoanAmount)	-0.004	-0.001	0.001	0.001
	(0.092)	(0.093)	(0.014)	(0.014)
Maturity	-0.000	-0.000	-0.000	-0.000
	(0.004)	(0.004)	(0.001)	(0.001)
Secured	-1.077***	-1.087***	-0.134**	-0.135**
	(0.396)	(0.398)	(0.059)	(0.059)
No. of Lenders	-0.045	-0.045	0.005	0.005
	(0.030)	(0.030)	(0.005)	(0.005)
Repayment	1.014***	1.014***	0.133***	0.133***
	(0.351)	(0.351)	(0.051)	(0.051)
Ln(Asset)	-0.114	-0.112	0.006	0.006
	(0.100)	(0.100)	(0.015)	(0.015)
ROA	3.509	3.447	1.085***	1.071***
	(2.433)	(2.436)	(0.360)	(0.361)
Leverage	-0.048	-0.068	0.003	0.001
	(0.130)	(0.133)	(0.021)	(0.021)
Zscore	0.290	0.291	0.027	0.029
	(0.178)	(0.177)	(0.026)	(0.026)
Tangibility	-0.751	-0.771	-0.167	-0.169
	(0.720)	(0.723)	(0.108)	(0.108)
Constant	0.263	0.197	0.902**	0.881**
	(2.033)	(2.040)	(0.357)	(0.359)
Observations	307	307	326	326
R-squared			0.232	0.233
Pseudo R-squared	0.120	0.121		
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is cross-border lending indicator, *All Foreign* and *Foreign Fraction*, respectively. *All Foreign* is a dummy variable, which equals one if all lead arrangers are foreign lenders; 0 otherwise. *Foreign Fraction* is the proportion of foreign leaders in the total number of lead arrangers. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Following the investigation on the participation of foreign lenders in leading loan syndication, we run additional tests to examine if earnings quality and state-ownership have different effects on loans led by foreign vs. domestic lenders. First, we run both OLS for Models 1 and 2 and endogenous switching regression models (Bharath et al., 2008) for Models 3 and 4 and report the results in Table 5-6. We show consistent results for both model specifications that foreign lenders are more sensitive to hard information (e.g. earnings quality) in pricing syndicated loans and charge lower spreads for Chinese corporate borrowers with higher earnings quality (i.e. lower abnormal accruals). For example, one standard deviation increase in *Abnormal Accrual* (0.085) could raise loan spread by 18.09 bps (Model 1) and 17.85 bps (Model 3), respectively. Table 5-6 also shows consistent results to those reported in Table 5-2 that state-ownership is not a factor affecting syndicated loan pricing. We also find that earnings quality has little impact on the spreads of loans led by domestic lenders who are subject to government control. Although interest rates have become deregulated, they may not work as an efficient pricing mechanism because they are subject to government intervention and only allowed to fluctuate in a narrow range (Chen et al., 2011).

Following the same logic, we investigate the effects of earnings quality and state-ownership on loan maturity for syndicated loan facilities led by foreign vs. domestic lenders and report the results in Table 5-7. Consistent with earlier results (Table 5-3), it shows that state-

ownership is positively associated with loan maturity and there is little evidence that such association varies between foreign and domestic lenders.

Table 5-6: Domestic vs. foreign lenders – evidence on loan price

	(1)	(2)	(3)	(4)
Variables	Foreign	Domestic	Foreign	Domestic
	(OLS)	(OLS)	(Switching)	(Switching)
Abnormal Accruals	212.840**	169.623	212.590**	210.566
	(99.100)	(297.910)	(88.245)	(162.839)
State-ownership	-4.097	-60.315	-7.146	-5.660
	(26.382)	(89.404)	(23.097)	(15.283)
Constant	386.461***	-22.938	341.501***	65.661
	(140.612)	(229.042)	(120.962)	(136.433)
Other Controls	YES	YES	YES	YES
Observations	124	56	180	180
R-squared	0.744	0.783		
LR test statistics (p-value)			27.07 (0.00)	
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan price (*spread*). In Models (1) and (2), we group lending group into foreign and domestic lead arrangers. Foreign group represents that all lead arrangers are foreign lenders. We define it as domestic group if there is one or more domestic lead arrangers in loan syndication. In Models (3) and (4), we use endogenous switching regression models corresponding to the endogenous selection in Table 5-5. The results for control variables are not reported but available on request from the authors. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-7: Domestic vs. foreign lenders – evidence on loan maturity

	(1)	(2)	(3)	(4)
Variables	Foreign	Domestic	Foreign	Domestic
	(OLS)	(OLS)	(Switching)	(Switching)
Abnormal Accruals	2.146	56.563	-28.273	26.513
	(27.859)	(47.939)	(27.131)	(50.797)
State-ownership	32.323***	23.818**	38.130***	51.819***
	(5.344)	(11.808)	(5.153)	(12.396)
Constant	68.735**	-97.280	-16.128	35.307
	(32.788)	(59.530)	(0.000)	(57.383)
Other Controls	YES	YES	YES	YES
Observations	212	125	337	337
R-squared	0.566	0.378		
LR test statistics (p-value)			170.13 (0.00)	
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan maturity (*months*). In Models (1) and (2), we group lending group into foreign and domestic lead arrangers. Foreign group represents that all lead arrangers are foreign lenders. We define it as domestic group if there is one or more domestic lead arrangers in loan syndication. In Models (3) and (4), we use endogenous switching regression models corresponding to the endogenous selection in Table 5-5. The results for control variables are not reported but available on request from the authors. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-4 (H2) has shown that lead arrangers take state-ownership as a favourable signal for implicit guarantee for repayment and lower default risk. Therefore, state-ownership enables lead arranger to construct a concentrated loan syndicate without the necessity to share risk with more participant lenders. It also alleviates adverse selection and moral hazard problems so that lead arranger could sell more shares to participant lenders. Table 5-8 shows consistent results on foreign lead arrangers who rely more heavily on hard information than on soft information for making lending decisions due to their disadvantage in private information collection against domestic lenders. The coefficients for both OLS (Model 1) and endogenous switching model (Model 3) are statistically significant for foreign lead arrangers and economically sizable, but not for domestic lead arrangers. Syndicated loans led by all foreign lenders and issued to SOEs have a greater loan share concentration by 51.4% (=14.422/28.071) in the OLS model (Model 1) and 66.9% (=18.769/28.071) in the endogenous switching model (Model 3).

Table 5-8: Domestic vs. foreign lenders – evidence on loan syndication structure

	(1)	(2)	(3)	(4)
Variables	Foreign	Domestic	Foreign	Domestic
	(OLS)	(OLS)	(Switching)	(Switching)
Abnormal Accruals	22.128	-30.012	7.864	-8.632
	(29.549)	(37.926)	(23.277)	(36.732)
State-ownership	14.422**	5.312	18.769***	-4.642
	(6.120)	(6.367)	(4.971)	(5.991)
Constant	104.671***	102.930***	90.864	103.828
	(36.819)	(26.173)	(0.000)	(0.000)
Other Controls	YES	YES	YES	YES
Observations	118	83	201	201
R-squared	0.530	0.582		
LR test statistics (p-value)			94.31 (0.00)	
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan structure (*ShareHHI*). In Models (1) and (2), we group lending group into foreign and domestic lead arrangers. Foreign group represents that all lead arrangers are foreign lenders. We define it as domestic group if there is one or more domestic lead arrangers in loan syndication. In Models (3) and (4), we use endogenous switching regression models corresponding to the endogenous selection in Table 5-5. The results for control variables are not reported but available on request from the authors. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

5.4.5 Robustness tests

A syndicated loan contract is mainly characterised by loan spread, maturity and syndication structure amongst others, such as amount, collateral, loan type etc., which reflect the inherent risk of borrowers, costs undertaken by lenders to collect information and to monitor, and the managing costs for lead arrangers. Our results above have shown that earnings quality plays a significant role in pricing syndicated loans and reducing information asymmetries between lenders and borrower. Therefore, borrowers with higher information quality would pay lower spreads on syndicated loans. State-ownership, however, reduces information asymmetries between lenders and alleviates adverse selection and moral hazard problems. In this section, we carry out two additional tests on the robustness of our earlier results.

First, alternative to the abnormal accruals derived from the modified Jones' model, we construct two additional measures for earnings quality, *Accrual2* and *Accrual3*, by following Francis et al. (2005) and Dechow and Dichev (2002), respectively (see Appendix 1 for variable construction). Consistent with our earlier findings (Tables 5-2, 5-3 and 5-4), Table 5-9 shows that abnormal accruals, but not state-ownership, would increase loan spread and state-ownership, but not earnings quality, plays a determinant role in loan maturity and syndication structure. For foreign lender partcipation, Table 5-10 shows consistent results to Table 5-5 where earnings

quality does not, but state-ownership does, affect the participation of foreign lenders in leading loan syndication.

Second, the quality of earnings, measured by abnormal accruals and its alternatives, varies overtime in our syndicated loan borrowers. As Figure 4 shows, abnormal accruals increased to their peak value during the financial crisis period (2007-2009) and decreased since then. Such a pattern in China is consistent with the cross-country evidence (Persakis and Iatridis, 2015). To test if our earlier results are driven by such extreme values in financial crisis period, we exclude samples during 2007-2009 in the analysis and Table 5-11 shows that our earlier results still hold where earnings quality affects loan spread and state-ownership has impacts on loan maturity, syndication structure and the participation of foreign lenders.

Figure 5-1: Change of earnings quality

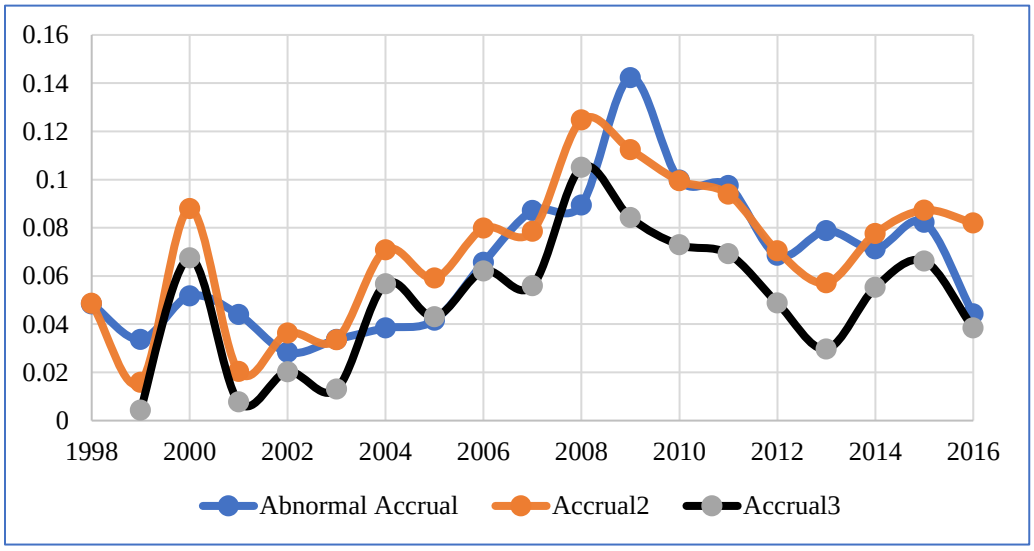


Table 5-9: Robustness test – alternative earnings quality measures

Variables	(1) Spread	(2) Spread	(3) Maturity	(4) Maturity	(5) ShareHHI	(6) ShareHHI
Accrual2	219.460*		-3.312		-5.339	
	(117.368)		(27.569)		(19.923)	
Accrual3		200.124*		-2.613		-3.376
		(119.078)		(27.999)		(20.993)
State-ownership	-5.638	-7.336	31.199***	31.242***	13.501***	13.619***
	(26.782)	(26.763)	(5.470)	(5.448)	(4.380)	(4.353)
Constant	123.611	119.343	20.443	20.473	108.643***	107.652***
	(145.034)	(143.069)	(40.744)	(40.744)	(23.867)	(23.600)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	169	168	314	313	187	186
R-squared	0.575	0.571	0.363	0.362	0.435	0.433
YEAR FE	YES	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variables are syndicated *Spread* (Models 1 and 2), *Maturity* (Models 3 and 4) and *ShareHHI* (Models 5 and 6). The key independent variables are *Accrual2* and *Accrual3*, respectively. The results for control variables are not reported but available on request from the authors. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-10: Robustness test – alternative earnings quality measures

VARIABLES	(1)	(2)	(3)	(4)
	All Foreign	All Foreign	Foreign Fraction	Foreign Fraction
Accrual2	0.444		-0.273	
	(1.871)		(0.297)	
Accrual3		-0.548		-0.419
		(1.893)		(0.298)
State-ownership	1.380***	1.348***	0.252***	0.249***
	(0.440)	(0.439)	(0.062)	(0.062)
Constant	0.927	0.962	0.861**	0.684
	(1.900)	(1.898)	(0.431)	(0.431)
Control variables	Yes	Yes	Yes	Yes
Observations	288	288	304	303
R-squared			0.227	0.229
Pseudo R-squared	0.105	0.105		
YEAR FE	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is cross border lending indicator, *All Foreign* and *Foreign Fraction*, respectively. *All Foreign* is a dummy variable, which equals one if all lead arrangers are foreign lenders; 0 otherwise. *Foreign Fraction* is the proportion of foreign leaders in total lead arrangers. The key independent variables are *Accrual2* and *Accrual3*. The results for control variables are not reported but available on request from the authors. We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-11: Robustness test – excluding samples in financial crisis period

Variables	(1) Spread	(2) Maturity	(3) ShareHHI	(4) No. Lenders	(3) LeadShare	(6) All Foreign	(7) Foreign Fraction
Abnormal Accruals	280.045**	34.716	14.589	0.093	2.464	-0.854	-0.313
	(127.112)	(34.400)	(28.395)	(0.410)	(36.430)	(2.583)	(0.378)
State-ownership	8.731	35.243***	19.992***	-0.614***	-29.136**	2.043***	0.374***
	(31.500)	(5.769)	(5.228)	(0.087)	(13.418)	(0.545)	(0.068)
Constant	172.665	12.815	96.769***	-1.276***	-38.387	2.174	1.027***
	(149.839)	(32.292)	(22.370)	(0.374)	(51.71)	(2.027)	(0.360)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	148	271	166	271	214	243	262
R-squared	0.612	0.392	0.501		0.221		0.288
Pseudo R2				0.185		0.135	
YEAR FE	YES	YES	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variables are syndicated Spread, Maturity, ShareHHI, No. Lenders, Leadshare, All Foreign and Foreign Fraction. We repeat the previous tests by excluding samples in the financial crisis period (2007-2009). We also control for year fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

5.4.6 Endogeneity

An endogeneity issue may exist because (1) there could be a reverse causality issue where syndicated loan places a monitoring effect on earnings quality (abnormal accruals) and (2) omitted variables exist which affect both syndicated loan prices, structure and corporate earnings quality. We overcome the first possible endogeneity issue by employing a lagged earnings quality measure in year t-1 so that a reverse causality issue is to be excluded.

The endogeneity caused by omitted variables may exist in our analysis because some omitted firm level characteristics, such as corporate governance, may affect both earnings quality (e.g. Xie, Davidson Iii, & Dadalt, 2003; Jaggi, Leung, & Gul, 2009) and syndicated loan prices and structures (e.g., Lin et al., 2012) simultaneously. Second, corporate social responsibility (CSR) has been known as a factor which affects costs of bank loan, even economically unimportant (Goss and Roberts, 2011). However, CSR performance is not significantly associated with either accrual-based or real earnings management (Liu et al., 2017). Third, there has been little evidence that there are any other omitted variables which cause endogeneity by affecting both earnings quality and loan prices. We include corporate governance variable, such as state-ownership, in our model to minimise the corporate governance related omitted variable problems. We also follow (Cornaggia et al., 2015) and run a Placebo test to investigate if our model is subject to endogeneity or not. We replace *Abnormal*

Accruals by a *fake-Accrual*[60] and re-run the baseline model (Eq. 5-5). Our results (Table 5-12) validate above analysis and show that the coefficients of *fake-Accrual* are not statistically significant in all loan models. Therefore, our earlier results are robust and not subject to endogeneity.

Table 5-12: Test of endogeneity

	(1) Spread	(2) Maturity	(3) ShareHHI	(4) Number of lenders	(5) LeadShare	(6) AllForeign	(7) Foreign Fraction
Fake_Accruals	120.538	-41.269	-15.346	-0.103	9.422	1.487	0.211
	(95.042)	(30.964)	(15.834)	(0.307)	(40.465)	(1.707)	(0.255)
State-ownership	-29.191	30.217***	13.482***	-0.474***	-29.916***	1.314***	0.252***
	(23.084)	(4.845)	(4.027)	(0.070)	(11.433)	(0.418)	(0.057)
Constant	100.441	3.859	110.305***	-1.331***	8.936	0.836	0.936***
	(140.989)	(31.772)	(20.824)	(0.372)	(49.958)	(1.983)	(0.347)
Observations	180	337	201	337	266	307	326
R-squared/Pseudo	0.580	0.403	0.493	0.170	0.141	0.115	0.227
Other Controls	YES	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10% respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variables are syndicated loan indicators, such as spread, maturity, share HHI, number of lenders, All Foreign dummy and foreign fraction. We use a fake earnings quality measure (fake-Accruals) and run a placebo test. We also control for the fixed effects of year and the results for control variables are not reported but available on request from the authors. Standard errors are clustered at firm level and

[60] We randomly reorder abnormal accruals over years for each sample borrower. If there exists an omitted variable at firm level which affects both abnormal accruals and syndicated loan, the coefficient of *fake_accrual* would be statistically significant.

5.5 Summary and conclusion

This paper investigates an under-studied research area on the relationship between corporate accounting practices and the key features of syndicated loans. Such an investigation is important to deepen our understanding on the roles played by earnings quality and state-ownership when Chinese public firms access syndicated loan markets, domestically and in foreign markets. This is because the accounting information quality of Chinese firms has been found to be low compared with that of companies in developed markets (Li et al., 2014). In addition, the unique state-ownership in Chinese firms has also been found to have both favourable (Boubakri et al., 2008) and unfavourable roles (Borisova et al., 2015) in raising traditional bilateral loans. Different from bilateral loans, syndicated loans carry a different nature of agency problem between lead arrangers and participant lenders and by using empirical data from China, this study contributes to existing literature on the effects of earnings quality and state-ownership on loan spread, maturity, syndication structure and the participation of foreign lenders.

Specifically, we show novel and robust evidence that Chinese corporate borrowers benefit from lower prices when they have better earnings qualities and state-ownership is positively related to loan maturity, syndication concentration and the willingness of foreign banks to participate the leading of syndicated loans. The identified effects of earnings quality and state-ownership on syndicated loans are economically sizable and shed new light on the application of asymmetric

information theories in a Chinese setting. Different from lenders in a bilateral loan, lenders in a syndicated loan contract face asymmetric information problems with both borrowers and other lenders, such as lead arrangers.

Our results suggest that earnings quality is used by lenders as an indicator of information transparency of borrower and its role is reflected in pricing syndicated loans. Earnings quality, however, plays little role in alleviating the asymmetric information problems with other lenders, such as *ex ante* adverse selection and *ex post* moral hazards. We also show that the pricing effects of earnings quality are especially stronger for state-owned enterprise (SOE) loans and loans led by foreign banks. This is because SOE managers usually have less pressure to manage earnings than those in non-SOEs and foreign lenders reply more heavily on hard information in making lending decisions.

Unlike earnings quality, state-ownership serves as a signal of implicit guarantee of loan repayment and we show that state-ownership has little impact on pricing syndicated loans in China. However, it contributes to the alleviation of adverse selection and moral hazard problems and lead arrangers of SOE loans could sell more shares to participant lenders. Foreign banks are also more willing to lead SOE loans.

Similar to a recent study on troubled loan restructuring in U.S (Demiroglu and James, 2015) which has 336 observations and relevant empirical studies on Chinese syndicated loan market,

such as Pessarossi et al. (2012) with 92 observations and Korkeamaki et al. (2014) with 206 observations, this paper is subject to a weakness of small sample size (363 observations). This is mainly because available data on syndicated loans in China are limited to those listed corporate borrowers. We call for future research to investigate how lenders overcome the asymmetric information problems when offering syndicated loans to private firms and how private borrowers access foreign lenders to raise syndicated loans in China.

Table 5-A1: Definition of variables

Variables	Definition	Sources
Loan Characteristics		
Spread	All-in-drawn-spread: basis point spread over LIBOR plus the annual fee and the up-front fee spread, if there is any.	Dealscan
Ln (LoanAmount)	Natural Log of loan amount in $m	Dealscan
Maturity	Syndicated loan maturity in months	Dealscan
No. of Lenders	Number of participating lenders in the facility syndicate	Dealscan
Secured	=1 if the facility is secured with collateral; 0 otherwise	Dealscan
Repayment	=1 if the primary purpose of the loan is a repayment; 0 otherwise	Dealscan
ShareHHI	The Herfindahl-Hirschman Index (HHI) of loan share retained by each lender within a loan facility	
All Foreign	=1 if all lead arrangers are foreign banks; 0 otherwise	
Foreign Fraction	The proportion of foreign lead arrangers in total lead arrangers	
Borrower Characteristics		
Abnormal Accruals	Abnormal accrual based on the modified Jones model (Dechow et al., 1995)	Compustat
Accrual_F	Alternative abnormal accrual (Francis et al., 2005)	Compustat
Accrual_DD	Alternative abnormal accrual (Dechow and Dichev, 2002)	Compustat
State-ownership	=1 if the firm is state-owned; 0 otherwise	CSI
Ln (Asset)	Natural Log of the total asset in $m	Compustat
Tangibility	The sum of net property, equipment and pant, divided by total asset	Compustat
Leverage	Long-Term debt divided by total assets	Compustat
Zscore	Modified Altman Z-score derived from (Altman, 1968)	Compustat
ROA	Net income divided by total asset	Compustat

5.6 Appendix 1: Alternative measurements of earnings quality

Our alternative measures of earnings quality are *Accrual2* (Francis et al., 2005) and *Accrual3* (Dechow and Dichev, 2002). For *Accrual2,* we first compute total current accruals using firm accounting information from Compustat as

$$TCA_{i,t} = \Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STDEBT_{i,t} - DEPN_{i,t} \ldots\ldots\text{(Eq. 5-A1)}$$

where $\Delta CA_{i,t}$ is firm i's change in current assets from year $t-1$ to year t; $\Delta CL_{i,t}$ is firm i's change in current liabilities between year $t-1$ and year t; $\Delta Cash_{i,t}$ is firm i's change in cash from year $t-1$ to year t; $\Delta STDEBT_{i,t}$ is firm i's change in debt from current liabilities between year $t-1$ and year t; $DEPN_{i,t}$is firm i's depreciation and amortization expense in year t. Then, we estimate the following equation for each industry group by following Fama and French (1997):

$$\frac{TCA_{i,t}}{AT_i} = \partial_1 \frac{1}{AT_i} + \partial_2 \frac{CFO_{i,t-1}}{AT_i} + \partial_3 \frac{CFO_{i,t}}{AT_i} + \partial_4 \frac{CFO_{i,t+1}}{AT_i} + \partial_5 \frac{\Delta REV_{i,t}}{AT_i} + \partial_6 \frac{PPE_{i,t}}{AT_i} + \varepsilon_{it} \ldots\text{(Eq. 5-A2)}$$

where $CFO_{i,t}$ is firm i's cash flow from operating in year t; $\Delta REV_{i,t}$ is firm i's change in revenues from year $t-1$ to year t; PPE_{it} is firm i's the gross value of property, plant and equipment in year t. We predict the firm-year residuals after regression, and *Accrual2* is the standard deviation of firm i's 5-years residuals from year $t-4$ to year t. We also follow Francis et al. (2005) to winsorize the extreme values of distribution to 1/99 percentiles. The larger the standard deviation of residuals, the poorer is the earnings quality.

For *Accrual3*, we follow Bharath et al. (2008) to construct a simple measure of accrual quality based on Dechow-Dichev model (Dechow and Dichev, 2002). We estimate the following regression for each industry group in year *t* (Fama and French, 1997).

$$\frac{TCA_{i,t}}{AT_i} = \partial_1 \frac{1}{AT_i} + \partial_2 \frac{CFO_{i,t-1}}{AT_i} + \partial_3 \frac{CFO_{i,t}}{AT_i} + \partial_4 \frac{CFO_{i,t+1}}{AT_i} + \varepsilon_{it} \text{.....(Eq. 5-A3)}$$

where our third measurement of abnormal accrual *Accrual3* is the absolute value of residual from the regression. A large value of *Accrual3* indicates a poor match between cash flow and accruals, and therefore a poor earnings quality.

5.7 Appendix 2: Tests on the 'price-concentration' and ‘market power-structure’ relations in China

In this section, I also tested the relation between bank market structure and syndicated loan terms in China by following notion in Chapter 3 and Chapter 4. After re-running the Eq. 3-1 and Eq. 4-2, Table 5-A2 and Table 5-A3 show how Chinese bank market concentration determines syndicated loan prices, maturity and structure[61]. The results demonstrate that the positive relation between ‘price-concentration’ still applies to Chinese syndicated loan market. However, I find little evidence that syndicated loan structure (ShareHHI) is determined by Chinese bank market structure.

[61] Because of the data limit in China, the variables in Chapter 5 are different from in Chapter 3 and Chapter 4.

Table 5-A2: Chinese bank market structure and syndicated loan terms (HHI-Deposit)

VARIABLES	(1) AISD	(2) Maturity	(3) ShareHHI	(4) Allforeignlead	(5) Foreignfraction
HHI_Deposit	375.305**	-58.591	-28.819	6.940**	0.615
	(160.938)	(42.383)	(32.363)	(3.540)	(0.481)
Ln(LoanAmount)	7.486	1.970	-6.804***	0.013	-0.001
	(6.654)	(1.287)	(1.100)	(0.109)	(0.015)
Secured	106.893***	11.796**	3.496	-1.207***	-0.129**
	(20.609)	(5.435)	(4.771)	(0.436)	(0.061)
Maturity	-0.725**		0.015	-0.003	-0.001
	(0.330)		(0.052)	(0.005)	(0.001)
No. of Lenders	-0.490	-0.295		-0.041	0.007
	(1.595)	(0.420)		(0.034)	(0.005)
Repayment	49.771***	-13.996***	-2.619	0.923**	0.104**
	(15.358)	(4.491)	(3.235)	(0.385)	(0.052)
Ln(Asset)	-32.011***	0.722	1.479	-0.094	0.017
	(5.076)	(1.428)	(1.168)	(0.118)	(0.016)
ROA	-198.776	0.961	12.592	2.376	0.740*
	(142.385)	(35.715)	(34.302)	(2.880)	(0.403)
Leverage	51.598***	3.037	3.596	-0.084	-0.002
	(15.521)	(1.885)	(2.339)	(0.140)	(0.021)
Z-Score	1.700	-6.236**	-4.482*	0.855***	0.083***
	(10.437)	(2.574)	(2.487)	(0.251)	(0.030)
Tangibility	-18.176	18.535*	15.756*	-1.252	-0.191
	(40.122)	(10.391)	(8.258)	(0.874)	(0.120)
Constant	203.514	-7.277	103.463***	-1.986	0.468
	(142.713)	(45.249)	(35.931)	(2.528)	(0.434)
Observations	171	310	178	292	299
R-squared	0.680	0.511	0.463	0.569	0.272
YEAR FE	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.
Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan spread, maturity, ShareHHI, Allforeignlead and Foreignfraction. The independent variable is the HHI-Deposit which measures the Chinese bank market concentration at state level using deposit ratio. We also control for year and industry fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Table 5-A3: Chinese bank market structure and syndicated loan terms (HHI-Loan)

VARIABLES	(1) AISD	(2) Maturity	(3) ShareHHI	(4) Allforeignlead	(5) Foreignfraction
HHI_Loan	486.824**	-9.432	-5.815	9.127**	1.022*
	(205.589)	(51.032)	(40.930)	(4.347)	(0.577)
Ln(LoanAmount)	6.967	2.282*	-6.656***	-0.007	-0.001
	(6.622)	(1.277)	(1.092)	(0.108)	(0.015)
Secured	107.256***	12.665**	4.241	-1.210***	-0.126**
	(20.611)	(5.446)	(4.761)	(0.434)	(0.061)
Maturity	-0.754**		0.012	-0.004	-0.001
	(0.330)		(0.052)	(0.005)	(0.001)
No. of Lenders	-0.213	-0.306		-0.036	0.007
	(1.595)	(0.421)		(0.034)	(0.005)
Repayment	49.910***	-13.636***	-2.397	0.844**	0.100*
	(15.350)	(4.498)	(3.235)	(0.381)	(0.052)
Ln(Asset)	-32.976***	0.376	1.245	-0.093	0.014
	(5.198)	(1.441)	(1.214)	(0.117)	(0.016)
ROA	-198.696	-3.137	4.550	2.481	0.741*
	(142.291)	(35.768)	(34.012)	(2.869)	(0.402)
Leverage	53.686***	3.079	3.608	-0.078	-0.001
	(15.597)	(1.892)	(2.346)	(0.140)	(0.021)
Z-Score	2.143	-6.235**	-4.232*	0.819***	0.080***
	(10.412)	(2.585)	(2.488)	(0.249)	(0.030)
Tangibility	-9.917	14.424	13.347*	-0.925	-0.175
	(38.782)	(10.039)	(7.976)	(0.830)	(0.115)
Constant	201.640	-19.220	101.910***	-1.638	0.450
	(142.689)	(44.918)	(36.007)	(2.517)	(0.433)
Observations	171	310	178	292	299
R-squared	0.680	0.507	0.460		0.276
YEAR FE	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES

***, **, and * denotes statistical significant level of 1%, 5% and 10%, respectively.

Samples collected are between 1998 and 2016 with a total number of observations of 363. Dependent variable is syndicated loan spread, maturity, ShareHHI, Allforeignlead and Foreignfraction. The independent variable is the HHI-Deposit which measures the Chinese bank market concentration at state level using loan ratio. We also control for year and industry fixed effect. Standard errors are clustered at each firm level and reported in parentheses.

Chapter 6 Thesis Conclusion

This thesis aims to provide new evidence on the determinants of syndicated loan terms from both lender and borrower perspectives. In particularly, I test how bank market structure influences syndicated loan prices and syndicated loan structure in the U.S. market (Chapter 3 and 4). I also examine how borrower's earnings quality and state ownership determine syndicated loan terms (e.g., price, maturity, structure and foreign bank's share) in Chinese syndicated loan market (Chapter 5) in a setting of emerging economies.

Chapter 3 shows supporting evidence to the market power hypothesis that syndicated loan prices are positively associated with bank market concentration of both borrower's and lead arranger's markets but not participant lenders' markets. Loan prices are more sensitive to lead arranger's bank market concentration than to that of borrower's market if a loan is issued by a lead arranger from a different state. Besides, this chapter also shows that loan prices are negatively related to bank market concentration if the loan is originated by non-commercial banks. Chapter 4 tests the role of lead arranger's bank market power on syndication structure. Lead arranger's bank market power can effectively reduce the information asymmetry between lenders through the ex-ante screen and ex-post monitor, thus constructing a more dispersed loan with more lenders, fewer shares hold by lead arranger and lower Herfindahl-Hirschman Index (HHI) of loan structure. These two chapters demonstrate the pivotal role of bank market structure in determining syndicated loan terms. Chapter 5 examines the effect of earnings quality for Chinese corporate borrowers on syndicated loan terms varies depending on state ownership. Chinese corporate borrowers benefit from lower prices

when they have better earnings qualities, partially consistent with the finding in the developed market (e.g., Bharath et al., 2008). I also find state-ownership is positively related to loan maturity, syndication concentration and the willingness of foreign banks to participate in the leading of syndicated loans. The results using interaction terms between earnings quality and state ownership indicate that the pricing effects of earnings quality are especially stronger for SOE (state-owned enterprise) loans than for NSOE (none state-owned enterprise) loans.

In each empirical chapter, I applied extensive robustness tests. I used different measures of bank market structure, e.g., CRn (concentration ratio), HHI, Lerner index and branch density, and different measures of earnings quality, e.g., Modified-Jones's model (Dechow et al., 1995), Accrual_F (Francis et al., 2005) and Accrual_DD (Dechow and Dichev, 2002). To deal with endogeneity concern, I used various types of methods, such as placebo test, higher-dimension of fixed effect, Hackman model and lagged value. My results are consistent and robust with regard to these additional tests.

This thesis has important implications for syndicated loan studies, especially for corporate borrowers, lenders and policymakers. Firstly, this thesis contributes to the literature regarding the determinants of syndicated loan terms (e.g., Ivashina, 2009), bank market structure theory (e.g., Lian, 2017) and accounting practice literature (e.g., Bharath et al., 2008). Secondly, the findings in Chapter 3 show that more competitive bank markets provide cheaper funds to corporate borrowers, in favour of economic growth. This finding is also important for policymaker who involves in decision makings, such as M&A (Mergers & Acquisitions) and banking regulations to guide the market competitiveness. Thirdly, for syndicated loan lenders, the results in Chapter 4 indicate that lead arranger with a greater market power can effectively diversify credit

risks amongst lenders by originating the syndicated loan with large group of lenders, small percentage of loan held by lead arranger and lower Herfindahl-Hirschman Index of loan share. Finally, corporate borrowers can reduce cost of debt to select lead arrangers from a more competitive bank market. And for SOEs (state owned enterprises) in China, the results in Chapter 5 show that they would be charged of higher loan prices if they have low earnings quality than NSOEs (non state owned enterprises) with the same earnings quality.

Nevertheless, this thesis also bears some limitations, which call for future research. Firstly, Chapter 4 involves the consideration of bank-firm relationship which would influence the asymmetric information between lender and borrower, and I define this relationship based on the whole syndicated loan database. While, in practice, bank and firm can also build such relationship through other sources, e.g., deposit. Secondly, same as other studies in Chinese syndicated loan market (Caporale et al., 2018, Pessarossi et al., 2012, Korkeamaki et al., 2014), Chapter 5 bears with the limit of small sample size. This is mainly because of the coverage of DealScan database. Thirdly, the bank market structure measures used in this thesis are HHI, CRn, Branch Density and Lerner. While, these indexes would be good approximation of bank market power and concentration of credit if only the firms largely borrow from bank markets, i.e., when the main source of competition for a bank is other banks. These indexes would be ideally used for a sample of small firms. However, the sample in this thesis consists of very large firms (average asset size over $5 billion), which is much larger than the average firm size in the Compustat database. Moreover, the syndicated loan facility size is also considerable large ($366 million on average). For these large firms and large deals, competition to fulfil the financing requirements does not only from other banks,

but also from arm's-length sources, such as commercial paper, equity and bond markets. Finally, the measurement of bank market structure also bears with weaknesses. For example, deposit concentration ratios (both CRn and HHI) are about overall concentration level in the market, and they have nothing to do with the power of a particular bank. At the same time, Lerner index is the 'average pricing power' of all bank's products in the U.S. market. It does not consider the regional bank's power and the power solely in syndicated loan market. I call for future research to copy with these limits.

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