Loan Sales and Loan Market Competition∗

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Abstract

In this article, we suggest a theoretical explanation on the recent spectacular growth of loan sales market. We show that banks can use loan sales as a strategic tool in order to preserve their informational advantage in a competitive environment. We consider a two-period competition model where banks acquire a private information about their clientele during lending relationship and where there is informational asymmetry in the loan sales market. In spite of information dilution cost for selling high quality loans, banks have an incentive to sell them to preserve informational advantage for the competition in the future if preserving its loan can emit a signal about the quality of its clientele to potential competitors. As a result, loan market competition can lead the emergence of the liquid loan sales market in which both low quality and high quality loans coexist. We also analyze the welfare effect of the loan sales market on the firms.

Keywords: loan sales, banking competition, informational asymmetries, informational rent

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1. Introduction

The securitization is frequently referred to as the only market on which loans are sold. Even though the market for securitization is the major part of the market for this aim, there exists another important market for loan sales, which is the secondary market for syndicated loans.

A syndicated loan is a loan whereby a group of banks or of financial institutions jointly offers funds to a borrowing firm. In general, a bank of the group plays a role as a “lead arranger”, who establishes a relationship with the firm and negotiates terms and conditions of the loan contract. The lead arranger then turn to participant lenders that funds part of the loan (“syndicates”). Portions of these loans are sold off by originating institutions to other banks and financial institutions via individually negotiated deals. However, over the last fifteen years, an active dealer-driven secondary market has emerged, which has led to these loans being traded, much like debt or equity securities, on an over-the-counter market.

This article attempts to provide a theoretical explanation on this remarkable growth of the loan sales markets. In 2005, the total primary market US syndicated loan volume was about 1.5 trillion US dollar. Syndicated loans account for approximately one-third of all corporate financing and represent the largest single financing tool used in the corporate financing in the United States [Gupta et al., 2008]. While the syndicated loans seem to be important in the absolute terms, it is remarkable that the growth of the primary market have remained relatively modest. In contrast, the secondary market for syndicated loans has grown spectacularly over the last decade. Figure 1 presents the secondary market trading volume in syndicated loans in the United States. It accounted for 342 billion US dollars on a peak in 2007 while It represented only 8 billion US dollars in 1991 [1]. This reflects an average annual growth of about 27 % per year over the last 17 years. The primary market for syndicated loans have had an average annual growth rate of 14 % between 1991 and 2003 [Yago and McCarthy, 2004].

This secondary market for syndicated loans provokes similar problems of securitized loans in terms of informational asymmetry in the sense that the loan in question does not remain any more in the balance sheet of the loan originator. In presence of the informational asymmetry, banks may have more incentive to sell underperforming loans, retaining high quality ones. Consider a secondary market for loans in which there exists informational asymmetry.

1Regarding Europe, we could not obtain a statistics similar to that of the United States. Nevertheless, we have an information which allows to compare to the US secondary market for loans. According to the Loan Market Association, an European trade association for the syndicated loan markets, trading volumes in the European secondary loan market, stood at 68 billion euros over the first nine months of 2008 - a 52% drop on the same period last year. For the comparison, the trading volume in the US secondary market was 325 billion US dollars.
In this secondary market for loans, the high quality loans would be underestimated because investors cannot distinguish the low quality loans from the high quality ones and thus they evaluate all loans at average expected value in an economy or a sector. Therefore, in the secondary market for loans, the bank who owns a high quality loan has to pay a information dilution cost ` a la Myers and Majluf (1984). This cost corresponds to the difference between the value on average of loans in secondary loan market and the fair value, which reflect correctly the risk of this loan. This bank who possesses a high quality loan has no interest to sell its loan, whereas the bank who owns a low quality loan always has an interest to sell it. The secondary market for loans thus becomes a lemon market ` a la Akerlof (1970) in which only low quality loans are sold.

If we accept the idea that only bad loans are sold in the secondary market, investors might react rationally by expecting this problem of the adverse selection. As a consequence, the loan price in this market would simply reflect the risk of the bad loans and would become below the price that reflects the average risk in the loan sale market as a whole. However, according to the data on the trading volume of the credit in the secondary

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2 In what follows, we will interchangeably use the term the secondary market for loans and the loan sales market.
3 From the point of view of an owner of a low quality loan, this difference can be considered as (lemon) premium.

Figure 1: Trading Volume in Loan Sale Market in the US (Source: SPC)
market in the United States, its tremendous growth over the last decade was not led by this segment of low quality loans. Figure 1 shows the growth of the two segments of loans divided in terms of prices. In Figure 1 “distressed loan” segment is referred to as the loans sold below 90% of book value while “par” segment is defined as the loans sold over 90% of the book value. Until the beginning of the 90s, “distressed loan” segment accounted for the majority of the loan sales with more than 50%. Since, this segment has had a relatively mild growth, whereas “par” segment has tremendously increased and represented more than 90% of the secondary market in 2007. This empirical fact suggests that the secondary market for loans has increased in terms of size but also this increase has been accompanied by the amelioration of the quality of loans sold in this market.

It thus seems to us that there exists a contradiction between theoretical explanation and the empirical facts. In this article, we try to fill this gap between the empirical development in the loan sale market and the insufficiency of theoretical explanation. We propose a novel explanation about this amelioration of the quality of loans sold in the secondary market, from a theoretical analysis based on an imperfect competition model. In particular, we develop a theoretical model according to which loan sales are considered as a tool for the banks with a high quality loan to preserve their informational advantage associated with loan market competition in the future period, in the context of a dynamic competition.

We consider an environment in which a bank’s sale decision of a firm’s loan is observable to the outside. This is an assumption adapted to the case of sales of loan to the corporate sectors, which is the majority of single-name loan sales in secondary market for syndicated loans. In general, market newsletters for syndicated loan market participants, for example, Bank Letter or Gold Sheets regularly (weekly) carry the news on the sales of bank loans by banks and those of loan price quotes in the secondary markets (Dahiya et al., 2003, Yago and McCarthy, 2004). The Loan Pricing Corporation (LPC), who publishes Gold Sheets, and the Loan syndications and Trading Associations (LSTA) play an important role for furnishing this information with markets. Since 1999, they have provided daily pricing data on secondary market (LSTA/LPC Mark-to-Market Pricing). They also provide information about the primary market for syndicated loans, such as new loan originations and terms of these loans. Market participants can thus observe not only which bank take part in generating loans for a firm in the primary market but also whether it sells its loans or retains them.

In this environment, when there exists an information asymmetry between bank (loan seller) and investor (loan buyer), the sale decision of a firm’s loan can unintentionally emit a signal to outsiders about the quality

\footnote{This segmentation of the secondary market is defined by Standard & Poor’s and is largely used in market participants and practitioners.}
of the firm to which this bank generate a loan. Initially, the quality of a firm was information available only to the internal bank (private information), whereas the loan sale decision reveals this information to potential competitor in the future. In competitive environment, private information allows the internal bank to extract the informational rent from its informational advantage, which (partly) protects it against pure price competition with competitors (Rajan, 1992, Sharpe, 1990, von Thadden, 2004).

However, the loan sale decision causes the leakage of private information to outsiders. If this information is captured by a potential competitor, its informational advantage will be reduced or disappear and the internal bank have less (or no) informational advantage in the future round of the competition in the primary market for loans. Therefore, when there exists a competition in the primary market, there exists a trade-off between paying information dilution cost in the secondary market and preserve the informational advantage for competition in the future in the primary market. We will demonstrate that there is an equilibrium in which both low and high quality loans are sold in the secondary market.

Our analysis shows that an increase in the competition in the primary market for loans can have an effect on banks’ behavior in the secondary market. We thus suggest that an exponential growth in the secondary market and the amelioration of the quality of loans sold in this market over the last two decades can be explained by an increase in loan market competition.

Our analysis, first of all, contributes to the literature on the rationale of loan sales. One of the commonly held ideas is bank’s perspective on risk management, according to which banks sell (a part of) their loans for transferring or diversifying credit risks (Allen and Carletti, 2006, Wagner and Marsh, 2006, etc.). Another well-known argument is that of regulatory arbitrage, associated with capital requirements (Calomiris and Mason, 2004, Carlstrom and Samolyk, 1995, Dufee and Zhou, 2001, Nicolo and Pelizzon, 2008). Given that capital is more costly than debt, the retention of a proportion of capital for loans in a balance sheet is a cost for banks. By taking this loan off their balance sheet, they can save their capital. A third argument is related to a more efficient recycling of bank funds (Gorton and Pennacchi, 1995, Parlour and Plantin, 2008). With a constraint on funds, retaining a loan until maturity bears an opportunity cost if banks have other more profitable lending opportunities. By selling loans, banks can recuperate their funds earlier and redeploy them for another investment project.

The novelty of our analysis lies in the two following facts: On the one hand, we relate loan market competition to the loan sales; On the other hand, we identify the link between the primary market and the secondary market for loans. To our knowledge, few studies analyzed these effects. Ahn and Breton (2008) analyze the relationship between loan market competition and securitization. On the other hand, Gupta et al. (2008) conducted an empirical analysis regarding the link between primary and secondary
markets. They showed that banks price the expected liquidity of a loan, at the time of origination, by charging lower spreads on loans that are more likely to trade in the secondary markets. Their focus was on the effect of the loan sale decision on the loan pricing on the primary market, whereas we focus on the effect of the introduction of competition in primary market on banks’ behavior in the secondary market.

Our study is also associated with the two strand of theoretical literature. The first strand of the literature related to this article is that of the competition between two agents who are differently finformed (Engelbrecht-Wiggans et al., 1983; Rajan, 1992; Sharpe, 1990; von Thadden, 2004). As is shown in their analyses, we demonstrate that a more informed bank (internal bank in our model) can extract an informational rent against less informed competitors (external bank in our model) even in the competition.

The second type of the literature is that of the strategic actions for maintaining informational advantage by the privately informed agent. The impact of free riding associated with production information on the behaviour of the informed agent are well developed in the literature on the microstructure of the markets (Grossman and Stiglitz, 1980; Kyle, 1985). This is a question relatively few developed until now in the literature concerning the financial intermediation. Breton (2006) showed that a financial intermediary can adopt a diversification of its loan portfolio as a strategy for the purpose of limiting the leakage of private information about the quality of borrowers when this bank is confronted with the competition. In our model, the participation in the secondary market is used for the same purpose.

The rest of this article proceeds as follows. Section 2 presents the general environment of the model. Then, we analyze the secondary market for loans when there does not exist the competition in the loan market as a benchmark in Section 3. We then analyze the secondary market when competition is introduced in the loan market and the effect of the introduction of the competition on the banks’ behaviors regarding the loan sales in the secondary market in Section 4. Section 5 concludes.

2. Environment

Consider a two-period economy composed of banks, firms and investors. They are all risk-neutral and their aim is to maximize their expected return overall period.

2.1. Firms

We have two firms in the economy. Firms have two consecutive investment projects that require an initial outlay of 1 in each period. They have to find external funding as they have no funds of their own. These can be of
two types: $\theta \in \{G, B\}$. Firms know their own type, which is, however, not known to outside. In period 1, a type $\theta$ project yields $Y$ with probability of $p_\theta$, and 0 otherwise. We assume the following

$$1 > p_G > p_B > 0.$$  \hspace{1cm} (A1)

In period two, a type $G$ always succeeds, and a type $B$ always fails. We assume that controlling a project allows borrowers to derive positive private benefit that the lender cannot extract (Holmstrom and Tirole, 1997). As a result, under limited liability, the type $B$ borrowers will undertake the project in the second period even though they know that they will be bankrupt with certainty. Riskless interest is normalized to 0. Furthermore, it will be assumed that

$$\nu p_G Y + (1 - \nu) p_B Y - 1 > 0$$  \hspace{1cm} (A2)

where $\nu$ denotes the prior probability of a type $G$. Define $\bar{p} := \nu p_G + (1 - \nu) p_B$. (A2) implies that making a loan in the first period is \textit{ex ante} efficient. $p_G$, $p_B$ and $\nu$ are known to public. This project profile is summarized in Figure 2.

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5The assumption that a type $B$ borrower’s second project fails w.p. 1 is made for analytical convenience. If we use also $p_B$ for the second project, the result is unaffected but the math becomes (even more) tedious.
2.2. Banks

There exists two banks, say A and B. The bank is the agent who has access to funds and it looks for profitable projects. They compete in two subsequent periods over the loan rate to attract the firms (Bertrand price competition) by offering short-term loan contracts. The lending rate can differ across periods. Banks initially have no specific information about the borrowers’ type. But, once they are engaged in lending relationship with a firm, they learn their borrowers’ type. It is a relationship-specific information of the lending bank, which is neither verifiable by others nor transferable to others (soft information). For simplicity, we assume that the information that these internal banks acquire is perfect.

Banks are subjected to a specific discount factor $\delta$ per dollar when they retain their loans in their balance sheet to the maturity. $1 - \delta$ can be considered as the factor of the opportunity cost associated with carrying a loan. More precisely, it can capture the idea that the bank receives new private opportunities to invest with other borrowers or nonlending business, but may be unable to seize them if it has insufficient liquid assets or binding capital adequacy ratios (Gorton and Pennacchi, 1995, Parlour and Plantin, 2008). In what follows, without loss of generality, we call $1 - \delta$ the illiquidity cost or the liquidity premium.

2.3. Investors

There is a pool of large number of investors, who endowed with the funds, in the secondary market for loans. We assume that the number of investors large enough so that the secondary market for loans is perfectly competitive.

2.4. Timing

The sequence of the game is described as follows:

Figure 3: Timing
At $t=0$: Two banks simultaneously offer a first period loan rate, $R_1$. Borrowers accept one of the banks and execute their project. They learn their borrower’s type. Banks decide whether they sell their loan or not. If they decide to sell it, they do so in the secondary market for loans. They observe the projects’ return, and the borrowers repay their loan in the case of success.

At $t=1$: Each bank makes a loan offer for second-period projects to his own borrowers, $R_2$, and his rival’s borrowers, $Q_2$. $Q_2$ is the poaching rate whereby bank $i$ tries to attract firms belonging to its rival’s first-period clientele. If borrowers receive an offer from both banks, they decide whether they continue their relationship with the first-period bank or change their bank. The rest is similar to the first period.

3. Benchmark: Loan Sales without competition in loan market

Before we analyze the effect of the loan market competition on loan sales, we analyze the equilibrium in the market for loan sales when competition does not exist in the primary market for loans. This case is not the one that we are interested in, but it allows to compare how the introduction of the competition in loan market can modify the functioning of the secondary market for loans.

For this purpose, assume that, in this section, loan market is local monopoly so that each bank have a captive client, whereas it is prohibited to offer a loan contract to its competitor’s client by the law. We can consider this situation as, for example, the United States before the 1994 Riegle-Neal Act where interstate banking is prohibited.

The primary market for loans is supposed to be local monopoly. Banks do not have any strategic decision to do concerning loan rate and they simply apply monopoly rate to their captive client in the first period: $R_1^M = Y$.

In second period, banks offer a loan contract if and only if their client is of type $G$ as they learn the type of their client during the first-period lending relationship. As is in the first period, the second-period interest for the $G$-type firm becomes $R_2^M = Y$. This monopoly loan market case allows to isolate the functioning of the loan sales market from the loan market.

Consider a loan sales market in which banks can sell their loan before the maturity. The potential buyers are a lot enough so that this market is perfectly competitive. Note that banks know the quality of their loan, i.e., the type of their client before they decide whether they sell it or not. When their type is of $\theta$ ($\theta \in \{G, B\}$), the expected value of this loan is the cash-flow that banks expect to receive to the maturity:

$$V_{\theta} = p_{\theta}R_1$$

The participation constraint of the bank who wants to sell its type $\theta$ loan
can be written as:

\[ P \geq V_G - (1 - \delta)V_G, \quad (1) \]

where \( P \) is the price of a loan in the secondary market. The term \((*)\) represents the liquidity premium that banks can benefit from loan sales.

The participation constraint of investors depend on the expected value of a loan evaluated by themselves. This depends on the information about the loan in question available for investors. We will analyze two opposite case: the case of symmetric information between bank (seller) and investors (buyers), on the one hand and the case of asymmetric information between them, on the other. The case of symmetric information provide us with a useful benchmark for the comparison demonstrating how asymmetric information plays a role in the market for loan sales, while our focus is the asymmetric information case.

3.1. Loan Sales Market with Symmetric Information

When investors perfectly know the type of each loan, their participation constraint can be written as:

\[ P \leq V_\theta \text{ where } \theta \in \{G, B\} \quad (2) \]

This result in the following lemma:

**Lemma 1.** *In the equilibrium, both types of loans are sold at the fair price, that is, the price that correctly reflects their default risk, \( 1 - p_\theta \). A type \( \theta \) loan is sold at \( P^* = V_\theta \).*

*Proof.* From (1) and (2), the price of a type \( \theta \) loan is such that \( \delta V_\theta \leq P \leq V_\theta \), where \( \theta \in \{G, B\} \). As investors are supposed to a lot enough, so that the banks have full bargaining power. This results in \( P^* = V_\theta \). In the equilibrium, both types of loans are sold at the fair price. \( \square \)

3.2. Loan Sales Market with Asymmetric Information

Assume now that investors do not know the type of loans that banks want to sell and the information available for the investors are public information, \( \nu, p_G, p_B, Y \).

In this environment where there exists informational asymmetry between bank and investors, the participation constraint of banks (1) remains unchanged. In contrast, the value of a loan measured by investors is not any longer \( V_\theta \), because investors cannot distinguish between two types of loans.
They, thus, simply rely on the expected quality of pool of loans in the secondary market. Following (1), banks’ decision about their participation in the market for loan sales depend on the price:

\[
\begin{align*}
\text{Both types} & \quad P \geq \delta V_G \\
\text{Only type } B & \quad \text{participate if } \delta V_G > P \geq \delta V_B \\
\text{None of the two types} & \quad P < \delta V_B
\end{align*}
\]

As investors know this constraint, the success probability of a loan in the loan sales market expected by an investor, noted as \( \tilde{p} \), becomes also a function of the price:

\[
\tilde{p} = \begin{cases} 
\bar{p} & P \geq \delta V_G \\
p_B & \delta V_G > P \geq \delta V_B \\
0 & P < \delta V_B
\end{cases}
\] (3)

This yields the expected value of a loan, noted as \( \tilde{V} \) as a function of price as follows:

\[
\tilde{V}(P) = \begin{cases} 
\bar{V} & P \geq \delta V_G \\
V_B & \delta V_G > P \geq \delta V_B \\
0 & P < \delta V_B
\end{cases}
\] (4)

where \( \bar{V} = \bar{p}R_1 \). (4) results in the investors’ new participation constraint, which is written as:

\[ P \leq \tilde{V} \] (5)

We obtain two types of equilibria:

**Lemma 2.** 1. When \( \delta V_G \leq \tilde{V} \), two equilibria are possible:

(a) pooling equilibrium in which both types of loans are sold at the price \( P^* = \bar{V} \)

(b) separating equilibrium in which only type \( B \) loans are sold at the price \( P^* = V_B \).

2. When \( \delta V_G > \tilde{V} \), only separating equilibrium (b) is possible.

**Proof.** We can demonstrate Lemma 2 in the way similar to Lemma 1 using the participation constraint of banks (1) and of investors (5). We obtain the result same as Akerlof (1970) with two different goods in the market. The intuition of Lemma 2 is as follows. When a bank sells its loan, it economizes on the illiquidity cost associated with retaining loans \( ((1 - \delta)\theta) \). This motivates banks to sell their loans. However, in the environment where there exists informational asymmetry between the seller and the buyer, the bank that owns type \( G \) loan has to pay information dilution cost \( (V_G - \tilde{V}) \), that is, the difference between the value of a loan...
and the value expected by investors. As $\bar{V}$ is $V$ at best, this cost is always positive for the type $G$ loan. Selling a type $G$ loan, thus, exhibits a trade-off between obtaining liquidity premium and paying information dilution cost. They compare between them to make a decision on loan sales. Let $\Delta V$ denote the information dilution cost. The information dilution cost can be considered as a measure of the degree of informational asymmetry between the buyer and the seller in the market for loan sales. It means that if informational asymmetry is too severe, high quality loans will not be sold because the liquidity premium that banks can benefit from loan sales is not sufficient to cover the cost that they have to pay because of the informational asymmetry. We obtain the following proposition:

**Proposition 1.** *Given the liquidity premium $1 - \delta$, if informational asymmetry is severe so that $\bar{p} - \delta p_G < 0$, the market for loan sales becomes a lemon market in which all the high quality loans are withdrawn and only the low quality loans are exchanged.*

*Proof.* It is straightforward from Lemma 2. \hfill \Box

4. Loan Sales with Loan Market Competition

Until now, we analyzed the behaviour of banks in the market for loan sales when there is no competition in loan market. In this section, we will analyze the impact of the introduction of the competition in the loan market on banks’ behaviour on the loan sales market. For this purpose, we introduce the loan market competition and we assume that two banks compete with each other over the loan rate in each period.

Before analyzing the link between loan market competition and the banks’ behaviour in the loan sale market, firstly, we will show how the information acquired during the lending relationship allows the internal bank to extract a rent even in competitive environment. For this purpose, we firstly consider the case where there is no market for loan sales in order to focus on the informational rent (4.1). Then, we consider an environment in which there exists a loan sales market with loan market competition (4.2).

4.1. Lending Relationship and Informational Rent

In this subsection, we analyze loan market competition in assuming that there does not exist loan sale market in order to concentrate our analysis on the informational rent that the internal bank can extract from its private information even in the competitive environment. We will characterize the Perfect Baysian-Nash Equilibrium (PBE).
4.1.1. Second-Period Competition

Consider firstly the second-period competition.

**Loan Contract Offering to Own Clientele**  Banks learn perfectly the type of the firm with whom they have a lending relationship during the first period. They propose a loan contract only if their period-1 client is of type $G$. Note that the loan rate to period-1 client is $R_2$.

**Loan Contract Offering to Rival’s Clientele**  As a bank has no private information about its rival’s clientele, its offering decision exclusively depends on the default record in the first period. Banks expect the type of firms by Bayesian revision. A successful (unsuccessful, respectively) firm in the first period, noted as $s$ ($f$, respectively), is of type $G$ with the probability:

$$\Pr[G \mid s] = \frac{\nu p_G}{\nu p_G + (1 - \nu) p_B}$$

$$\Pr[G \mid f] = \frac{\nu (1 - p_G)}{\nu (1 - p_G) + (1 - \nu) (1 - p_B)}$$

We can easily check that $\Pr[G \mid s] > \Pr[G \mid f]$ as far as $p_G > p_B$. The banks thus apply two different rates depending upon the performance in the first period. Note $Q_{2\eta}$ as the poaching rate to rival’s clientele whose performance is $\eta$ ($\eta \in \{s, f\}$) in the first period.

The sequence of the competition runs as follows: The two banks simultaneously propose an interest rate to the firms to whom they want to offer a loan. Each firm, then, choose a bank. The second-period competition is formalized as a first price sealed bid auction between the informed agent (the internal bank) and uninformed agents (external banks). Engelbrecht-Wiggans et al. (1983) demonstrated that this game does not have an equilibrium in pure strategies. Hauswald and Marquez (2006), Rajan (1992) and von Thadden (2004) showed the similar result in the context of the banking competition. We obtain the following lemma:

**Lemma 3.** The competition on interest rate between the internal bank and the external bank:

1. does not have an equilibrium in pure strategies;
2. but has a unique mixed-strategy equilibrium, such that the external bank breaks even, while the internal bank makes positive ex-ante expected profit from the type $G$ borrowers, $\Pi_I(G, \eta) = \frac{1}{\Pr[G \mid \eta]} - 1$.

*Proof.* See Appendix A. □
The internal bank has the exact information about the type of the firms, whereas the information available for the external bank is less precise. The informed bank can use its ability to perfectly distinguish $G$-type firms from $B$-type firms to adjust its lending policy and thus subject the external bank to problems of adverse selection. As a result, the internal bank exploits its information advantage over the competitor to extract rents from $G$-type borrowers.

4.1.2. First Period Competition

We compute, first of all, the expected profit from a type $G$ loan when a bank learns its client is of type $G$. As we demonstrated in Lemma 3, this expected rent depends on the performance of the loans in the first period, which is observable ($\eta \in \{s, f\}$). It is written as:

$$
\Pi_I(G, \eta) = \frac{1}{\Pr[G|\eta]} - 1
$$

The expected profit of a type $G$ loan, that is, the expected profit when a bank learns its client is of type $G$ during the first period and when the result of the first period is not still observed, is:

$$
\Pi_I(G) = p_G \Pi_I(success, G) + (1 - p_G) \Pi_I(fail, G) \\
= p_G \left( \frac{\nu p_G + (1 - \nu) p_B}{\nu p_G} - 1 \right) \\
+ (1 - p_G) \left( \frac{\nu (1 - p_G) + (1 - \nu) (1 - p_B)}{\nu (1 - p_G)} - 1 \right) \\
= \frac{1}{\nu} - 1
$$

(8)

$\Pi_I(G)$ can also be considered as the expected value of the informational rent that the internal bank extract in the second period when a bank learn their client is of type $G$ during the first period.

At the beginning of the first period, no banks have private information and thus they only compete with the first-period loan rate. Note that we have two firms in the economy. As a result, first period market shares obey:

$$
\mu^i = 2 - \mu^j = \begin{cases} 
0 & \text{if } R^i_1 > R^j_1, \\
1 & \text{if } R^i_1 = R^j_1, \\
2 & \text{if } R^i_1 < R^j_1.
\end{cases}
$$

(9)

The overall profit of the bank $i$ ($i \in \{A, B\}$) knowing its expected profit in the second period is written as a function of first-period interest rate
policies:

\[ \Pi^i(R_1) = \mu^i \left( \bar{p}R_1 - 1 + \nu \left( \frac{1}{\nu} - 1 \right) \right) \]
\[ = \mu^i (\bar{p}R_1 - \nu) \]

where \( \mu^i \) is the number of firms that bank \( i \) offers a loan, which represent the market share. We easily obtain that \( R^*_1 = \frac{\nu}{\bar{p}} \) and \( \mu^* = 1 \), that is, banks split evenly the loan market, as we have two firms in the economy. Note that the expected ex-ante profits of a bank is 0 even though bank can benefit from their own clients because price competition in the first period obliges bank to take their period-2 rent into account.

4.2. Link between Loan Sales and Loan Market Competition

Now, we introduce the market for loan sales in this competitive environment in loan market. In particular, we develop a model in which selling a loan exhibits a trade-off between the extraction of informational rent in the loan market and the information dilution cost in the market for loan sales. A lending relationship with a firm allows banks to acquire proprietary information, which renders competitive advantage when they face the competition with external banks. The more this informational advantage is important, the more the internal banks extract informational rent. However, as we have shown in the previous section, when informational asymmetry is important, banks who own the type \( G \) loan have no incentive to sell their loans because informational asymmetry causes the information dilution cost, which is higher than the liquidity premium that banks can benefit from selling their loans. But, this decision about loan sales unintentionally reveal the quality of loan that banks own to potential competitors in loan market. This leakage of information can reduce the informational advantage of the internal banks. When a competition is introduced in the loan market, banks have to take account of this leakage of information in the market for loan sales.

4.2.1. Information Leakage in the market for loan sales and the Second Period Competition

As we demonstrated, all the type \( B \) loans are sold because they are evaluated at the fair price \( (V_B = p_BR_1) \) at worst case. For this reason, the loans that are not on the market for loan sales can be considered as the signal that these loans are of type \( G \). Loan sale decision, thus, unintentionally reveal the information about the type of a bank’s client. This information leakage reduces the informational advantage of the internal bank in the
second-period competition. This information leakage has a negative effect on the profit from its own client in the second period because the profit in the second period relies on the rent extracted from the informational advantage. In our model, we assume that each bank can perfectly observe its rival’s decision about the loan sales. Thus, it perfectly reveal the type of rival’s client and all the informational advantage of the internal bank disappears. This renders the second-period competition to be pure price competition and makes the second period profit to be 0 even for the internal bank.

4.2.2. Loan Sale decision

The introduction of the competition in loan markets has an impact on the banks’ behaviour in the market for loan sales. In particular, the introduction of loan market competition modifies the banks’ participation constraint. Now, the informational rent that the internal bank can extract in the second period has to be taken into account. Thus, the participation constraint of banks depends on the type of their loan. If their loan is of type $G$, their participation constraint is written as:

$$ P \geq V_G - (1 - \delta) V_G - \left( \frac{1}{\nu} - 1 \right) \tag{10} $$

Note that the participation constraint of the $G$-type loan is relaxed compared to (I), that is, the constraint when there is no competition. In the right-hand side, the term of the informational rent (***) is added. Note that the term (**) represents the liquidity premium. On the other hand, that of the $B$-type loans remain unchanged, because banks do not have any informational rent to extracted from this type of loan in the second period.

Consider now the participation constraint of investors. The changes in the participation constraint of banks affects the value of a loan in the secondary market that investors expect. The computation similar to Section 3 give us:

1. when $\delta V_G\left(\frac{1}{\nu} - 1\right) > \delta V_B$,

$$ \tilde{V} (P) = \begin{cases} \bar{V} & P \geq \delta V_G\left(\frac{1}{\nu} - 1\right) \\ V_B & \delta V_B \leq P < \delta V_G - \left( \frac{1}{\nu} - 1 \right) \\ 0 & P < \delta V_B \end{cases} $$

2. when $\delta V_G - \left( \frac{1}{\nu} - 1 \right) \leq \delta V_B$,

$$ \tilde{V} (P) = \begin{cases} \bar{V} & P \geq \delta V_B \\ V_B & P \leq \delta V_B \\ 0 & P < \delta V_B \end{cases} $$
This yields the following proposition:

**Proposition 2.**

1. When $\delta V_G - \left(\frac{1}{\nu} - 1\right) \leq \bar{V}$, this sub-game has a pooling equilibrium in which both type of loans are sold at the price $P^* = \bar{V}$.

2. When $\delta V_G - \left(\frac{1}{\nu} - 1\right) > \bar{V}$, this sub-game has a separating equilibrium in which only type-B loans are sold at the price $P^* = \bar{V}_B$.

Comparing to Lemma 2, it is remarkable that regarding the critical value that change the equilibrium from the separating equilibrium to the pooling equilibrium, the informational rent is taken into account.

### 4.2.3. First period competition

Now, we solve the whole game. The market shares is a function of the first-period loan rate and remains unchanged (9). On the other hand, bank $i$’s overall profits is not only a function of first-period interest rate but also a function of the loan sale decision, $s$ ($s \in \{S, noS\}$, where $S$ is loan sale and $noS$ is no loan sale):$$
\Pi_i(\mu, \nu, \delta p_G) = \left\{ \begin{array}{ll}
\mu_i \left( \bar{p} R_i^1 - \nu \right) & \text{if } s = S \\
\mu_i \left( \nu \delta p_G + (1 - \nu) \bar{p} B \right) R_i^1 - 1 & \text{if } s = noS 
\end{array} \right.
$$

This yields the following proposition:

**Proposition 3.** When $\delta p_G - \bar{p} \leq \frac{\bar{p}}{\nu} \left(\frac{1}{\nu} - 1\right)$, we have a pooling equilibrium in which both types of loans are sold in the secondary market. And, in the first period, $\mu_i^* = 1$ and $R_i^1 = \frac{\nu}{\bar{p}}$.

**Proof.** It is straightforward from Lemma 2 and Proposition 2.

This leads to the following proposition:

**Proposition 4.** When $0 < \delta p_G - \bar{p} \leq \frac{\bar{p}}{\nu} \left(\frac{1}{\nu} - 1\right)$, competition lead to the emergence of a pooling equilibrium in which all the types of loans are sold, while only the type B loans would be sold in the secondary market without competition in loan market.

**Proof.** Straightforward from (2) and (3).

The competition in loan market makes private information be valuable. The private information insulate from the pure price competition and allows to earn positive profits. When the decision on loan sales reveal private information (the quality of clients), banks take account of the future rent of private information, and this softens the banks’ participation constraint on the loan sales market. This renders banks’ decision about loan sales easier than the case where there is no competition.
4.3. Welfare Effect on Firms

We demonstrated that loan market competition makes loan sales market more liquid. In our model, firms benefit from this effect by reduction in their loan rate in the first period. From (11), the break-even loan rate when banks do not sell their type \( G \) loans is written as:

\[
R'_{1} = \frac{1}{\nu \delta p_{G} + (1 - \nu) p_{B}}
\]

Note that the first-period equilibrium loan rate is \( R'_{1} = \frac{\nu}{\bar{p}} \). On the one hand, loan sales market with more liquidity and higher average quality reduces loan rate. This effect is captured in the denominator in each rate. \( \bar{p} \) in \( R^*_{1} \) is always higher than \( \nu \delta p_{G} + (1 - \nu) p_{B} \) in \( R'_{1} \). An empirical study by Gupta et al. (2008) documented this effect.

On the other hand, the other effect on loan rate is captured in the numerator in each rate. Informational-rent seeking behaviour by banks makes worse off type \( G \) firms in the second period. However, this rent extraction is taken into account by reduction in the first-period loan rate and this compensates reduced welfare in the second period. Overall effect is positive.

5. Conclusion

In this article, we suggest a theoretical explanation on the growth of loan sales market. We have shown that banks can use loan sales as a strategic tools in order to preserve their informational advantage in a competitive environment. We have considered a two-period competition model where banks acquire a private information about their clientele during lending relationship and where there is informational asymmetry in the loan sales market. In spite of information dilution cost for selling high quality loans, banks have an incentive to sell them to preserve informational advantage for the competition in the future if preserving its loan can emit a signal about the quality of its clientele to potential competitors. As a consequence, loan sales market can be a liquid market in which both low quality and high quality loans coexist.

In our analysis, we use a simple duopoly model. It is in part for the analytical convenience but we can expect that our result would be robust. Regarding rent extraction, as far as only one internal bank can acquire more precise information, the number of external bank does not affect the result (Rajan, 1992). On the other hand, concerning informational leakage by observation on the loan sale decision, it would be enough to have at least one potential competitor who observes a bank’s decision about loan sales in order for that our predicted effect might be effective.
Appendix

A. Proof of Lemma

We prove this lemma in two steps. We firstly demonstrate that there does not exist pure strategy equilibrium in this game and then show that this game has a unique mixed strategy equilibrium in which the internal bank makes positive profit facing competition with external banks.

Step 1: Absence of Pure Strategy Equilibria

The proof is by contradiction. Consider a firm whose performance in the first period is $\eta$. The external bank estimates the probability for this firm to be $G$ by Bayesian revision. It thus consider $\Pr[G \mid \eta]$ as this firm’s success probability in the second period. We define $Q_{2\eta} = \frac{1}{\Pr[G \mid \eta]}$ as the break-even interest rate for an unsuccessful firm in the first period. Let $Q^*$ denote equilibrium interest rate. We have three different cases:

(i) $Q^* < Q_{2\eta}$: then the external bank would make strictly negative expected profits. It thus never offers an interest rate below $Q_{2\eta}$.

(ii) $Q^* = Q_{2\eta}$: if this were a known strategy of the external bank, the internal bank would make higher profits by offering a loan rate $R = Q_{2\eta} - \epsilon$ to its type $G$ client ($\epsilon$ is small and positive).

(iii) $Q_{2\eta} \leq Q^* \leq Y$: if this were a known strategy of a bank, its rival has an interest to lower its offering rate in order to attract more type $G$. This strategy thus cannot be an equilibrium.

Therefore, no equilibrium exists in pure strategies.

Step 2: This game has a unique mixed-strategy equilibrium, such that the internal bank makes positive ex-ante expected profit from the type $G$ projects while the external bank breaks even.

Let $F_I(R_2; \theta, \eta)$ denote as the internal bank’s bidding distribution over loan-rate offers $R_2$ for a type $\theta$ firm with the first-period performance $\eta$. Similarly, let $F_E(Q_2; \eta)$ denote as the external bank’s bidding distribution over loan-rate offers $Q_2$ for a firm with the first-period performance $\eta$.

The internal bank never make a loan offer to a type $B$ firm. Therefore, $F_I(R_2; B, \eta) = 0$ for all $\theta$. The external bank never makes an offer below $Q_{2\eta}$ because doing this, it would makes negative expected profit. The reason is as follows. As the type $B$ banks do not receive an offer from their relationship bank, they always change their bank. This renders the external bank being subject to more severe adverse selection. The internal bank knowing this

19
never offers a loan rate below $Q_2$. On the other hand, no banks make 
an offer above $Y$, the firm’s pay-off in the successful state. Hence, we can 
conclude that the common support is $[Q_2, Y]$.

By standard arguments such as Engelbrecht-Wiggans et al. (1983), $F_I (R_2; G, \eta)$ 
and $F_E (Q_2; \eta)$ are continuous, strictly increasing and atomless on the above 
common support.

Note that a mixed strategy is composed of several pure strategies of 
which the profit must be constant on $[Q_2, Y]$. The expected profit of for 
each bank from offering an interest rate $r$ therefore can be stated as:

\[
\begin{align*}
\pi_I (R_2 = r \mid G, \eta) &= (1 - F_E (r; \eta)) (r - 1) = \bar{\pi}_\eta \\
\pi_I (R_2 = r \mid B, \eta) &= 0 \\
\pi_E (Q_2 = r \mid \eta) &= \Pr [G \mid \eta] (1 - F_I (r)) (r - 1) + \Pr [B \mid \eta] (-1)
\end{align*}
\]

We know that at the lower bound, $F_E (Q_2; \eta) = 0$, substituting it into (12), 
we obtain: $Q_2 - 1 = \bar{\pi}_\eta$. This yields:

\[
\bar{\pi}_\eta = \frac{1}{\Pr [G \mid \eta]} - 1
\]

As $\Pr [G \mid \eta] < 1$, $\bar{\pi}_\eta$ is always positive. □

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