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Abstract:

This study uses samples of 34,082 syndication loans of publicity banks in the U.S. during the periods of 1987-2010, to test the theory of informational monopolies advantage and the theory of sacrificing reputational capital, then analyzes the impact of capital level on banking return and credit risk through its lending activity under syndication loans. The implications would be provided with policy implication to supervisory institution.

On the impact of capital level on banks' return in the U.S during 1987-2010, the results show that there is negative correlation between the ratios of bank's capital over its total assets and return. It implies that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return, but lower lending spread for borrowers with strong cash flows. When controlling for the state of the bank- and loan-specific characteristics, the effects are the same and meet the expectation of hypothesis 1.

On the impact of capital level on banking credit risk, the results show that there is positive correlation between the ratios of bank's capital over its total assets, borrowers' loan-amount, and its interaction and banks' credit risk. It implies that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows; hence the banks would bear a higher probability of default, but lower credit risk for borrowers with strong cash flows. When controlling for the state of the bank- and loan-specific characteristics, the effects are the same and meet the expectation of hypothesis 4.

Keywords:

Capital regulation, syndication loans, lending behavior, return of assets, credit risk.

1. Introduction

Since the subprime mortgage crisis began in 2007, bank with low capital led to significant cutbacks

in lending caused by huge credit crunches. A better understanding of the relation between bank capital levels and lending behavior is critically important to authorities for bank regulation and supervision, and seeking to oversee the stability of the banking system and its impact on the wider financial system. Existing studies on the effect of the banks' lending behavior has begun to draw more attention recently, but the consequences on banks' return and credit risk which had been relatively scarce.

Recently, several theories advocate that a banks' capital level should affect their lending behavior. Sharpe (1990) and Rajan (1992) propose successively the *theories on banks' information monopoly*; predicted that banks with low capital should charge higher lending rates to borrowers that are more bank-dependent. Hence, banks with low capital would obtain higher return and take lower risk. In addition, Boot, et al. (1993) suggest the *theory of sacrificing reputational capital* and predicted that banks with low capital are more likely to exploit borrowers in order to preserve financial capital. Subsequently, Diamond and Rajan (2000) argue that banks with low capital are much focused on obtaining cash flow quickly, thus they may charge more to borrowers with low cash flow; however give large discounts to borrowers with high cash flow.

Through the perspective of *supervision mechanism* and *rule-based governance* (Li and Filer, 2007), this study tests the hypotheses linked to the predictions of Diamond and Rajan's (2000) *theory of bank capital* and Sharpe (1990) and Rajan (1992) *theory of informational monopolies advantage* on a sample of syndication loans to publicly-traded borrowers from 1987-2010, and examines the links between banks' capital, banks' lending behavior, loan spreads, return and credit risk that banks charge their borrowers. Key to the above theories is the notion that the informational monopolies advantage of a bank and its borrowers' relative bargaining power are critical as economies with different *supervision mechanism,* or *rule-based governance*. Specifically, this study focuses on consequences resulting from *supervision mechanism* or *rule-based governance* in the U.S., a total of 34,082 syndication loans samples of banks over the 1987-2010 periods, and assesses that if banks with low capital level are more sensitive to borrowers' loan-amounts than are banks with high capital. That is, banks with low capital charge relatively more for borrowers with low cash flows; however, offer relatively great discounts for borrowers with high cash flows. In addition, this study performs the robustness test to the inclusion of loan- and bank- specific controlling variables, to perceive if the results were consistent with either theory.

This study proposes theoretical issues of the impact and effectiveness of banks' return and credit risk from the perspectives of lending behavior. The banking sectors during the financial crisis caused by credit crunch also notice the importance of rule-based governance mechanisms. The related effects on capital reserves, credit spreads, borrowing's bargaining power, banks' return and credit risk are examined with the 34,082 syndication loans data from the rule-based governance environments, that is, the U.S. This

study further discusses the association between bank loan practices and their return and risk. That is, the study analyzes the effectiveness of banks' lending behavior from rule-based governance mechanisms that could affect the changes in return and credit risk of baking sectors. Therefore, the empirical evidence provided with syndication loans data in rule-based governance environment (e.g.: US) during the periods of 1987-2010.

Overall, one important task of this study is to explore the transitions of *rule-based governance environment* to the loan practices in baking sectors. The study contributes to the prior literatures are summarized as follows:

(1) The study provides new insights resulting from *rule-based governance* prevalent in the U.S., and a total of 34,082 samples of publicity banks over the 1987-2010 periods. In addition, this study analyzes the relationship between banks' capital, borrowers' loan-amount, banks' loan spreads, return and risk, and examines that if banks with low capital level are more sensitive to borrowers' cash flows than are banks with high capital.

(2) This project proposes models and derives testable hypotheses to test the *theory of bank capital* (Diamond and Rajan, 2000) and *theory of information monopoly rents* from bank-dependent borrowers (Sharpe, 1990; Rajan, 1992) as economies with rule-based governance.

(3) The study further examines the robustness of the above evidences by adding controlling variables of loan- and bank-specific characteristics.

The remainder of the project organized as follows. Section 2 reviews the theoretical and empirical literatures on the governance and supervision environment, the relationship between banks' capital level, lending behavior, return and credit risk. Section 3 and 4 proposes the hypotheses, empirical specification and data used in this study. Finally, section 5 outlines the empirical results and implications.

2. LITERATURES REVIEW

(1) Bank's capital and loan rate

Recently, several theories advocate that a banks' capital level should affect their lending behavior. Sharpe (1990) and Rajan (1992) propose successively the *theories on banks' information monopoly*; predicted that banks with low capital should charge higher lending rates to borrowers that are more bank-dependent. By contrast, Boot, et al. (1993) suggest the *theory of sacrificing reputational capital* and predicted that banks with low capital are more likely to exploit borrowers in order to preserve financial capital. Subsequently, Diamond and Rajan (2000) argue that banks with low capital are much focused on

obtaining cash flow quickly, thus they may charge more to borrowers with low cash flow; however give large discounts to borrowers with high cash flow.

Some empirical studies related to the impacts of banks' capital level on it borrowers reimburse. In assessing the impact of a bank's capital level on borrowers' refinancing rate, Diamond and Rajan (2000) model how banks' lending decisions varies with their capital level and borrowers' cash flows. Hubbard, et al. (2002) hypothesize that banks with low capital will charge higher rates for borrowers with high switching costs, and examined the pricing of bank loans to publicly-traded firms in U.S. during the period of 1987-1992. The findings support their hypothesis. As Hubbard, et al. (2002), Steffen and Wahrenburg (2008) test Hubbard, et al. (2002) hypothesis on U.K. bank loans to both publicly- and privately-traded firms during 1996-2005. The findings show that banks with low capital charge higher rates to borrowers with higher switching costs; however, the effect is limited to economic downturns. The results implied that banks needing financial capital more in downturns, leading them to consume reputational capital by charging higher spreads to borrowers during these periods.

Alternatively, Santos and Winton (2008) investigate the importance of banks' information advantage and found that, when banks are likely to have greater information monopoly rents from bank-dependent borrowers, who without access debt market will pay higher rates than borrowers with such access, and the difference increases during recessions. Subsequently, Schenone (2008) finds that borrowers pay higher rates before their stock IPO than after, and argued that this effect is related to bank informational monopolies. In addition, Hale and Santos (2009) find that borrowers pay lower rates after their bond IPO; reflects a reduction in bank information monopolies. Contrary to the above literatures, Santos and Winton (2009) focus solely on how bargaining power varies across banks depending on their capital level. The findings show that banks' capital level has a significant impact on the lending rates that their borrowers pay. That is, low capital bank generally charges more rates to borrowers with low cash flow, but banks with low capital give large discounts to borrowers with high cash flow, consistent with Diamond and Rajan (2000).

From the perspective of bank reputation and lending incentives, Boot, et al. (1993) forecast that banks with low capital may forfeit reputational capital by reneging on implicit guarantees, which is the commitment to not utilize monopoly power over borrowers. In Sharpe (1990) and Rajan (1992) single-period setting, banks can remove monopoly rents from bank-dependent borrowers through an informational delay mechanism. Santos and Winton (2008) point out that the Winner's Curse should be larger in recessions. Consistently, Santos and Winton (2008) find that the loan spreads charged to borrowers that do not have access to public bond markets increase in recessions. However, they also find that banks' reputation concerns may offset their incentive to exploit their monopoly rents in a multiperiod

setting. Combining with the theory of banks' monopoly rents extraction, proposed by Boot et al. (1993) and Santos and Winton's (2008) *theory of informational monopolies advantage*, it follows that banks with poorer capital level should be further likely to sacrifice their reputation in order to keep or enhance their capital. Hubbard, et al. (2002) finds their empirical results consistent with the above proposition.

As regard as the borrowers' financing source, Sharpe (1990) and Rajan (1992) indicate that as firms with access to public debt markets will have a broader array of sources of refinancing funds, such firms are likely to be less reliant on banks financing. Furthermore, the reality that those firms' debt is publicly traded reduces the amount of private information that their bank lenders have, dropping the extent to which the lenders can exploit information monopolies rents. Rajan (1992) finds that fewer risky borrowers face lower information monopoly costs.

The correlation between bank capital and lending rates may be driven by some other variables that affect both independently. Santos and Winton (2009) find that capital matters for all borrowers, once we control for business conditions. They argue that a borrower's cash flow is more important for loan pricing in recessions, when the case is most useful in warding off default; banks suffer higher credit losses in recessions. Steffen and Wahrenburg (2008) use U.K. firms from 1995-2005 and find that banks with lesser Tier-1 capital charge higher rates to bank-dependent firms in recessions, in particular when potential rents and incentives to preserve capital are likely to be higher.

(2) Governance and supervision environment

In recent years, scholars have begun to pay increasing attention to the effects of macro environment in a society (Gastanaga et al., 1998; Loree and Guisinger, 1995; Hejazi and Safarian, 2002; Bulter and Joaquin, 1998; Henisz, 2000). One of the main focuses is on how different governance environments, such as the legal system, affect investors' willingness to invest. There are some deficiencies in the literature of supervisory mechanism on the effect of bank lending behavior. Furthermore, the effect of the governance environment has been essentially ignored. Literatures have focused on the "good" governance environment, that is, an environment characterized by the rule of law. However, the governance environment that lacks the rule of law (relation-based) has not been sufficiently examined. These gaps have left some important questions unanswered.

Li and Filer (2007), in societies that legal system is not transparent or fair, the state if unable to enforce laws impartially. Thus, people rely on personal connections and informal networks to protect themselves. Contrary, rule-based societies have a better public information infrastructure, a higher level of public trust, and fairer and more efficient public protection, and offer better protection than relation-based societies. Li and Filer (2007) define the governance environment as the macro social,

political, legal, and economic institutions that shape and constrain micro governance behavior in social, political, and economic exchanges. That is, the governance environment is not only determined by government policies (Globerman and Shapiro, 2003), but it is also shaped by the long evolution of social, political, legal, and economic institutions. As North (1990) point out, history and cultural traditions play important roles in determining the path of governance evolution, such institutions change slowly.

Based on a similar rationale, Li (2003) and Li, et al. (2004) utilize *rule-based governance* and *relation-based governance* to explain the two contrasting institutional settings. Li et al. (2004) define a society as having a *rule-based governance environment* if it has the following features: the legislative process is transparent and just (Rawls, 1971), the law-adjudication function is independent and the law-application branch is checked and balanced by the legislative and law-adjudication branches, the government can enforce laws impartially and efficiently. Consequently, people primarily rely on *public* rules to protect their social and economic exchange. Alternatively, a *relation-based governance environment* is defined by Li et al. (2004) as an institutional environment in which social and economic exchanges are systematically conducted through the employ of *private, personal relations* to: (1) avoid the legal and regulatory system to attain public goods; or (2) protect one's property rights instead of the legal system.

Instead, legal scholars have proposed analogous dichotomy. Peerenboom (2002) argues that there are two governance systems: *public ordering*, which consists of the rule of formal legal codes and is dominant in the West, equivalent to the "rule-based" system in Li, et al. (2004). On the other hand, *private ordering* or the dependence on informal law and relational networks prevalent in East Asia, that is similar to Li, et al.'s (2004) concept of the "relation-based" system. Greif (1997), Li (2003) and Olson (1993) indicate that in order to carry out economic exchanges, some type of governance must exist and function. If public ordering is ineffective, as it is in many countries, a private ordering must take its place. Similarly, Li and Filer (2007) point out that "Private ordering" is less restrictive the "relation-based" in the reason that private ordering includes all types of non-public ordering, including but not limited to ordering based on private relationships. Thus, Li and Filer (2007) argue that in societies where a rule-based system is weak, an alternative governance system (private ordering) must exit. Intriligator (1994), Li (2003) and Peerenboom (2002) illustrate it may based on the rule of village elders, feudal lords, organized crime or other type of non-government mechanism.

There are some deficiencies in the literature of supervisory mechanism on the effect of bank lending behavior. Furthermore, the effect of the governance environment has been ignored. Literatures have focused on the "good" governance environment, that is, an environment characterized by the rule of law. However, the governance environment that lacks the rule of law (relation-based) has not been sufficiently

examined. These gaps have left some important questions unanswered. Consequently, this study uses an institutional approach (North, 1990) and uses frameworks of *governance environment* (Li, et al. 2004) and *supervision mechanism* to explain this puzzle.

3. HYPOTHESES AND MODEL SPECIFICATIONS

Based upon the above discuss of the variation in governance and supervision environment, and the differences in protection necessary to examine the links between banks' capital, borrowers' bank-dependence, loan spreads that banks charge their borrowers, banks' return and credit risk under *rule-based governance*. This study presents the following general proposition.

In assessing the impact of a bank's capital level on borrowers' refinancing rate, Diamond and Rajan (2000) model how banks' lending decisions varies with their capital level and borrowers' cash flows. The perception is that a bank with low capital level is desperate to get cash to hold up its liquidity position vis-à-vis depositors. If the borrower's cash flow (proxy by borrower's loan-amount) is also rather weak, the bank has a plausible threat to liquidate the borrower to get cash; this makes the borrower willing to pay more to avoid liquidation. Hence, the bank would obtain higher return and lower risk. Alternatively, for borrowers with physically powerful cash flows, the bank's bargaining position is weak; knowing the bank needs cash now, the borrower can extract weaker lending terms in return for paying debts earlier. Thus, the bank would obtain lower return and take higher risk. Overall, compared to a bank that has adequate capital ratio, a bank that has low capital may extract more lending rates from borrowers whose cash situation is relatively weak to get higher return and take lower risk. On the contrary, a bank that has high capital will extract fewer rates from borrower whose cash situation is relatively strong; bank will get lower return and take higher risk. Based upon above propositions, this study proposes the following hypotheses:

(1) The hypothesis required to verify the theories on banks' information monopoly:

H_1^1 : Compared to adequately capitalized banks, banks with lower capital level charge higher lending spread (and lower risk) for borrowers with fewer cash flows, but lower lending spread for borrowers with strong cash flows.

$$ROA_{l,b,t} = c + a \times CAPITAL_{b,t-1} + b \times LOANAMOUNT_{f,t} + \\ + g(CAPITAL_{b,t-1} \times LOANAMOUNT_{f,t}) + e_{f,t} \quad \text{.....(1)}$$

$$LOANCHARGEOFF_{f,l,b,t} = c + a \times CAPITAL_{b,t-1} + b \times LOANAMOUNT_{f,t} + \\ + g(CAPITAL_{b,t-1} \times LOANAMOUNT_{f,t}) + e_{f,t} \quad \text{.....(2)}$$

Where $LOANCHARGEOFF_{f,l,b,t}$ is the COST TO IMCOME RATIO of loan l of firm f from bank b at issue date t. According to source of the loan dataset of Dealscan, the all-in-drawn $LOANCHARGEOFF_{f,l,b,t}$ is a measure of the overall cost of the loan as Santos and Winton (2009), expressed as *cost to income ratio %*, because it takes into account both one-time and recurring fees associated with the loan.

$CAPITAL_{b,t-1}$ is the ratio of bank $b's$ equity capital to total assets at date of *t-1*.

$ROA_{l,b,t}$ is a measure of bank $b's$ return on assets of loan l.

$LOANAMOUNT_{f,t}$ is a measure of firm $f's$ syndication loan amounts from bank.

$X_{i.l,t}$ represents the control variables of diverse loan-specific variables which might affect the rate at which the bank is willing to lend.

$Z_{k,b,t}$ represents the control variables of various bank-specific variables which might affect the rate at which the bank is willing to lend.

$e_{t,t}$ is the error term.

Hypothesis 1 assets the a is negative (banks with lower-capital charge strictly higher rates to low-cash-flow borrowers than banks with higher-capital do), but g is positive (banks with lower-capital charge lower rates for high-cash-flow borrowers than banks with higher-capital do). Santos and Winton (2009) state that in a more continuous model, higher cash flow means a lower probability of default, all else equal, and thus this study would expect that the banks would obtain higher return. Based upon the inference, this study expect b is negative.

Hypothesis 2 arises from the literature on bank reputation and lending incentives. Boot, et al. (1993) forecast that banks with low capital may forfeit reputational capital by reneging on implicit guarantees, which is the commitment to not utilize monopoly power over borrowers. In Sharpe (1990) and Rajan (1992) single-period setting, banks can remove monopoly rents from bank-dependent borrowers through an informational delay mechanism. That is, competitor banks would face a Winner's Curse in trying to win the business of these borrowers, thus those banks offer less aggressively, allowing the current bank to extract monopoly rents on average, in which increasing the borrowers' default risk. Santos and Winton (2008) point out that the Winner's Curse should be larger in recessions. Consistently, Santos and Winton (2008) find that the loan spreads charged to borrowers that do not have access to public bond markets increase in recessions. However, they also find that banks' reputation concerns may offset their incentive to exploit their monopoly rents in a multiperiod setting.

Combining with the theory of banks' monopoly rents extraction, proposed by Boot et al. (1993) and Santos and Winton's (2008) *theory of informational monopolies advantage*, it follows that banks with

poorer capital level should be further likely to sacrifice their reputation in order to keep or enhance their capital. Hubbard, et al. (2002) finds their empirical results consistent with the above proposition. This phenomenon leads to hypothesis 2 as follows:

H_1^2 : Banks with lower capital will charge higher lending rates and earn higher return for bank-dependent borrowers than do banks with adequate capital. For borrowers that are bank-dependent, bank capital level has impact on lending amount and borrowers' sales revenues. That is, banks with lower capital will lend more syndication loans to borrowers. Thus, the more cash flow for borrowers, the more sales revenues and vice versa.

$$ROA_{l,b,t} = c + a' \ CAPITAL_{b,t-1} + h' \ SALES_{f,t} + c \times (CAPITAL_{b,t-1}' \ SALES_{f,t}) + u_{f,t} \quad \text{.....(3)}$$

$$LOANCHARGEOFF_{f,l,b,t} = c + a' \ CAPITAL_{b,t-1} + h' \ SALES_{f,t} + c \times (CAPITAL_{b,t-1}' \ SALES_{f,t}) + u_{f,t} \quad \text{.....(4)}$$

Where $SALES_{f,t}$ are the sales revenues of firm *f* at date of *t*.

$u_{f,t}$ is the error term.

Rajan (1992) finds that fewer risky borrowers face lower information monopoly costs. Consequently, hypothesis 2 predicts that h is positive (borrowers with higher syndication loans obtain higher sales revenues would able to pay higher lending-spreads) and that a is negative (bank capital has decreasing impact of the rates of bank-dependent borrowers); while the sum of h and a is zero (bank capital has no impact on borrowers with public debt market access). Borrowers with higher cash flow means a lower probability of default, all else equal, and thus this study would expect that the banks would obtain higher return. Based upon the inference, this study expect c is negative.

In order to test the robustness and determine whether other controlled variables might impact of bank capital on return and risk, this study considers additional controlling variables for lending bank and loan-specific characteristics. To test hypothesis 3 and 4, this study includes for business condition. That is, tests of hypothesis 3 and 4 are subject to the same critique mentioned above.

H_1^3 : Controlling for the state of the bank- and loan-specific characteristics and its effect on the importance of borrower cash flows and sales revenues, there is positive relationship between banks' capital charge level, borrowers' bank-dependence, the banks' return.

$$ROA_{l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' LOANAMOUNT_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(5)}$$

$$LOANCHARGEOFF_{f,l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' LOANAMOUNT_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(6)}$$

$$ROA_{l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' SALES_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' SALES_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(7)}$$

$$LOANCHARGEOFF_{f,l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' SALES_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' SALES_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(8)}$$

H_1^4 : Controlling for the state of the bank- and loan-specific characteristics and its effect on the importance of borrower cash flows and sales revenues, there is a positive relationship between banks' capital charge level, borrowers' bank-dependence, the banks' credit risk.

$$CREDITRISK_{l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' LOANAMOUNT_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(9)}$$

$$CREDITRISK_{l,b,t} = c + \alpha' CAPITAL_{b,t-1} + \beta' SALES_{f,t} +$$
$$+ \gamma \times (CAPITAL_{b,t-1}' SALES_{f,t}) + \sum_{i=1}^{I} \delta_i' X_{i.l.t} + \sum_{k=1}^{K} \varphi_{i,t}' Z_{k,b,t} + \rho_{f,t} \text{.....(10)}$$

Where $X_{i.l,t}$ represents the loan-specific variables, proposed by Berger and Udell (1990) as well as Santos and Winton (2009), including as follows: *Loan Restrictions,* which include 4 dummy variables if the loan has restrictions on paying dividends $(DIVERSTRICT)$, is senior $(SENIOR)$, is secured $(SECURED)$, or has a guarantor $(GUARANTOR)$; *loans maturity* $(LMATURITY)$; *loans amount* $(LAMOUNT)$; *loans purposes* $(PURPOSES)$ which include 3 dummy variables if the loan taken out for corporate purposes $(CORPORPOSES)$, to repay existing debt $(DEBTREPAY)$, and for working capital purposes $(WORKCAPITAL)$; *type of loan* $(TYPELOAN)$ *-whether it is a line of*

credit$(CREDITLINE)$ *or a term loan*$(TERMLOAN)$; *whether this loan is a renewal of an existing loan*$(RENEWAL)$; *syndicate arrangers* $(LEADBANKERS)$; *the relationship of borrowers with lead arranger*$(RELATIONSHIP)$.

Where $Z_{i.l.t}$ represents the bank-specific controlling variables, proposed by Santos and Winton (2009) that may affect banks' willingness or capability to supply funds, in which are including: *bank's total assets*$(LASSETS)$, *subordinated debt*$(SUBDEBT)$, *bank's liquidity*$(LIQUIDITY)$.

(2) METHODOLOGY AND DATA

A. Dependent variable:

(A) $LOANCHARGEOFF_{f,l,b,t}$ is the COST TO INCOME RATIO of loan l of firm f from bank b at issue date t. According to source of the loan dataset of Dealscan, the all-in-drawn ratio is a measure of the overall cost of the loan as Santos and Winton (2009), expressed as a cost to income over the syndication loans, because it takes into account both one-time and recurring fees associated with the loan.

(B) $ROA_{l,b,t}$ is a measure of bank $b's$ return on assets of loan l.

(C) *NPL ratio Impaired Loans / Gross Loans - %* as the proxy variable of credit risk of banks.

B. Explanatory variable:

(A) $CAPITAL_{b,t-1}$ is the ratio of bank $b's$ equity capital to total assets at issue date $t-1$.

(B) $LOANAMOUNT_{f,t}$ is the amount of syndication loans to measure of firm $f's$ cash flow at issue date t.

(C) $SALES_{f,t}$ is the sales revenues to measure of firm $f's$ cash flow at issue date t.

C. Control variables:

(A) Loan-specific characteristics

a. *Loan Restrictions,* which include four dummy variables equal to one if the loan has restrictions on paying dividends $(DIVERSTRICT)$, is senior $(SENIOR)$, is secured $(SECURED)$, or has a guarantor $(GUARANTOR)$; otherwise, equal to zero. Berger and Udell (1990) suggest that any of these features should make the loan safer, decreasing the loan spreads, but it is well known that lenders more likely to require these features if they think the firm is riskier, so the relationship may be reversed or ambiguous.

b. *Loans maturity* $(LMATURITY)$, measured by the log of maturity in years. Santos and Winton (2009) propose that loans with longer maturities may face greater credit risk, but they are more likely to be granted to borrowers that are thought to be more creditworthy. Thus again, the effect on loan spreads is ambiguous.

c. *Loans amount* $(LAMOUNT)$, calculated by the log of loan amount in hundreds of millions dollars. It expects that larger loans amount may represent more credit risk, raising the loan rate, but they may also allow economies of scale in processing and monitoring the loan. Accordingly, the sing of this variables' effect on loan spreads is ambiguous.

d. *Loans purposes* $(PURPOSES)$, which include three dummy variables equal to one if the loan taken out for corporate purposes $(CORPORPOSES)$, to repay existing debt $(DEBTREPAY)$, and for working capital purposes $(WORKCAPITAL)$; otherwise, equal to zero.

e. *Type of loan* $(TYPELOAN)$, which includes two dummy variables equal to one of -*whether it is a line of credit* $(CREDITLINE)$ *or a term loan* $(TERMLOAN)$; otherwise, equal to zero.

f. *Whether this loan is a renewal of an existing loan* $(RENEWAL)$, which is a dummy variable indicative of whether the loan is a renewal of an existing loan. If lenders renew a loan may indicate that the borrower is in relatively good shape, which could lead to more aggressive competition. Consequently, this study predicts that the variable could have a *negative* effect on loan spreads.

g. *Syndicate arrangers* $(LEADBANKERS)$, measured by the number of lead arrangers in the syndicate. Santos and Winton (2009) suggest that multiple lead arrangers may lead to free rider problems in monitoring the borrower, thus, this study expects that this would lead to higher loan spreads.

h. *Relationship of borrowers with lead arranger* $(RELATIONSHIP)$, which is a dummy variable equal to one if the firm borrowed from the same lead arranger in the three years prior to the current loan. Santos and Winton (2009) advise that this implies that a relationship may give the borrower the benefit of a lower loan spread, but it is also possible that it indicates greater information monopoly, leading to higher loan spreads. Bharath, et al. (2008) find that the impact of a relationship on loan spreads is negative. On the other hand, Santos and Winton (2009) find that this effect is reversed in recessions, while information monopolies are likely to be stronger and maintaining relationships is likely to

be less attractive to lenders.

(B) Bank-specific characteristics

a. *Bank's total assets* $(LASSETS)$, calculated by the log of the bank's total assets to control for banks' size. Santos and Winton (2009) suggest that larger banks may be better-diversified or have better entrance to funding markets, leading to a lower cost of funds. Therefore, this study predicts a lower loan spreads relative to LIBOR.

b. *Subordinated debt* $(SUBDEBT)$, which is calculated by a bank's subordinated debt as a fraction of assets, which is proxy as bank equity capital, or an indicator of bank access to public debt markets. In each case, this study expects that the impact on loan spreads should be *negative*.

c. *Bank's liquidity* $(LIQUIDITY)$, measured by the bank's cash and marketable securities as a fraction of total assets, which is proxy for the bank's cost of funds. This study predicts that banks with more liquid assets should find it easier to fund loans on the margin, thus leading to lower loan spreads.

D. Samples and data source:

The data used in this study came from several data sources, including as follows:

a. *The Loan Pricing Corporation's Dealscan database* (LPC), which includes business loans to identify the corporations that borrowed from banks and when they did so. Furthermore, the Dealscan database also provides information on: individual loans, including loan's spread over Libor, maturity, seniority status, purpose and type. On the side of borrowers' information, including its sector of activity, and its legal status (private or public firm), and the lending syndicate, as well as the identity and role of the banks in the loan syndicate.

b. *Compustat*, which includes corporations' balance sheet. Given that Compustat is dominated by publicly-held firms, this study has to exclude loans to private-held firms from the sample.

c. *BankScope database*, which provides data of balance sheet and income statement of publicly banks in thousands of US dollars.

To get a relatively homogenous sample of banks, this study bounds the variables at 0.01%. This study also drops the missing values for corporations that did not report their total capital ratio. For at least two

consecutive years is deleted from the data set for these firms. Thus, this study constructs a data set containing 34,082 syndication loans from the U.S. banking for the period 1987-2010.

(3) Statistics method:

The estimation formed by Eqs. (1-10) is carried out by multiple regression estimation to obtain consistent parameter estimates, as the use of pairwise regression to eliminate or reduce estimation bias. In addition, to keep away from collinearity problem on controlled variables, the study conducts firstly Bartlett sphericity test to examine the presence of collinearity and excludes variables with collinearity based on three indices - conditional index (CI), tolerance (T) and variance inflation factor (VIF).

4. Empirical Results

Through the perspective of supervision mechanism and *rule-based governance* (Li and Filer, 2007), this study tests the hypotheses linked to the predictions of Diamond and Rajan's (2000) *theory of bank capital* and Sharpe (1990) and Rajan (1992) *theory of informational monopolies advantage* on a sample of syndication loans to publicly-traded borrowers from 1987-2010, and examines the links between banks' capital, borrowers' bank-dependence, and loan spreads that banks charge their borrowers.

Specifically, this study focuses on consequences resulting from a total of 34,082 samples of syndication loans in the U.S. over the 1987-2010 periods, and assesses that if banks with low capital level are more sensitive to borrowers' cash flows than are banks with high capital. In addition, this study performs the robustness test to the inclusion of loan- and bank- specific controlling variables, to perceive if the results were consistent with either theory.

Table 1 shows the descriptive statistics of the variables in this study. The mean value of bank's capital over its total Assets is 9.3663%, higher than the norms of BIS regulation. On the side of return, the mean value of return on assets of banks in the U.S. during the periods of 1987-2010 is 0.795%, implies that the return of banking in the U.S. is very slightly. In addition, the mean value of cost to income ratio (Loan-chargeoffs) is 57.4%. On the side of credit risk, the mean value of NPL ratio Impaired Loans over Gross Loans is 1.838%.

On the side of syndication loan, the mean value of syndication loan is 8.5538 million dollars. The syndication loan restrictions are non-diversification, senior, secured, and have some guarantor, it implies that the banks are risk-sensitive and need more protection in order to reduce its credit risk. The mean maturity of syndication loan is 4.8671 years. The purposes of syndication loan are most repay corporate existing debt and for its working capital. The type of syndication loan is a line of credit or a term loan, but

not a renewal of an existing loan. The bank is almost as syndicate arrangers and the borrowers have relationship with lead arrangers.

Table 1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Return on assets(ROA)	6,403	-50.322	48.237	0.7950	3.5866
Loan-chargeoffs (CHARGEOFFS)-(t-1):	6,302	-7	577	57.40	31.723
NPL ratio Impaired Loans / Gross Loans - %	5,170	0.000	83.814	1.8380	4.4638
Bank's capital (t-1) Equity / Total Assets - %	6,590	-2.540	99.660	9.3663	11.7545
Loan amount (LAMOUNT)	34,082	5.1761	10.3802	8.5538	0.6552
Capital * Loan-Amount	33,981	-4.9600	2.4322E5	7.1466E2	1.0192E4
Loan Restrictions-DIVERSTRICT	34,082	0	0	0	0
Loan Restrictions-SENIOR	34,082	0	1	1	0.056
Loan Restrictions-SECURED	34,082	0	1	0.59	0.491
Loan Restrictions-GUARANTOR	34,082	0	1	0.12	0.322
Loan maturity (LMATURITY)	33,816	-1.0792E0	2.4000E10	4.8671E8	1.4321E9
Loan purposes (PURPOSES)	34,082	0	1	0.08	0.264
Loan purposes (PURPOSES)	34,082	0	1	0.49	0.500
Type of loan (TYPELOAN)	34,082	0	1	0.82	0.385
Renewal	34,082	0	1	0	0.030
LEADBANKERS	34,082	0	1	0.26	0.439
RELATIONSHIP	34,081	0	1	0.74	0.437
Valid N (listwise)	4,767				

On the impact of capital level on banking lending return (ROA) in the U.S during 1987-2010, Table 2 shows that there is negative correlation between the ratios of bank's capital over its total assets and ROA, the coefficient is -0.053 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets, but lower lending spread for borrowers with strong cash flows. In addition, the interaction effects of capital and loan-amount on banks' ROA is negative, the coefficient is -5.186E-6 and signification at 5%. The results meet the expectation of hypothesis 1.

Table 2 Impact of capital level on banking lending return (ROA) in the U.S during 1987-2010

$$ROA_{l,b,t} = c + a \times CAPITAL_{b,t-1} + b \times LOANAMOUNT_{f,t} +$$
$$+ g(CAPITAL_{b,t-1} \acute{} LOANAMOUNT_{f,t}) + e_{f,t} \quad \text{.....(1)}$$

Dependent variable: Loan-Chargeoff@	Unstandardized c、。 . . ∵、@ ¦ 。 b@	s：、N@e‥@	s： ‵@N	Collinearity Statistics@ Toleranc 。@	vif@
(Constant)@	QNQQX@	NVSS@	PNPWX@		
Bank's capital@H :MQI@Equity / Total	MPNPUS@	NPPT@	PNPPPJJJ@	PNYXX@	QNPQR@
Loan amount (LAMOUNT)@	PNPRS@	NPWT@	PNWUW@	PNYYY@	QNPPQ@
Capital * LoanMa‥ , ?@‥ :	MUNQXVeMV@	NPPP@	PNPRRJJ@	PNYXX@	QNPQR@
F	50.711				
Adj-R^2	0.025				
Durbin-Watson value	2.026				
Observation	5,805				

Table 3 shows the impact of capital level on banking lending return (ROA) with considering the loan-specific variables in the U.S during 1987-2010. It shows that there is negative correlation between the ratios of bank's capital over its total assets and ROA, the coefficient is -0.052 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets, but lower lending spread for borrowers with strong cash flows. In addition, the interaction effects of capital and loan-amount on banks' ROA is negative, the coefficient is -4.757E-6 and signification at 10%. The results meet the expectation of hypothesis 2 and Table 2.

Table 3 Impact of capital level on banking lending return (ROA) with considering the loan-specific variables in the U.S during 1987-2010

$$ROA_{l,b,t} = c + a' CAPITAL_{b,t-1} + b' LOANAMOUNT_{f,t} +$$

$$+ c \times (CAPITAL_{b,t-1}' LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} d_i' X_{i.l.t} + \sum_{k=1}^{K} j_{i,t}' Z_{k,b,t} + \rho_{f,t} \quad \text{.....(5)}$$

Dependent variable: ROA	Unstandardized Coefficients B	Std. Error	Sig.	Collinearity Statistics Tolerance	VIF
(Constant)	1.176	1.182	0.320		
Bank's capital (t-1) Equity / Total Assets - %	-0.052	0.004	0.000***	0.976	1.024
Loan amount (LAMOUNT)	0.026	0.079	0.742	0.886	1.128
Capital * Loan-Amount	-4.757E-6	0.000	0.060*	0.798	1.254
Loan Restrictions-SENIOR	-0.338	0.982	0.731	0.991	1.009
Loan Restrictions-SECURED	-0.191	0.106	0.071*	0.858	1.166

Loan Restrictions-GUARANTOR	-0.231	0.130	0.075*	0.988	1.012
Loan maturity (LMATURITY)	-1.591E-10	0.000	0.417	0.789	1.268
Loan purposes (PURPOSES)	0.818	0.299	0.006***	0.976	1.025
Loan purposes (PURPOSES)	0.228	0.103	0.027**	0.898	1.113
Type of loan (TYPELOAN)	0.217	0.127	0.088*	0.944	1.059
LEADBANKERS	-0.254	0.107	0.017**	0.975	1.026
RELATIONSHIP	0.189	0.123	0.126	0.924	1.082
F	14.715				
Adj-R^2	0.028				
Durbin-Watson value	2.031				
Observation	5,746				

On the impact of capital level on banking lending return (loan-chargeoff) in the U.S during 1987-2010, Table 4 shows that there is positive correlation between the ratios of bank's capital over its total assets and cost to income ratio, the coefficient is 0.327 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets and lower cost to income ratio, but lower lending spread and higher cost to income ratio for borrowers with strong cash flows. In addition, Table 4 shows that there is negative correlation between the borrowers' loan-amount and banks' cost to income ratio, the coefficient is -3.302 and significantly at 1%. The result shows that compared to adequately capitalized banks, borrowers borrow more syndication loan-amounts from banks with fewer cash flows, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets and lower cost to income ratio, but lower lending spread and higher cost to income ratio for borrowers with strong cash flows. Finally, the interaction effects of capital and loan-amount on banks' cost to income ratio is very trivial, the coefficient is 0 and signification at 1%. The results meet the expectation of hypothesis 1.

Table 4 Impact of capital regulation on banking lending return (Loan-Chargeoff) in the U.S during 1987-2010

$$LOANCHARGEOFF_{f,l,b,t} = c + a \times CAPITAL_{b,t-1} + b \times LOANAMOUNT_{f,t} +$$
$$+ g(CAPITAL_{b,t-1} \acute{} \ LOANAMOUNT_{f,t}) + e_{f,t} \quad \text{.....(2)}$$

Dependent variable: Loan-Chargeoff	Unstandardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error		Tolerance	VIF
(Constant)	86.928	6.121	0.000		

Bank's capital (t-1) Equity / Total	0.327	0.046	0.000***	0.987	1.013
Loan amount (LAMOUNT)	-3.302	0.713	0.000***	0.999	1.001
Capital * Loan-Amount	0.000	0.000	0.000***	0.987	1.013
F			66.065		
Adj-R^2			0.033		
Durbin-Watson value			1.820		
Observation			5,699		

Table 5 shows the impact of capital level on banking lending return (ROA) with considering the loan-specific variables in the U.S during 1987-2010. It shows that on the impact of capital level on banking lending return (loan-chargeoff) in the U.S during 1987-2010, Table 5 shows that there is positive correlation between the ratios of bank's capital over its total assets and cost to income ratio, the coefficient is 0.307 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets and lower cost to income ratio, but lower lending spread and higher cost to income ratio for borrowers with strong cash flows. In addition, Table 5 shows that there is negative correlation between the borrowers' loan-amount and banks' cost to income ratio, the coefficient is -2.89 and significantly at 1%. The result shows that compared to adequately capitalized banks, borrowers borrow more syndication loan-amounts from banks with fewer cash flows, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return of assets and lower cost to income ratio, but lower lending spread and higher cost to income ratio for borrowers with strong cash flows. Finally, the interaction effects of capital and loan-amount on banks' cost to income ratio is very trivial, the coefficient is 0 and signification at 1%. The results meet the expectation of hypothesis 2 and Table 4.

Table 5 Impact of capital level on banking lending return (Loan-Chargeoff) with considering the loan-specific variables in the U.S during 1987-2010

$$LOANCHARGEOFF_{l,b,t} = c + a' \ CAPITAL_{b,t-1} + b' \ LOANAMOUNT_{f,t} +$$

$$+ c \times (CAPITAL_{b,t-1}' \ LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} d_i' \ X_{i.l.t} + \sum_{k=1}^{K} j_{i,t}' \ Z_{k,b,t} + p_{f,t} \ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Dependent variable: LOAN-CHARGEOFF	Unstandardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error		Tolerance	VIF
(Constant)	79.826	11.286	0.000		

Bank's captial(t-1) Equity / Total Assets - %	0.307	0.046	0.000***	0.975	1.025
Loan amount (LAMOUNT)	-2.890	0.758	0.000***	0.885	1.130
Capital * Loan-Amount	0.000	0.000	0.000***	0.800	1.250
Loan Restrictions-SENIOR	3.459	9.345	0.711	0.991	1.009
Loan Restrictions-SECURED	0.395	1.019	0.699	0.857	1.167
Loan Restrictions-GUARANTOR	2.107	1.249	0.092*	0.988	1.012
Loan maturity (LMATURITY)	-7.297E-9	0.000	0.000***	0.792	1.262
Loan purposes (PURPOSES)	-5.036	2.849	0.077*	0.975	1.026
Loan purposes (PURPOSES)	-2.167	0.990	0.029**	0.897	1.114
Type of loan (TYPELOAN)	-1.151	1.221	0.346	0.946	1.058
LEADBANKERS	5.012	1.025	0.000***	0.975	1.026
RELATIONSHIP	0.687	1.184	0.562	0.924	1.082
F	21.088				
Adj-R^2	0.041				
Durbin-Watson value	1.825				
Observation	5,640				

On the impact of capital level on banking credit risk (NPL %) in the U.S during 1987-2010, Table 6 shows that there is positive correlation between the ratios of bank's capital over its total assets and NPL %, the coefficient is 0.291 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence the banks would bear a higher probability of default and credit risk, but lower credit risk for borrowers with strong cash flows. In addition, there is positive correlation between the ratios of borrowers' loan-amount and NPL %, the coefficient is 0.501 and signification at 1%. Finally, the interaction effects of capital and loan-amount on banks' credit risk is positive, the coefficient is 5.981E-6 and signification at 5%. The results meet the expectation of hypothesis 4.

Table 6 Impact of capital level on banking lending credit risk (NPL %) in the U.S during 1987-2010

$$CREDITRISK_{l,b,t} = c + a' \, CAPITAL_{b,t-1} + b' \, LOANAMOUNT_{f,t} +$$

$$+ c \times (CAPITAL_{b,t-1}' \, LOANAMOUNT_{f,t}) + \sum_{i=1}^{I} d_i' \, X_{i.l.t} + \sum_{k=1}^{K} j_{i,t}' \, Z_{k,b,t} + p_{f,t} \quad \text{.....(9)}$$

Dependent variable: NPL Impaired Loans / Gross Loans (%)	Unstandardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error		Tolerance	VIF
(Constant)	-4.811	0.844	0.000		
Bank's capital (t-1) Equity / Total Assets - %	0.291	0.012	0.000***	0.952	1.050

Loan amount (LAMOUNT)	0.501	0.097	0.000***	0.997	1.003
Capital * Loan-Amount	5.981E-6	0.000	0.028**	0.954	1.048
F	208.352				
Adj-R^2	0.114				
Durbin-Watson value	1.777				
Observation	4,829				

On the impact of capital level on banking credit risk (NPL %) controlling for the state of the loan-specific characteristics in the U.S during 1987-2010, Table 7 shows that there is positive correlation between the ratios of bank's capital over its total assets and NPL %, the coefficient is 0.289 and signification at 1%. The result shows that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence the banks would bear a higher probability of default and credit risk, but lower credit risk for borrowers with strong cash flows. In addition, there is positive correlation between the ratios of borrowers' loan-amount and NPL %, the coefficient is 0.457 and signification at 1%. The results meet the expectation of hypothesis 4 and Table 6. That is, controlling for the state of the loan-specific characteristics and its effect on the importance of borrower cash flows, there is a positive relationship between banks' capital level, borrowers' bank-dependence, the banks' credit risk.

Table 7 Impact of capital level on banking lending credit risk with considering the loan-specific variables in the U.S during 1987-2010

Dependent variable: NPL Impaired Loans / Gross Loans (%)	Unstandardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error		Tolerance	VIF
(Constant)	-4.573	1.602	0.004		
Bank's captial(t-1) Equity / Total Assets - %	0.289	0.012	0.000***	0.938	1.067
Loan amount (LAMOUNT)	0.457	0.103	0.000***	0.869	1.151
Capital * Loan-Amount	3.717E-6	0.000	0.210	0.784	1.275
Loan Restrictions-SENIOR	0.433	1.349	0.748	0.991	1.009
Loan Restrictions-SECURED	-0.389	0.136	0.004***	0.853	1.172
Loan Restrictions-GUARANTOR	-0.058	0.163	0.722	0.989	1.011
Loan maturity (LMATURITY)	2.263E-10	0.000	0.323	0.782	1.278
Loan purposes (PURPOSES)	1.623	0.368	0.000***	0.973	1.028
Loan purposes (PURPOSES)	-0.503	0.131	0.000***	0.911	1.098
Type of loan (TYPELOAN)	-0.301	0.164	0.066*	0.940	1.064
LEADBANKERS	0.596	0.138	0.000***	0.974	1.026

RELATIONSHIP	0.358	0.158	0.023**	0.922	1.084
F			57.865		
Adj-R^2			0.125		
Durbin-Watson value			1.799		
Observation			4,786		

5. Conclusion Remarks

This study uses samples of 34,082 syndication loans of publicity banks in the U.S. during the periods of 1987-2010, to test the theory of informational monopolies advantage and the theory of sacrificing reputational capital, then analyzes the impact of capital regulation on banking return and credit risk through its lending activity. The implications would be provided with policy implication to regulatory.

On the impact of capital level on banks' return in the U.S during 1987-2010, the results show that there is negative correlation between the ratios of bank's capital over its total assets and return. It implies that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows, hence obtain higher return, but lower lending spread for borrowers with strong cash flows. When controlling for the state of the bank- and loan-specific characteristics, the effects are the same and meet the expectation of hypothesis 1.

On the impact of capital level on banking credit risk, the results show that there is positive correlation between the ratios of bank's capital over its total assets, borrowers' loan-amount, and its interaction and banks' credit risk. It implies that compared to adequately capitalized banks, banks with lower capital level charge higher lending spread for borrowers with fewer cash flows; hence the banks would bear a higher probability of default, but lower credit risk for borrowers with strong cash flows. When controlling for the state of the bank- and loan-specific characteristics, the effects are the same and meet the expectation of hypothesis 4.

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