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The Roles of Relationship Lending and Utilization of Soft Information on Bank Performance in Competitive Local Markets

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Discussion Paper Series

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要約

　わが国では，2003 年の金融審議会報告『リレーションシップバンキングの機能強化に向けて』以降，中小企業金融に対するひとつのビジネスモデルとして注目を集めるようになっており，わが国においてもマイクロデータを用いた研究が蓄積されている．しかしながら，これは企業側のデータを用いた分析であり，銀行がリレーションシップバンキングによるソフト情報の利用によって，パフォーマンスを向上できるのかどうかは分析されていない．

　そこで本稿では，地域金融機関（地銀，第二地銀，信用金庫）に対するアンケートデータを用いて，リレーションシップバンキングによるソフト情報の利用が，貸出パフォーマンスに影響を及ぼすか否かを分析している．ここでは銀行のアンケート回答を因子分析することによって，3 つのソフト情報の利用に関する潜在変数（企業の組織形態に関するソフト情報，企業の取引関係に関するソフト情報，企業の事業と経営者に関するソフト情報）を抽出し，貸出収益率と不良債権比率との関係を分析している．

　分析の結果，ソフト情報の利用は，銀行の貸出収益率を向上させ，また統計的に有意ではないが不良債権比率を低下させることが発見された．とくに抽出された 3 つの潜在変数の中でも，収益性の向上において，企業の取引関係に関するソフト情報が最も重要なソフト情報となっていることが示されている．また，競争的な市場において，ソフト情報を利用することによって貸出における収益性を確保できることも示された．

　これらの結果は，リレーションシップバンキングの研究における新たな発見事実であり，貸出技術の発展による他業態の競争圧力の増加に対して，リレーションシップバンキングによるソフト情報を利用した貸出方法が，地域金融機関の収益確保に寄与していることを示している．

Key words: Relationship lending, soft information, inter-bank competition, lending profitability, credit risk rating, regional banks

JEL classification code: G21, G33, L14, L25

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1. Introduction

Berger and Udell (2002) have argued that soft information, defined as unquantifiable, unverifiable and undocumentable information production is an essential part of relationship lending. For the past two decades, whether relationship lending benefits both lenders[1] and borrowers has been examined by many researchers. Before the early 2000s, much literature has discussed the influence of using soft information on credit conditions (credit availability, interest rate, and collateral securities, etc). However their results showed a mixed picture across countries. The effect differed across the bank's lending technologies and the borrower's characteristics (Petersen and Rajan, 1994; Berger and Udell, 1995; Petersen and Rajan, 1995).

In recent years, researchers have focused more on the role that relationship lending has on inter-bank competition. For example, Boot and Thakor (2000) suggested that inter-bank competition would accelerate relationship lending, but that beneficial added value for borrowers might decrease as lenders shift their business from transaction lending to relationship lending. On the other hand, Dinc (2000) suggested that inter-bank competition would lower the threshold of credit availability of borrowers, but diminish the lenders' enthusiasm for costly commitment with borrowers. Hauswald and Marquez (2006) similarly suggested that inter-bank competition would reduce banks' investment in information acquisition because of the decrease of the lower expected interest rate. Previous theoretical research reported that lenders benefit from monopolistic rent and higher interest rates by relationship lending (Sharpe, 1990; Rajan, 1992).

However there has been little empirical evidence which supports this claim. Moreover, almost all previous research investigated this claim using proxies of relationship lending: duration (the number of years since lender granted the first loan to the borrower), scope of varieties of financial services from lenders, and distance between headquarters of the lender and location of the borrower. The reason why previous research used proxies for relationship lending is attributed to the difficulty of measuring soft information directly. One exception was Schwarze (2007) who investigated the direct influence of using soft information on lending performance by sending questionnaires to German banks. Our research expands on Schwarze's by identifying the components of soft information that are beneficial to lenders. This paper is the first one to analyze the type of soft information that is important and should be collected by banks to raise their profitability and improve their judgment of credit risk. It also describes the benefit of utilizing soft information *especially if the bank faces strong inter-bank competition*.

Japanese Financial Services Agency introduced the action program which requires regional banks to shift from transaction banking to relationship lending. "General supervisory guidance for small/medium-sized and regional financial banks" (FSA guideline, July 2008) clearly emphasized the need for improvement in the ability to evaluate the importance of soft information. Against such a background, the "Organization for Small & Medium Enterprises and Regional Innovation, JAPAN"

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[1] Note that the definition of the term "soft" is not identical to private or proprietary, while these terms often show similarities. In this case, however, only the realm of ``soft'' information, including the similarities with private and proprietary information, has been used in the relationship lending research. Hard proprietary and private, such as information regarding personal manager assets, are, therefore, excluded from research analysis in this specific study. For further detailed discussion of the information characteristics, see Petersen (2000).

(SMRJ[2]) set up a working group for strengthening finance based on the soft information of small and medium-sized businesses. The SMRJ carried out a survey in 2008, on the use of soft information in the decision process used by lenders, especially for small and medium-sized enterprises. The results are reported in "Investigation research business for the use of intellectual capital by small and medium-sized enterprises—a chapter of the investigation and research of financing based on intellectual capital" (SMRJ report, September 2008).

We investigated three factors of soft information: organizational systems, networks or alliances/partnerships, and business/management leadership on the basis of the SMRJ data. We analyzed the relationship between financial metrics of lenders' performance and soft information factors both separately and jointly. We also examined whether these soft information factors have significant effects in an inter-bank competitive market. This paper contributes greatly to research on relationship lending because we showed what kind of soft information is vital for banks to boost their profitability and improve their judgment skill of credit risk *especially if the bank faces strong inter-bank competition*.

The remainder of this paper is structured as follows. Section 2 introduces previous research and shows how our hypotheses were developed and tested. Section 3 shows our survey data and related micro/macro data in detail and describes how we extracted soft information factors from our survey data. Section 4 and 5 report the results of univariate and multivariate analyses, respectively. Finally, section 6 reviews our results, summary, and conclusion.

2. Theory and Hypotheses

2.1 Information asymmetry and informational lock-in

Small businesses face difficulties raising long-term funds from capitalists due to asymmetrical information between lenders and borrowers. Typically, the financial information of small businesses is not audited by accountants. Therefore, its level of reliability is inferior, by comparison, to big businesses. In addition, even if small business financial information is reliable, the profitability and solvency still lags behind that of big businesses. As a consequence, small businesses are more inclined to rely heavily on banks, especially in Japan, where third-party investment capital is still in beginning stages. In the absence of reliable financial information, soft information can often assure the borrowers' trustworthiness, which plays an important role in the lending market. Ideally, lenders would start by conducting relation specific investments, in order to acquire the borrowers' relevant soft information. A commitment to future long-term lending can be made when lenders become familiar with the borrower's (typical) business practices. Soft information, established through long-term, personal relationships with borrowers, have specific characteristics. It is not only difficult to quantify, verify, and document, but access is often restricted to others. Therefore, soft information

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[2] SMRJ is an affiliated association of Ministry of Economy, Trade, and Industry in Japan. SMRJ) was officially launched on July 1st, 2004. SMRJ was formed through a merging of Japan Small and Medium Enterprise Corporation (JASMEC), Japan Regional Development Corporation (JRDC), and Industrial Structure Improvement Fund (ISIF). They are expanding and strengthening networks with private and public SME supporting organizations, such as Local Government Units, Chamber of Commerce and Industry, Society of Commerce and Industry, financial institutions and Universities, to provide optimum support.

provides a certain level of exclusivity allowing lenders to enjoy advantageous monopolistic rents from secure informational relationships ((Greenbaum(1989), Sharpe(1990), Rajan(1992), Hauswald and Marquez (2006)). So we propose Hypothesis 1 as follows:

Hypothesis 1: ***The highly marginalized lending market creates monopolistic rents allowing lenders who strategically collect and use soft information to achieve a higher lending performance.***

There is little previous empirical research that examines the influence of the utilization of soft information on lenders' performance. Schwarze (2007) found that qualitative information, such as customer relationships and internal ratings generated by sales departments, has a positive impact on two types of lenders' performance: return on equity and operational margin, where operational expenditure represents the ratio of administration effort plus loan losses to operation income.

Contrary to our hypothesis, some research suggests negative effects from relation-based lending upon lenderothesis, some research suggests negative effects from relation-basedity an the expected pay-off of lenders involved in relationship lending. He insists that even if the project requires long-term funding, lenders actually prefer to create contracts with recurring short-term loan increments rather than one long-term lump sum. Short-term contracts with recurring pay increments create an atmosphere of pressure and responsibility amongst borrowers. Lenders are able to better control the progress of their investments with the financial manipulation of capital, and borrowers are compelled to communicate constantly eliminating the moral hazard inherent in long-term relationships. The control of financial capital by lenders, however, *holds up* borrowers from progressing efficiently and discourages borrowers negating their motivation and incentives. This controlling and oppressive relationship harms the success of the business, and, in turn, also limits the financial returns for lenders. Rajanhip harms the success of the business, and, in turn, also limits theard inherent in long-termnal expenditure represents the ratio of administration effort plus loan losses to operation incomeween the nature of the lender-borrower relationship and the profitability of the investment which can only be studied accurately through empirical data.

2.2 Inter-bank competition, shift to relationship lending, and the effect of relationship lending on profitability

Petersen and Rajan (1995) insist that inter-bank competition has the effect of lowering market interest rates pressuring lenders towards the relationship lending option. Considering a model where lenders are engaged in either transaction lending or relationship lending, not both, lower market interest rates adversely hinder the lenders (banks) own future investment opportunities into soft information (relationship lending). Even though, Boot and Thakor (2000) support Petersen and Rajan's model with the specific stipulation that lenders are engaged only in relationship lending, they propose, on the other hand, that if lenders are engaged in both transaction lending and relationship lending, a *substitution effect* arises. Although, inter-bank competition causes a decrease in both lending types' interest rates, lenders are motivated to lean more towards relationship lending, because the accumulation of soft information and opportunity for controlled involvement *insulate* lenders from the effects of a pure price competition market.

The substitution effect urges lenders to shift away from transaction lending towards relationship lending for business. Meanwhile, the insulation effect protects the lender's privilege to borrowers' private information through constructed barriers for potential competitors and minimizes the lenders' risk of profit loss. Therefore, we propose Hypotheses 2, 3 and 4 as follows:

Hypothesis 2: ***Lenders in local markets with high inter-bank competition face lower profitability.***

Hypothesis 3: ***Local market competition is the main motivation for lenders to acquire an investment advantage through exclusive relationship lending which obtains and uses soft-information.***

Hypothesis 4: ***Even though inter-bank competition has negative effects, a bank in a competitive local market can acquire an informational advantage to limit its own loss.***

In fact, some previous research of borrowers' data has provided empirical evidence of a positive correlation between inter-bank competition and relationship lending. For example, Degryse and Ongena (2007) deduced evidence from a sample of 645 Bergin's borrowers that lenders facing inter-bank competition are more likely to engage in relationship lending. Degryse and Ongena (2007) argue that the two most relevant variables for determining relationship lending situations are 1) the length of the loan period and 2) the geographic proximity of the lenders to the borrowers. Specifically, relationship lending is characterized by a longer term loan period and a closer geographical distance between lenders and borrowers. Data shows that these characteristics, signifying the presence of relationship lending, correlate with a higher degree of inter-bank competition measured by the density of lenders within a borrower's district.

Contrary to the data aforementioned, there has been no empirical evidence supporting an inter-bank competition effect upon lenders' profitability. This gap is primary due to the difficulties in obtaining lenders' data regarding relationship lending. This is the first study providing empirical evidence of a direct correlation between inter-bank competition and lenders' profitability.

2.3 Information advantage of relation-based lending and skill of credit analysis of regional banks

Information advantage from collecting and using soft information might enable banks to improve their ability to accurately predict the risk of bankruptcy of potential borrowers, and reduce loan losses from bankruptcy proceedings. Moreover, through the monitoring process of relationship lending, the bank could observe the borrower's business operation and investigate the efficiency of the loans over a long period (Berger and Udell, 2006). The efficient use of loans might lower probability of bankruptcy. So we provide Hypothesis 5 as follows:

Hypothesis 5: ***Lenders who place a great importance on collecting and using soft information obtain a lower bad loan ratio, on average.***

2.4 Inter-bank competition and the effect of relationship lending on bad loan ratios

In the previous section, we exposed that inter-bank competition decreases the overall rents for lenders. However, a shift towards relationship lending and away from transaction lending, may curb a more drastic decrease in lenders' profitability, because it is characteristic for relationship lending to maintain profitable under the pressures of competition. The decline of rents lowers banks' financial ability to participate fully in information investment, and drives down the threshold of credit availability for borrowers, as described by Dinc (2000). While the shift towards relationship lending can balance the decreased engagement in transaction lending, the competition for soft information results in a lower standard for borrower contracts. These two factors, the financially restrained information investment and lower threshold of credit availability, may result in a higher incidence of bad loans. So we propose Hypotheses 6 and 7 as follows:

Hypothesis 6: ***Lenders in higher inter-bank competition local markets proportionally have higher bad loan ratios.***

Hypothesis 7: ***Furthermore, banks within a competitive local market that acquire an information advantage become insulated from inter-bank competition, despite the lower average quality of loans.***

3. Data and Characteristics of Japanese Banks

3.1 Survey description and sample

The data in this study come from a survey of a working group that examined financing using the soft information of small and medium-sized businesses. This survey was conducted by the "*Organization for Small & Medium Enterprises and Regional Innovation, JAPAN*" (*SMRJ*) in early 2008. Before sending questionnaires to the banks, we conducted primary interview surveys with six regional banks in late 2007, and we collected comprehensive soft information items which are generally used in credit decision making and/or business support for borrowers. Soft information items were assigned to seven categories: (1) manager, (2) internal/external business environments, (3) business contents, (4) customers/suppliers, (5) employees, (6) systems that form the bases of organizations, and (7) risk management/corporate governance. Questionnaires were mailed to 575 banking institutions and responses were received from 428 (6 city banks, 76 regional banks, 244 cooperatives banks, 98 credit unions[3], and 4 others), with a response rate of 76.3%. To improve the response rate, a follow-up phone call was made to all banks that did not respond by the deadline.

Trust banks and urban banks are totally different from regional and cooperative banks. Credit

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[3] Cooperative banks (*Shinkin banks*, based on the Law on Cooperatives of Small and Medium Enterprises) and credit unions (*Shinkumi banks*, based on the Law on new Credit Unions) are Japanese banks which are legally limited to specializing in local small and medium-sized businesses. While both are based on not-for-profit and mutual-aid membership schemes, there are some differences in business areas which are outlined in their respective laws. Cooperative banks are supposed to lend to firms that are slightly larger than the firms that credit unions serve. (Ulrike, 2005).

unions are prohibited from serving a broad clientele. Therefore, we excluded these three types of institutions from our analysis. We constructed our sample with 76 regional banks and 244 cooperative banks, totaling 310 banks.

Table 1 shows the level of use by banks of soft information in three finance processes: credit ratings, assessment of borrowers and loan determination, and monitoring policies. S= "Strong use", M= "Medium use", W= "Weak use", N= "No use", and NA= "No reply." The credit rating stage has the highest percentage of "Strong use" of soft information, 18.8%. This figure suggests that a large minority of regional banks in Japan use soft information positively in making financial decisions.

Table 2 shows how soft information influences credit conditions (interest rate, amount offered, length of financing, and collateral amount). The table shows that banks utilized soft information the most on the amount offered (28.36%). The second highest percentage, 26.09% was utilized in the area of interest rate. Table 2 shows that 19.16% and 15.23% of the banks used soft information for determining the collateral amount and the length of financing, respectively. These descriptive results are consistent with the findings of previous research such as Petersen and Rajan (1994) and Berger and Udell (1995), which analyze the benefits of relationship lending. Their findings asserted that relationship lending leads to lower interest rates, amplifies credit availability, and reduces collateral securities.

The survey utilized a five-point likert scale to determine credit lending (1=No use, to 5= Considerable use). Soft information items, mean values, and standard deviations of our sample for each SMRJ category are given in Table 3.

3.2 Factor analysis for soft information and descriptive data of our sample

We conducted factor analysis in order to determine what categorized information the lenders place a great importance on in the credit decision. Many previous researchers (Scott, 2004; Ogura and Uchida, 2007; Uchida et al., 2008) conducted principal component analysis to integrate their data. However, we extracted latent factors based on the lenders' view of soft information. The procedure of extracting latent factors from the lenders' responses was done in order to identify the kind of soft information that is beneficial to lenders, when it is collected and utilized in credit decisions.

Our survey was conducted after the Financial Services Agency (FSA) promoted relationship lending in banks. We thought that, even though the action program issued by FSA was not compulsory, Japanese banks would conform to the guidelines for relationship lending. We were in the position of determining the precise value of soft information in the banks' credit making decisions.

In our procedure of extracting latent factors, we computed the correlation coefficients between the SMRJ categorized items and the major potential factors by varimax rotation, and we finally extracted the three principal factors: (1) organizational systems, (2) business and management leadership, and (3) networks or alliances/partnerships. To test the convergent and discriminant validity of the multiple-item scale of the three factors, we performed the confirmatory maximum likelihood factor analysis. The resulting three factors explained 67.82% of the total variance, had eigenvalues of 6.973, 2.709, and 1.227, respectively, and had an average communality of 0.460. The loadings for all items within a factor exceeded .4 and were statistically significant. Taken together, these findings strongly support the identification of our three main factors. Additionally, no item

cross-loaded on another factor at a level was higher than .40. The procedure used to derive the factor score is as follows: the average number of each SMRJ item was multiplied by the corresponding factor loadings of the variables for the given factors. The resulting products for each item within a factor were summed and this sum comprises the factor score. See Table 3 for the results of the factor analysis and the detailed items of all the soft information factors. Our detailed procedure is also explained in the Appendix A.

Organizational systems. The seven items comprising the factor *organizational systems* (Cronbach's alpha = .878) were based on the work of Nonaka and Takeuchi (1996) and Edvinsson and Malonc (1997). They originally discussed the key concept of an organization's ability to appropriate and store the knowledge of workers in their physical organization, and to subsequently share the organizational knowledge by facilitating interactions and exchanges among workers. *Organizational systems* involve the following SMRJ categories: personnel evaluation systems (.868), in-house improvement proposal systems/number of improvement suggestions (.819), incentive systems (.718), corporate education systems (.674), IT system implementation (.640), healthy management-labor relations (.611), and expertise employees (.535).

Networks or alliances/partnerships. Likewise, the seven items defining *networks or alliances/partnerships* (Cronbach's alpha = .860) were based on the following concepts: customer scope and relation-specific knowledge in the network and the coordination with the suppliers in the network (Nobeoka and Dyer, 2002). We also referred to the more general knowledge management literature by Nonaka (1994), in order to describe this factor. We thought that an organizational ability to share and disseminate knowledge among networks of customers, suppliers, and managers determines the extent the organization can improve their collaboration. Therefore we constructed *networks or alliances/partnerships* with the following SMRJ categorized items: relationship with suppliers (.807), relationship with customers (.727), suppliers and their status (.706), customers and their status (.623), seniority of management (.506), length of senior management in the sector (.497), and networks of management (.456).

Business and management leadership. Finally, the eight items measuring *business and management leadership* (Cronbach's alpha = .801) were based on the following concepts: the selection and concentration of businesses by analyzing their strengths and weaknesses (Porter, 1980; Porter 1985), the focus on the economics of scope and the generation of technological innovation (Teece, 1980; Teece, 1986), and the management leadership which drives the business and makes their profit (Nonaka et al., 1996). We constructed *networks or alliances/partnership* with the following SMRJ categorized items: capability of management (.590), business schedules (.569), character of management (.547), superiority of main business (.509), leadership of management (.501), management philosophy (.496), superiority of technologies (.461), and management training of successors (.445).

Bank performances: profitability and bad loan ratio. The assessment of the regional banks' profitability in the lending operation can be measured by multiple financial metrics, such as the ratio of interest income from loans and discounts to total assets (Loan Profitability), the ratio of net interest income from loans and discounts to total assets, and return on assets (ROA). We adopted Loan Profitability in our analysis because our purpose was to measure the performance of the bank's credit operation. Therefore we did not use ROA metric because the numerator involves revenue outside the lending operation. Net interest income is defined as the interest income from loans and

discounts minus loan losses and minus provision for possible loan losses. Many researchers in accounting pointed out that the figure of the provision for possible loan losses is often arbitrarily decided by the management; therefore we did not use Net Loan Profitability.

The regional banks' ability to utilize the credit analysis can be measured by the ratio of bad loans to total assets (Bad Loan Ratio). However, there are several ways to define bad loans in Japan. One is the balance of the loans to bankrupt borrowers (or in bankruptcy proceedings) under the bank accounts. Those have been reported in the statement of risk-controlled loans in Japan since 1997. The other is the balance of non-accrual delinquent loans under the bank accounts. Those had been reported in the statement of risk-controlled loans until 1997. Accordingly, we used both bad loan definitions in our analysis, but reported only the results from the first one. However the results from the second one showed almost the same as the first one. All the data used to calculate the performance and the bad loans ratio were obtained through the Nikkei NEEDS-Financial QUEST by Nikkei Media Marketing, Inc. All independent variables are measured in the 2007 accounting period, the same period in which the survey was conducted.

Herfindahl-Hirschman index. In our study, the number of bank branches in the local market was used to calculate the Herfindahl-Hirschman index. A higher Herfindahl-Hirschman index indicates a greater bank monopoly in the local market. According to the traditional viewpoint of competition-fragility, higher competition encourages the banks to take higher risk, because it gives rise to diminishing monopolistic rent. In this scenario, riskier lending due to higher competition results in a higher bad loan ratio. On the other hand, according to the modern viewpoint of competition-stability, a monopolistic environment encourages the banks to take higher risks. However, riskier lending practices result in adverse selection and increase the bad loan ratio. This view suggests that monopolistic rent from low competition increase the moral hazard of the bank. In order to determine which viewpoint best accounts for our data, we included the square term of Herfindahl-Hirschman index in our analysis.

Control Variables. There has been little research which examined the relationship between soft information and banks' performance. Therefore, we controlled for all the variables that might influence the banks' performance in order to exclude the possibility of covariation between the dependent variables and the missing control variables in our multivariate regression analysis. There is much empirical evidence which showed that large banks recorded more profit than smaller ones (Stiroh and Rumble, 2006). On the other hand, there is also some empirical evidence which showed the opposite results (Carter et al., 2004). Therefore we controlled for any potential extraneous effects of economies of scale and/or any potential differences in credit risk management techniques between the organizational size and its growth (Bank Size, Extent of Growth).

We included the square term of Extent of Growth to take diseconomies of scale into consideration (Stiroh and Rumble, 2006).

We also controlled for the following variables:

(1) The ratio of branches to total assets (Branch Ratio) was used due to its potential effect on regional networks. Franchising neighborhood bank offices in the local area strengthens the community knowledge of those banks and improves their judgment in assessing credit-worthiness of loan applicants. Expanding the market share by franchising their branches results in improving their ability to decide on credit-worthiness and reduces risk of bankruptcy. This method is independent of risk reduction obtained by a diverse lending portfolio (Berger

and Deyoung, 2001; Bofondi and Gobbi, 2006).

(2) The ratio of net assets to total assets (Capital) was used due to its potential function as barrier and/or a buffer. Capital functions as an entry barrier for credit lending, and also functions as a buffer when a bank decides to take a risk. Only banks with great capital are in the position to undertake the risk and to extend credit to SME lending.

(3) The ratio of SME lending to total lending (SME Lending Ratio) was used to control for higher interest rate of SME lending. The higher the SME Lending Ratio, the higher the interest rate of SMEs lending, because SME lending has a larger risk than big business lending. Previous research pointed out that community banks take advantage of the rent from small business lending and suggested that banks should focus on these types of loans to survive in a competitive market (Carter et al., 2004; Carter et al., 2005).

(4) The local market share of the loan (Local Share) was used as a proxy variable, representing the bank's familiarity of the local market characteristics and the bank's reputation from within the local community (Bharath et al., 2007). Local share also represents monopolistic power (Bofondi and Gobbi, 2006) as well as the Herfindahl-Hirschman Index described above.

Additionally, the performance of the banks and the default risk of the borrowers might systematically depend on the local macro economic circumstances. Therefore, we controlled the following four regional economic characteristics:

The growth rate of the land price (Land Price) is linked to the collateral value of the lending property. An increase in the collateral value facilitates the lending because the banks will able to recover the principle if the firm faces bankruptcy. Land Prices is also a lagged indicator of the local economic climate.

The descriptions of all dependent and independent variables, including Cooperative Dummy, Merger Dummy, and Urban Dummy, and Soft Collecting are shown in Table 5.

4. Data and Empirical Analysis

4.1 Descriptive statistics and univariate test

Descriptive statistics are shown in Table 5. We also show three principal factors: organizational systems, business/management leadership, and networks or alliances/partnerships. These three metrics are normalized. The mean value of Loan Profitability is 1.412%. The mean value of bad loan ratios is 7.051%.

We crossed loan profitability and Bad Loan Ratio with two levels of soft information use (high and low). We analyzed the factors into two groups (see Table 6 left side). In this dichotomy, scores were assigned to high score group if they were above the median and low factor score group if they were below the median. We also analyzed the factors into three groups (see Table 6 right side). We compared the top tertile with the bottom tertile and ignored the middle tertile in our analysis. Thus groups were either high or low on Factor Scores 1, 2, and 3.

First, we analyzed the factors by dividing them into two groups (see Table 6 left half). In this dichotomy, scores were assigned to High Factor Score group if they were above the median and Low Factor Group if they were below the median. We also analyzed the factors by dividing them into three groups (see Table 6 right side). We compared the top tertile with the bottom tertile and ignored

the middle tertile in our analysis. So groups were either High or Low on Factor Scores 1, 2, and 3. We crossed Loan Profitability and Bad Loan Ratio with two levels of soft information use (High Factor Score and Low Factor Score). Table 6 summarizes the mean values and the results of the difference of means test for both groups using a t test.

In Hypothesis 1, we predicted higher profitability when the lenders use more soft information in the credit decision process. In particular, we found Loan Profitability as a function of the level of use of Network information supported Hypothesis 1. This was significant at the 1% level with a one-tailed test and 5% level with a two-tailed test, respectively, both in the dichotomized and tertile groups. The other two main factors, Organizational Systems and Business/Leadership, were not statistically significant. Regarding Loan Profitability as a function of the level of use of Organizational Systems, the mean score of the High Factor Score group was lower (but not significantly) than the mean score of the Low Factor Score group in both the dichotomized and tertile analysis. Regarding Loan Profitability as a function of the level of use of Business/Leadership, the mean score of the High Factor Score group was lower (but not significantly) than the mean score of the Low Factor Score group in the dichotomized and analysis. The mean score of the High Factor Score group was higher than the mean score of the Low Factor Score group (consistent with our hypothesis, but not significant) in the tertile analysis.

In Hypothesis 5, we predicted a lower Bad Loan Ratio effect when the lenders use more soft information in the credit decision process. In particular, Loan Profitability as a function of the level of use of Network information strongly supported Hypothesis 1, at the 1% level both with a one-tailed test and a two-tailed test, for both the dichotomized and tertile groups. The other two main factors, Organizational Systems and Business/Leadership were not statistically significant. Regarding the Bad Loan Ratio as a function of the level of use of Organizational Systems, the mean score of the High Factor Score group was higher (but not significantly) than the mean score of the Low Factor Score group in both the dichotomized and tertile analysis. Regarding Bad Loan Ratio as a function of the level of use of Business/Leadership, the mean score of the High Factor Score group was lower (which was consistent with our hypothesis, but not significant) than the mean score of the Low Factor Score group in both the dichotomized and tertile analysis.

Second, we analyzed interbank competition by dividing Herfindahl-Hirschman indexes into two groups (see Table 7 above side). In this dichotomy, Herfindahl-Hirschman indices were assigned to banks that fell into the High Competition group if they were below the median and to the Low Competition group if they were above the median. We also analyzed interbank competition by dividing Herfindahl-Hirschman indices into three groups (see Table 7, Panel B). We compared the top tertile with the bottom tertile and ignored the middle tertile in our analysis. We crossed Loan Profitability and Bad Loan Ratio with two levels of interbank competition (High Competition and Low Competition). Table 7 summarizes the mean values and the results of the difference of means test for both groups using a t test.

In Hypothesis 2, we predicted lower profitability when the lenders face strong interbank competition. We found Loan Profitability as a function of interbank competition strongly supported Hypothesis 2, at the 1% level both with a one-tailed test and a two-tailed test, for both the dichotomized and tertile groups. In Hypothesis 6 we also predicted a higher bad loan ratio when the lenders face strong interbank competition. However, this prediction was not borne out. In fact, we found the opposite results. We obtained a low Bad Loan Ratio as a function of interbank competition

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at the 1% level both with a one-tailed test and a two-tailed test, for both the dichotomized groups and tertile groups, a finding which was contrary to Hypothesis 6. These results suggests that the lenders who enjoyed a monopolistic environment were inclined to undertake riskier lending practices that resulted in a higher bad loan ratio, a finding consistent with the modern viewpoint of competition-stability described in Berger et al. (2009). We discuss these results in detail in the later section of multivariate analysis.

Finally, we crossed three principle factors (together with their component items) with two levels of interbank competition (High Competition and Low Competition). Panel A and Panel B of Table 8 summarize the mean values and the results of the difference of means test for both the dichotomized and tertile groups using a t test, respectively.

In Hypothesis 3 we predicted higher use of soft information Factor Scores when interbank competition is higher in. In particular, Factor Scores of Business/Leadership as a function of interbank competition supported Hypothesis 3, at the 10% level with a one-tailed test in the tertile groups. In the dichotomized analysis, the mean score of High Competition was higher (but not significantly) than the mean score of Low Competition. The other two main factors, Organizational Systems and Networks were not statistically significant. Regarding Organizational Systems as a function of interbank competition, the mean score of the High Competition was lower (but not significantly) than the mean score of the Low Competition for both the dichotomized and tertile analysis. Regarding Networks as a function of interbank competition, the mean score of the High Competition group was higher (which is consistent with our hypothesis, but not significant) than the mean score of the Low Competition group for both the dichotomized and tertile analysis.

4.2 Multivariate Analysis

In our multivariate analysis, we assumed banks' profit function include bank-specific characteristics as well as regional characteristics, as follows:

$$Performance_i = f\,(Soft\ Information\ Factors_i,\ Inter\text{-}bank\ Competition_i,\ Bank\ Characteristics_i\ ,$$
$$Regional\ Characteristics_{ij},\ \varepsilon_i)\ ,$$

where bank characteristics denote an individual banks specific attributes excluding soft information and the Herfindahl-Hirschman Index (which measures inter-bank competition). i denotes an individual bank, and j denotes the region where the bank's headquarters are located.

We correlated all of the control variables with each other and we were concerned with the number of control variables that were found to have significant correlations. We calculated the variance inflation factor (VIF) which quantifies the severity of multicollinearity. All the VIFs of the independent variables in our multivariate regression were below 7. Consequently, we concluded that our model did not have a severe multicollinearity problem, because in general, this problem occurs when VIF is over 10. In order to ensure unbiased and consistent estimates, we controlled for all the variables that might influence the banks' performance to exclude the possibility of covariation between the dependent variables and the missing control variables.

4.2.1 Multivariate Analysis and Loan Profitability

Results of our multivariate tests on Loan Profitability are shown in Panel A and B of Table 9. In

Hypothesis 1, we had predicted positive coefficients of the three Soft Information Factors (Organizational Systems, Networks, and Business/Leadership) on Loan Profitability. Our prediction was borne out for two Soft Information Factors: Networks and Business/Leadership. The coefficient of Networks with Loan Profitability was 0.0413 with a t statistic of 3.49 (1% significance level); the coefficient of Business/Leadership with Loan Profitability is 0.0299 with a t statistic of 2.01 (5% significance level). These results are presented in the Full Model of Panel A.

On the other hand, the coefficient of Organizational Systems with Loan Profitability was negative, -0.0219, with a t statistic of -1.90 (10% significance level), which is contrary to our hypothesis, also presented in the Full Model of Panel A. The banks which use soft information regarding Organizational Systems face lower profitability, on average. The component items of Organizational Systems relate to organizational stability. Our results suggest that excessive reliance on soft information regarding the borrowers' organizational appearance results in slightly less profit. Larger companies may appear to be better risks, but this is not always the case.

Regarding the interactions of Soft Information Factors, we found that Organizational Systems and Business/Leadership was significantly positive at the 10% level (see Interaction Model of Panel A). Recall that we found a negative effect of Organizational Systems when this factor was examined independently. However, the interaction of Organizational Systems and Networks was positive (resulting in higher profitability for the bank). This change in direction from negative to positive suggests that if banks make use of Organizational Systems information in conjunction with Networks information, the negative impact of Organizational Systems information was diminished by the powerful positive effects of Network information.

However, we also found that the interaction of Networks and Business/Leadership was significantly negative at the 10% level (see Interaction Model of Panel A). Recall that we found positive effects of both Networks and Business/Leadership when these factors were examined independently. Therefore, when banks make use of Networks information in conjunction with Business/Leadership information, they should not expect an additive effect of the two factors.

In Hypothesis 2, we predicted a positive relationship between the Herfindahl-Hirschman Index and Loan Profitability. Our results strongly support this hypothesis. The coefficient of the Herfindahl-Hirschman Index is 1.208 with a t-statistic of 4.27, significant at the 1% level, and is presented in the Full Model of Panel A. In Appendix B, we show the positive linear relationship which was obtained by the regression of Loan Profitability on the Herfindahl-Hirschman Index (measured by the square of the number of branches) and adjusted for covariation with other control variables.

In Hypothesis 3, we predicted that the utilization of soft information would limit the banks' losses, even in a competitive local market. In our regression analysis, we assigned banks to tertile categories based on their Herfindahl Index. We limited our analysis to the first and third tertile. We assigned banks that were at or below the first tertile to the High Competition Dummy variable = 1, and banks that were at or above the first tertile the High Competition Dummy variable = 0. We found the coefficient of the intersection of Networks and the High Competition Dummy was significantly positive at the 10% level, and Business/Leadership and the High Competition Dummy was also significantly positive at the 5% level. These findings were consistent with our hypothesis (see Joint Effects Model of Panel B, Table 9). In general, banks' profitability suffers in a highly competitive market (supporting Hypothesis 1). Our data shows that banks can offset the loss inherent in a

highly competitive local inter-bank environment if they utilize soft information, especially Networks and Business/Leadership information.

4.2.2 Multivariate Analysis on the Bad Loan Ratio

Results of our multivariate tests on the Bad Loan Ratio are shown in Panel A and B of Table 10. In Hypothesis 5, we predicted negative coefficients of the three Soft Information Factors (Organizational Systems, Networks, and Business/Leadership) on the Bad Loan Ratio. However, the coefficients of the three soft information factors are not significant. The signs of the coefficients of Organizational Systems and Networks are in the direction of our hypothesis (negative).

In Hypothesis 6, we predicted a negative relationship between the Herfindahl-Hirschman Index and the Bad Loan Ratio. However, the coefficient of the Herfindahl-Hirschman Index was positive, 34.48, with a t statistic of 2.73 (1% significance level),, also presented in the Full Model of Panel A. Regarding the Bad Loan Ratio, we included the square of the Herfindahl-Hirschman Index to examine the modern viewpoint of competition-stability, which suggests that a monopolistic environment encourages banks to take higher risks. The coefficient of the squared Herfindahl-Hirschman Index was negative, -78.80, with a t statistic of -2.26 (5% significance level). This result shows an inverse U-shaped relationship (convex function) between the Herfindahl-Hirschman Index and the Bad Loan Ratio. In Appendix B, we present this inverse U-shaped relationship which was obtained by the regression of the Bad Loan Ratio on the Herfindahl-Hirschman Index and adjusted for covariation with other control variables. At the peak of the inverse U, two different things happen. When banks are located in the local area with a Herfindahl Index over 0.218, they tend to lower their threshold of credit-worthiness and this result in a higher Bad Loan Ratio, which is consistent with our hypothesis. On the other hand, when banks are located in the local area with a Herfindahl Index below 0.218, they enjoy a lower Bad Loan Ratio in a high-competitive market, which is consistent with the competition stability view.

In Hypothesis 7, we predicted that the utilization of soft information would decrease the banks' Bad Loan Ratio, even in a competitive local market. In our regression analysis, we assigned banks to tertile categories based on their Herfindahl Index. We limited our analysis to the first and third tertile. We assigned banks that were at or below the first tertile to the High Competition Dummy variable = 1, and banks that were at or above the first tertile the High Competition Dummy variable = 0. However, all the coefficients of the three soft information factors were unexpectedly not significant.

5. Robustness Test

5.1 Influence of Soft Information on Loan Profitability

We conducted the *F* test for the coefficients of three factors in the baseline model in order to quantify the robustness of our multivariate test results. In regards to loan profitability in the baseline model, the *F* test results, shown in the 4th row in Panel A of Table 9, strongly rejects the null hypothesis that requires all coefficients of the three factors (organizational system, networks, and business/management leadership) to be zero at a 1% significant level (*p* value = 0.0003). Therefore, we can confirm that the utilization of soft information, all-in-all, has an influential power over lender

profitabilities. With respect to the joint effect model of soft information and local competition, the *F* test results, shown in the 5th row from the bottom in Panel B of Table 9, strongly rejects the null hypothesis that requires all coefficient of the three factors to be zero at a 5% significant level (*p* value = 0.0478), which is consistent with the results of the baseline model. The joint effect model also strongly rejects the null hypothesis that states all coefficients of the three points of intersection between soft information factors and local competition are zero at 10% significant level (*p* value = 0.0717).Therefore, we can confirm that the utilization of soft information in the local market, overall, has the power to reduce the lenders' loss due to the local market competition.

5.2 Influence of Soft Information on Bad Loan Ratio

In regards to the bad loan ratio in the baseline model, the *F* test results, shown in the 4th row in Panel A of Table 10, does not reject the null hypothesis that states all coefficients of the three factors are zero. Therefore, it is difficult for us to insist upon the utilization of soft information's all-in-all influence over a lender's judgment of the borrower's creditworthiness. With respects to the joint effect model of soft information and local competition, the *F* test results, shown in the 5th row from the bottom in Panel B of Table 10, also does not reject the null hypothesis which imposes that all coefficients of the three factors need to be zero. The joint effect model also does not reject the null hypothesis that also mandates all coefficients of the three points of intersection between soft information factors and local competition to be zero. Therefore, it is also difficult for us to quantify definitively the power of soft information utilization, to subdue the lender's risk taking behavior in the local market competition.

5.3 Panel Data Analysis Regarding Loan Profitability

To confirm the robustness of our multivariate test results, we also ran the random-effects of the GLS regression, despite the ordinary regression model, sampling from 2004 to 2008, which is the period after the action program was introduced in 2003. The random effect model estimation enables us to identify the case specific affects of soft information which is consistent with regards to time. In our GLS regressions, three soft information factors are considered to be individualized effects constant with time, and are separated and identified as three soft information effects from other independent variables. In our model specifications, we included three soft information factors as proxy variables for measuring soft information usage levels respectively, which further explain the individual firm's affect in the GLS regression. Therefore, we can assume that the influence from the omitted individual effects is slight and do not give raise to serious estimation problems (Wooldridge (2001)). Thus, we specified the econometric model as follow:

$$performance_{it} = \alpha + \mathbf{f}_i'\beta + \mathbf{x}_{i,t}'\gamma + \mathbf{z}_{i,t}'\varsigma + \eta_i + \varepsilon_{it}. \quad i = 1,\cdots,N \quad t = 2004,\cdots,2007$$

In our model, we have included the following independent variables: First, the three soft information factors $\mathbf{f}_i$, which highlight the consistent individualistic soft information effects.

Second, the bank oriented control variables $\mathbf{x}_i$, which show the regional economic effects. We estimated our GLS regression by controlling the dummy variables by year in order to avoid the influence of other factors that are time-specific.

Both GLS test results for the baseline model and the joint effect model regarding soft information within the local market, shown in Panel A and B of Table 11 respectively, are consistent with the ordinary square regression results. The joint effect model also strongly rejects, at 5% significant level, both the null hypothesis where all the coefficients of the three factors are zero (p value = 0.0201), and the null hypothesis where all the coefficients of the three intersections between soft information factors and local competition are zero (p value = 0.0461). As the baseline model results show that the utilization of soft information, in general, has an influential power on lender profitability, and the results of the joint effect model illustrates that the utilization of soft information in the local market, overall, subdues the lender's loss due to the local market competition.

Furthermore, Both GLS test results for the baseline model and the joint effect model regarding soft information within the local market, shown in Panel A and B of Table 11 respectively, are also consistent with the ordinary square regression results. The baseline model Wald test results does not reject the null hypothesis that states all coefficients of the three factors are zero. The joint effect model Wald test also does not reject the null hypothesis that states all coefficients of the three factors are zero, and the null hypothesis where all the coefficients of the three intersections between soft information factors and local competition are zero.

6. The Role of Network Information in Lending Decisions

In the univariate analysis, we found a strong positive association between high loan profitability and the use of network information. In the multivariate analysis, we also found positive effects of networks and business/leadership information on loan profitability. The magnitude of the Network factor (coefficient = 0.0413) is greater than the magnitude of the Business/Leadership factor (coefficient = 0.0299). We also found that network and business/leadership information can mitigate the reduction of the lenders' profitability when inter-bank competition is high. In addition, in the univariate analysis, we also found a strong association between an improved bad loan ratio and the use of network information. In the multivariate analysis, these two variables co-varied in the predicted direction but were not statistically significant. On the whole, however, our empirical results have suggested that utilizing the soft information allow the banks to attain a more precise lending decision.

Why does network information play such a substantial role in lending performance? We propose that network information plays a vital role in determining creditworthiness of small and medium-sized businesses. Lenders accumulate network information in order to compensate for the opacity of the information provided by small and medium-sized businesses. Lenders can reach a certain level of confidence if the small and medium-sized businesses have created durable networks in their community.

Our rationale is consistent with the empirical findings in the area of trade credit (Cunat, 2006; Giannetti et al., 2008). In the supplier/customer relationship of trade credit, the supplier accumulates the customers' private information through a credit trade and an exchange of commercial notes. The

supplier is also more aware of the customers' financial situation through daily trade, evaluating their situation through such measures as the punctuality of delivery and quality of products. For example, Cunat (2006) found that suppliers may act as liquidity providers and insure against liquidity shocks when customers face financial distress, especially when their customer-supplier relationship is durable and intermediate products are specific (not commodity products) and difficult to sell to other parties.

7. Concluding Remarks

In our study, we examined the influence of the utilization of soft information in relationship lending on lenders' financial profitability and their ability to determine credit-worthiness of their borrowers. Soft information is difficult to quantify and document; it is often protected from access by others. Therefore, it is difficult to directly measure the utilization of soft information. In order to do so, we conducted a questionnaire survey of regional and cooperative banks in Japan. From this data, we were able to extract principal soft information types through factor analysis. We identified three principal factors: organizational systems, networks or alliances/partnerships, and business/management leadership. These factor scores which were extracted by factor analysis are latent variable for utilization of soft information.

Regarding loan profitability, we found a strong association between high loan profitability and the use of *network information,* in our univariate analysis. We also examined the relationship between the financial metrics of lenders' performance and soft information factors (both separately and jointly) in our multivariate analysis. We found that two significant main factors (networks and business/leadership information) individually contribute to the lenders' profit. However we also found that the independent utilization of organizational system information hampers their profitability. This result suggests that excessive and sole reliance on soft information that emphasizes the borrowers' organizational appearance results in slightly less profit. Still, if lenders make use of organizational system information in conjunction with business/leadership information, the negative impact of organizational system information was diminished by the powerful positive effects of business/leadership information.

Regarding the bad loan ratio, we found a strong association between a low bad loan ratio and the use of *network information*, in our univariate analysis. In our multivariate analysis, however, we did not find that the use of soft information exerts any significant decrease on the bad loan ratio.

We were very interested in the role of soft information in differing levels of inter-bank competition. Regarding loan profitability, we found that the utilization of networks and business/leadership information limits the lenders' losses, even in a competitive local market. In general, lenders' profitability suffers in a highly competitive market, which is supported by our data. Yet our data also show that lenders can offset the loss inherent in a highly competitive local inter-bank environment if they utilize network and business/leadership information. Regarding the bad loan ratio, we did not find that the use of soft information exerted any positive influence on the ability of lenders to determine creditworthiness of borrowers, particularly when there is high inter-bank competition. Our results regarding lenders profitability in a competitive market are consistent with Boot and Thakor's (2000) rationale.

Our findings suggest that information production, especially *network information*, plays an

essential role in promoting banks' profitability; this effect is strong even when banks face high inter-bank competition. We propose that *network information* plays an essential role in determining creditworthiness of small and medium-sized businesses. How can banks acquire network information? We believe there is a two-step strategy. First, banks need to franchise their branches throughout the local area. Second, banks need to invest in and allocate human resources sufficiently in the franchises to promote better face-to-face communication with borrowers. In this manner, network information may be obtained. This two-step strategy would not only improve the bankers' lending techniques, but also foster and enhance their community knowledge and enable them to survive in a highly competitive market.

[2011.8.23 1058]

Appendix:A

A.1: Factor analysis model

We assumed that x_p ($p = 1,..., P$) where observed random variables are explained by latent common factors, f_m ($m = 1,..., M \quad where \ M < P$), and a unique factor, ε_p . Then, we supposed the mathematic expression as follows:

$$
\begin{aligned}
x_1 &= \lambda_{11} f_1 + \lambda_{12} f_2 + \cdots + \lambda_{1M} f_M + \varepsilon_1 \\
x_2 &= \lambda_{21} f_1 + \lambda_{22} f_2 + \cdots + \lambda_{2M} f_M + \varepsilon_2 \\
&\vdots \\
x_P &= \lambda_{P1} f_1 + \lambda_{P2} f_2 + \cdots + \lambda_{PM} f_M + \varepsilon_P
\end{aligned}
\tag{A.1}
$$

where the observed random variables are standardized, i.e. $E[x_p] = 0, E[x_p^2] = 1$. The equation (A.1) is the so called "fundamental equation of actor analysis," and these equations can be expressed in the matrix notation as follows:

$$
\mathbf{x} = \mathbf{\Lambda f} + \mathbf{\varepsilon}
\tag{A.2}
$$

where $\mathbf{\Lambda}$ is the $P \times M$ matrix of factor-patterns, $\mathbf{f}$ is the $M \times 1$ random vector of common factors, and $\mathbf{\varepsilon}$ is the $P \times 1$ random vector of unique factors. In this matrix, we assume that the random vector of the unique factor, i.e., $\mathbf{\varepsilon}$ follows the condition:

$$
\mathrm{E}[\mathbf{\varepsilon}] = \mathbf{0}, \quad \mathrm{Var}[\mathbf{\varepsilon}] = \mathbf{D} = \begin{pmatrix} \tau_1^2 & 0 & \cdots & 0 \\ 0 & \tau_2^2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \tau_P^2 \end{pmatrix}
\tag{A.3}
$$

In addition to this assumption, we also assume that the common factors have zero means and unity variances, in the equations, $\mathrm{E}[\mathbf{f}] = \mathbf{0}$, $\mathrm{Var}[\mathbf{f}] = \mathbf{I}$, and $\mathrm{E}[\mathbf{f\varepsilon}'] = \mathbf{O}$. Since $\mathbf{x}$ is the standardized vector, the correlation matrix of the factor model (A.1) is given as follows:

$$
\begin{aligned}
\mathrm{Var}[\mathbf{x}] = \mathbf{R_x} &= \mathrm{E}[(\mathbf{\Lambda f} + \mathbf{\varepsilon})(\mathbf{\Lambda f} + \mathbf{\varepsilon})'] = \mathbf{\Lambda \Lambda}' + \mathbf{D} \\
&\Leftrightarrow \mathbf{R_x^*} = \mathbf{R_x} - \mathbf{D} = \mathbf{\Lambda \Lambda}'.
\end{aligned}
\tag{A.4}
$$

The principal factor method estimates $\mathbf{\Lambda}$ and $\mathbf{D}$ by utilizing the relation of (A.4).

To estimate $\mathbf{\Lambda}$ and $\mathbf{D}$, we generally used the estimated correlation matrix $\tilde{\mathbf{R}}_x$ from the observations, $\mathbf{x}_i$ ($i = 1,...., n$) . In order to estimate the common factor, $\mathbf{f}$, which are called factor scores, we adopted the least squares method. This estimation procedure is conceptually similar to the OLS which is the classical econometric method. The least squares method minimizes the following function, with respect to $\mathbf{f}$, under the assumption that $\mathbf{\Lambda}$ and $\mathbf{D}$ are "true" estimators:

$$
LS = \mathrm{tr}\big[\mathrm{E}\{\mathbf{\varepsilon \varepsilon}'\}\big] = \mathrm{tr}\big[\mathrm{E}\{(\mathbf{Y} - \mathbf{\Lambda f})(\mathbf{Y} - \mathbf{\Lambda f})'\}\big]
\tag{A.5}
$$

After executing this procedure, we obtained the following equation:

$$\hat{\mathbf{f}} = \left(\mathbf{\Lambda}'\mathbf{\Lambda}\right)^{-1}\mathbf{\Lambda}'\mathbf{x}.\qquad\qquad\qquad\text{(A.6)}$$

The factor scores which are estimated by these procedures are used in our analysis.

A.2 Number of Factors

We chose contains three factors. Although there are some heuristic rules which can be used to decide the number of factors, we adopted the combination of the *"Kaiser-Guttman rule"* and "*Cattell's screen criterion rule.*" The combination of these rules has the following benefits: the eigenvalue of each factor is greater than 1 from the former rule, and the cut-off point is decided by the minima difference between the eigenvalues of the factors. Following the adoption of these rules, we identified three principle factors. Figure A illustrates this combination.

Figure A
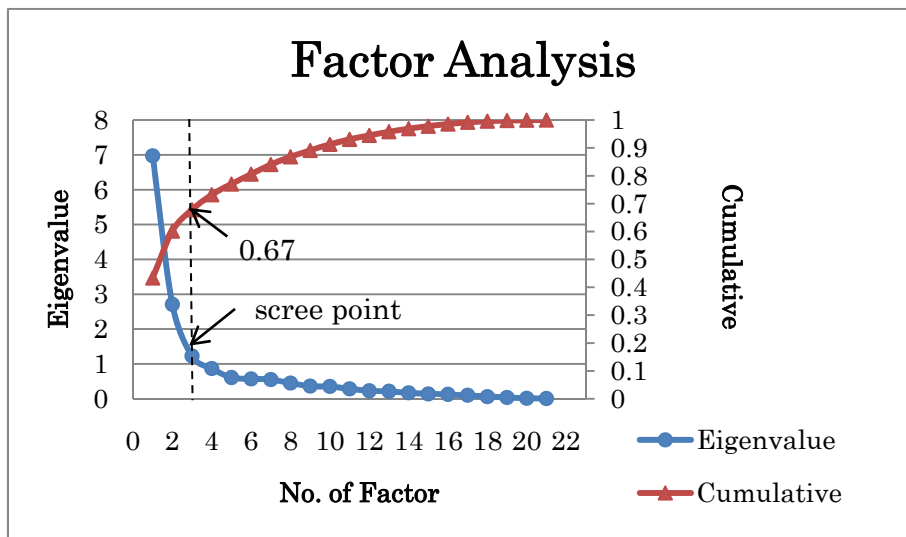
Appendix:B

(1) Linear Relationship between Loan Profitability and the Herfindahl-Hirschman Index (adjusted for covariation with other control variables)
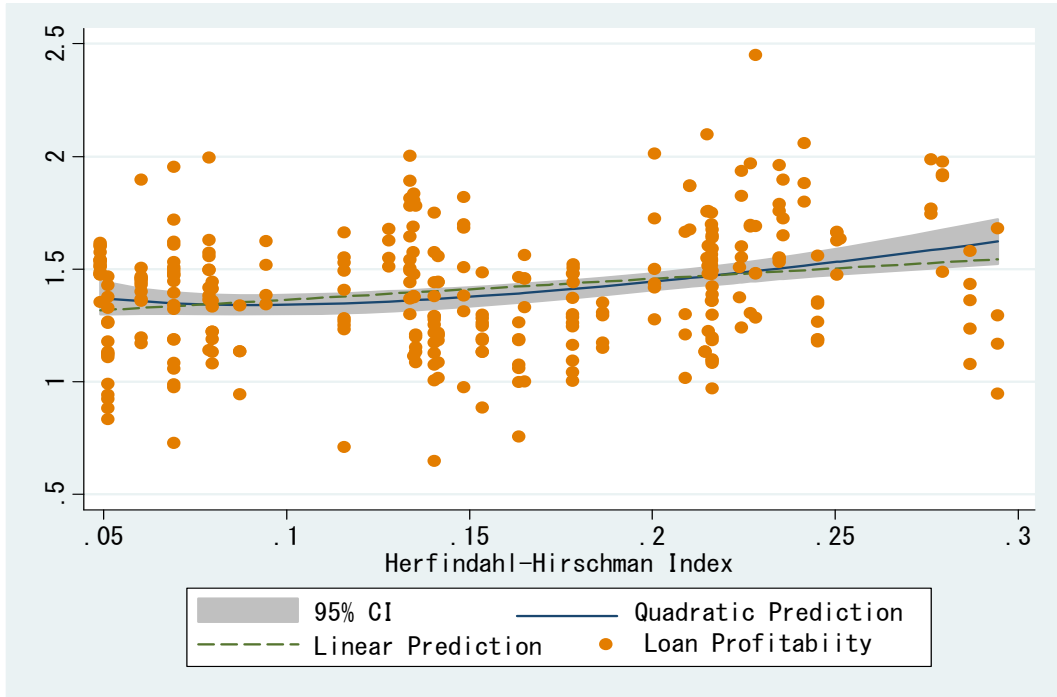
(2) Inverse U-shaped Relationship between the Bad Loan Ratio and the Herfindahl-Hirschman Index (adjusted for covariation with other control variables)
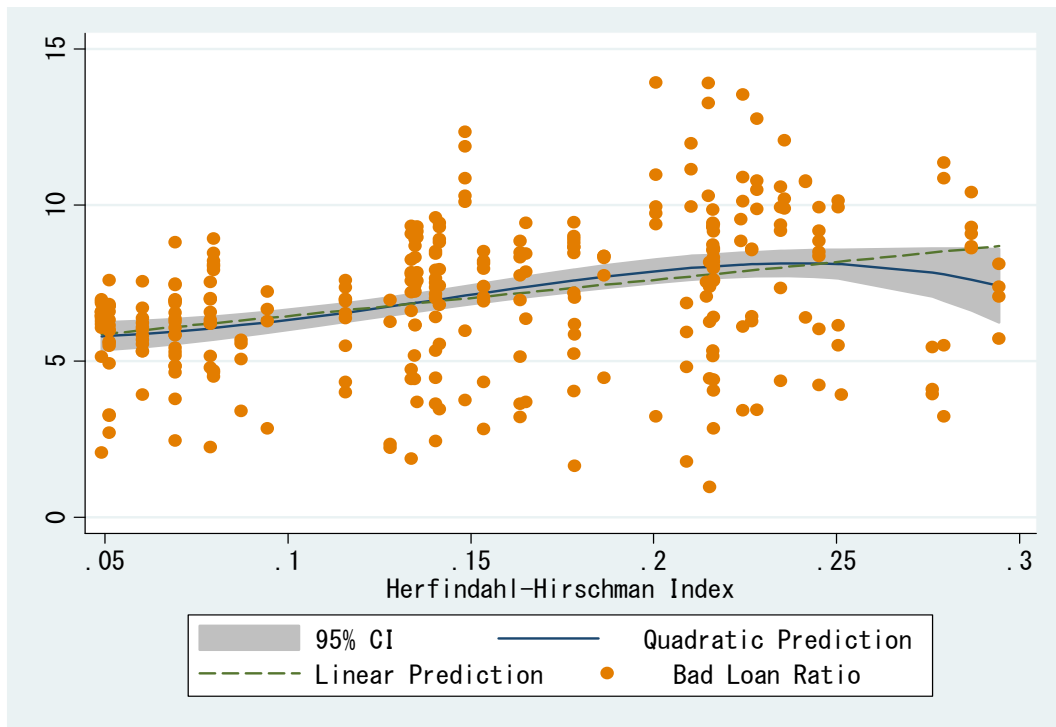
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Table 1 Use level of soft information in the finance process

S= "Strongly use", M= "Use in medium", W= "Weakly use", N= "Do not use at all", and NA= "No reply".
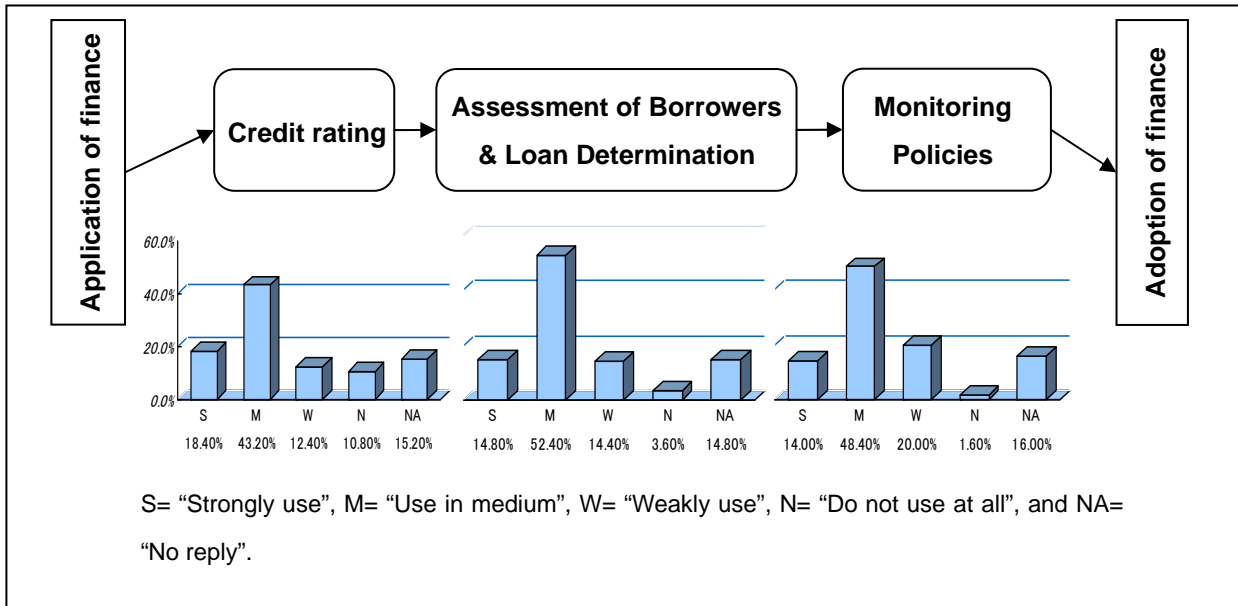
Table 2 Influence of soft information on credit conditions
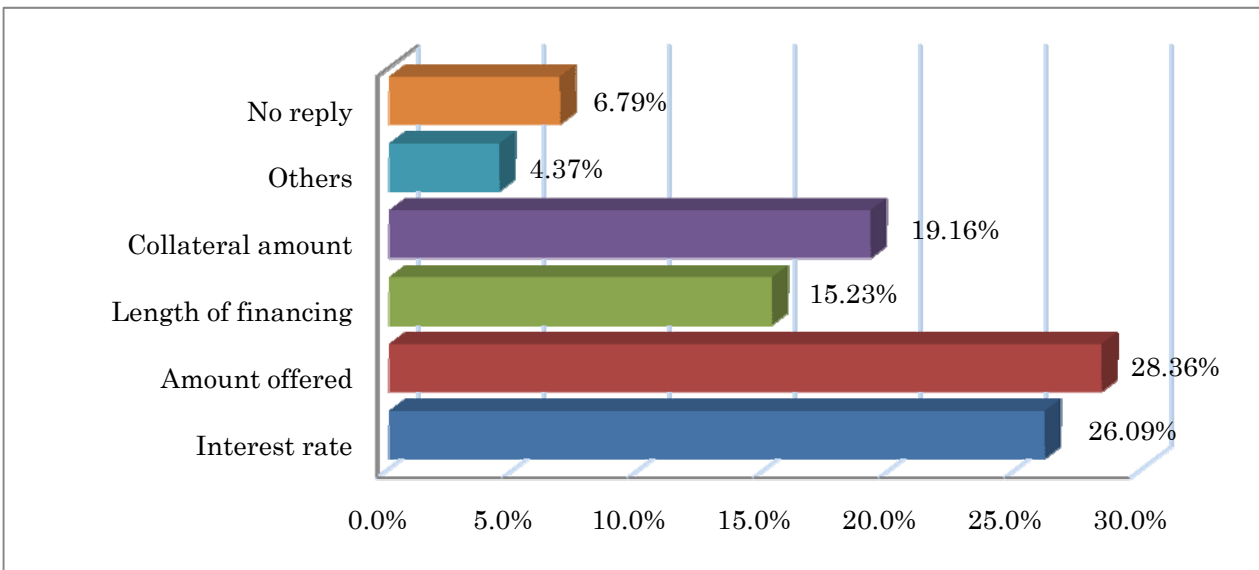
Table 3 Factor Analysis for Soft Information

For 310 regional and local cooperative banks, we computed the correlation coefficients between the all SMRJ categorized items and the factors by varimax rotation, and we finally extracted the three principal factors: (1) organizational systems, (2) business and management leadership, and (3) networks or alliances/partnerships. We performed the iterated principal factor analysis. The convergent and discriminant validity of the multiple-item scale of the three factors explained 67.83% of the total variance, had eigenvalues of 6.973, 2.709, and 1.227, respectively, and had average communality of 0.46. Additionally, no item cross-loaded on another factor is higher than .40. SMRJ is an affiliated association of Ministry of Economy, Trade, and Industry in Japan. In SMRJ survey, soft information items are original categorized to seven modes: (1) manager, (2) internal/external business environments, (3) business contents, (4) customers/suppliers, (5) employees, (6) basis of organizations, and (7) risk management/corporate governance.

	1	2	3	Mean value of five likert scale	Standard deviation	SMRJ Categories
Organizational systems						
personnel evaluation system	**.868**	.139	-.011	2.794	.548	basis of organizations
in-firm improvement proposal system /the number of improvements	**.819**	.146	.023	2.858	.545	basis of organizations
incentive system	**.718**	.098	-.018	2.774	.581	employees
enhancement level of corporate education	**.674**	.113	.226	3.003	.531	basis of organizations
introduction of IT system to employees	**.640**	.032	.294	3.048	.552	basis of organizations
quality of management-labor relations	**.611**	.237	.176	3.100	.585	basis of organizations
expertise of employees	**.535**	.147	.223	3.232	.621	employees
Networks or Alliances / Partnerships						
relationship with suppliers	.239	**.807**	.161	3.336	.537	customers / suppliers
relationship with customers	.223	**.727**	.223	3.439	.592	customers / suppliers
suppliers and their status	.042	**.706**	.302	3.461	.583	customers / suppliers
customers and their status	-.012	**.623**	.378	3.671	.598	customers / suppliers
seniority of management	.181	**.506**	.234	3.390	.574	manager
experience in the sector	.128	**.497**	.234	3.342	.591	manager
networks of management	.251	**.456**	.274	3.277	.546	manager
Business and Management Leadership						
capability of management	.070	.107	**.590**	3.923	.575	manager
business plans/schedules	.035	.200	**.569**	3.977	.588	basis of organizations
traits of management	.078	.265	**.547**	3.748	.650	manager
establishment/duration of main business	.083	.375	**.509**	3.890	.581	business contents
management leadership	.220	.272	**.501**	3.494	.579	manager
management philosophy	.324	.173	**.496**	3.490	.573	basis of organizations
superiority of technologies	.118	.211	**.461**	3.884	.557	business contents
smooth management succession	.104	.231	**.445**	3.977	.548	manager
eigenvalue	6.973	2.709	1.227			
percent of variance	43.350%	16.840%	7.630%			
No. observations					310	

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Table 4 Description of the variables

Table 4 displays the description and sources of the dependent and independent variables. The (D) notation indicates a dummy variable. Nikkei stands for the Nikkei NEEDS-Financial QUEST by Nikkei Media Marketing, inc. FM stands for Financial Map in Japan by the Japan Financial News Co. Ltd. CD stands for Census Data by Ministry of Internal Affairs and Communications. DJFI stands for Directory of Japanese Financial Intermediations by the Japan Financial News Co. Ltd. LPS stands for Land Price Survey by Prefectural Governments, by Ministry of Land Infrastructure, Transport and Tourism. LS stands for Labor Statistics by Ministry of Health, Labour and Welfare. SAR stands for Statistical Annual Report by National Tax Agency.

Symbol	Description	
	Dependent Variables	**Source**
Loan Profitability$_i$	The ratio of interest income from loans and discounts to total assets of bank i in the period 2007.	Nikkei
Bad Loan Ratio$_i$	The ratio of bad loans to total assets of bank i at the end of 2007. Bad loan is balance of loans to bankruptborrowers (or in bankruptcy proceedings) under bank accounts reported in the statement of risk-controlled loans in Japan after 1997.	Nikkei
	Independent Variables	
	Bank Variables	
Organizational Systems$_i$	Organizational system, which is the one of three principal factors based on factor analysis for each of soft information items, is factor score of bank i. Soft information items are surveyed asking about degree of use in credit decision making by five likert-type scale (1= "Do not use at all", 5= "Considerably use") in 2007.	Survey data
Networks$_i$	Networks or alliances/partnerships, which is the one of three principal factors based on factor analysis for each of soft information items, is factor score of bank i in 2007.	Survey data
Business and Leadership$_i$	Business and Management leadership, which is the one of three principal factors based on factor analysis for each of soft information items, is factor score of bank i in 2007.	Survey data
Bank Size$_i$	Log of total assets of bank i at the end of 2007.	Nikkei
Growth of Size$_i$	Growth of total assets of bank i from 2006 to 2007.	Nikkei
Branch Ratio$_i$	The ratio of branches to total assets of bank i at the end of 2007 $\times$ 10^4.	
SMEs Lending Ratio$_i$	The ratio of SMEs lending to total lending of bank i at the end of 2007.	
Capital$_i$	Ratio of net assets to total assets of bank i at the end of 2007.	Nikkei
Local Share$_i$	Banks' local market share is based on loans share of local market of bank i at the end of 2007.	FM
Soft Collecting (D)	Dummy variable equal to 1 if bank i has a hearing sheet of soft information.	Survey data
Cooperative (D)	Dummy variable equal to 1 if bank i is a cooperative bank.	
Merger &HC(D)	Dummy variable equal to 1 if bank i experienced merger,or established a bank holding company between 2003 and 2007.	Annual Report
	Local Market Variables	
Herfindahl$_{ij}$	Herfindahl index of local market j computed on branches, based on the location of the bank i in 2006.	DJFI
Land Price$_{ij}$	Growth rate of land price of local market j is differences of log of land price between 2005 and 2006 , based on the location of the bank i.	LPS
Job Offers	Effective ratio of job offers (seasonally adjusted) to applicants of local market j, based on the location of the bank i in 2006.	LS
Number of Firms	Log of the number of firms in local market j, based on the location of the bank i in 2006.	SAR
Urban (D)	Dummy variable equal to 1 if the headquarter of bank i is in the area with the population of a millions or higher.	CD

Table 5 Descriptive Statistics

Variables	Mean	S. D.	Minimum	25th Pctile	median	75th Pctile	Maximum
Dependent variables							
Performance variables							
Loan Profitability	1.412	0.348	0.355	1.168	1.372	1.662	2.281
Bad Loan Ratio	7.051	3.449	2.129	4.387	6.190	8.742	23.244
InDependent variables							
measure of Soft Information							
Organizational System$_i$	0.003	0.949	-4.203	-0.181	0.245	0.413	2.242
Networks$_i$	0.012	0.900	-2.237	-0.669	-0.225	0.826	2.585
Business and Leadership$_i$	-0.00003	0.861	-2.134	-0.571	0.013	0.485	2.622
Bank Characteristics variables							
Bank Size$_i$	12.898	1.248	10.576	11.908	12.803	13.682	16.269
Groth Size$_i$	1.988	6.542	-7.513	-0.182	1.141	2.777	65.612
Local Share$_i$	6.549	10.483	0.042	1.010	2.111	5.700	48.300
SMEs Loan Ratio$_i$	87.686	8.564	58.959	82.954	89.972	93.865	99.983
Branch Ratio$_i$	0.824	0.388	0.174	0.547	0.806	0.998	2.571
Capital$_i$	8.080	4.785	0.580	4.850	6.810	10.130	31.300
Soft Collecting(D)	0.534	0.500	n/a	n/a	n/a	n/a	n/a
Cooperative (D)	0.238	0.426	n/a	n/a	n/a	n/a	n/a
Merger &HC(D)	0.143	0.351	n/a	n/a	n/a	n/a	n/a
Regional Characteristics variables							
Herfindahl$_{ij}$	0.152	0.070	0.049	0.080	0.142	0.216	0.295
Land Price$_{ij}$	1.511	7.076	-7.953	-3.572	-0.895	2.934	20.555
Job Offers	1.095	0.358	0.430	0.890	1.070	1.300	2.020
Number of Firms	10.859	0.995	9.216	9.965	10.654	11.686	13.272
Urban (D)	0.169	0.376	n/a	n/a	n/a	n/a	n/a
No. Observations	307						

Mean, standard deviation (S. D.), minimum, 25th pictile, medium, 75th pictile, and maximum values of performance, soft information, and bank variables for the period 2007, and local market variables for the period 2006. See Table 4 for a definition of the variables.

Table 6 Univariate Analysis of Performance as a Function of Use of Soft Information (High Use of Soft Information vs. Low Use of Soft Information)

High vs. Low (Dichotomized Groups)

Panel A Organizational Systems

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.4011	1.4232	-0.0221	0.5787	0.7106	0.2894
Bad Loan Ratio	7.2258	6.8751	0.3507	0.3738	0.1869	0.8131
No. observations	154	153				

Panel B Networks

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.4717	1.3522	0.1195	0.0025***	0.0012***	0.9988
Bad Loan Ratio	6.5157	7.5899	-1.0742	0.0062***	0.9969	0.0031***
No. observations	154	153				

Panel C Business and Leadership

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.4015	1.4228	-0.0212	0.5937	0.7031	0.2969
Bad Loan Ratio	6.9445	7.1582	-0.2137	0.5882	0.7059	0.2941
No. observations	154	153				

High vs. Low (Tertile Groups)

Panel A Organizational Systems

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.3898	1.4477	-0.0579	0.2040	0.8980	0.1020
Bad Loan Ratio	7.652836	6.93398	0.7188563	0.1046	0.0523*	0.9477
No. observations	123	109				

Panel B Networks

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.4772	1.3493	0.1279	0.0048***	0.0024***	0.9976
Bad Loan Ratio	6.6368	7.8942	-1.2575	0.0064***	0.9968	0.0032***
No. observations	123	109				

Panel C Business and Leadership

	High Factor Score μ_1	Low Factor Score μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1-\mu_2\neq0$	Ha: $\mu_1-\mu_2>0$ p-value	Ha: $\mu_1-\mu_2<0$
Loan Profitability	1.3967	1.3906	0.0061	0.8963	0.4481	0.5519
Bad Loan Ratio	7.1489	7.3305	-0.1815	0.7029	0.6486	0.3514
No. observations	123	109				

Table 7 Univariate Analysis of Performance as a Function of Competition (High Competition vs. Low Competition)

Panel A **High Competition vs. Low Competition (Dichotomized Groups)**

		High Competition	Low Competition		Ho: $\mu_1 - \mu_2 = 0$		
		μ_1	μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1 - \mu_2 \neq 0$	Ha: $\mu_1 - \mu_2 > 0$	Ha: $\mu_1 - \mu_2 < 0$
						p-value	
Performance	Loan Profitability	1.3522	1.4732	-0.1209	0.0022 ***	0.9989	0.0011 ***
	Bad Loan Ratio	6.2042	7.9146	-1.7104	0.0000 ***	1.0000	0.0000 ***
	No. observations	155	152				

Panel B **High Competition vs. Low Competition (Tertile Groups)**

		High Competiton	Low Competition		Ho: $\mu_1 - \mu_2 = 0$		
		μ_1	μ_2	$\mu_1 - \mu_2$	Ha: $\mu_1 - \mu_2 \neq 0$	Ha: $\mu_1 - \mu_2 > 0$	Ha: $\mu_1 - \mu_2 < 0$
						p-value	
Peformance	Loan Profitability	1.3577	1.5694	-0.2116	0.0000 ***	1.0000	0.0000 ***
	Bad Loan Ratio	5.7540	8.2643	-2.5103	0.0000 ***	1.0000	0.0000 ***
	No. observations	116	108				

Table 8 Univariate Analysis of Use level of Soft Information as a Function of Competition (High Competition vs. Low Competition)

Panel A High Competition vs. Low Competition(Dichotomized Groups)

		High Competition	Low Competition	Ho: $\mu_1 - \mu_2 = 0$		
		μ_1	μ_2	Ha: $\mu_1 - \mu_2 \neq 0$	Ha: $\mu_1 - \mu_2 > 0$	Ha: $\mu_1 - \mu_2 < 0$
						p-value
Organizational Systems	incentive system	2.742	2.815	0.275	0.863	0.137
	know-how of employees	3.271	3.199	0.308	0.154	0.846
	smoothness of management-labor relations	3.135	3.066	0.305	0.152	0.848
	in-firm improvement proposal system /the number of improvement	2.852	2.868	0.799	0.400	0.601
	personnel evaluation system	2.794	2.801	0.901	0.549	0.451
	enhancement level of corporate education	3.000	3.000	1.000	0.500	0.500
	situations of introduction of the IT system	3.058	3.040	0.774	0.387	0.613
	Factor Score	-0.017	0.023	0.713	0.643	0.357
Networks	career in the sector	3.381	3.318	0.352	0.176	0.824
	career of management	3.413	3.371	0.519	0.260	0.740
	networks of management	3.284	3.278	0.928	0.464	0.536
	customers and their status	3.742	3.609	0.052*	0.026**	0.974
	suppliers and their status	3.516	3.417	0.139	0.070*	0.931
	relationship with customers	3.426	3.470	0.510	0.745	0.255
	relationship with suppliers	3.329	3.358	0.640	0.680	0.320
	Factor Score	0.036	-0.010	0.658	0.329	0.671
Business and Leadership	capability of management	3.942	3.914	0.670	0.335	0.665
	leadership of management	3.355	3.384	0.637	0.682	0.318
	character of management	3.516	3.477	0.554	0.277	0.723
	management successor's presence	4.039	3.927	0.074*	0.037**	0.963
	superiority of technologies	3.845	3.934	0.164	0.918	0.082*
	superiority of main business	3.923	3.854	0.308	0.154	0.846
	management philosophy	3.497	3.490	0.919	0.459	0.541
	business schedules	3.961	3.993	0.636	0.682	0.318
	Factor Score	0.060	-0.059	0.228	0.114	0.886

Panel B High Competion vs. Low Competition(Tertile Groups)

		High Competition	Low Competition	Ho: $\mu_1 - \mu_2 = 0$		
		μ_1	μ_2	Ha: $\mu_1 - \mu_2 \neq 0$	Ha: $\mu_1 - \mu_2 > 0$	Ha: $\mu_1 - \mu_2 < 0$
						p-value
Organizational Systems	incentive system	2.733	2.879	0.071*	0.964	0.036**
	know-how of employees	3.317	3.271	0.590	0.295	0.705
	smoothness of management-labor relations	3.139	3.093	0.575	0.287	0.713
	in-firm improvement proposal system /the number of improvement	2.881	2.907	0.747	0.627	0.373
	personnel evaluation system	2.802	2.841	0.614	0.693	0.307
	enhancement level of corporate education	2.960	3.037	0.312	0.844	0.156
	situations of introduction of the IT system	3.069	3.103	0.661	0.669	0.331
	Factor Score	-0.009	0.124	0.318	0.841	0.159
Networks	career in the sector	3.406	3.327	0.363	0.181	0.819
	career of management	3.436	3.402	0.673	0.337	0.663
	networks of management	3.238	3.299	0.423	0.788	0.212
	customers and their status	3.782	3.598	0.025**	0.012**	0.988
	suppliers and their status	3.515	3.402	0.161	0.080*	0.920
	relationship with customers	3.406	3.430	0.771	0.614	0.386
	relationship with suppliers	3.287	3.364	0.292	0.854	0.146
	Factor Score	0.000	-0.035	0.783	0.392	0.608
Business and Leadership	capability of management	3.990	3.907	0.310	0.155	0.845
	leadership of management	3.406	3.402	0.958	0.479	0.521
	character of management	3.525	3.477	0.558	0.279	0.721
	management successor's presence	4.059	3.944	0.116	0.058*	0.942
	superiority of technologies	3.891	3.972	0.284	0.858	0.142
	superiority of main business	3.921	3.888	0.675	0.338	0.662
	management philosophy	3.505	3.523	0.820	0.590	0.410
	business schedules	3.901	3.972	0.400	0.800	0.200
	Factor Score	0.113	-0.039	0.190	0.095*	0.905

Table 9 Effects of Soft Information and Interbank Competition on Loan Profitability

	Control varibles	*Single Model*			*Full Model*	*Interaction Model*		
Variables	Coefficient (*t* statistics)	Coefficient (*t* statistics)			Coefficient (*t* statistics)	Coefficient (*t* statistics)		
Organizational Systems$_i$	-0.0193 *				-0.0219 *	-0.0244 **	-0.0274 **	-0.021 *
	(-1.65)				(-1.90)	(-2.13)	(-2.27)	(-1.85)
Networks$_i$		0.0437 ***			0.0413 ***	0.0433 ***	0.0394 ***	0.046 ***
		(3.63)			(3.49)	(3.53)	(3.38)	(3.81)
Business and Leadership$_i$			0.0344 **		0.0299 **	0.0285 *	0.0321 **	0.0303 **
			(2.30)		(2.01)	(1.93)	(2.10)	(2.07)
Organ.Systems×Networks$_i$						0.0207		
						(1.54)		
Organ.Systems×Busi.&Leader.							0.0240 *	
							(1.83)	
Networks$_i$ ×Busi.&Leader.								-0.0192
								(-1.63)
Joint test on Soft Information : *F* statistics(*p*-value)					*6.53(0.0003)* ***	*5.13(0.0005)* ***	*5.26(0.0004)* ***	*5.54(0.0003)* ***
Herfindahl$_{ij}$	1.1361 ***	1.1763 ***	1.1284 ***	1.1749 ***	1.2083 ***	1.2114 ***	1.1905 ***	1.2109 ***
	(3.97)	(4.09)	(4.01)	(4.12)	(4.27)	(4.26)	(4.17)	(4.29)
Bank Size$_i$	0.0032	0.0013	0.00013	0.0024	-0.0026	-0.0028	-0.00088	-0.0011
	(0.10)	(0.04)	(0.00)	(0.07)	(-0.08)	(-0.09)	(-0.03)	(-0.03)
Growth Size$_i$	-0.0097 *	-0.0094	-0.0102 *	-0.0102 *	-0.0102 *	-0.0103 *	-0.0101 *	-0.0104 *
	(-1.65)	(-1.59)	(-1.79)	(-1.75)	(-1.79)	(-1.79)	(-1.74)	(-1.83)
$\overline{(\text{Growth Size-Growth Size})}^2_i$	0.000049	0.000045	0.000069	0.000062	0.000074	0.000076	0.000072	0.000080
	(0.37)	(0.34)	(0.53)	(0.47)	(0.57)	(0.57)	(0.54)	(0.61)
Branch Ratio$_i$	0.3165 ***	0.3166 ***	0.3141 ***	0.3266 ***	0.3231 ***	0.3232 ***	0.3234 ***	0.3341 ***
	(3.44)	(3.47)	(3.62)	(3.71)	(3.90)	(3.93)	(4.00)	(3.93)
SMEs Loan Ratio$_i$	0.0143 ***	0.0144 ***	0.0142 ***	0.0139 ***	0.0140 ***	0.0138 ***	0.0137 ***	0.0139 ***
	(5.76)	(5.79)	(5.85)	(5.64)	(5.79)	(5.71)	(5.66)	(5.77)
Capital$_i$	-0.0195 ***	-0.0197 ***	-0.0194 ***	-0.0194 ***	-0.0194 ***	-0.0193 ***	-0.0201 ***	-0.0194 ***
	(-6.35)	(-6.44)	(-6.58)	(-6.23)	(-6.57)	(-6.53)	(-6.70)	(-6.53)
Local Share$_i$	-0.00103	-0.00089	-0.00103	-0.00102	-0.00086	-0.00102	-0.00105	-0.00068
	(-0.40)	(-0.34)	(-0.41)	(-0.40)	(-0.34)	(-0.41)	(-0.41)	(-0.27)
Land Price$_{ij}$	0.0019	0.0019	0.0026	0.0024	0.0030	0.0030	0.0028	0.0029
	(0.70)	(0.73)	(0.97)	(0.88)	(1.15)	(1.15)	(1.07)	(1.10)
Job Offers$_{ij}$	-0.3257 ***	-0.3219 ***	-0.3271 ***	-0.3257 ***	-0.3227 ***	-0.3273 ***	-0.3231 ***	-0.3162 ***
	(-7.76)	(-7.75)	(7.91)	(-7.75)	(-7.90)	(-7.95)	(-7.92)	(-7.70)
Number of Firms$_{ij}$	0.0748 ***	0.0764 ***	0.0718 ***	0.0766 ***	0.0753 ***	0.0745 ***	0.0745 ***	0.0758 ***
	(2.69)	(2.75)	(2.63)	(2.79)	(2.80)	(2.77)	(2.74)	(2.81)
Soft Collecting(D)	-0.0188	-0.0174	-0.0223	-0.0256	-0.0266	-0.0262	-0.0283	-0.0243
	(-0.72)	(-0.67)	(-0.87)	(-0.97)	(-1.03)	(-1.02)	(-1.10)	(-0.95)
Cooperative (D)	-0.3976 ***	-0.3962 ***	-0.3847 ***	-0.3981 ***	-0.3843 ***	-0.3847 ***	-0.3781 ***	-0.3819 ***
	(-8.18)	(-8.27)	(-8.14)	(-8.03)	(-8.10)	(-8.00)	(-8.04)	(-8.15)
Merger&HC (D)	0.0100	0.0080	0.0103	0.0115	0.0093	0.0096	0.0037	0.0099
	(0.25)	(0.21)	(0.26)	(0.30)	(0.25)	(0.26)	(0.10)	(0.26)
Urban (D)	0.0966 **	0.0990 **	0.0862 *	0.0933 **	0.0866 *	0.0916 **	0.0922 **	0.0904 **
	(2.00)	(2.08)	(1.83)	(1.99)	(1.90)	(2.01)	(2.02)	(1.99)
Const.	-0.2974	-0.3097	-0.2235	-0.2848	-0.2306	-0.2014	-0.2088	-0.2670
	(-0.51)	(-0.53)	(-0.40)	(-0.50)	(-0.42)	(-0.37)	(-0.39)	(-0.48)
No. observations	307	307	307	307	307	307	307	307
R Squere	0.627	0.630	0.639	0.634	0.647	0.649	0.651	0.650

Panel A Baseline Model and Interaction Model : Loan Profitability

Variables	Control variables	Single Model			Full Model
	Coefficient (*t* statistics)	Coefficient (*t* statistics)			Coefficient (*t* statistics)
Organizational Systems$_i$		-0.0254 * (-1.81)			-0.0284 ** (-2.00)
Organ. Systems×high_comp		0.0160 (0.62)			0.0211 (0.83)
Joint test : *F* statistics(*p*-value)		*1.77(0.1717)*			*2.09(0.1260)*
Networks$_i$			0.0246 * (1.82)		0.0249 * (1.77)
Networks×high_comp			0.0529 * (1.86)		0.0543 * (1.95)
Joint test : *F* statistics(*p*-value)			*7.17(0.0009)* ***		*7.59(0.0006)* ***
Business and Leadership$_i$				0.0130 (0.74)	0.0091 (0.48)
Busi.& Leader.×high_comp				0.0571 * (1.79)	0.0631 ** (2.03)
Joint test : *F* statistics(*p*-value)				*3.78(0.0241)* **	*4.36(0.0137)* **
Joint test on Soft Information : *F* statistics(*p*-value)					*2.67(0.0478)* **
Joint test on Local Competition : *F* statistics(*p*-value)					*2.36(0.0717)* *
Herfindahl$_{ij}$	1.1361 *** (3.97)	1.1820 *** (4.11)	1.1177 *** (3.97)	1.1497 *** (4.06)	1.1761 *** (4.19)
Bank Size$_i$	0.0032 (0.10)	0.0016 (0.05)	-0.0028 (-0.09)	-0.0048 (-0.15)	-0.0133 (-0.43)
Growth Size$_i$	-0.0097 * (-1.65)	-0.0093 (-1.56)	-0.0104 * (-1.84)	-0.0105 * (-1.81)	-0.0108 * (-1.89)
$\overline{(\text{Growth Size-Growth Size})}^2_i$	0.000049 (0.37)	0.000043 (0.32)	0.000071 (0.56)	0.000064 (0.49)	0.000079 (0.61)
Branch Ratio$_i$	0.3165 *** (3.44)	0.3179 *** (3.48)	0.3088 *** (3.50)	0.3186 *** (3.51)	0.3113 *** (3.59)
SMEs Loan Ratio$_i$	0.0143 *** (5.76)	0.0143 *** (5.76)	0.0142 *** (5.83)	0.0141 *** (5.58)	0.0141 *** (5.68)
Capital$_i$	-0.0195 *** (-6.35)	-0.0198 *** (-6.37)	-0.0201 *** (-6.86)	-0.0199 *** (-6.36)	-0.0208 *** (-6.99)
Local Share$_i$	-0.00103 (-0.40)	-0.00086 (-0.34)	-0.00062 (-0.25)	-0.00030 (-0.11)	0.00037 (0.15)
Land Price$_{ij}$	0.0019 (0.70)	0.0019 (0.72)	0.0026 (0.97)	0.0025 (0.92)	0.0032 (1.22)
Job Offers$_{ij}$	-0.3257 *** (-7.76)	-0.3227 *** (-7.73)	-0.3275 *** (-7.92)	-0.3266 *** (-7.81)	-0.3257 *** (-7.99)
Number of Firms$_{ij}$	0.0748 *** (2.69)	0.0771 *** (2.77)	0.0756 *** (2.76)	0.0774 *** (2.84)	0.0809 *** (3.02)
Soft Collecting(D)	-0.0188 (-0.72)	-0.0185 (-0.72)	-0.0215 (-0.85)	-0.0267 (-1.02)	-0.0293 (-1.18)
Cooperative (D)	-0.3976 *** (-8.18)	-0.3950 *** (-8.16)	-0.3817 *** (-8.09)	-0.3949 *** (-7.76)	-0.3752 *** (-7.62)
Merger&HC (D)	0.0100 (0.25)	0.0065 (0.17)	0.0108 (0.27)	0.0167 (0.43)	0.0139 (0.35)
Urban (D)	0.0966 ** (2.00)	0.0983 ** (2.07)	0.0642 (1.31)	0.0862 * (1.86)	0.0541 (1.15)
Const.	-0.2974 (-0.51)	-0.3189 (-0.55)	-0.2149 (-0.38)	-0.2102 (-0.36)	-0.1438 (-0.26)
No. observations	307	307	307	307	307
R Squere	0.627	0.630	0.643	0.638	0.658

Table 10 Effects of Soft Information and Interbank Competition on Bad loan ratio

	Panel A Baseline Model and Interaction Model : Bad Loan Ratio							
Variables	*Control varibles*	*Single Model*			*Full Model*	*Interaction Model*		
	Coefficient (*t* statistics)	Coefficient (*t* statistics)			Coefficient (*t* statistics)	Coefficient (*t* statistics)		
Organizational Systems$_i$		-0.2444			-0.2381	-0.2532	-0.2405	-0.2383
		(-1.37)			(-1.34)	(-1.38)	(-1.35)	(-1.34)
Networks$_i$			-0.1643		-0.1548	-0.1423	-0.1556	-0.1557
			(-0.96)		(-0.90)	(-0.80)	(-0.91)	(-0.90)
Business and Leadership$_i$				-0.0006	0.0265	0.0187	0.0275	0.0264
				(-0.00)	(0.16)	(0.11)	(0.16)	(0.15)
Organ.Systems×Netwarks						0.1249		
						(0.61)		
Organ.Systems×Busi.&Leader.							0.0105	
							(0.06)	
Networks$_i$×Busi.&Leader.								0.0039
								(0.02)
Jounit test on Soft Information : *F* statistics(*p*-value)					*0.80(0.4964)*	*0.65(0.6271)*	*0.61(0.6528)*	*0.60(0.6595)*
Herfindahl$_{ij}$	34.8551 ***	35.2828 ***	33.8476 ***	34.8514 ***	34.4802 ***	35.1270 ***	34.4628 ***	34.4522 ***
	(2.77)	(2.81)	(2.68)	(2.76)	(2.73)	(2.76)	(2.72)	(2.72)
Herfindahl$^2_{ij}$	-81.5189 **	-81.2500 **	-78.5182 **	-81.5100 **	-78.8006 **	-80.6281 **	-78.7665 **	-78.7217 **
	(-2.34)	(-2.35)	(-2.25)	(-2.33)	(-2.26)	(-2.30)	(-2.26)	(-2.25)
Bank Size$_i$	0.2340	0.2117	0.2488	0.2340	0.2251	0.2214	0.2262	0.2248
	(0.81)	(0.72)	(0.86)	(0.81)	(0.77)	(0.75)	(0.77)	(0.76)
Growth Size$_i$	-0.1692 **	-0.1655 **	-0.1672 **	-0.1692 **	-0.1641 **	-0.1643 **	-0.1640 **	-0.1640 **
	(-2.12)	(-2.07)	(-2.09)	(-2.12)	(-2.05)	(-2.04)	(-2.04)	(-2.05)
(Growth Size-$\overline{\text{Growth Size}}$)$^2_i$	0.0040 **	0.0040 **	0.0040 **	0.0040 **	0.0039 **	0.0039 **	0.0039 **	0.0039 **
	(2.53)	(2.51)	(2.47)	(2.53)	(2.46)	(2.45)	(2.45)	(2.45)
Branch Ratio$_i$	3.1659 ***	3.1735 ***	3.1775 ***	3.1658 ***	3.1915 ***	3.1884 ***	3.1928 ***	3.1892 ***
	(3.84)	(3.84)	(3.83)	(3.81)	(3.81)	(3.78)	(3.80)	(3.72)
SMEs Loan Ratio$_i$	0.0887 ***	0.0900 ***	0.0889 ***	0.0887 ***	0.0898 ***	0.0887 ***	0.0898 ***	0.0898 ***
	(3.87)	(3.90)	(3.88)	(3.87)	(3.90)	(3.81)	(3.88)	(3.89)
Local Share$_i$	0.0043	0.0063	0.0042	0.0043	0.0061	0.0052	0.0060	0.0060
	(0.18)	(0.26)	(0.17)	(0.18)	(0.25)	(0.21)	(0.24)	(0.24)
Land Price$_{ij}$	-0.0664 *	-0.0661 *	-0.0700 *	-0.0665 *	-0.0689 *	-0.0684 *	-0.0691 *	-0.0689 *
	(-1.88)	(-1.88)	(-1.94)	(-1.86)	(-1.92)	(-1.90)	(-1.91)	(-1.91)
Job Offers$_{ij}$	0.9294 *	0.9786 *	0.9366 *	0.9294 *	0.9838 *	0.9542 *	0.9839 *	0.9825 *
	(1.88)	(1.95)	(1.88)	(1.88)	(1.95)	(1.89)	(1.94)	(1.92)
Number of Firms$_{ij}$	0.1976	0.2186	0.2020	0.1975	0.2245	0.2233	0.2243	0.2242
	(0.64)	(0.70)	(0.64)	(0.64)	(0.71)	(0.71)	(0.71)	(0.71)
Soft Collecting(D)	-0.1278	-0.1127	-0.1162	-0.1277	-0.1071	-0.1032	-0.1082	-0.1076
	(-0.41)	(-0.36)	(-0.37)	(-0.40)	(-0.33)	(-0.32)	(-0.33)	(-0.33)
Cooperative (D)	2.3998 ***	2.4131 ***	2.3526 ***	2.3998 ***	2.3679 ***	2.3663 ***	2.3696 ***	2.3675 ***
	(4.76)	(4.76)	(4.56)	(4.75)	(4.57)	(4.59)	(4.56)	(4.56)
Merger&HC (D)	0.3670	0.3424	0.3628	0.3670	0.3406	0.3440	0.3383	0.3404
	(0.69)	(0.65)	(0.68)	(0.69)	(0.65)	(0.66)	(0.65)	(0.65)
Urban (D)	-0.2058	-0.1741	-0.1638	-0.2058	-0.1382	-0.1101	-0.1356	-0.1389
	(-0.48)	(-0.39)	(-0.37)	(-0.48)	(-0.31)	(-0.25)	(-0.30)	(-0.31)
Const.	-14.0802 ***	-14.3039 ***	-14.2519 ***	-14.0802 ***	-14.4601 ***	-14.3191 ***	-14.4650 ***	-14.4490 ***
	(-2.79)	(-2.82)	(-2.81)	(-2.78)	(-2.84)	(-2.81)	(-2.84)	(-2.81)
No. observations	307	307	307	307	307	307	307	307
R Squere	0.471	0.475	0.472	0.471	0.477	0.477	0.477	0.477

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(Table 10 Continue)

Panel B Joint Effects of Soft Information and Competition : **Bad Loan Ratio**

Variables	Control varibles	Single Model			Full Model
	Coefficient (t statistics)	Coefficient (t statistics)			Coefficient (t statistics)
Organizational Systems$_i$		-0.3377 (-1.34)			-0.3267 (-1.29)
Organ. Systems×high_comp		0.2422 (0.72)			0.2384 (0.70)
Joint test : F statistics		*1.01(0.3657)*			*0.93(0.3949)*
Networks$_i$			-0.323 (-1.42)		-0.3119 (-1.33)
Networks×high_comp			0.442 (1.30)		0.4334 (1.25)
Joint test : F statistics			*1.11(0.3297)*		*0.99(0.3716)*
Business and Leadership$_i$				-0.0568 (-0.24)	0.0394 (0.16)
Busi.& Leader.×high_comp				0.1505 (0.48)	0.0461 (0.14)
Joint test : F statistics				*0.13(0.8770)*	*0.09(0.9123)*
Jouint test on Soft Information : F statistics(p-value)					*1.04(0.3759)*
Jouint test on Local Competition : F statistics(p-value)					*0.66(0.5770)*
Herfindahl$_{ij}$	34.8551 *** (2.77)	34.3819 *** (2.73)	33.8665 *** (2.69)	35.0636 *** (2.75)	33.8436 *** (2.66)
Herfindahl$^2_{ij}$	-81.5189 ** (-2.34)	-78.3693 ** (-2.27)	-78.7097 ** (-2.26)	-82.2844 ** (-2.34)	-76.7958 ** (-2.18)
Bank Size$_i$	0.2340 (0.81)	0.2207 (0.74)	0.2303 (0.79)	0.2157 (0.73)	0.2094 (0.69)
Growth Size$_i$	-0.1692 ** (-2.12)	-0.1640 ** (-2.04)	-0.1701 ** (-2.11)	-0.1703 ** (-2.12)	-0.1663 ** (-2.04)
(Growth Size-$\overline{\text{Growth Size}}$)$^2_i$	0.0040 ** (2.53)	0.0040 ** (2.50)	0.0040 ** (2.46)	0.0040 ** (2.53)	0.0039 ** (2.43)
Branch Ratio$_i$	3.1659 *** (3.84)	3.2012 *** (3.83)	3.1560 *** (3.77)	3.1501 *** (3.78)	3.2009 *** (3.75)
SMEs Loan Ratio$_i$	0.0887 *** (3.87)	0.0896 *** (3.86)	0.0899 *** (3.88)	0.0896 *** (3.89)	0.0904 *** (3.83)
Local Share$_i$	0.0043 (0.18)	0.0066 (0.27)	0.0081 (0.33)	0.0064 (0.26)	0.0108 (0.42)
Land Price$_{ij}$	-0.0664 * (-1.88)	-0.0671 * (-1.89)	-0.0699 * (-1.94)	-0.0660 * (-1.85)	-0.0692 * (-1.90)
Job Offers$_{ij}$	0.9294 * (1.88)	0.9690 * (1.95)	0.9367 * (1.88)	0.9274 * (1.88)	0.9730 * (1.93)
Number of Firms$_{ij}$	0.1976 (0.64)	0.2239 (0.72)	0.2394 (0.75)	0.2026 (0.65)	0.2702 (0.84)
Soft Collecting(D)	-0.1278 (-0.41)	-0.1323 (-0.41)	-0.1153 (-0.36)	-0.1316 (-0.41)	-0.1325 (-0.41)
Cooperative (D)	2.3998 *** (4.76)	2.4293 *** (4.83)	2.3600 *** (4.55)	2.4035 *** (4.76)	2.3914 *** (4.61)
Merger&HC (D)	0.3670 (0.69)	0.3171 (0.59)	0.3698 (0.70)	0.3823 (0.71)	0.3292 (0.62)
Urban (D)	-0.2058 (-0.48)	-0.1810 (-0.41)	-0.3435 (-0.73)	-0.2242 (-0.51)	-0.3305 (-0.68)
Const.	-14.0802 *** (-2.79)	-14.4028 *** (-2.83)	-14.4876 *** (-2.86)	-13.9881 *** (-2.76)	-14.7587 *** (-2.90)
No. observations	307	307	307	307	307
R Squere	0.471	0.476	0.475	0.471	0.480

Table 11 Panel Data Analysis

Panel A Baseline Model and Interaction Model

Variables	Loan Profitability — Control variables	Single Model	Single Model	Single Model	Full Model	Interaction Model	Interaction Model	Interaction Model	Bad Loan Ratio — Control variables	Single Model	Single Model	Single Model	Full Model	Interaction Model	Interaction Model	Interaction Model
	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)
Organizational Systems$_i$	-0.0187 (-1.33)				-0.0213 (-1.54)	-0.0242 * (-1.79)	-0.0257 * (-1.81)	-0.0203 (-1.47)	-0.2531 * (-1.66)				-0.2471 (-1.62)	-0.2840 * (-1.83)	-0.2532 (-1.60)	-0.2533 * (-1.66)
Networks$_i$			0.0457 *** (3.16)		0.0435 *** (3.07)	0.0457 *** (3.14)	0.0420 *** (2.96)	0.0485 *** (3.34)			-0.1453 (-0.89)		-0.1312 (-0.79)	-0.1026 (-0.61)	-0.1332 (-0.81)	-0.1633 (-0.96)
Business and Leadership$_i$				0.0306 * (1.86)	0.0254 (1.57)	0.0237 (1.46)	0.0271 (1.67)	0.0255 (1.59)				-0.0458 (-0.27)	-0.0197 (-0.11)	-0.0410 (-0.24)	-0.0174 (-0.10)	-0.0209 (-0.12)
Organ.Systems×Networks						0.0226 (1.40)								0.2948 (1.61)		
Organ.Systems×Busi.&Leader.							0.0192 (1.27)								0.0277 (0.18)	
Networks$_i$×Busi.&Leader.								-0.0222 (-1.44)								0.1412 (0.85)
Jouint test on Soft Information : χ^2 statistics (p-value)					13.87(0.0031) ***	15.46(0.0038) ***	15.15(0.0044) ***	16.15(0.0028) ***					3.38(0.3370)	5.4(0.2487)	3.4(0.4932)	4.24(0.3744)
Herfindahl$_{ij}$	0.6024 ** (2.47)	0.6225 ** (2.54)	0.6115 ** (2.53)	0.6233 *** (2.57)	0.6523 *** (2.70)	0.6501 *** (2.69)	0.6521 *** (2.70)	0.6585 *** (2.73)	13.973 (1.54)	14.164 (1.56)	13.809 (1.52)	13.811 (1.52)	13.926 (1.53)	14.811 (1.63)	13.856 (1.52)	13.484 (1.48)
Herfindahl$^2_{ij}$									-25.878 (-0.94)	-25.255 (-0.91)	-25.212 (-0.91)	-25.511 (-0.92)	-24.476 (-0.88)	-27.225 (-0.98)	-24.365 (-0.88)	-23.269 (-0.84)
No. observations	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227
Wald test : χ^2 statistics	838.05 ***	845.81 ***	831.67 ***	843.82 ***	849.31 ***	876.63 ***	853.45 ***	857.45 ***	543.06 ***	542.93 ***	546.75 ***	549.63 ***	551.86 ***	561.07 ***	551.66 ***	561.37 ***

(Table 11 Continue)

Panel B Joint Effects of Soft Information and Competition

Variables	Loan Profitability					Bad Loan Ratio				
	Control varibles	Single Model			Full Model	Control varibles	Single Model			Full Model
	Coefficient (z statistics)	Coefficient (z statistics)			Coefficient (z statistics)	Coefficient (z statistics)	Coefficient (z statistics)			Coefficient (z statistics)
Organizational Systems$_i$		-0.0164 (-1.16)			-0.0214 (-1.56)	-0.3605 ** (-2.07)				-0.3605 ** (-2.07)
Organ. Systems×high_comp		-0.0058 (-0.64)			0.0013 (0.14)	0.2660 (1.37)				0.2869 (1.47)
Jouint test : χ² statistics (p-value)		*2.03(0.3625)*			*2.44(0.2957)*	*4.46(0.1076)*				*4.55(0.1029)*
Networks$_i$			0.0373 ** (2.40)		0.0373 ** (2.43)			-0.1730 (-0.87)		-0.1562 (-0.75)
Networks×high_comp			0.0231 * (1.81)		0.0199 (1.50)			0.0759 (0.31)		0.0832 (0.33)
Jouint test : χ² statistics (p-value)			*14.53(0.0007) ****		*13.63(0.0011) ****			*0.81(0.6662)*		*0.59(0.7433)*
Business and Leadership$_i$				0.0224 (1.34)	0.0186 (1.12)				-0.0855 (-0.43)	-0.0461 (-0.22)
Busi.& Leader.×high_comp				0.0220 ** (2.06)	0.0210 * (1.88)				0.1063 (0.56)	0.1141 (0.57)
Jouint test : χ² statistics (p-value)				*7.65(0.0219) ***	*6.45(0.0397) ***				*0.34(0.8451)*	*0.34(0.8419)*
Jouint test on Soft Information : χ² statistics (p-value)					*9.83(0.0201) ****					*5.19(0.1584)*
Jouint test on Local Competition : χ² statistics (p-value)					*8.00(0.0461) ***					*2.46(0.4823)*
Herfindahl$_{ij}$	0.6024 ** (2.47)	0.6206 ** (2.53)	0.6118 ** (2.55)	0.6296 *** (2.61)	0.6683 *** (2.80)	13.9734 (1.54)	14.147 (1.56)	13.785 (1.52)	13.837 (1.52)	13.951 (1.54)
Herfindahl$^2_{ij}$						-25.8784 (-0.94)	-24.738 (-0.90)	-25.146 (-0.91)	-25.628 (-0.93)	-24.090 (-0.87)
No. observations	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227
Wald test : χ² statistics	838.05 ***	847.61 ***	850.68 ***	852.92 ***	882.82 ***	543.06 ***	545.16 **	546.66 ***	551.21 ***	555.51 ***