“Loan policy and bank performance: evidence from Taiwan”

AUTHORS	Hsien-Chang Kuo Lie-Huey Wang Yi-Hsun Lai Shuhui Yu Chinfu Wu

ARTICLE INFO	Hsien-Chang Kuo, Lie-Huey Wang, Yi-Hsun Lai, Shuhui Yu and Chinfu Wu (2010). Loan policy and bank performance: evidence from Taiwan. *Banks and Bank Systems*, *5*(2)
RELEASED ON	Friday, 14 May 2010
JOURNAL	"Banks and Bank Systems"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
0	**0**	**0**

Hsien-Chang Kuo (Taiwan), Lie-Huey Wang (Taiwan), Yi-Hsun Lai (Taiwan), Shuhui Yu (Taiwan), Chinfu Wu (Taiwan)

Loan policy and bank performance: evidence from Taiwan

Abstract

This study aims to investigate the impact of IT loans on the performance of banks. Using panel data covering the period from 1998 to 2002, the results of the empirical analysis indicate that such IT loans have a significant negative influence as banks increase their loan ratios to the IT industry. The implications are that, during a macroeconomic downturn, banks will suffer losses if they abruptly offer loans to the IT industry and do not handle such business appropriately. Besides, this study also finds that there is a positive correlation between the consumer loan ratio and bank performance, suggesting that it is beneficial for banks to exploit the consumer loans market. Conversely, we find that the changes in the political and economic environment have a negative effect on the performance of banks during the year 2000, which lies in the middle of the sample period.

Keywords: loan policy, bank performance, IT industry, IT loan, consumer loan.
JEL Classification: C23, G21, G32.

Introduction

The role of a bank in a financial market is that of a financial intermediary, which makes use of loan and deposit services to effectively channel the idle funds of the general public into valuable production and other investment projects. As indirect finance is still the major funding channel for enterprises, banks through their intermediation bridge the gap between the supply and demand for funds, thereby reducing the costs of exchange, and efficiently supervising the capital utilization of the enterprises. In addition, banks play a key role in the development of the overall economy of the society as it creates profit for itself.

In recent years, we have observed that the financial institutions in Taiwan have faced the double predicament of a decline in credit business and an increase in nonperforming loans (NPLs). For example, in February 2001, the total loans of the Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank, and Chang Hwa Commercial Bank slid to a new 22 month-low. As for the loan-deposit ratios in recent years, we find that the loan-deposit ratio for all banks was 87.90% in 1997, but was only 72.66% in 2002, indicating that the banks have not been doing well in the loan market.

In the 1990s, the lifting of restrictions on the establishment of new banks in Taiwan, along with existing financial institutions being allowed to engage in banking business, resulted in an increasingly large number of banks and especially fierce competition in Taiwan's financial markets. However, in recent years, as the investment environment has deteriorated, traditional industries have hollowed out and the incomes of the general populace have decreased, there has been a significant decline in the ability of industry to purchase or upgrade mechanical equipment and people have been less willing to consume. This has resulted in a fall in the demand for loans. In addition to the influence of the external environment upon the demand for loans, the government's request for risk controls has also indirectly frustrated the loan decisions of banks that have higher debt ratios (Lown and Peristiani, 1996; Berger and Udell, 1994). In terms of the high NPLs ratios, the statistical data clearly show that the banks in Taiwan are facing high pressure in this regard. For instance, the NPLs ratio for Taiwan's financial institutions greatly increased from 3% in 1995 to 6.84% in 2002, reaching a peak of 8.78% in the first quarter of 2002. Using the domestic banks (see Table 1) as an illustration, there is no doubt that the domestic banks are characterized by low profitability and high NPLs ratios.

From the perspective of industries, we find that Taiwan's industries are undergoing a transformation from traditional industries to high-technology industries (IT industries). In the 1990s, the market value of listed IT firms was only 2.7% of total listed firms; in 1995, it had increased to 13.4%; and in 1999, it was 54.2%. From 1994 to 1999, the average annual growth rate of the IT industry was 19.03%, and the ratio of its market value among manufacturing industries increased from 15.83% to 28.99%; moreover, it ranked fifth among the world's leading IT industries. This transformation was a showcase for the rapid transformation and the superiority of Taiwan's development in the IT industry. Furthermore, the government in Taiwan has actively allocated resources and industrial strategies into its "Two Trillion, Twin Stars" project. On the one hand, it is enhancing the existing superior industries (including the semiconductor and TFTLCD industries), and expects that the output production value of these industries will reach a total value of two trillion NT dollars, thereby making it the third largest IT industry in the world; this is the so-called "Two Trillion" project. On the other hand, it aims to continue to build upon the superior research, development talent and social environment that Taiwan has as a foundation, in order to develop global star industries, such as

its digital content industry and bio-technology industry, which is referred to as the "Twin Stars" project. As the government and the general public set these plans into action, and inject resources into the "Two Trillion, Twin Stars" project, it is expected that the process of transforming Taiwan's industry will be accelerated.

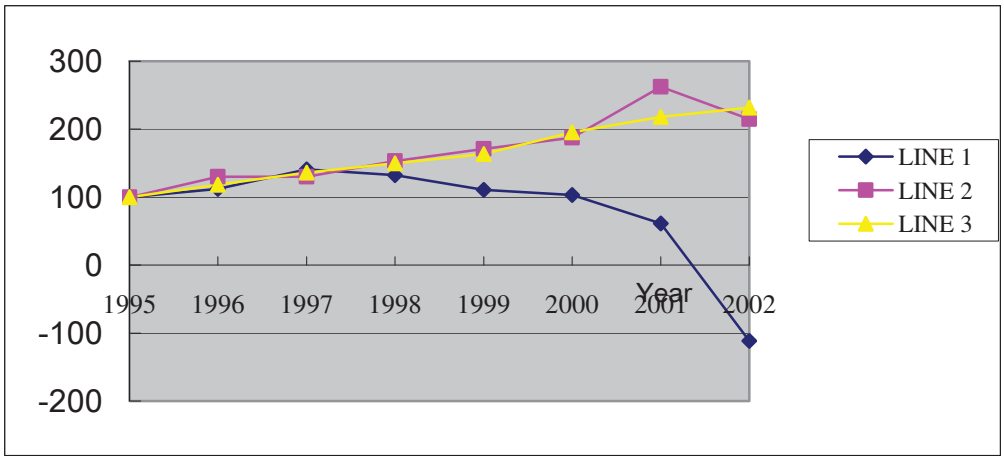
Table 1. Financial data of domestic banks in Taiwan (1998-2002)

Financial data of domestic banks in Taiwan from 1998 to 2002. The data are taken from Statistics Office of the Bureau of Monetary Affairs, Ministry of Finance, *Financial Statistics* and *Financial Statistics Index*.

Item	1998	1999	2000	2001	2002
Annual total assets (million NT)	175,479	192,601	207,751	217,408	220,970
Return on total assets	0.7	0.54	0.46	0.26	-0.47
Net income rate	9.57	8.01	7.27	4.5	-10.57
Nonperforming loans ratio	4.37	4.88	5.34	7.48	6.12

Since the transformation of Taiwan's industries started to take place, the IT industry has gradually replaced traditional industry as the primary driving force of economic development. Through the extension of loans to the IT industry, banks can generate profits, sustain themselves, and allocate further funds to the industry, which will enable the industry to gain enough funds for investment and will help develop the economy as a whole. Nevertheless, since the industry started to be transformed, the profitability of banks has decreased as a whole (see Figure 1).

From Figure 1 we can see that during the industrial transformation and the development of the IT industry, the profitability and loan quality of the banks continuously worsened. It may have been caused by the special characteristics of the IT industry. While the IT industry has experienced a very rapid pace of change, a big requirement for investment and a long return period compared to the traditional industry, it has encountered much greater risk than traditional industries. Meanwhile, many firms in the new technology industries do not have enough collateral, and therefore, banks have to worry about NPLs and bad debts when lending to the IT industry. The loss may lead to potential bankruptcy. Therefore, the dilemma between profitability and potential loss causes banks to hesitate in their lending policies.



Notes: The data are taken from *Financial Statistics Monthly, Republic of China* (Taiwan), published by the Economic Research Department, Central Bank of the Republic of China (Taiwan), and the Taiwan Economic Journal Data Bank. Line 1 is the domestic banks' earning deflator; line 2 is the domestic banks' NPL ratio deflator; and line 3 is the IT firms' market value to all listed firms' market value deflator (the deflator is 100 in 1995).

Fig. 1. Domestic banks and IT industry development

When banks make the maximization of profitability their target, loan policy takes into consideration the competitiveness and resources of a bank to determine how many resources it will allocate to its credit departments, or how much funding each credit branch (e.g., in terms of business loans, consumer loans, etc.) can have. Under limited bank resources, the quality of the bank's loan policy determines the ability of the bank to achieve its goal. This study does not evaluate the quality of bank loan policy by observing the history of its strategy. It rather analyzes the profitability of different loan combinations, and the kinds of borrower that can help the bank achieve maximum profit, as it seeks to further discuss whether a bank should reallocate its business resources and change its loan policy to achieve or accelerate the achievement of its goals. This study analyzes the effects of loan policy toward the IT industry on the banks' operating performance, and hopes to answer the question as to whether banks in Taiwan should increase their loans to the IT industry in order to maximize their profits.

This study seeks to clarify whether loans to the IT industry can become the primary source of profit for banks from the perspective of protecting the financial

markets and promoting economic development. If the results show that the increase in the flows of capital between financial institutions and the IT industry will boost the profitability of financial institutions, it becomes clear that this kind of loan policy should be implemented. The reinforcement of the loan relationships between banks and the IT industry will be significant for the stability of the financial market and the development of the economy. On the contrary, if the results show that increasing loans to the IT industry will result in a loss, banks should either be more actively seeking other sources of profit or reevaluating and readjusting the existing structure of interactions with industries in order to increase profitability and reduce their bad debts.

In addition, this study also discusses the loan ratio in relation to a bank's assets: even though loan services are the main sources of income of banks, banks can still allocate their resources. Besides loans, banks also handle bonds and securities investments. In particular, since the rise of the bond market, the bonds that banks possess have increased significantly (from 1998 to 2002 that growth has almost doubled). It, thus, needs to be asked whether allocating assets to loan services would result in profitability. The inclusion of the loans to total assets ratio in this study helps us to understand whether banks' resources in terms of loan services are beneficial for creating the banks' profitability.

The remainder of this article is organized as follows. Section 1 discusses previous studies, highlighting those studies related to loan policies and the banks' performance. Section 2 explains the variables that this study adopts and introduces the methodology and the model specifications. Section 3 presents the analysis and discusses the empirical results. The final section provides the conclusions.

1. Literature review

Since the loan spread is the basic source of profit for banks, the banks' loan policies are closely tied to their operating performance. Many scholars in discussing the optimal loan policies make the maximization of the banks' profitability their primary goals.

Pringle's (1974) assumption was based on the borrowers and interest rates remaining unified, so that banks could earn profit by controlling the amount of loans and investing in government bonds, to set the target function as in the case when banks pursued the goal of maximizing private wealth. Pringle deduced that the optimal loan policies (the amount of the loans), would be affected by the spread of deposits (minus the risk-free rate of interest), the spread of loans, the amount of the deposits in the next period, and the capital of the bank. The study emphasized that the risk-free rate of interest did not influence the bank's decision regarding the amount of the loans. Graddy and Kyle (1979) also started with the equation on the balance sheet, and concluded that the amount of loans, deposits, bank capital and labor cost were factors that were significant to a bank's profitability. In addition, Molyneux et al. (1998), under the assumption that managers of banks pursued to maximize profitability, minimize risk, and maximize expected utility, deduced that the two major factors influencing a bank's amount of loans were the profitability of the loans and the risk faced by the bank itself.

Besides making theoretical deductions, scholars have also empirically discussed the influence of the amount of loans on a bank's operating performance. Taking Molyneux et al. (1998) as an example, in that paper they discussed how loan behavior affects bank performance, utilizing the data for foreign banks in the United States from the first quarter of 1990 to the third quarter of 1992. With the 2SLS method, they found that with the return on total assets (ROA) as the proxy variable for operating performance, when the amounts of the loans increase, the bank's performance is significantly positively affected. Graddy and Kyle (1979) made use of the sample data for 463 commercial banks in 1974, and adopted OLS and 3SLS estimations to find that, when banks raised the amount of the loans in their assets, at the 0.01 significance level, doing so would have a significantly positive influence on the labor costs ratio (labor cost to total assets). Kwan (2002) examined the banks in 7 Asian countries (Hong Kong, Indonesia, South Korea, Malaysia, Philippines, Singapore, and Thailand) from 1992 to 1999, using regression analysis, and empirically found that when banks increased the amount of their loans in earning assets, at the 0.01 significance level, they would significantly and positively influence the labor cost ratio (the labor cost to earning assets). This conclusion is in agreement with Graddy and Kyle (1979).

In financial markets, the conditions of borrowers are not identical; therefore, in addition to the banks' decisions as to the amounts of the loans, the targets of the loans and their condition are also important factors related to bank performance. By understanding the borrower, the risk premium can be ascertained, and the profit erosion from bad debts can be decreased. Basically borrowing can be categorized as consisting of business loans and consumer loans. With differences in time periods, regions, and subjects of study, scholars categorize the amounts of the loans, and then discuss the influence of different types of loans on bank performance. For example, Fraser et al. (1974) used American banks in 1969 and 1970 as the study sample, and applied canonical

correlation analysis to find that the composition of loans (the ratio of different types of loans including real estate, agriculture, consumer and business loans) would significantly affect the bank at the 0.01 significance level.

In addition, Arshadi and Lawrence (1987), based on Graddy and Kyle's (1979) research, divided the factors that influenced bank performance into seven types, including cost, structure, loan composition, deposit composition, regional factors, economic conditions and scale. The loan composition type categorized the total amount of loans into real-estate loans, agricultural loans, consumer loans and business loans. Through the categorization, their study empirically analyzed new banks in America from 1980 to 1984 (the purpose of the study was to discuss the influence of the factors on bank performance after the new banks had entered the market), using canonical correlation analysis. It was found that the above-mentioned factors did exhibit a significant correlation with operating performance. Furthermore, different types of loan and bank performance had different degrees of correlation. For example, the study empirically found that agricultural loans and business loans were significantly negatively correlated with operating performance, and the authors reached the conclusion that loan composition directly influenced bank performance.

The meaning of a functional policy under a loan policy is that, when the bank makes a loan policy decision to allocate resources to different departments, each department can, based on the direction of the policy, design functional policies to assist in the execution of the loan policy and attain profitability. For instance, by observing the borrowers, it may be possible to decrease risk and loss associated with the loan. Glover (1939) once categorized the factors that should be taken into consideration in lending into nine items, including expecting a future surplus, the financial statement of the borrower, additional conditions, such as collateral, the business management of the borrower, the business operations of the borrower, the purpose of the loan, the relationship with the borrower, the scale of the borrower's business, and the term of the loan, and stated that the banks should reinforce their understanding of these factors to increase executive capability. In addition, Kuo (2001) further introduced a support system to the loan policy, as a result of which the data of the borrower (such as the financial, managerial, and economic aspects) were put into the system to scientifically increase the quality of the loans and the profitability of banks.

In addition to the above-mentioned discussions of loan policy and bank performance in terms of the amounts of the loans and the types of loans, there are other studies that regard NPLs as an explicit factor of the severity of the loan policy, the reason being that the amount of the loans is sometimes determined by the external factors of the environment, and not necessarily by the willingness of the manager to take risks. However, when a bank chooses a high-risk loan policy, it should reasonably reflect on the higher amount of bad loans, and create a positive influence on the performance of the bank. This is referred to as the policy hypothesis by scholars. Jordan (1998) took the new banks in England from 1989 to 1992 as his sample to test the hypothesis. The study used cost efficiency and profit efficiency as proxy variables for bank performance. Through examination, he found that the amount of bad loans did have a significant positive correlation with profitability, proving that the effect of the policy hypothesis did exist. In other words, assuming that the hypothesis is valid, when banks have high NPLs, it means that they have easier loan policies, or are more willing to engage in loan services. The above-mentioned hypothesis indicates the existence of this effect, but it is worth noting that Berger and Robert (1997) once created three different hypotheses as to the causes of bad loans, namely, bad luck, bad management, and skimping and moral-hazard. Skimping meant that, in the pursuit of high performance, the resources on monitoring were reduced, which resulted in a high NPLs ratio. Although the phenomenon of a high NPLs ratio and a high return did occur, its direction of influence was directly opposite to that of the policy hypothesis; the two hypotheses did not contradict each other.

Meanwhile, interest rates on loans can reflect the preferences of a bank's lending policy. Liew (1970) thought that when interest rates for loans increased, profitability would increase, and would cause a bank to increase its preference for risks, thus resulting in an easier loan policy (when interest rates for loans increase, the debtor's risks also increase, resulting in a higher probability of default). Conversely, Lown and Peristiani (1996) thought that when banks tried to reduce loans, they would also increase interest rates to increase the difficulties for the borrowers. Nonetheless, in an empirical analysis of the relationship between loans and interest rates, Hannan (1991) found that whatever the amount of the loan was, the interest rate and the amount of the loan exhibited a significant negative correlation. The empirical finding of Lown and Peristiani (1996) exhibited significant positive correlations in small banks, and insignificant negative correlations in large banks, indicating that the two loan policies had a mixed influence on the interest rate.

From the previous literature we may clearly see that there are many different factors related to the differences in banks' lending policies. Different

lending policies (severeness, composition) have different effects on bank performance. However, the previous literature rarely studies the influence of loan policies on bank performance in a country that is transforming its industries from traditional industries to IT industries. When we find that Taiwan faces the problem of low performance for banks and the transformation of industry, we consider the loan policies of banks towards the IT industry and their relationship with performance. On the one hand, it discusses the aspects that the previous studies have rarely touched upon; on the other hand, it provides appropriate suggestions for banks in the face of today's dilemma. We trust that this study will be valuable and will contribute to related studies.

2. The method

2.1. Variables. *2.1.1. Bank performance variables.* The purpose of this study is to discuss the relationship between loan policies and bank performance. There are many factors involved in measuring bank performance. The performance referred to in this study is operating performance, i.e., banks are evaluated from the perspective of profitability. The important consideration for loan policies concerns whether banks in Taiwan will increase the ratio of loans to the IT industry, which has higher risk. In terms of the explanatory variable, the return on total assets (ROA) and the return on equity (ROE) serve as the proxy variables for bank performance (Arshadi and Lawrence, 1987; Bourke, 1989; Webster, 1997; Jordan, 1998; Molyneux et al., 1998; Joyce, 2001; Sigler and Porterfield, 2001).

2.1.2. Loan policy variables. The loan policy variables include the loan policies of banks toward the IT industry, the consumer loan ratio, as well as the total loans to total assets ratio. Through the design of the above-mentioned variables, the analysis is expected to indicate whether increasing the loan ratio and amount for the IT industry, increasing the consumer loan ratio, and utilizing assets in loan services can effectively increase the bank's profitability, i.e., the analysis of the adjustment of the loan policy following the transformation of industry.

(1) IT loan ratio

While discussing the relationship between borrowers and bank performance, the purpose is to understand the bank's allocation of funds for loans. When the borrowers are different, there will be differences in terms of bank performance. In terms of the loans, many previous studies used "the loans for specific borrowers to total loans" as a proxy variable for this decision (Fraser and Rose, 1971; Fraser et al., 1974; Arshadi and Lawrence, 1987). Some scholars have also elected to use "the loans for specific borrowers to total assets" as the proxy variable (Graddy and Kyle, 1979). The difference is that the latter variable takes into consideration the bank's asset allocation policy and loan policy at the same time. This study uses "the loans to the IT industry to total loans" (IT loan ratio) as the proxy variable. Its function is to discuss whether the IT industry has a more significant influence than other borrowers when banks select borrowers. Of course, when banks do not have other ideal borrowers, whether or not lending to the IT industry can result in profitability is also an important issue.

(2) Consumer loan ratio

With the decreases in the traditional industry's demand for funds, banks can try to increase profitability not only through increasing loan services for the IT industry, but also by extending the consumer loan market. Increasing the consumer loan ratio is also one of the banks' main loan policies in recent years. The consumer loans have continued to reach new highs in recent years, and the consumer loan ratio has increased from 32.81% in 1997 to 37.61% in 2001. It is mainly caused by not only traditional personal loan services, but also the proliferation of credit cards and cash cards. Since Makto Bank first started to provide this service, 30 financial institutions have begun to offer cash card services. Compared to the high risk and uncertainty of loans in the IT industry, whether increasing amount of consumer loans and the consumer loan ratio (consumer loans to total loans) should be included in banks' lending policies to increase profitability or not will be empirically analyzed in this study. In this study, in order to analyze the influence of the newly-launched consumer loan services on bank performance, the consumer loans in this study will exclude mortgages as well as car, housing and welfare loans for the sake of accuracy in this study.

(3) Total loans to total assets ratio (Loan ratio)

To examine the allocation of bank assets, this study also applies "total loans to total assets" (the loan ratio) as the proxy variable for the asset allocation policy. The meaning of this variable involves measuring the allocation of bank assets, and it also reflects the risk faced by the bank. When this ratio is higher, it means that banks will be more enthusiastic in offering loans to the general public instead of letting them remain unused or using them to purchase securities, which have much higher risk. Under the basis of high risk and high returns, increasing the total loans to total assets ratio should have a positive influence on bank performance; however, if the risk management is ineffective, which causes the NPLs ratio to be too high and erodes profitability, the result will be negative. Molyneux et al. (1998) empirically found that the

foreign banks in America were in a situation where the loan ratio was significantly negatively correlated with the ROA.

2.1.3. Bank's structure variables. The bank's structural factors in this study include the debt ratio, the bank scale, and the number of bank branches. Their purpose is to analyze whether the high debt characteristic of the bank industry and bank scale influence the profitability of banks. In addition, in the financial environment of Taiwan, where there are large numbers of banks and bank branches, it needs to be asked whether increasing the number of bank branches has a negative influence on profitability, or impacts the operation of banks because of high cost.

(1) Debt ratio

On the one hand, the debt ratio represents a bank's consideration of cost for its sources of funds, meaning that when the bank uses more external capital its profitability will be more limited. On the other hand, when the debt ratio is too high, the bank will have to monitor its risk and cannot engage in high-risk high-return services (Lown and Peristiani, 1996; Berger and Udell, 1994). It also compresses the profitability of a bank. Under this theory, the debt ratio should be negatively correlated with bank performance.

(2) Bank scale

When a bank has a larger scale of operations, it means that it has more resources and services for its consumers, and it can also decrease its costs through scale economies; its size is, thus, beneficial for profitability. However, under poor management, when the bank cannot cover its huge costs, its oversized scale of operations will adversely affect the bank's performance. In terms of empirical studies, Miller and Noulas (1996) found that larger-scale banks had lower operating performance, showing that bank scales were negatively correlated with their performance. Meanwhile, Zhang (1996) categorized the scales of banks by dividing total assets into large, medium and small, and found that when the assets scale was too big or too small, it would become non-efficient, indicating that only the medium scale would be beneficial for bank performance. This study uses total assets as the proxy variable for bank scale.

(3) Number of branches

The number of branches, which can increase the competitiveness of a bank, represents the bank's ability to provide service and convenience. Under this theory, the number of bank branches will be positively correlated with the expected profitability of the bank. Arshadi and Lawrence's (1987) study also shows that there is a positive correlation. On the other hand, there are a total of 3,068 branches of financial institutions in Taiwan. With a limited market, the overabundance of branches will render the operation inefficient, result in unused resources, and affect the profitability of the banks adversely. Anderson et al. (1982) found that having too many branches would negatively influence bank performance. Therefore, this study includes the number of bank branches as an explanatory variable.

2.2. Major events during the study period. During the period from 1998 to 2002, the financial environment of Taiwan underwent major changes. In the middle of the year 2000, for the first time in Taiwan's political history the ruling party changed. The original ruling party, the Kuomintang (KMT, the Chinese Nationalist Party), lost the election, and the Democratic Progressive Party (DPP), which had never had the experience of ruling before, became the ruling party. On the one hand, the previous ruling party had launched many financial reforms and, on the other hand, the inexperience of the new government was reflected on its indecisive policies, such as those related to the nuclear power plants and the reform of the farmers' and fishermen's associations. Meanwhile, the lack of communication or a relationship between the new government and China also increased the domestic political crisis. Using a study by *Business Environment Risk Intelligence* (BERI) as an example, the analysis shows that the investment environment in Taiwan in 2003 was at the lowest risk level 1A and was ranked 4th globally, while Taiwan's political risk was ranked 11th globally (the lower the rank, the less the risk), indicating that the political environment of Taiwan adversely affected the investment environment in Taiwan. In addition, in 2000, after the ruling party had changed, Taiwan's political risk score decreased by 6, and its rank declined to 16th globally. The political risk indicator did not return to its former level until 2002.

In addition to political factors, during this time, Taiwan's economic environment also underwent drastic change. From the fourth quarter of 2000 onwards, Taiwan's GDP growth rate began to slide down. In the second, third and fourth quarters of 2001, there was even negative growth, which had not occurred in 20 years. Furthermore, the private investment growth rate and the investment amount also began to decrease in 2001, showing that the economic environment had undergone significant changes since the middle of the year 2000.

In particular, there was the bursting of the Internet bubble in the year 2000. With this unexpected turn of events in the development and profitability of the electronic business market, investors in this market encountered huge losses. *Amazon.com*, for example,

saw its stock price fall from 113 USD in 1999 to 40 USD in 2000. A number of well-known internet companies also suffered huge losses, which impacted both the domestic and foreign economic environment.

To sum up, after the middle of the year 2000, the following questions are raised. Do the increases in political risk, the changes in the domestic economic and investment environment, and the effects of the Internet bubble on the international economic environment negatively influence the domestic economy? Do those influences result in a loss of profitability, or a loss of performance indirectly through the bank's business relationship with various corporations?

This study discusses the impact of such influences on bank performance as a result of these drastic changes. Thus, we set a dummy variable, referred to as *TIME*, before the middle of the year 2000 as *TIME* = 0, and after the middle of the year 2000 as *TIME* = 1, in order to analyze the impact of the change in the ruling party on Taiwan's financial sector.

The operating definitions of the variables in this study will be shown in Table 2.

2.3. Statistical method and model specifications. The sample in this study consists of banks covering the period from 1998 to 2002, with half a year as a period, or a total of 10 periods, including cross-sectional and time series panel data. Since banks differ from each other, we should not directly adopt the ordinary least squares (OLS) method, but through testing should select the most appropriate model for the data based on the OLS model, namely, the fixed effects model (FE model) and the random effects model (RE model), to avoid estimation bias. The distinctive feature of the FE model is that, by using panel data, the intercept term will change because of the different characteristics of banks, but the error term of the sample does not change with time, indicating that the error term remains constant at different times, i.e., during the observation period, the individual sample is reflected by the intercept term of the regression equation. Therefore, the FE model is also referred to as the dummy variable method; at this time, the intercept changes only with the differences among banks, but not with time. The RE model, by contrast, mainly assumes that the individual differences in the sample are random, and are independent of the independent variable. It, therefore, shows that the differences in terms of the individual samples will be reflected in the error term in the regression equation. Hence, the RE model can also be referred to as the error component model.

Table 2. Operating definitions of variables

In this table we present the operating definitions of return on assets (*ROA*), return on equity (*ROE*), high-technology industries loan ratio (IT loan ratio, *ITRATIO*), consumer loan ratio (*CONRATIO*), loan ratio (*LORATIO*), debt ratio (*DRATIO*), bank scale (*SCALE*), number of branches (*BRANCH*), and time dummy (*TIME*).

Variable	Operating definition
Return on assets (*ROA*)	(Net gain after tax before interest ÷ Total assets) ×100%.
Return on equity (*ROE*)	(Net gain after tax before interest ÷ Total equity) ×100%.
IT loan ratio (*ITRATIO*)	(The loans for IT industry ÷ Total loans) ×100%.
Consumer loan ratio (*CONRATIO*)	[(Consumer loans minus housing, car, maintenance, and welfare loans) ÷ Total loans] ×100%.
Loan ratio (*LORATIO*)	(Total loans ÷ Total assets) ×100%.
Debt ratio (*DRATIO*)	(Total debt ÷Total assets) ×100%.
Bank scale (*SCALE*)	Logarithm of total assets.
Number of branches (*BRANCH*)	Logarithm of the number of branches.
Time factor (*TIME*)	Dummy variable: before the middle of year 2000, TIME = 0; after the middle of year 2000, TIME = 1.

To compare which of the models would be more appropriate for the data, we have to test each of them. The comparison between the OLS model and the FE model can be achieved by means of the F-test, the F-test being a distribution that corresponds to F (N-1, NT-N-K-1). The comparison between the OLS model and the RE model can be achieved by means of the Lagrange Multiplier (LM), where the LM is a chi-square distribution with one degree of freedom. When the FE model and the RE model are both superior to the OLS model, we should select from the FE model and the RE model, and use the Hausman test to test whether the intercept term and the independent variable are statistically correlated. If the intercept term and independent variable are not statistically correlated, we should adopt the RE model; if, alternatively, the intercept term and independent variable are statistically correlated, we should adopt the FE model.

Through the above-mentioned hypothesis tests, we select the most appropriate model for the data type from the OLS model, FE model and RE model, in order to decrease the estimation bias. This will be helpful to the accuracy of this study.

This study mainly discusses the effect of loan policy, the bank's structural factors and changes of the politico-economical environment in 2000 on bank performance. Based on the above-mentioned variable specifications, we select the appropriate variables for the analysis. This study constructs three models for analysis.

The purpose of the first model (Model 1) is to discuss the relationship between borrowers, resource allocation and bank operating performance. Thus, in Model 1, we select three variables as independent variables: the IT loan ratio (*ITRATIO*), the consumer loan ratio (*CONRATIO*), and the loan ratio

(*LORATIO*). The dependent variables are denoted by operating performance (*OP*) in equation (1). When we use *ROA* as the proxy variable for bank operating performance, it is shown in Model 1-1. In addition, this study attempts to again treat *ROE* as the proxy variable for bank performance, and places it in Model 1-2 as the dependent variable for the model to analyze and compare it with Model 1-1. Through the specification of Model 1, we expect that after the empirical analysis is completed, the result can help banks to select borrowers and design loan policies, in order to increase their profitability.

$$OP_{it} = \beta_{0i} + \beta_1 ITRATIO_{it} + \beta_2 CONRATIO_{it} + \\ + \beta_3 LORATIO_{it} + \varepsilon_{it}. \quad (1)$$

In Model 2, in addition to the same independent variables as in Model 1, i.e., *ITRATIO*, *CONRATIO*, and *LORATIO*, we further incorporate the bank's structural variables, including the debt ratio (*DRATIO*), bank scale (*SCALE*), and the number of branches (*BRANCH*), into the model to discuss the influences that these variables have on the bank's profitability, and thereby, increase the explanatory power. In Model 2, we use *ROA* (in Model 2-1) and *ROE* (in Model 2-2) separately to represent the factors, and to measure, discuss and compare the influence of loan policy and structural factors on the bank's performance:

$$OP_{it} = \beta_{0i} + \beta_{1t} ITRATIO_{it} + \beta_2 CONRATIO_{it} + \\ + \beta_3 LORATIO_{it} + \beta_4 DRATIO_{it} + \beta_5 SCALE_{it} + \\ + \beta_6 BRANCH_{it} + \varepsilon_{it}. \quad (2)$$

The purpose of Model 3 is to discuss whether the bank's performance exhibits significant change before and after the middle of the year 2000, and whether the influence the borrowers have on the bank's operating performance has changed significantly after this time period. Thus, in Model 3, in specifying the independent variables, we include the three variables, the same as in Model 1; we also include the middle of the year 2000 as the time factor. The model with *ROA* as the dependent variable is Model 3-1, and the model with *ROE* as the dependent variable is Model 3-2. Through the specification of the model, we can analyze the influence that the time factor has on the bank's operating performance.

$$OP_{it} = \beta_{0i} + \beta_1 ITRATIO_{it} + \beta_2 CONRATIO_{it} + \\ + \beta_3 LORATIO_{it} + \beta_4 TIME_{it} + \varepsilon_{it}. \quad (3)$$

3. Results

3.1. Data source and descriptive statistics. Our data are collected from the "Financial Report Database" in the *Taiwan Economic Journal* (TEJ), and a part of the undisclosed data is deduced from the estimation[1]. The sample consists of all domestic financial institutions and small to medium commercial banks listed on the Taiwan Stock Exchange from 1998 to 2002. Banks with missing data are excluded from the sample. As a result, a total of 27 listed banks (270 semiannual observations) are included in this study. The descriptive statistics of the variables are presented in Table 3.

Table 3. Descriptive statistics of variables

The sample consists of 270 observations on Taiwanese listed banks from 1998-2002. Data are taken from the "Financial Report Database" in the Taiwan Economic Journal (TEJ). *ROA* is the ratio of net gain after tax before interest to total assets. *ROE* is the ratio of net gain after tax before interest to total equity. *ITRATIO* is the ratio of the loans for IT industry to total loans. *CONRATIO* is the ratio of consumer loans minus housing, car, maintenance, and welfare loans to total loans. *LORATIO* is the ratio of total loans to total assets. *DRATIO* is the ratio of total debt to total assets. *SCALE* is the logarithm of total assets. *BRANCH* is the logarithm of the number of branches.

Variables	N	Minimum	Maximum	Average	Std. deviation
ROA	270	-2.44	1.45	0.19	0.68
ROE	270	-57.59	15.64	1.72	10.53
ITRATIO	270	0.00	52.59	3.80	11.06
CONRATIO	270	0.00	40.89	50.18	4.63
LORATIO	270	41.51	78.55	65.84	6.22
DRATIO	270	88.81	97.28	92.29	1.64
SCALE	270	4.84	7.18	5.81	0.70
BRANCH	270	3.18	5.16	3.98	0.54

From Table 3, we may find that, among the observations, banks have huge differences in profitability. Taking *ROA* as an example, the maximum is 1.45%, and the minimum is -2.44%. We find that banking is not an "easy to operate" industry and slight mistakes can result in huge losses.

Moreover, with regard to the IT loan ratio and the consumer loan ratio, we may find that the loan policies differ significantly among banks. From the significant differences in the banks, we may find that domestic banks do not have a general consensus on the loan policy for optimal profitability; this is also why this study is valuable.

In addition, from the loan ratio, we may learn that all of the samples treat loaning as the main business, and the differences are slight. In terms of the assets scale, the maximum is ten times the minimum, showing that there are still banks with very small scales of operations in Taiwan. Finally, in terms of the number of branches, we find that the minimum is 24 while the maximum is 175, and the standard deviation is as high as 38.42, showing that the banks

[1] Since the banks did not disclose accurate data on the IT nonperforming loans ratio, we calculate the corporate borrowers disclosed by the banks as the sample used in this study, and the IT loan amount is estimated by the loan ratio multiplied by the amount of loans for the corporations which the banks have disclosed.

have significantly different opinions as to how many branches should be established[1].

To avoid the problem of collinearity, we use the variance inflationary factor (VIF) to test the collinearity of the variables. Marquardt (1970) thought that when the VIF was greater than 10, the model would be seriously affected by collinearity. Through the analysis, the variables of the above-mentioned models all have VIF values under 10. Thus, we determine that there is no collinearity that will affect the empirical results in the model. The analysis is presented in Table 4.

3.2. Empirical results. *3.2.1. The effects of lending policy on bank performance.* From Table 5, we are able to find that for Model 1 (including Model 1-1 and Model 1-2), both the F-test and the LM test indicate that the panel data model performs better than the OLS model. The Hausman test also suggests that the FE model is more suitable for use than the RE model.

Table 4. The VIF of the independent variables

We use the variance inflationary factor (VIF) to test the collinearity of the variables. *ROA* is the ratio of net gain after tax before interest to total assets. *ROE* is the ratio of net gain after tax before interest to total equity. *ITRATIO* is the ratio of the loans for IT industry to total loans. *CONRATIO* is the ratio of consumer loans minus housing, car, maintenance, and welfare loans to total loans. *LORATIO* is the ratio of total loans to total assets. *DRATIO* is the ratio of total debt to total assets. *SCALE* is the logarithm of total assets. *BRANCH* is the logarithm of the number of branches. *TIME* dummy equals one if after the middle of year 2000 and zero otherwise. The dependent variable of models 1, 2, 3 is *ROA*. The independent variables of Model 1 are *ITRATIO*, *CONRATIO*, and *LORATIO*. The independent variables of Model 2 are *ITRATIO*, *CONRATIO*, *LORATIO*, *DRATIO*, *SCALE*, and *BRANCH*. The independent variables of Model 3 are *ITRATIO*, *CONRATIO*, *LORATIO*, and *TIME*.

Variables	Model 1	Model 2	Model 3
ITRATIO	1.034	1.324	1.142
CONRATIO	1.016	1.102	1.026
LORATIO	1.035	1.357	1.036
DRATIO		1.603	
SCALE		3.434	
BRANCH		3.406	
TIME			1.119

Table 5. The effects of loan policy on bank performance

The dependent variable is either *ROA* (Model 1-1) or *ROE* (Model 1-2). *ROA* is the ratio of net gain after tax before interest to total assets. ROE is the ratio of net gain after tax before interest to total equity. *ITRATIO* is the ratio of the loans for IT industry to total loans. *CONRATIO* is the ratio of consumer loans minus housing, car, maintenance, and welfare loans to total loans. *LORATIO* is the ratio of total loans to total assets. We use F-statistic test (F-test), Lagrange Multiplier test (FM-test) and Hausman test to examine whether OLS model, fixed effect model, or random effect model are appropriate ones. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Model 1-1 *ROA*	Model 1-2 *ROE*
ITRATIO	-0.02714***	-0.43191***
CONRATIO	0.028952**	0.470653**
LORATIO	0.027503**	0.401161**
F-test	4.32***	3.47***
LM-test	24.70***	11.73***
Hausman test	32.27***	32.16***
Adj R-squared	0.2368	0.1865

Through Model 1-1 and Model 1-2, we can arrive at the following empirical results: when banks raise their ratios of loans to the IT industry, this will give rise to a significant negative influence on the banks' performance. There are two possible reasons for this. When banks increase their loans to the IT industry, even though this action may bring interest income from the spread between deposits and loans, banks still have to input more resources in order to enter this industry and avoid the decreases in the quality of the loans because the IT industry is highly risky and it is difficult for it to provide collateral. Besides, during the 1998-2002 period, the banks' NPLs increase but profitability decreases; this might be due to the the fact the bank cannot ascertain the risk and select a good borrower; consequently, this gives banks higher NPLs, erodes the profitability and creates this negative correlation.

In addition, in terms of the consumer loan ratio, although this proves that the trend in the banks' loan policies is correct, what is particularly worth noting is that the market is expanding and maturing, and the competition will be more fierce. Newcomers will divide the existing market and banks will have to pay more to maintain the share, such as in terms of the marketing cost and R&D cost. The fierce competition will also force banks to decrease interest rates and fees, and even expand the market to risky borrowers, such as students. In these circumstances, whether or not increasing the consumer loan ratio will be beneficial to the bank's performance is certainly worth looking into.

In terms of the allocation of bank assets, we find that the loan ratio is significantly positively correlated with the banks' performance, and this conclusion is the same as that of Molyneux et al. (1998), indicating that banks' loan services have higher profitability than other investments. One of the possible reasons may be that loan service is the main service of banks, and both talent and experience are comprehensive; thus, banks may rely on loans for profit. Another possible reason is that the securities market in Taiwan has yet to mature; the targets of investment are limited and the risks are high, thus affecting the profitability of banks.

3.2.2. The effects of bank structural variables on bank performance. From Table 6, we may find that

[1] In the analysis of descriptive statistics, both total assets and the number of branches are original values, the maximum amount of total assets is 13151.8 billion, and the minimum is 126.40 billion.

in Model 2 (including Model 2-1 and Model 2-2), both the F-test and LM test indicate that the panel data model performs better than the OLS model. The Hausman test also suggests that the FE model is more suitable to use than the RE model.

From the influences that loan policy has on bank performance, we find that in Model 2-1, the IT industry loan ratio and consumer loan ratio are significant at the 1% and 5% significance levels, respectively. In Model 2-2, the IT industry loan ratio and consumer loan ratio are significant at the 1% and 10% significance levels, respectively. This indicates that when banks increase their ratios of loans to the IT industry, the lending policy will significantly negatively influence bank performance; when banks increase their consumer loan ratios, their lending policy will significantly and positively benefit bank performance. This conclusion is the same as in the case of Model 1. During the period of 1998-2002, the annual business loan interest rate was 4%~6%, which is lower than the annual consumer loan interest rate (the annual credit card interest rate was 18%~20%, and annual cash card interest rate was 17%~18%). The NPLs ratio was increasing from 4.36% to 8.55%, and majority NPLs were business bad debts. The asymmetric return-risk distributions between business and consumer loans made the IT industry loan negatively related to bank performance while the consumer loan positively related to bank performance. These encouraged Taiwanese banks to granting credit to consumers. The Taiwanese banks faced the cash-credit card crisis in 2005.

Table 6. The effects of bank structure variables on bank performance

The dependent variable is either *ROA* (Model 2-1) or *ROE* (Model 2-2). *ROA* is the ratio of net gain after tax before interest to total assets. *ROE* is the ratio of net gain after tax before interest to total equity. *ITRATIO* is the ratio of the loans for IT industry to total loans. *CONRATIO* is the ratio of consumer loans minus housing, car, maintenance, and welfare loans to total loans. *LORATIO* is the ratio of total loans to total assets. *DRATIO* is the ratio of total debt to total assets. SCALE is the logarithm of total assets. *BRANCH* is the logarithm of the number of branches. We use F-statistic test (F-test), Lagrange Multiplier test (FM-test) and Hausman test to examine whether OLS model, fixed effect model, or random effect model are appropriate ones. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Model 2-1 *ROA*	Model 2-2 *ROE*
ITRATIO	-0.0189032***	-0.3154417***
CONRATIO	0.0237138**	0.3780544*
LORATIO	0.0058228	0.0845423
DRATIO	-0.4337637***	-6.454996***
SCALE	1.978064***	28.77167***
BRANCH	-1.423505***	-19.89049***
F-test	6.05***	4.80***
LM-test	23.47***	11.34***
Hausman test	134.38***	99.94***
Adj R-squared	0.5792	0.4951

In terms of the allocation of bank assets, we find that the loan ratio does not have a significant influence on bank performance in Model 2; this conclusion is different from the positive results of Model 1. This shows that with the addition of the bank's structural variables, the effect of the loan ratio on performance disappears, indicating that other variables compared to the loan ratio are more significant in terms of their effect on bank performance. Therefore, in Model 2, other variables account for the explanatory power of the loan ratio, and the loan ratio does not exhibit a significant result in Model 2. As a result, this study suggests that increasing the loan ratio does not have a significant positive influence on bank performance. This study also suggests that the bank has to reinforce its own crediting capability, so that it will be able to maintain a certain level of profitability under the situation where there is no good investment opportunity available.

Furthermore, the empirical results show that bank scale has a significant and positive influence on operating performance, indicating that when a bank expands its scale and integrates resources, talents and service, it may increase its competitiveness and profitability. Recently, Taiwanese banks have expanded their scales of operations through mergers. If merged successfully, the competitiveness of domestic banks will increase due to internationalization. From another perspective, when resources merge and increase, how to allocate resources effectively and reduce unnecessary costs will become important issues.

We also learn that the number of branches is still negatively correlated with bank performance, matching the empirical results of Anderson et al. (1982) from Model 2. This indicates that there are generally too many branches in Taiwan, and it causes inefficiency in operation, leaving too many unused resources and, thereby, adversely affecting profitability. In fact, in recent years, the establishment of new branches has slowed down. Banks may have also faced problems with having too many branches. Conversely, in order to maintain their services and cut costs, banks have gradually replaced normal branches with simplified branches to improve the banks' financial situation by decreasing costs.

In terms of the empirical results of other variables, we find that the debt ratio is significantly negatively correlated with bank performance; this is the same as in the previous literature. When the debt ratio is too high, banks will have to monitor risk and will not be able to engage in high-risk high-profit businesses (Lown and Peristiani, 1996; Berger and Udell, 1994); this also compresses the profitability of banks. The above-mentioned considerations of

cost lead to banks using external capital and facing high risk, as a result of which they have to offer higher interest rates on deposits. It may also be one of the reasons why the debt ratio and bank performance are negatively correlated.

3.2.3. The effects of the time factor on bank performance. During the period from 1998 to 2002, the financial environment of Taiwan was dramatically changed. In 2000, the Kuomintang Party lost the election, and the new ruling party, Democratic Progressive Party, launched many financial reforms. In addition, the domestic political risk adversely affected the investment and economic environments in Taiwan. Furthermore, many electronic companies suffered huge losses from the Internet bubble. In this study, we further to discuss the impact of these changes on bank performance.

From Table 7, we may see that in Model 3 (including Model 3-1 and Model 3-2), both the F-test and LM test indicate that the panel data model performs better than the OLS model. The Hausman test also suggests that the FE model is more suitable for use than the RE model.

Table 7. The effects of the time factor on bank performance

The dependent variable is either *ROA* (Model 3-1) or *ROE* (Model 3-2). *ROA* is the ratio of net gain after tax before interest to total assets. *ROE* is the ratio of net gain after tax before interest to total equity. *ITRATIO* is the ratio of the loans for IT industry to total loans. *CONRATIO* is the ratio of consumer loans minus housing, car, maintenance, and welfare loans to total loans. *LORATIO* is the ratio of total loans to total assets. *TIME* dummy equals one if after the middle of year 2000 and zero otherwise. We use F-statistic test (F-test), Lagrange Multiplier test (FM-test) and Hausman test to examine whether OLS model, fixed effect model, or random effect model are appropriate ones. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Model 3-1 *ROA*	Model 3-2 *ROE*
ITRATIO	-0.0115472*	-0.1880818*
CONRATIO	0.0400379***	0.6440054***
LORATIO	0.019804*	0.2807685
TIME	-0.3392419***	-5.304663***
F-test	3.70***	2.88***
LM-test	26.83***	12.00***
Hausman test	18.73***	18.30***
Adj R-squared	0.2787	0.2289

Through the empirical results of Model 3, we may learn that since the middle of the year 2000, the domestic and international political and economic environment has had a significant negative influence on bank performance. The reasons for this influence, in terms of the political environment, may be twofold. The first reason is that the new government was inexperienced and had trouble with China, which in turn gave rise to political risk and influenced the willingness of international investors to invest in Taiwan, thereby, resulting in a poor economic environment. Thus, banks cannot get sufficient earnings from either loans or investments, resulting in a significant negative influence. The second reason is that the new government has passed many new amendments and new financial laws. The financial institutions when faced with such new laws must incorporate the changes into their organizational structures and include new services, or else simplify their organizations after paying high costs, which may have a negative influence on bank performance. In terms of economics, since the middle of the year 2000, the domestic economic environment has continued to deteriorate, and private investors have not had the willingness to invest. Moreover, the Internet bubble has also impacted the world economy, resulting in significant negative influences on the operating performance of the domestic banking industry.

3.3. Discussions. While analyzing the influences of lending policy on operating performance, we find that when banks increase their IT industry loan ratios, this will result in undesired operating performance. When we review the background of the period under study, we find that from 1998 to 2002 bank performance continued to decrease, while the IT industry continued to develop, and so the motive was generated. As the IT industry continues to develop, the demand for funds increases, meaning that banks may increase their IT loan ratios; in addition, as bank performance continues to decline, it needs to be asked whether it is influenced by IT loans. After the analysis of this study, we find that with the increases in loans from the banks to the IT industry, IT loans do give rise to a negative influence on bank performance.

Furthermore, banks earn profit through loan services by collecting loan interest. If loan services are not profitable, such performance will directly reflect upon the banks' loan interest income rate (interest income divided by the loan amount); if the loan interest income rate is high, it means that each amount that banks lend out can achieve maximum interest income. Thus, this study further analyzes the correlation between the IT loan ratio and loan interest income rate in order to re-examine the above-mentioned conclusions.

By means of Pearson correlation coefficient test, we may find that the correlation coefficient of the IT loan ratio and loan interest income rate is -0.387, and it is statistically significant at the 0.01 significance level (see Panel A of Table 8), indicating that the higher the ratio of loans to the IT industry is, the lower the profitability will be[1]. During this period, Taiwanese

[1] Banks with missing data are excluded from the sample. As a result, 22 domestic banks listed on the Taiwan Stock Exchange from 1998 to 2002 (220 semi-annual observations) are included in this study.

government pushed the "Two Trillion, Twin Stars" project and arranged with domestic banks about granting low interest rate loans to IT industry. Therefore, the IT loans were the low return and high risk assets for banks.

In addition, this study finds that the consumer loan ratio is positively correlated with the banks' operating performance. Therefore, we use the same data to examine the Pearson correlation coefficient for the consumer loan ratio and the loan interest income rate. The result shows that Pearson correlation coefficient between the two is 0.256, and it is statistically significant at the 1% significance level (see Panel B of Table 8). This also proves that the higher the loan ratio is to the general populace, the higher the profitability will be.

To sum up, both the results of the panel data regression analysis and Pearson correlation coefficient test show that increasing the banks' ratio of loans to the IT industry will negatively impact the banks' operating performance. In addition, the consumer loan ratio is positively related to the banks' operating performance. This shows that the empirical results of this study are robust.

Table 8. The results of the Pearson correlation coefficient test

We use a Pearson correlation coefficient test to examine the correlation between the IT loan ratio and loan interest income rate. Panel A reports the Pearson correlation coefficient test of IT loan ratio and loan interest income rate. Panel B reports the Pearson correlation coefficient test of consumer loan ratio and loan interest income rate. *** indicates statistical significance at the 1% level.

Panel A. IT loan ratio & loan interest income rate		
	IT loan ratio	Loan interest income rate
IT loan ratio	1***	-0.387***
Loan interest income rate	-0.387***	1***
Panel B. Consumer loan ratio & loan interest income rate		
	Consumer loan ratio	Loan interest income rate
Consumer loan ratio	1***	0.256***
Loan interest income rate	0.256***	1***

Conclusions

The primary purpose of this study is to discuss bank loan policy and its relationship with performance. Hopefully, we are able to understand through our analysis whether there are adjustments to the loan ratio and the loan amount to the IT industry, and the consumer loan ratio. This study can help banks to improve their profitability under an undesirable performance, or actually result in more losses. Meanwhile, we empirically prove the influence of different factors, such as a bank's debt ratio and the number of branches in relation to bank performance.

The sample consists of 27 domestic banks listed on the Taiwan Stock Exchange from 1998 to 2002. We find that in terms of the influence of bank loan policy on bank performance, when banks increase their loan ratios to the IT industry, the action is negatively correlated with bank performance, meaning that when banks are faced with the compression of loan business and the transformation of traditional industry into the IT industry, increasing the loan amount to the IT industry does not only result in profit, but will be adversely affected by the complexity and high risk of the industry, and will result in losses, thus reducing the banks' operating performance. If the transformation of industry is inevitable, banks must first improve their loan quality, and offer loans to establish the IT industry with better credentials, avoid loan losses, and increase profitability. Furthermore, banks may, through increasing service quality, increase their own profit bases, and by enhancing their negotiating capabilities and raising their loan interest rates, reflect the costs to the banks in order to sustain themselves. By contrast, the empirical results demonstrate that the consumer loan ratio has a significant and positive influence on bank performance, indicating that with the growth of the consumer loan market, banks can input funds in the market as an effective use of an ideal loan policy. Yet banks should be aware that once the consumer market has reached its limits, the pursuit of new clients may result in a lower standard of borrowers, and in increased personal bad debts. The increases in bad loans will erode the banks' profitability.

Then, in terms of the results of analyzing the influence of a bank's structural variables on bank performance, we find that both the debt ratio and the number of branches are significantly negatively correlated with bank performance. This conclusion agrees with the empirical results of Berger and Udell (1994) and Anderson et al. (1982), respectively. Based on this conclusion, banks must decrease their external capital and utilize more of their internal capital to lower risk, increase the expansion of services and positively influence performance. In addition, banks should decrease the number of their branches as they increase operating costs, for an appropriate reduction or the restructuring of branches into simplified branches will positively increase bank performance. The empirical results show that bank scale has a significant positive influence on bank performance, meaning that the scales of the domestic banks tend to be too small and the banks, hence, do not benefit from economies of scale. Through partially merging, resources and talents can be integrated into better competitiveness for domestic banks. In the meantime, this study finds that, since the middle of the year 2000, banks' performances have become more undesirable, indicating that the political and economic environment since the middle of the year 2000 has worsened and has impacted the survival and development of banks. If banks expect to perform better, increasing their operating and managerial capability will become a primary task.

There are two limitations to this study. First, banks did not fully disclose their IT industry loan ratios and loan amounts; thus, this study has to calculate these figures from the names of borrowers the banks have disclosed to obtain the data. Second, the lack of observations could be improved in the future; we expect that when the data become more comprehensive, the future related studies will be able to include more variables to measure bank loan policy and to contribute to this issue.

References

1. Anderson, R., Handoff, W., McCarthy, M. (1982). Bank Size and the Management of Capital Ratios. *The Bankers Management* 165 (1), 64-69.
2. Arshadi, N., Lawrence, C.E. (1987). An Empirical Investigation of New Bank Performance. *Journal of Banking and Finance* 11 (1), 33-48.
3. Berger, A.N., Robert., D. (1997). Problem Loans and Cost Efficiency in Commercial Banks. *Journal of Banking and Finance* 21 (6), 849-870.
4. Berger, A., Udell, G. (1994). Did Risk-Based Capital Allocate Bank Credit and Cause a 'Credit Crunch' in the U.S. *Journal of Money*, Credit & Banking 26 (3), 585-628.
5. Bourke, P. (1989) Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia. *Journal of Banking and Finance* 13 (1), 65-79.
6. Fraser, D.R., Phillips, J.W., Rose, P.S. (1974). A Canonical Analysis of Bank Performance. *Journal of Financial and Quantitative Analysis* 9 (2), 287-295.
7. Fraser, D.R., Rose, P.S. (1971). More on Banking Structure and Performance: The Evidence from Texas. *Journal of Financial and Quantitative Analysis* 6 (1), 601-611.
8. Glover, J.D. (1939). Industrial Loan Policy of the RFC. *Harvard Business Review* 17 (4), 465-476.
9. Graddy, D.B., Kyle, R. (1979). The Simultaneity of Bank Decision-making, Market Structure, and Bank Performance. *Journal of Finance* 34 (1), 1-18.
10. Hannan, T.H. (1991). Bank Commercial Loan Markets and the Role of Market Structure: Evidence from Surveys of Commercial Lending. *Journal of Banking and Finance* 15 (1), 133-149.
11. Joyce, W.B. (2001). Return and Reward: Bank Performance and CEO Compensation. *American Business Review* 19 (2), 93-99.
12. Jordan, J.S. (1998). Problem Loans at New England Banks, 1989 to 1992: Evidence of Aggressive Loan Policies. *New England Economic Review* (Jan/Feb), 23-38.
13. Kuo, H.C. (2001). Strategic Decisions for the Management of Banks' Credit Granting System. International *Journal of Services Technology and Management* 2 (3/4), 313-325.
14. Liew, C.K. (1970). Lending Behavior and the Nature of Default Loans in the Case of the Savings and Loan Industry. *Journal of Finance* 25 (3), 701-702.
15. Lown, C., Peristiani, S. (1996). The Behavior of Consumer Loan Rates During the 1990 Credit Slowdown. *Journal of Banking and Finance* 20 (10), 1673-1694.
16. Marquardt, D.W. (1970), Generalized Inverses, Ridge Regression, Biased Linear estimated, and Nonlinear Estimation. Technometrics 12 (4), 591-612.
17. Miller, S.M., Noulas, A.G. (1996). The Technical Efficiency of Large Bank Production. *Journal of Banking and Finance* 20 (3), 495-309.
18. Molyneux, P., Remolona, E., Seth, R. (1998). Modeling Foreign Bank Performance and Lending Behavior. *Financial Markets, Institutions and Instruments* 7 (4), 26-41.
19. Pringle, J.J. (1974). The Capital Decision in Commercial Banks. *Journal of Finance* 29 (3), 779-795.
20. Sigler, K.J., Porterfield, R. (2001). CEO Compensation: Its Link to Bank Performance. *American Business Review* 19 (2), 110-114.
21. Kwan, S.H. (2002). Operating Performance of Banks among Asian Economics: An International and Time Series Comparison. Federal Reserve Bank of San Francisco, Working Paper.
22. Webster, A.L. (1997). The Impact of Technological Change on Bank Performance. *Journal of Economics and Finance* 21 (3), 41-47.
23. Zhang, J. (1996). Measurement and Determinants of X-efficiency, Technological Change and Profitability in Banking. Unpublished Ph.D. Dissertation, The Temple University.