

Is Financial Institution Management Effective to Reduce Problems Related to Information Asymmetry in Taiwan?

Chih-Hsiung Chang^{1*}, Wu-Hua Chang² and Yi-Yu Shih²

Abstract

Thanks to the deregulation of financial regulations since the 1990s, the domestic financial institutions had ever been in excessive amounts for a long time. In order to expand their business scope and market share, they often adopted a looser or simple review mechanism, which led to a decline in the asset quality of financial institutions and an upward trend in overdue loans. As a result, the credit card debt crisis caused by the information asymmetry and the derived serious social problems ensued. Under the pressure of public opinion, the financial authority was forced to promote the debt negotiation mechanism in 2005 and even led passing the Consumer Debt Clearance Regulations in 2007.

This article analyzed the statistics of consumer finance related to public and private banks, trying to explain whether the problems related to information asymmetry was reduced and whether financial institution management was effective. The result revealed that the number of valid cards, revolving interest rates, and overdue ratios fell in tandem after the financial authority intervened in the market. Especially when the credit card debt crisis and the social problem were showed under control, it was proven that financial institution management is essential and effective to reduce problems related to information asymmetry in Taiwan.

JEL classification numbers: G01,G21,G28.

Keywords: Financial Institution Management, Credit Cards, Card Debt Crisis, Information Asymmetry, Adverse Selection, Moral Hazard.

^{1*} Department of Finance, I-Shou University.

² Department of International Business, I-Shou University.

* Corresponding author e-mail: simon5289@gmail.com

1 Introduction

1.2 Research background and motivation

Information asymmetry is not limited to financial markets. Based the latest papers published, even in agriculture or green industries, economic and social problems arising from information asymmetry must be faced or resolved. For example, Juan D. Borrero and Jesús Mariscal (2022) thought farmers are new players to enter the new and important digital data market for agriculture, increasing power asymmetries and reinforcing their competitive advantages. With the information obtained from the agents of this sector, a digital platform called farm data was designed, which connects to several regional and national, and public and private databases, aggregating data and providing tools for decision making. Xiaowo Wu et al.(2022) mentioned about controlling the credit risk of forest farmers under internet crowdfunding mode and concluded that the degree of investor information asymmetry, the intensity of supervision, the degree of innovation and cooperation between funders and investors are the main credit risk factors of forest farmers. Yangyang Zheng et al.(2022) argued that Internet is an important production factor and is also an important channel for farmers to obtain agricultural information, which can effectively reduce the information search cost and information asymmetry. Changlu Zhang et al. (2022) proposed that green product certification (GPC) is an important means of eliminating the asymmetry of information between consumers and manufacturers in the context of sustainable development. Therefore, information asymmetry existing in Taiwan's credit card market is never exceptional.

Since the opening of private banks and credit card business in 1989, the credit card business of two foreign banks, American Unicom and Citibank, has entered the Taiwan market. In the early days, credit card application procedures were very cumbersome and strict, making credit cards a conspicuous financial product. However, with the development of technology and the changes in the social environment, credit cards became a very common consumer financial product.

Because credit cards had many convenient functions and very attractive discounts, to achieve economies of scale, card issuers also actively launched many credit card businesses, and issued credit cards through looser review methods to attract people to apply for cards for use. Therefore, credit cards flooded all parts of society at this stage. According to the information from the Financial Supervisory Commission (FSC), the cash advance of credit cards increased by 1467% from 1996 to 2005, and the revolving credit balance increased by 369% from 1998 to 2005 (Figure 1). As of July 2018, the number of cards in circulation hit another high,45,624 thousand (Figure 2), with an average of 1.98 credit cards per person. It could be seen that its growth rate was astonishing.

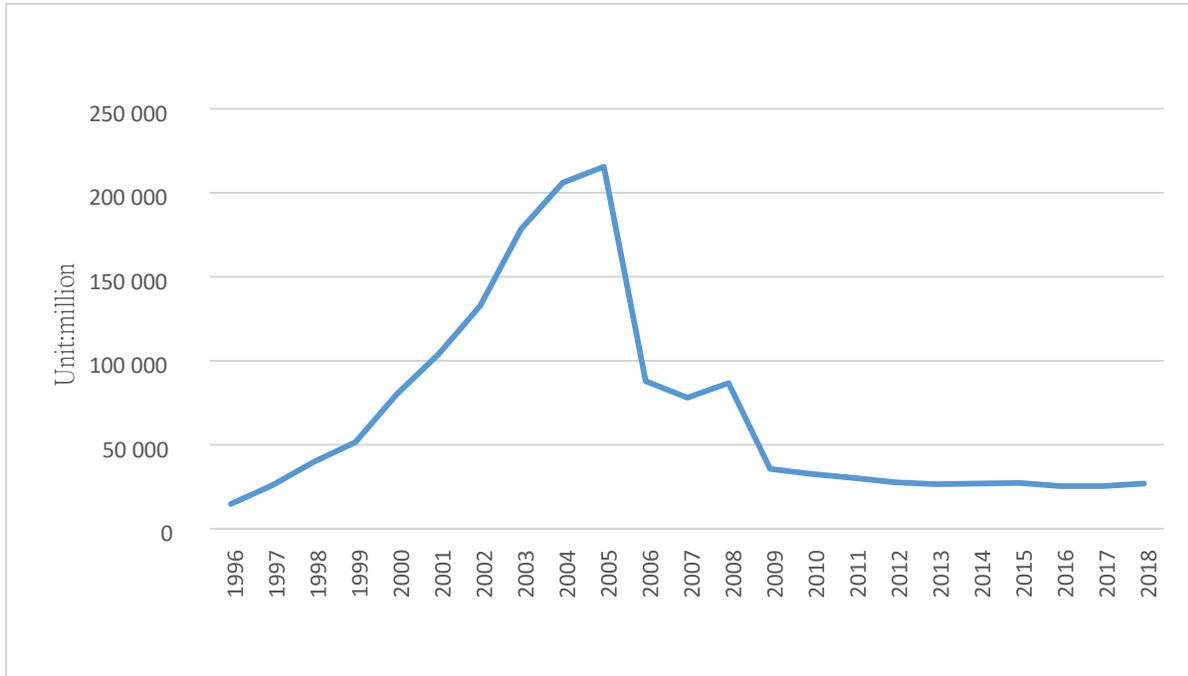


Figure 1: Revolving Credit Balance

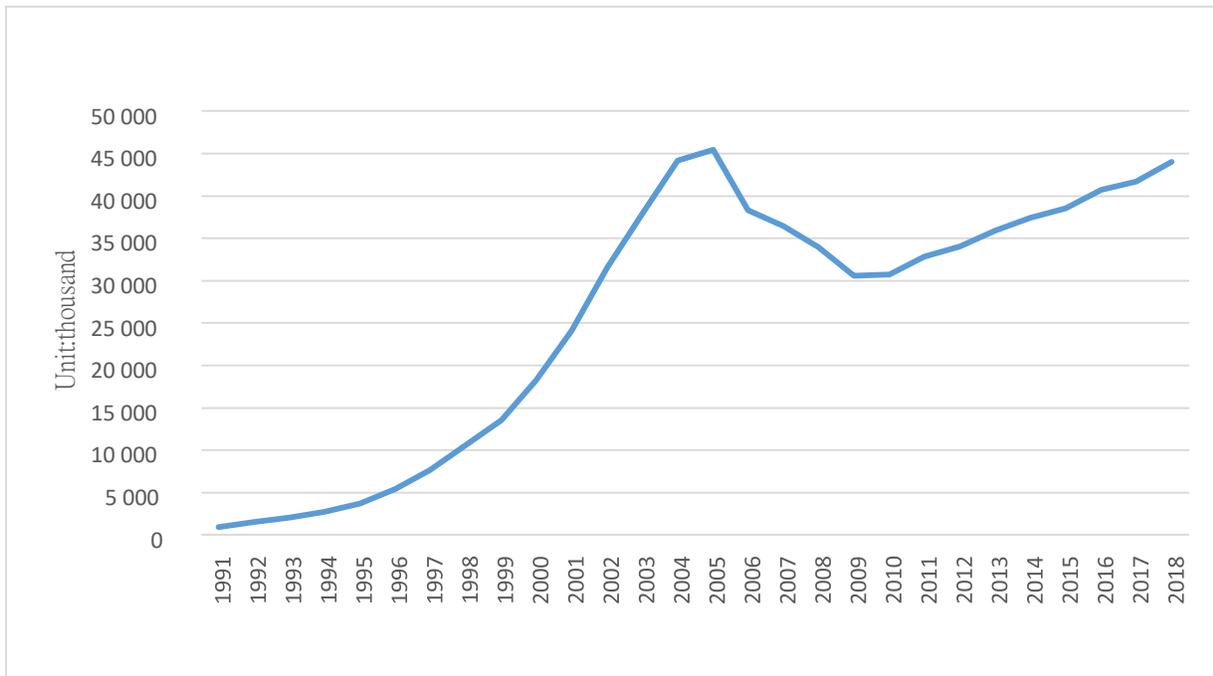


Figure 2: Cards in circulation

With the increasing popularity of credit cards, the credit problems brought by them have gradually emerged. Due to the economic recession and the ensuing rise in unemployment, some borrowers borrowed too much, coupled with the high revolving interest rate of credit cards, making it impossible for borrowers with weak credit to repay. Eventually, social tragedies such as being unable to bear the pressure of card debts and family suicides continued to occur and led to the "card debt" crisis in 2005. Therefore, the FSC and the Association of Banks worked on credit tightening and interest rate control. The part related to the credit tightening includes the requirement of the FSC for all card issuers to stipulate that the maximum amount of bank dual-card and credit loans is 22 times the borrower's monthly income, and increase the minimum credit card payment to 10%. In addition, interest rate information should be disclosed in the establishment of the dual-card formalized contract, and the dual-card interest rate was calculated at simple interest (originally, mostly compound interest).

After the card debt crisis in 2005, the government adopted dual measures to rectify the market, which indeed restrained the development of the credit card market. Although the number of credit card issuances rose again since 2010, conditions have changed and improved. The time and space environment of the credit card market was different from the past.

First of all, the number of credit cards was growing in an orderly manner. The number of cards in circulation increased, even faster than the number of cards issued in 2005. However, the obvious difference was that the overdue ratio of credit cards was controlled at a low level of around 0.22% (Table 1), which was much lower than the 2% during the card debt crisis. Therefore, it could be speculated that this wave was a very healthy growth, and the probability of a card debt crisis happening again was much smaller.

Table 1: Comparison of the overdue ratio between December 2005 and December 2018

Financial institutions	2005/12 overdue ratio	2018/12 overdue ratio
Bank of Taiwan	1.50%	0.31%
Taiwan Land Bank	3.12%	0.26%
Cooperative Treasure Bank	2.23%	0.19%
First Commercial Bank	1.72%	0.16%
South China Commercial Bank	2.12%	0.07%
Changhua Commercial Bank	1.67%	0.16%
Shanghai Commercial Saving Bank	1.13%	0.51%
Taipei Fu Bon Bank	2.42%	0.10%
Cathay Pacific Commercial Bank	1.73%	0.15%
Kaohsiung Bank	1.67%	0.25%
Taiwan Small and Medium Enterprise Bank	2.35%	0.13%
China Trust and Commercial Bank	1.50%	0.11%
Tai Shin International Commercial Bank	1.34%	0.17%
Federal Commercial Bank	3.76%	0.27%
Far East International Commercial Bank	1.83%	0.30%
Taiwan Shin Kong Commercial Bank	2.39%	0.23%
Hua Tai Commercial Bank	1.81%	0.23%
Rushing International Commercial Bank	2.73%	0.25%
Yang Xin Commercial Bank	3.09%	0.22%
Taichung Commercial Bank	2.01%	0.63%
San Xin Commercial Bank	2.78%	0.53%
E. Sun Commercial Bank	0.79%	0.23%
Wan Tai Commercial Bank	2.49%	0.35%
Total average	2.24%	0.22%

Secondly, the revolving credit balance increased and decreased significantly during the period(Figure 1). However, the current revolving credit balance was less than a quarter of the card debt period. To correct the nature of credit cards as payment tools, the FSC also launched the "long-term use of revolving credit card conversion mechanism". This allowed cardholders to convert revolving credit to microfinance or credit card installment repayment to reduce the burden. In addition, people would not easily use revolving credit and no longer regard credit cards as their main financing tool. These were the reasons for the decline in the revolving credit balance.

Finally, the business revenue of credit cards changed substantially. The main revenues included revolving interest revenue, transaction fee revenue, and cash advance fee revenue. In the past, revolving credit interest revenue ranked first, but now it was replaced by transaction fee revenue as the main resource. After the card debt crisis, the government revised the law to reduce the upper limit of the revolving credit interest rate to 15% using interest rate control (the original was based on the civil law of 20% annual interest rate). In addition, differential interest rates were adopted according to the degree of risk-taking of cardholders (officially launched in April 2006), and then, the declining revolving credit balance caused the decline in revolving interest revenue.

1.3 Research purpose

According to information from the Financial Supervisory Commission, since 2005, revolving credit, the number of cards in circulation, cash advances, and the ratio of excess loans all declined significantly (from Figure 1 to Figure 4). However, the term “card debt” still lingered in people’s hearts. It seemed that financial events had a profound impact on people’s hearts. In other words, while the FSC and the Association of Banks introduced many solutions and the management of financials came under closer scrutiny, not only was its effectiveness a very tough test, but its external performance on society was likely to demand attention.

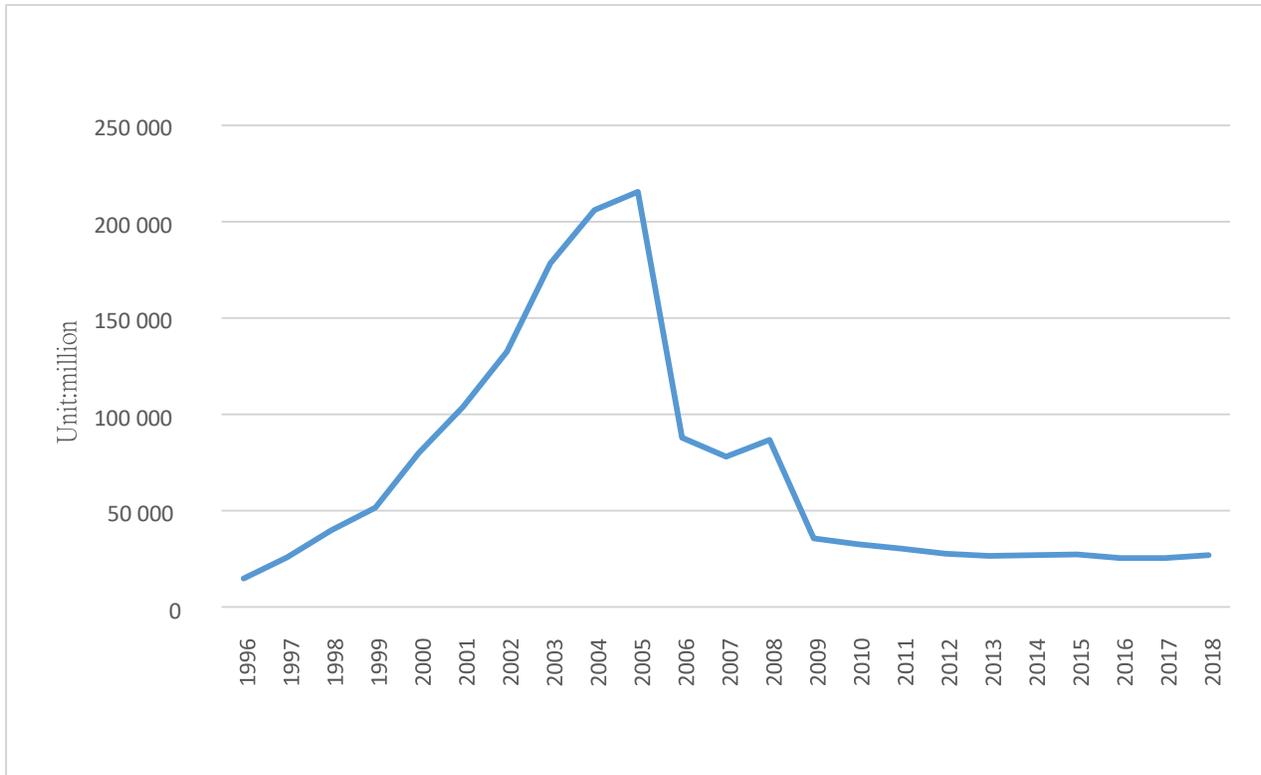


Figure 3: Cash advance

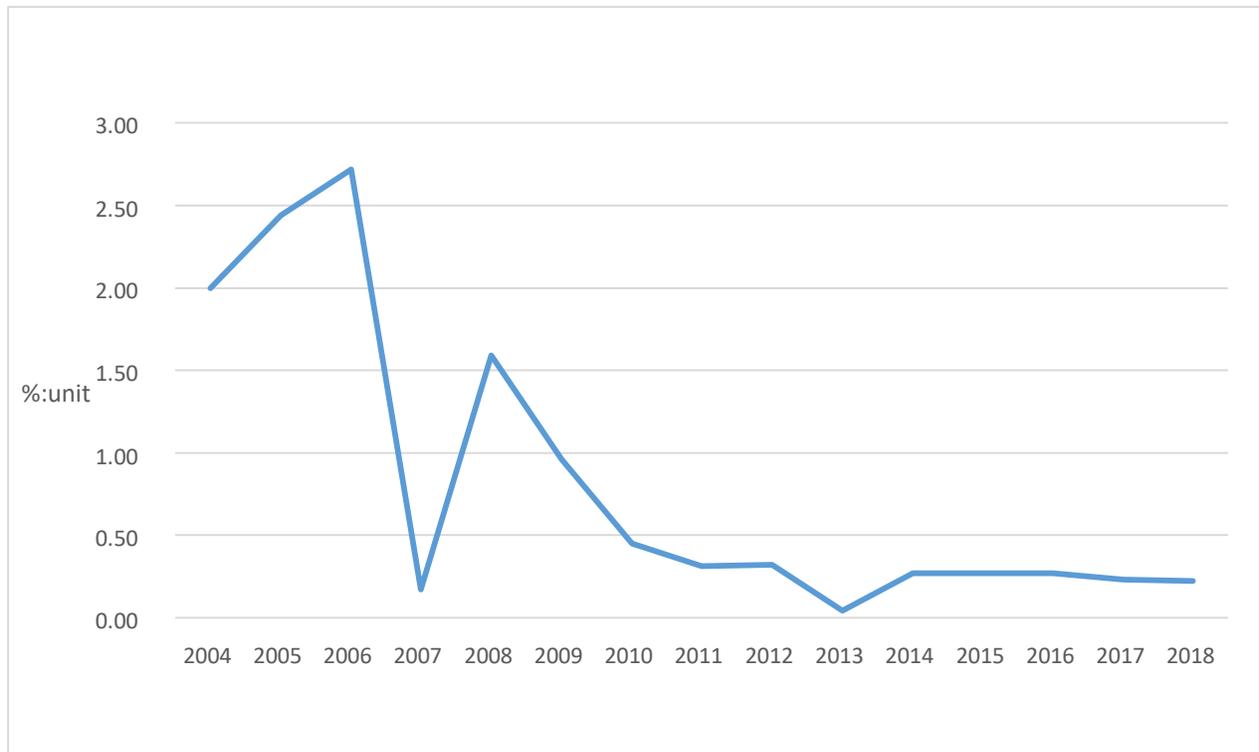


Figure 4: Overdue ratio

In addition, the high revolving interest rates of credit cards of various banks were always a hot topic of discussion. What reasons caused the high-end credit card revolving interest rate? Even after the FSC and the Association of Banks intervened, what was the effect? In particular, when the number of domestic credit cards in circulation continued to rise, the external environment of the domestic credit card market was different from that of 2005, which triggered the card debt crisis. In order to explore the differences between them, this article intended to use adverse selection and moral hazard caused by the phenomenon of asymmetry information in the credit card market and time series analysis to find the ways in which the financial competent authorities face the economic and social problems arising from credit cards and what their effectiveness is. In other words, the article will reveal whether the financial institution management matters or not.

The article is structured as follows: the next part presents the literature related to information asymmetry, adverse selection, and moral hazard to construct the proposed model and hypothesis. The following part presents the methodology, as a basis of understanding for examining hypotheses. The paper is completed with a discussion, conclusion, and recommendation for the future and advanced study.

2 Literature

2.1 Information Asymmetry

Since Akerlof (1970) published a paper entitled "Lemon Market: Uncertain Quality and Market Mechanism", which claimed that the seller will have more information about the traded commodities than the buyer, information asymmetry is ubiquitous in various fields or markets. For example, there are also some studies on the relationship between information asymmetry and some other kinds of markets.

For example, Lewis (2010) indicated that in the era when online shopping is quite common, the lemon market theory is more likely to occur in online shopping. Because all information about products in online shopping is provided by the seller, the buyer can only rely on the information provided by the seller. Since there are so many homogenous products, low-priced products can be more popular with consumers. On the

contrary, higher unit price products with better quality are hard to continuously attract consumers' attention and are gradually withdrawn from the market, resulting in only low-priced inferior products in the final market. If the buyer wants to obtain more information about the product, he can only rely on the seller's degree of disclosure, but the degree of disclosure also directly affects the cost of disclosure. If the information asymmetry of the buyer can be resolved by increasing the degree of disclosure, it can indeed make the status of lemon products no longer flooded in the market, but it must also be considered whether the disclosure cost is too high and affects the seller's participation. Suciu et al. (2011) studied asymmetric information on the impact of the US real estate market. During the economic depression, large-scale unemployment occurred in the United States, and financial institutions or enterprises faced a crisis of bankruptcy and the collapse of the social system. Information asymmetry caused excessive bank interest rates and other speculative behavior patterns, which aggravated the collapse of the real estate market and affected the overall recession of the US economy. Garleanu and Pedersen (2003) proposed that the securities market can circulate so well because it is supported by a group of investors with asymmetric information. After all, each investor has a completely different view of the company's stock price and prospects. The occurrence of transactions with selling created the vigorous development of the securities market. It can be seen that information asymmetry is also flooding the securities market. Mester (1994), Brito and Hartley (1995) successively held that the reason for the rigidity of credit card interest rates stems from information asymmetry. That banks cannot fully grasp the relevant information or risk preferences of consumers is the main reason why the credit card market cannot conduct market price competition. When the market price cannot operate normally, the credit card interest rate is set by the issuing bank, resulting in rigidity. In addition, the issuing bank must avoid possible risks, so that the revolving interest rate of the credit card will add a risk premium (compensation for possible losses), resulting in a higher price level for the revolving interest rate of the credit card.

The study found that banks are the intermediaries of fund surplus units (depositors) and fund deficit units (lenders). In order to reduce the risk of information asymmetry between depositors and lenders, financial institutions are needed to improve risk. However, there are also information asymmetries between banks and depositors or lenders. If a depositor does not understand the physique of the bank, he will run on the bank as long as he hears a little bit of wind, which will also cause the bank to face a crisis of failure. On the other hand, after the bank absorbs a large amount of deposits, it will have certain financial review standards for the lender, just like applying for a credit card, and it must conduct a credit review, which is also to reduce the default risk-driven from information asymmetry. But will the bank take it for the sake of its card issuance or occupying the market to loosen the inspection standards for risk, leading to the recurrence of a serious card debt crisis? It is exactly worthy of discussion in this article.

2.2 Adverse selection

Adverse selection is sometimes called "survival of the fittest", which means that because of information asymmetry between buyers and sellers, the party lacking information "before the transaction" makes unfavorable choices for themselves, and the phenomenon of inferior products driving out quality products occurs. And then, the average quality of products traded in the market declines.

From the perspective of a bank as a lender, one usually hopes that the higher the interest rate of the funds that can be lent, the better, thereby increasing the deposit spread of the bank. However, due to the information asymmetry between the bank and the borrower, funds may be loaned to speculators with a higher degree of risk preference, resulting in a higher probability that the funds will become bad debts, and adverse selection occurred after the transaction. Additionally, with the rapid expansion of the peer-to-peer lending marketplace, Xinyuan Wei et al. (2020) stated that investors are at the disadvantage of information asymmetry, which is a key issue in this marketplace that is unavoidable and can lead to moral hazard or adverse selection. Therefore, the risk-averse investors could apply a higher penalty factor to lower the risk of losing principal at the cost of the loss of some potential investment opportunities according to their own risk preferences, which can help investors reduce the impact of information asymmetry to a great extent. Again, Yao Wang and Zdenek Drabek (2022) investigated the efficiency of the credit-screening mechanism on the P2P lending platform and found that due to the growing size of the Fintech industry, this may pose

a systematic risk to the financial system, necessitating regulators' close attention. Since, investors can better diagnose soft signals, an effective and transparent enlargement of socially related soft information together with a comprehensive and independent credit bureau could mitigate adverse selection in a disintermediation environment. David Mhlanga (2021) studied the impact of machine learning and artificial intelligence in credit risk assessment and discovered that artificial intelligence and machine learning had a strong impact on credit risk assessments using alternative data sources such as public data to deal with the problems of information asymmetry, adverse selection, and moral hazard. Besides the top of related finance, Walter Nicholson and Karen Needels (2006) found that when the company wants to lay off employees, it will provide a contract to induce workers to choose to continue to work or leave the company, which can help the company remove some unsuitable employees or poorly skilled employees, and retain the rest of the employees who work hard. However, at this time, if the government provides unemployment assistance to the unemployed, it will instead cause the problem of adverse selection, leading to an increase in the number of involuntary unemployment. It can be seen that relevant policies are indeed more likely to induce adverse selection problems. Therefore, the authority should carefully evaluate and review whether the intervention of the authority will worsen the adverse selection phenomenon especially when the card debt occurs. Furthermore, the phenomenon of adverse selection in the loan market means that lenders with good quality (referring to low risk and good financial structure) will want to choose banks with relatively low loan interest rates; those with poor quality will pretend to be good-quality lenders and try to obtain lower loan interest rates. If the bank does not have a good grasp of this information, there will be an adverse selection, choosing the average interest rate of both parties to lend the money. It means that poor quality people borrow money at a lower interest rate than originally proposed, but good quality people cannot borrow money because of higher interest rates. As a result, information asymmetry causes the problem of bank adverse selection. Bester (1994) deemed that if a company wants to borrow abroad, it uses mortgage loans. If the company really cannot pay the interest later, the bank can also get a part of the repayment, avoiding the risk of corporate debt, thereby reducing part of the problem of adverse selection.

Stavins (1996) and Ausubel (1991) argued that when banks lower the interest rate of credit cards, they will attract more high-risk cardholders, making the overdue ratio of credit cards higher, which stems from adverse selection. Therefore, the issuing bank must use a higher interest rate to reduce the losses caused by high-risk cardholders. The card issuing bank originally hoped to reduce the interest rate to attract more people to use the credit card, but due to the information asymmetry, it attracted too many high-risk cardholders or reduced the cost of using funds for the original cardholders who use more than the amount they can afford. All that eventually leads to more bad debts for the issuing bank. Simultaneously, Stephen G. Cecchetti (2006) pointed out that when a card issuer classifies credit card holders as high risk of default, it will increase the revolving interest rate to compensate for the high risk they bear. Because the issuing bank understands that if a large number of cards are issued, the accompanying default risk will also increase. Therefore, increasing the revolving interest rate in response to the accompanying high default risk becomes a necessary means.

This phenomenon of adverse selection did occur in the credit card market of private banks in Taiwan. Based on Table 2, shows the truth that the highest revolving interest rates for private banks with relatively large card issuance at that time were set close to the maximum limit of 20% stipulated by the civil law; on the contrary, public banks with relatively small card issuance applied lower revolving rates.

Table 2: 2005 Maximum Revolving Interest Rate and Number of Valid Cards for Credit Cards

Financial institutions	Maximum revolving interest rate	Number of valid cards
Bank of Taiwan	10.8%	119,195
Taiwan Land Bank	17.99%	56,004
China Trust Commercial Bank	20.00%	3,468,784
Cathy Pacific Commercial Bank	19.70%	1,934,320
Tai Shin Commercial Bank	20.00%	1,791,487
Taipei Fu Bon Commercial Bank	20.00%	1,396,633
Federal Commercial Bank	19.71%	1,023,095
Yong Feng Commercial Bank	19.97%	870,821
Far East International Commercial Bank	19.97%	730,955
ABN AMRO	19.97%	448,493
Hong Kong and Shanghai Banking Corporation	19.93%	410,271
Taiwan Shin Kong Commercial Bank	20.00%	403,587
Mega International Commercial Bank	19.71%	324,415
First Commercial Bank	17.82%	320,373
Public Commercial Bank	20.00%	252,146
South China Commercial Bank	20.00%	251,042
Wan Tai Commercial Bank	19.89%	249,420
Shanghai Commercial Saving Bank	19.71%	221,860
Standard Chartered International Commercial Bank	20.00%	202,796
Rushing International Commercial Bank	20.00%	177,966
Yuan Ta Commercial Bank	19.71%	131,496
Taiwan American International Express Co., Ltd.	20.00%	71,603
Changhua Commercial Bank	18.25%	69,109
Taiwan Small and Medium Enterprise Bank	19.24%	102,813
Prime rate	4.125%	

2.3 Moral hazard

Apparently, more studies linked moral hazard to the insurance. Chenhao Yu et al. (2022) recognized that policymakers should optimize health insurance policy to ensure the sustainability of health insurance and suggested that primary medical staff should assist patients to establish healthy living habits and reduce their risky behaviors, though health insurance reduces alcohol consumption has been debated. Qian Xing et al. (2022) argued that volume-based drug purchasing by China's health insurance system currently represents the largest group purchasing organization worldwide and found that the problems associated with high co-occurrence frequencies were divided into the following clusters: cost control, drug accessibility, system rationality, policy fairness, drug quality, and moral hazards. Ziheng Niu et al. (2022) examined the relationship between agricultural insurance and the input of chemical fertilizer and the result showed that farmers in eastern China and high-disaster areas have a higher probability of moral hazard with overuse after purchasing policy-based agricultural insurance. Meanwhile, Tao Li et al. (2021) demonstrated that the cost of production insurance's positive marginal incentive to apply more input expense of chemicals in production dominates the negative moral hazard effect.

A moral hazard refers to the fact that the buyer and seller fail to comply with the original agreement to change their behavior after the "transaction" due to information asymmetry, thus harming the interests of the other party.

Paul Krugman (1999) has also pointed out that if the government provides insurance for free and the supervision is not strict enough, financial intermediaries will lack relevant thinking and have a compulsive high-risk investment desire. If domestic financial institutions are unable to obtain funds in the international market, resulting in excessive capital demand, it will only increase domestic interest rates without triggering excessive investment or excessive borrowing. However, if domestic financial institutions can obtain the funds they need in the international market, then due to the government insurance system and international capital borrowing, it may easily meet the capital needs of domestic enterprises and induce the desire of financial institutions to overinvest, which will lead to a severe asset bubble or a large number of ineffective investments may eventually end in a crisis of moral danger.

Both Stiroh (2004) and Stiroh and Rumble (2006) believed that emerging financial instruments require relatively low capital reserves, so the proportion of bank non-interest income will increase, and banks may engage in high-risk loans or investments which makes banks riskier.

Lepetit et al. (2008), Busch and Kick (2009) also found that if a bank engages in diversified operations, it will gradually increase investment in securities and other profit-producing assets, thereby increasing the probability of bankruptcy and overall related risks.

Wang Feng Sheng (2006) proposed that if the revolving interest rate is reduced, and although the debt repayment burden of the people who use the revolving interest rate can be reduced, it does reduce the source of income for banks. In order to avoid the risk of its debtors, banks will inevitably use more stringent inspection methods or need to provide collateral before they are willing to let the public handle credit cards or borrowing, thus causing people who need funds to be unable to borrow money.

Pozdena (1991) also mentioned that usually credit card holders take transaction convenience as their primary consideration for card application, but once the revolving credit line needs to be used, there are usually moral hazards. In other words, people with low solvency usually need to use revolving credit, and this is also the reason why credit card interest rates remain high. Because credit card loans are unsecured loans, service costs are also high, and credit card borrowers have relatively high risks, to bear this risk, banks will inevitably set higher interest rates.

Claassen Rutger (2015) elevated the financial crisis from a financial issue to an ethical issue. He lifts the 2008 global financial crisis as an example and shows that moral hazards originate from a serious imbalance between financial institutions and taxpayers. Because greedy financial institutions take excessive risks just to make huge profits in a good economy; but when the economy is bad, all losses derived from this risk are borne by taxpayers. Just like the dual-card crisis that occurred in Taiwan in 2005, when card issuers faced a fiercely competitive market, they arbitrarily relaxed their review conditions and credit-granting strategies for their performance growth, allowing those who could pay off debts to get credit cards, etc.

Based on the above studies, it is found that the credit card market with high revolving interest rates implies high risks. In addition to the adverse selection, the issuing banks are facing the moral hazard of bad debts for cardholders with poor credit. Table 3 reveals that private banks with high revolving interest rates not only have more valid cards than public banks but also have higher over-due ratios caused by high revolving interest rates. All that proves moral hazard exists in the credit card market and especially occurs in private banks.

Table 3: The Comparison of Maximum Revolving Interest Rate, Number of Valid Cards, and Overdue Ratio for Credit Cards

Financial institutions Max	Maximum revolving interest rate	Number of valid cards	2006/01 overdue ratio	2006/12 overdue ratio
Bank of Taiwan	10.80%	119,195	1.93%	2.74%
Taiwan Land Bank	17.99%	56,004	2.67%	2.14%
China Trust and Commercial Bank	20.00%	3,468,784	2.82%	2.90%
Cathy Pacific Commercial Bank	19.70%	1,934,320	2.80%	2.97%
Tai Shin International Commercial Bank	20.00%	1,791,487	2.67%	2.95%
Taipei Fu Bon Commercial Bank	20.00%	1,396,633	2.73%	2.98%

2.4 Proposed model and hypothesis

According to the above literature data, although the phenomenon of information asymmetry will be presented in two aspects: adverse selection and moral hazard, similarly, adverse selection and moral hazard also affect the degree of information asymmetry. In addition, adverse selection and moral hazard also affect each other, which further affects information asymmetry. In other words, information asymmetry, adverse selection, and moral hazard are the phenomena of mutual influence and causal cycle in the proposed model (Figure 5). It can be seen that, whether it is to reduce the credit card debt crisis or social problems, or to improve the phenomenon of information asymmetry, facing information asymmetry, adverse selection, and moral hazard at the same time is the solution to the problems related to information asymmetry.

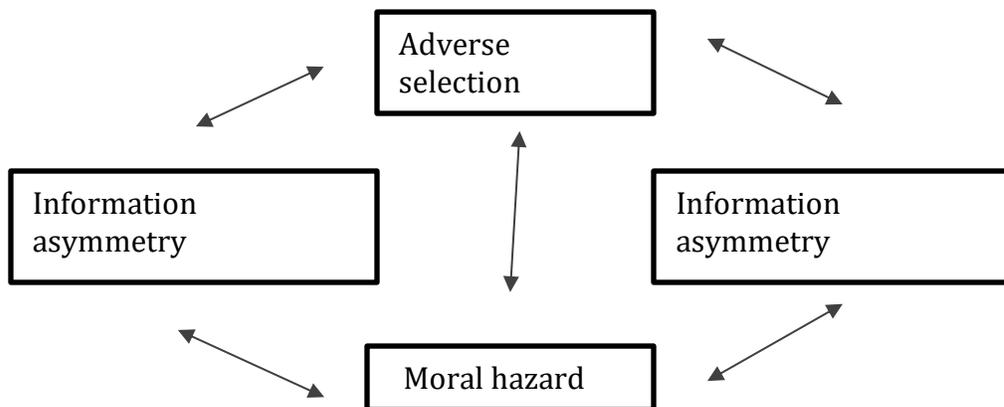


Figure 5. Proposed model

Hypotheses of the article:

The following were the hypothesis formulated within the framework of the article:

Hypothesis 1 (H1).

The financial institution management is effective to reduce the problems related to information asymmetry.

Hypothesis 2 (H2).

The financial institution management is effective to reduce the problems related to adverse selection.

Hypothesis 3 (H3).

The financial institution management is effective to reduce the problems related to moral hazard.

3 Methodology

3.1 Documents Analysis Method

Bowen (2009) claimed that the document analysis method used in this article is a static research form, which extracts required data and information through document collection, analysis, and research, and makes an objective interpretation and presentation of the document. It pays particular attention to objective, systematic, and qualitative research methods, which in themselves are methods of social research and important research tools. In addition, the document analysis method not only refers to the analysis of document content but also pays attention to the academic dissemination process of related documents; For example, the inference of the content of the literature focuses on the impact of the academic communication process, rather than a single discussion of its narrative explanation. In other words, the document analysis method adopts static and comparative research methods to understand the causes, processes, and changes of problems, and finally predict the possible orientation and evolution of events.

In terms of data collection, this article can be divided into two parts:

1. Collect related special books, literature data, Internet resources, official statistical information (government agency-related data, business statistical information, press releases, etc.), newspapers and magazines.
2. Collect information through the National Dissertation Information Network, Journal Literature Information Network, Airiti Library, Huayi Online Library, and other network information.

3.2 Qualitative and quantitative analysis combined

Bowen advanced to a state that researchers should corroborate findings across data sets to reduce the impact of potential biases that can exist in a single study. Document analysis is included in the mixed-method studies which combine quantitative and qualitative research techniques. Hence, the article is supplemented by qualitative analysis, which is a way and perspective to study things from the inherent qualitative nature of affairs based on the attributes of social phenomena and the contradictory changes. It uses universally recognized axioms, a set of deductive logic, and a large number of historical facts as the basis of analysis. It is based on certain theories and experiences, directly grasping the main aspects of things, and studying and explaining them.

After the qualitative analysis method provides the correct direction, the trend analysis method in the quantitative analysis method is used to explain and anticipate the direction of future events. That is to compare the data of the same unit for several consecutive years with vertical and horizontal comparisons, and observe its growth, change trends, and the similarities and differences with peer data so that analysts can understand the development and changes of events under specific conditions.

4 Discussions and results

4.1 Adverse selection

It can be seen from Table 4 that the revolving interest rate of private banks is higher than that of public banks, and the number of valid cards of private banks is also significantly higher than that of public banks. The operation mode that violates the law of market demand shows the truth that adverse selection did exist in the credit card market.

Further analysis, it is even more obvious that public banks with relatively low revolving rates have a very low percentage of valid cards (almost less than 2%); on the contrary, private banks with high revolving interest rates, such as Cathay Pacific, Citigroup, E. Sun, China Trust Bank, etc., account for more than 98% (Table 5, Figure 6). The result reveals that the phenomenon of adverse selection that may derive from Taiwan's credit card market exactly exists in private banks.

However, the situation has apparently changed since the financial authority intervened in the credit cards market in 2005. Comparing the data in 2005 and 2019, the highest revolving interest rate of private banks has dropped significantly, even close to the level of public banks. At the same time, although the number of cards in circulation continues to rise (Figure 2), the proportion of Issued valid cards of private banks is indeed slowly declining (Figure 6). When the maximum circulating interest rate, which represents a high-

risk premium, drops, the card issuing bank must return to the strict card issuance review mechanism. Therefore, with the simultaneous decline of the maximum revolving interest rate and the proportion of issued cards, it is proven that the financial institution management is primarily effective to reduce the problems related to the phenomenon of adverse selection, especially in private banks. In other words, H1 and H2 are supported.

Table 4: The comparison of maximum revolving interest rate and number of valid cards between public and private banks

Financial institutions	2005		2019	
	Maximum revolving interest rate	Number of valid cards	Maximum revolving interest rate	Number of valid cards
Public banks				
Bank of Taiwan	10.80%	119,195	11.34%	115,335
Taiwan Land Bank	17.99%	56,004	14.77%	164,477
Private banks				
China Trust Commercial Bank	20.00%	3,468,784	15.00%	4,564,963
Cathy Pacific Commercial Bank	19.70%	1,934,320	15.00%	4,768,252
Tai Shin International Commercial Bank	20.00%	1,791,487	15.00%	3,587,137
Taipei Fu Bon Commercial Bank	20.00%	1,396,633	14.97%	1,959,466
Federal Commercial bank	19.71%	1,023,095	15.00%	1,188,716
Yong Feng Commercial Bank	19.97%	870,821	15.00%	1,084,985
Far East International Commercial Bank	19.97%	730,955	14.99%	1,010,287
Taiwan Shin Kong Commercial Bank	20.00%	403,587	15.00%	490,032
Mega International Commercial Bank	19.71%	324,415	15.00%	550,123
First Commercial Bank	17.82%	320,373	15.00%	739,161
South China Commercial Bank	20.00%	251,042	15.00%	800,724
Shanghai Commercial Saving Bank	19.71%	221,860	15.00%	218,907
Standard Chartered International Commercial Bank	20.00%	202,796	14.98%	260,023
Yuan Ta Commercial Bank	19.71%	131,496	15.00%	731,080
Taiwan American International Express Co., Ltd	20.00%	71,603	15.00%	118,630
Changhua Commercial Bank	18.25%	69,109	15.00%	221,184
Taiwan Small and Medium Enterprise Bank	19.24%	102,813	15.00%	122,748
Prime rate	4.12%		2.61%	

Table 5: The proportion of Issued valid cards between public and private banks

Year	Public banks(1)	Private banks (2)	Share of private banks:(2)/(1)+(2)
2004	445,226	24,143,378	98.19%
2005	491,874	24,085,669	98.00%
2006	401,764	20,004,589	98.03%
2007	373,386	19,391,592	98.11%
2008	362,058	19,093,184	98.14%
2009	360,062	18,467,604	98.09%
2010	379,197	19,148,533	98.06%
2011	375,081	20,384,480	98.19%
2012	393,981	21,103,935	98.17%
2013	393,683	22,170,740	98.26%
2014	410,189	23,955,766	98.32%
2015	468,776	24,888,540	98.15%
2016	522,650	26,501,176	98.07%
2017	554,753	27,479,957	98.02%
2018	600,497	28,973,491	97.97%

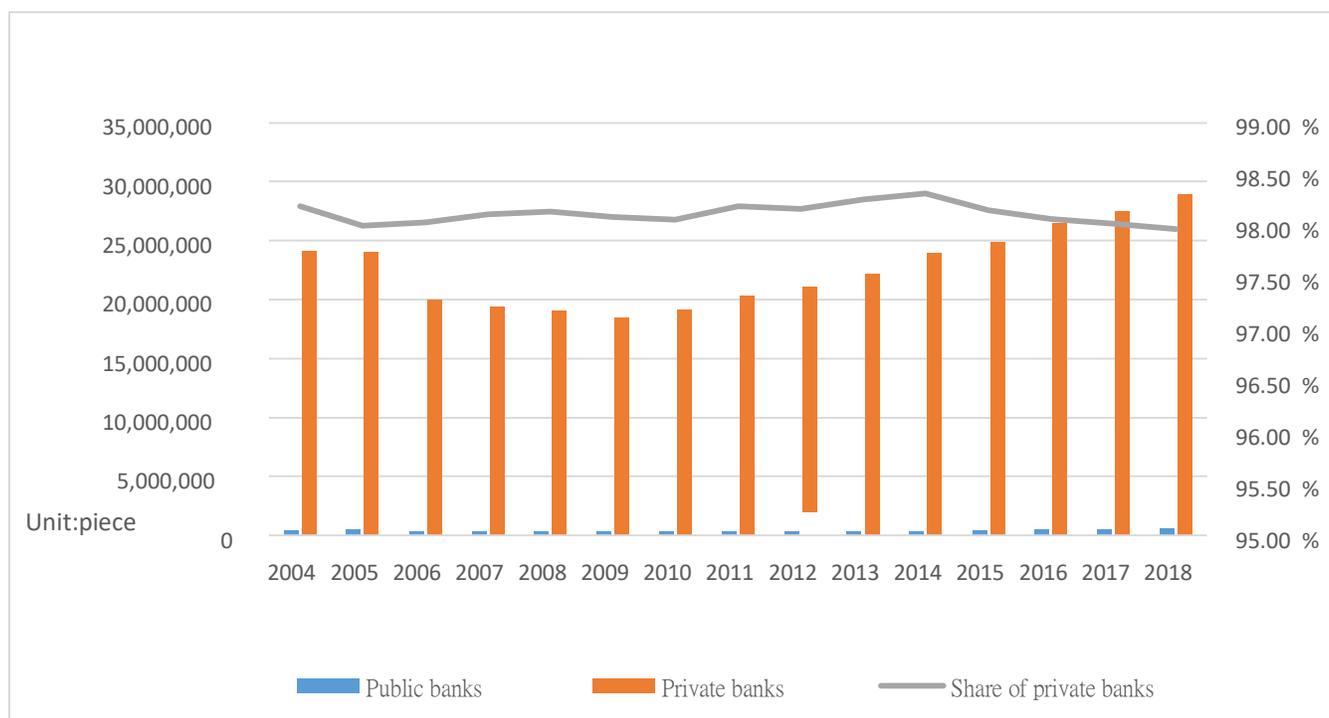


Figure 6: The proportion of Issued valid cards between public and private banks

4.2 Moral hazard

Undoubtedly, the overdue ratio is an important indicator to examine whether the moral hazard has changed after the financial authorities intervened in the market.

Based on the above study and research, it can be seen that although private banks have always maintained a high revolving interest rate, their issuance volume also accounts for the majority of the market before the financial authority intervened in the market in 2005, showing the abnormal phenomenon of market imbalance in the credit card market due to adverse selection. More importantly, the moral hazard associated with high revolving interest rates has also come with it because the higher overdue ratio is exactly accompanied by the private banks. The high issuance volume of credit cards is combined with high revolving interest rates, which leads to high overdue ratios. All this shows that the credit card market not only has an adverse selection phenomenon, but also a moral hazard phenomenon resulting from adverse selection. Above all, most private banks, which integrate high card issuance, high revolving interest rates, and high overdue ratio, are just the best interpretation of the information asymmetry in the credit card market.

However, this phenomenon reached a turning point in 2007. What happened to the phenomenon changed, or why? As early as 2005, the Association of Banks promoted the debt negotiation mechanism in an attempt to solve the serious card debt problem. In 2007, the Legislative Yuan further passed the Consumer Debt Clearance Regulations. Either the debt negotiation mechanism or the Consumer Debt Clearance Regulations conveyed strongly that the competent authorities will solve the problem of credit card debt and the social problems derived from it. It has been proven that the overdue ratio of all banks has decreased significantly year by year since 2007 (Figure 4). Due to the improvement of adverse selection, when the card issuing bank has lost the reward of the high circulating interest rate that subsidizes the risk premium and needs to conduct a strict review of the card issuing mechanism, the decline in the overdue ratio is a more specific indicator of whether the financial institution management is effective. That is because lowering the maximum revolving interest rate and the proportion of issued cards of private banks is just the subjective intention for the financial authority to improve the adverse selection. The key point is that lowering overdue ratio is the objective and concrete achievement for the financial authority to reduce the problems related to moral hazards or information asymmetry. Therefore, whether it's based from the trend of overdue ratio of overall financial institutions (Figure 4) or the overdue ratio of individual banks (from Table 6-1 to Table 6-3), the result confirms that with effective financial institution management, the moral hazard caused by information asymmetry in the credit card market has been apparently improved. Combined with H2, H1 and H3 are supported at the same time.

Table 6-1: The comparison of maximum revolving interest rate and the overdue ratio of public and private banks from 2004 to 2018

Financial institutions	Maximum revolving interest rate (%)	Overdue ratio (%)				
	2019	2004	2005	2006	2007	2008
Public banks						
Central Trust of China	*	0.57	0.87	1.02	*	*
Taiwan of Bank	11.34	0.56	1.97	3.35	0.19	0.75
Taiwan Land Bank	14.77	4.47	2.49	2.02	0.30	0.97
Cooperative Treasure Bank	15.00	3.68	2.27	2.14	1.57	1.15
Private banks						
First Commercial Bank	15.00	1.38	2.62	1.59	0.00	0.52
South China Commercial Bank	15.00	2.52	2.86	2.88	0.01	0.34
Changhua Commercial bank	15.00	2.80	1.80	1.94	0.36	0.38
Shanghai Commercial Saving Commercial Bank	15.00	1.93	2.45	1.12	0.00	1.15
Taipei Fu Bon Commercial Bank	14.97	0.30	2.73	1.09	0.00	0.89
Cathy Pacific Commercial Bank	15.00	1.26	2.69	2.01	0.00	1.24
Kaohsiung Bank	14.97	0.40	1.02	0.05	0.20	0.46
Citi (Taiwan) Commercial Bank (OCBC)	15.00	2.25	1.68	1.72	0.00	1.79
Taiwan Small and Medium Enterprise Bank	15.00	3.95	2.12	2.39	0.59	0.79
Standard Chartered International Commercial bank	14.98	0.85	1.93	2.15	0.04	1.03
Taichung Commercial Bank	14.98	3.63	1.94	1.61	0.00	0.74
Hua Tai Commercial Bank	15.00	2.10	0.04	0.76	0.89	0.09
Taiwan Shin Kong Commercial Bank	15.00	1.38	2.75	2.48	0.22	1.94
Federal Commercial Bank	15.00	3.84	2.95	2.72	0.00	2.82
Far East International Commercial Bank	14.99	2.29	1.14	2.52	0.10	1.70
E. Sun Commercial Bank	15.00	0.98	1.53	2.02	0.32	1.66
Wan Tai Commercial Bank	15.00	2.86	1.10	0.88	2.73	2.02
Tai Shin International Commercial Bank	15.00	1.49	2.82	2.98	0.16	2.59
Yuan Ta Commercial Bank	15.00	2.09	2.87	2.95	0.00	0.06
Rushing International Commercial Bank	14.99	3.68	1.72	3.83	0.00	2.41
China Trust and Commercial Bank	15.00	1.97	2.47	2.81	0.01	1.23
Total average		2.00	2.44	2.72	0.17	1.59

Table 6-2: The comparison of maximum revolving interest rate and the overdue ratio of public and private banks from 2004-2018

Financial institutions	Overdue ratio (%)					
	2009	2010	2011	2012	2013	2014
Public banks						
Central Trust of China	*	*	*	*	*	*
Taiwan of Bank	0.50	0.30	0.41	0.44	0.47	0.23
Taiwan Land Bank	0.71	0.79	0.94	0.97	0.69	0.57
Cooperative Treasure Bank	1.10	0.75	0.64	0.62	0.64	0.70
Private banks						
First Commercial Bank	0.10	0.19	0.13	0.13	0.16	0.20
South China Commercial Bank	0.58	0.39	0.05	0.10	0.09	0.04
Changhua Commercial Bank	0.21	0.18	0.14	0.19	0.27	0.21
Shanghai Commercial Saving Bank	0.66	0.49	0.54	0.52	0.61	0.57
Taipei Fu Bon Commercial Bank	0.49	0.14	0.08	0.10	0.00	0.19
Cathy Pacific Commercial Bank	0.36	0.19	0.14	0.17	0.00	0.13
Kaohsiung Bank	0.12	0.00	0.01	0.00	0.17	0.23
Citi (Taiwan) Commercial Bank (OCBC Commercial Bank)	0.93	0.67	0.62	0.66	0.16	0.61
Taiwan Small and Medium Enterprise Bank	0.69	0.31	0.41	0.26	0.03	0.24
Standard Chartered International Commercial Bank	0.60	0.34	0.34	0.72	0.00	0.47
Taichung Commercial Bank	0.54	0.72	0.66	1.42	0.00	1.46
Hua Tai Commercial Bank	0.17	0.53	0.21	0.25	0.12	0.75
Taiwan Shin Kong Commercial Bank	1.11	0.36	0.22	0.25	0.00	0.16
Federal Commercial Bank	1.82	0.65	0.27	0.36	0.00	0.27
Far East International Commercial Bank	1.47	0.48	0.22	0.40	0.10	0.27
E. Sun Commercial Bank	1.44	0.36	0.23	0.22	0.00	0.23
Wan Tai Commercial Bank	1.42	0.75	0.87	1.12	0.68	1.32
Tai Shin International Commercial Bank	0.76	0.41	0.28	0.29	0.00	0.23
Yuan Ta Commercial Bank	0.00	0.00	0.04	0.38	0.00	0.27
Rushing International Commercial Bank	1.14	0.51	0.34	0.40	0.00	0.37
China Trust and Commercial Bank	0.81	0.53	0.29	0.23	0.00	0.15
Total average	0.96	0.45	0.31	0.32	0.04	0.27

Table 6-3: The comparison of maximum revolving interest rate and overdue ratio of public and private banks from 2004-2018

Financial institutions	Overdue ratio(%)			
	2015	2016	2017	2018
Public banks				
Central Trust of China	*	*	*	*
Taiwan of Bank	0.30	0.48	0.28	0.31
Taiwan Land Bank	0.28	0.45	0.34	0.26
Cooperative Treasure Bank	0.31	0.19	0.26	0.19
Private banks				
First Commercial Bank	0.16	0.18	0.18	0.16
South China Commercial Bank	0.04	0.06	0.04	0.07
Changhua Commercial Bank	0.34	0.14	0.19	0.16
Shanghai Commercial Saving Bank	0.57	0.73	0.59	0.51
Taipei Fu Bon Commercial Bank	0.17	0.14	0.11	0.10
Cathy Pacific Commercial Bank	0.13	0.12	0.13	0.15
Kaohsiung Bank	0.33	0.65	0.32	0.25
Citi (Taiwan) Commercial Bank (OCBC Commercial Bank)	0.66	0.67	0.57	0.66
Taiwan Small and Medium Enterprise Bank	0.07	0.15	0.14	0.13
Standard Chartered International Commercial Bank	0.50	0.40	0.41	0.27
Taichung Commercial Bank	1.44	1.59	1.07	0.63
Hua Tai Commercial Bank	0.45	1.12	0.83	0.23
Taiwan Shin Kong Commercial Bank	0.20	0.26	0.25	0.23
Federal Commercial Bank	0.31	0.36	0.29	0.27
Far East International Commercial Bank	0.29	0.36	0.24	0.30
E. Sun Commercial Bank	0.23	0.26	0.24	0.23
Wan Tai Commercial Bank	1.52	0.97	0.77	0.63
Tai Shin International Commercial Bank	0.25	0.23	0.20	0.17
Yuan Ta Commercial Bank	0.15	0.12	0.07	0.08
Rushing International Commercial Bank	0.18	0.25	0.33	0.25
China Trust and Commercial Bank	0.15	0.16	0.13	0.11
Total average	0.27	0.27	0.23	0.22

5 Conclusions and recommendations

5.1 Conclusions

According to the research in this article, private banks with high revolving interest rates have always issued more cards than public banks with low revolving rates, which can fully demonstrate that the domestic credit card market does have adverse selection phenomena, making the market price mechanism unable to operate normally. In particular, when the concomitant moral hazard derives from the high over-to-play ratio, the information asymmetry in the domestic credit card market will emerge. Public economics once mentioned that when information asymmetry, externalities, public goods, or natural monopoly occurs in the market, there will be a market failure phenomenon where the market price mechanism cannot operate normally. To solve the market failure, the government has to intervene in the market and restore the welfare losses caused

by the market failure. In other words, when it is confirmed that there is indeed information asymmetry in the domestic credit card market, leading to failure of the consumer financial market and even causing serious social problems, the government's intervention in the market is already duty-bound. If the market price mechanism is used as an excuse and does nothing, or even fear that the government's intervention will be accused of interfering in the market, distorting the market price mechanism, and holding back countermeasures, it is not a responsible authority's application. Therefore, regardless of the self-disciplined debt negotiation mechanism of the Association of Banks in November 2005 or the Consumer Debt Clearance Regulations passed by the Legislative Yuan in June 2007, despite challenges in the timing of policy launch or implementation effectiveness, the results do show that the information asymmetry of credit card market has been alleviated gradually. Recognizing the nature of market information asymmetry, the competent authority needs to be responsible for supervising and managing the order of the financial market. Especially when card debt has further deteriorated from a financial problem to a social problem, actively intervening in the market is nothing more than its role to play. In other words, the conclusion of the article is that it's necessary for the financial authority to intervene in the market under information asymmetry and it's proven that the financial institution management from the financial authority is exactly effective to reduce or improve the problems related to information asymmetry .

5.2 Recommendations

Although this article has several implications for researchers and practitioners and confirms that the financial authority can effectively improve the domestic credit card debt crisis and the derived social problems after implementing financial institution management on the domestic credit card market with asymmetric information, it still has some limitations in application. First of all, this article examines the policy effects on the credit card market with market failure in Taiwan, but does not compare and analyze the differences in policy effects in different countries or regions. Next, despite this article used a survey method for the empirical analysis, it's suggested that combining in-depth techniques with information asymmetry is required to produce prescriptive and actionable results that can provide both theoretical and practical contributions. Finally, the article only examines whether the financial authority management was effective before the onset of COVID-19. As everyone knows, the epidemic has severely impacted various industries, but due to the characteristics of COVID-19, it has also driven the rapid development of the information technology and financial technology industries. Either information technology or financial technology is beneficial to consumer financial products, such as block chain, virtual currency, mobile payment, or online payment platform, once again the opportunity for rapid development. Therefore, in order to expand the applicability of the policy implications of financial institution management , or in response to another wave of financial crises that may be derived from the development of consumer finance, comparing cross-border or cross-regional policy effects or extending the period of observation of financial institution management will be an important topic for follow-up research , so as to highlight the financial institution management

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