A Study on the Adverse Selection in the Securitization of Bank Credit Assets in China Using System GMM

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Abstract

After the outbreak of the subprime mortgage crisis in the United States, the problem of adverse selection in credit asset securitization had become a hot spot. Based on the data of Chinese commercial banks from 2012 to 2020, we used the system generalized method of moments to construct a dynamic panel model, and used the test of Arellano-Bond and Sargan to examine the rationality of models and instrumental variables, so as to made empirical research on whether there was adverse selection and its existing motivation in bank credit asset securitization. The results showed that large banks have adverse selection, but small and medium-sized banks did not have, and regulatory capital arbitrage was more sufficient than risk transfer profit in the bank's adverse selection motivations. It had important practical significance and theoretical value for promoting the steady development of credit asset securitization and preventing and resolving bank risks.

Keywords-*credit asset securitization; information asymmetry; adverse selection; regulatory capital arbitrage; system GMM*

1. INTRODUCTION

Asset securitization is one of the greatest financial innovations since the 20th century, but it was also the fuse that led to the outbreak of the global financial crisis in 2008, causing financial instability. Scholars believe that the basic problem of asset securitization stems from the role of information asymmetry[1]. Banks, as lenders and initiators of asset securitization, have a lot of information, but that information cannot be reliably transmitted to the market in the process of credit asset securitization, and eventually lead to information asymmetry, which is mainly manifested in adverse selection and moral hazard. Adverse selection helps banks reduce their credit risk by transferring poor quality assets but it will stimulate the emergence of moral hazard, relax credit approval standards and post loan review and supervision, which will further aggravate the deterioration of the quality of bank credit assets. If this cycle continues, it will create the illusion of a securitization boom, which will reduce the ability of bank to withstand risk and cause huge risks. Therefore, it is of great practical significance to analyze and judge whether there is adverse selection in the process of credit asset securitization. It is essential to promote the steady development of credit asset securitization, prevent and resolve bank systemic risks.

The issuance of credit asset securitization was initially to help banks control their systemic risks, allowed banks to diversify their characteristic risks and improve financial stability. Securitization can enhance the liquidity of credit assets, providing banks with new financing channels and expanding funding sources[4], but credit asset securitization realized credit expansion by increasing the leverage ratio of the whole banking system. If the necessity of asset expansion reduced the loan standard and triggered a higher probability of loan loss, the securitization of credit assets might not enhance financial stability[9].

At present, in the available literature, scholars from home and abroad have not reached a unanimous conclusion on whether there is adverse selection in the process of asset securitization, which can be divided into two opinions: one is that there is adverse selection in the process of credit asset securitization. Elul found that the quality of assets sold by banks to special interest vehicles (SPV) was significantly lower than that on the balance sheet. Loan quality[15]. Downing et al. empirically found that adverse selection might exist in the main mortgage

loan market, leaded to the deterioration of underwriting standards[16]. Agarwal et al. also found that in the major mortgage market after the crisis broke out, banks showed an obvious pattern of adverse selection[17]. Similarly, Keys et al. found that the existing securitization of subprime mortgages did have an adverse effect on the screening incentives of lenders[18]. In addition, Chen and Li found that there were adverse selection problems in small and medium-sized banks in the United States, and they were more inclined to choose low-quality loans for securitization[19].

The second is that there is no obvious adverse selection in the process of credit asset securitization. Ambrose et al (2005) found that high-risk loans did remain in the investment portfolio, while low-risk loans were securitized by examining the ex-post performance of securitized and non-securitized loans [20]. Benmelech et al. through the study of the performance of personal loans of mortgage loans, it was found that the amount of adverse selection in the securitization of corporate loans is weak[21]. Albertazzia et al. compared the securitized loans of 50 Italian banks with the loans retained on the original bank's balance sheet, and found that there was a negative correlation between the error term of securitization probability and default probability, banks sold loans with low default probability [22].

In summary, the available literature based on different research perspectives, national economic environments and policies, the conclusions were different. And the most available researches were based on European and American data, rarely based on China. According to that, we select China's commercial banks as the research object, and research the existence of adverse selection in the process of credit asset securitization and its motivation. Our contributions are mainly reflected in: First, it is the first time to use China's commercial bank data to study the existence of adverse selection in the process of credit asset securitization, which will help enrich the research. Second, different from the available literature that only used the change of non-performing loan ratio, we use the non-performing loan ratio and the growth rate of loan loss to overcome the deficiency that it is difficult to distinguish the result caused by adverse selection or moral hazard, and the conclusion is more robust. Third, we not only by dividing the sample into large banks and small and medium-sized banks for regression to distinguish the heterogeneity, but also make a further empirical analysis on the motivation of adverse selection of banks, so as to make a useful supplement to the available literature on credit asset securitization and adverse selection.

2. THEORETICAL ANALYSIS AND HYPOTHESIS

The existence of adverse selection in the process of bank credit asset securitization mainly depends on whether the bank's adverse selection motivation is sufficient. The motivation of adverse selection in bank credit asset securitization mainly includes risk transfer profit, and the regulatory capital arbitrage.

2.1 Based on risk transfer profit

The adverse selection of banks based on "risk transfer" is mainly reflected in: First, reduce their own credit risk. As a debt-operated enterprise, loans are the bank's main business and credit risk is the main risk. The "risk transfer" is to sell credit risk assets and transfer the risk to investors, reduce the bank's own credit risk. The second is to change the risk-taking tendency of banks. Commercial banks usually have a complicated approval and supervision process for loan issuance. In this process, a lot of manpower and material resources are consumed to verify, track, and manage the risk status of the borrower. Because the "risk transfer" function of credit asset securitization enables banks to always realize credit risk transfer and avoiding the consumption of a large amount of resources. It will stimulate banks to lower loan approval standards and relax post-loan supervision. In this way banks not only can expand business market share, but also reduce a large number of poor-quality loans with high credit risk, and the quickly recovered funds can be used to support credit issuance again, so that banks can realize low-cost risk transfer arbitrage.

2.2 Based on regulatory capital arbitrage

Regulatory capital arbitrage refers to the behavior of commercial banks to reduce the amount and cost of regulatory capital when the regulatory capital requirements and costs of risky assets are inconsistent with the actual risk capital requirements and costs of the assets[23]. Therefore, commercial banks will re-allocate their asset portfolios to reduce their capital holdings if they meet the conditions of regulatory capital. The adverse selection of banks is mainly reflected in the following: First, increase the capital adequacy ratio to avoid capital supervision. Credit asset securitization can transfer and sell some loans with high risk and poor quality, but the risk weight is the same as the regulatory capital requirements, so as to enable the bank to reduce the amount of risk weighted assets on the balance sheet and improve the bank's capital adequacy ratio. The second is to expand the scale of business. As the capital adequacy ratio is increased, the regulatory capital is reduced to achieve capital release, and part of the capital recovered through the securitization of credit assets can support the expansion of the bank's credit business scale and increase the bank's profits.

Accordingly, we put forward the following hypothesis: Hypothesis 1: Banks have adverse selection problems in the process of credit asset securitization. Hypothesis 2: When banks have adverse selection based on risk transfer profit motivation, credit asset

securitization is positively correlated with bank risk exposure and bank credit scale. Hypothesis 3: When banks have adverse selection based on regulatory capital arbitrage motivation, credit asset securitization has a positive correlation with bank capital adequacy ratios.

3. MATERIALS AND METHODS

3.1 Sample and Data

Considering the small sample size before the 2012, so we select the sample period from 2012 to 2020, and the data is annual data. In order to ensure the robustness of the results, we finally select 32 commercial banks that have carried out asset securitization business more than once, including 5 state-owned banks. 12 joint-stock banks, 15 urban and rural commercial banks. And classifies them according to the nature of banks, that is, state-owned banks and joint-stock banks are large banks, and local commercial banks and rural commercial banks are small and medium-sized banks. All data are from Wind database and Bankscope.

3.2 Variable selection and definition

Generally, the securitized loans will be stripped from the bank's balance sheet and the non-performing loans generated will not be included in the bank's overall non-performing loan. Therefore, when the bank's securitization scale has a negative relationship with the non-performing loan ratio, it can be explained that banks choose to sell loans with poor quality through securitization, shows the existence of adverse selection[19]. But if the moral hazard worsens the bank's loan quality, increasing the overall non-performing loans. At this time, even if the bank has adverse selection, the non-performing loan rate of the bank may show an upward trend. Therefore, in order to eliminate the influence of moral hazard on the rate of non-performing loans. We add the change of loan losses to the research to test the existence of adverse selection.

3.2.1 Dependent variable

To verify Hypothesis 1, the dependent variable Y selects the bank's non-performing loan ratio (NPL) and loan loss growth rate (LLG). In order to explore the motivation of banks' adverse selection of credit asset securitization, that is, to verify Hypothesis 2 and 3, the dependent variable Y selects risk exposure (LNZ), loan growth rate (LG) and capital adequacy ratio (CAR).

3.2.2 Independent variable

Referring to the study of Zou et al.[24], we construct the participation degree of credit asset securitization (SEC1), that is, the proportion of the issuance scale of credit asset securitization in its total assets to measure the

participation degree of bank asset securitization. At the same time, in order to ensure the robustness of the results, we construct the credit asset securitization index (SEC2) as an alternative variable for the robustness test, that is, the proportion of the issuance scale of credit asset securitization in its total loans.

3.2.3 Control variable

Control variables include total asset logarithmic scale (LNSIZE), leverage ratio (LEV), capital adequacy ratio (CAR), loan-to-deposit ratio (LDR), GDP growth rate (GDP), consumer price index growth rate (CPI) and broad money supply growth rate (M2). Because small and medium commercial banks are mainly local and rural commercial banks, they have strong regional attributes. Therefore, for small and medium commercial banks, we use the GDP and CPI data of the province where the bank is located for control. The definition and description of the variables are shown in Table 1.

TABLE 1. DEFINITION AND DESCRIPTION OF VARIABLES

Variable	Definition
NPL	Non-Performing Loans to Gross Loans
LLG	The growth rate of Loan Loss Provisions to Gross Loans
LG	The growth rate of loans
LNZ	Logarithm of the reciprocal of Z-score
SEC1	The ratio of total issuance of credit asset securitization to Total Assets
SEC2	The ratio of the total issuance of credit asset securitization to the Gross Loans
LNSIZE	Natural logarithm of the total bank assets for bank
CAR	Capital Adequacy Ratio
LEV	Ratio of Total Assets to Total Equity
LDR	Ratio of Gross Loans to Gross Deposits
GDP	The growth rate of Gross Domestic Product
CPI	The growth rate of Consumer Price Index
M2	The growth rate of broad money supply

3.3 Model construction and descriptive statistics

Referring to the practice of Louzis et al.[25], we establish a dynamic panel model to capture the time duration in the variables, and uses the system generalized moment estimation (GMM) for estimation. The model is constructed as follows:

$$Y_{i,t}=\alpha_1 Y_{i,t-1}+\alpha_2 Y_{i,t-2} + \beta_1 SEC_{i,t}+\beta_2 Control_{i,t}+\mu_i+\varepsilon_{i,t} \qquad (1)$$

Where i represents an individual bank; μ_i indicates the individual fixed effect of commercial banks; $\varepsilon_{i,t}$ is a random disturbance term. $Y_{i,t}$ represents the dependent variable; independent variable $SEC_{i,t}$ represent the securitization of credit assets of commercial banks; $Control_{i,t}$ indicates other control variables. Variable descriptive statistics are shown in Table 2.

TABLE 2. DESCRIPTIVE STATISTICS OF VARIABLES

Variable	Large banks				Small and medium-sized banks			
	Mean	Std. D	Min	Max	Mean	Std. D	Min	Max
NPL	1.00	0.70	0.001	2.39	0.18	0.36	0.001	1.46
LLG	0.03	0.38	-0.80	4.24	0.03	0.14	-1	0.41
LNZ	0.22	0.03	0.175	0.31	0.24	0.03	0.183	0.30
LG	0.13	0.12	-0.39	1.12	0.20	0.27	0	3.09
SEC1	0.01	0.09	0	0.94	0.00	0.01	0	0.04
SEC2	0.02	0.15	0	1.56	0.01	0.02	0	0.10
LNSIZE	10.7	1.08	8.279	12.7	8.26	0.87	6.375	10.3
CAR	0.13	0.02	0.09	0.18	0.13	0.01	0.083	0.16
LDR	0.80	0.14	0.501	1.19	0.69	0.13	0.344	0.98
LEV	15.3	3.01	10.58	24.4	15.1	2.17	9.995	21.6
GDP	0.09	0.02	0.03	0.12	0.09	0.03	0.019	0.17
CPI	0.02	0.01	0.014	0.03	0.02	0.01	0.009	0.04
M2	0.12	0.03	0.073	0.19	0.12	0.03	0.073	0.19

4. EMPIRICAL RESULTS AND ANALYSIS

4.1 Empirical analysis

Relevant test results and System GMM estimation results are shown in Table 3. The Arellano bond test results show that there is no second-order autocorrelation in the disturbance term, and the System GMM estimation can be used. At the same time, the results of Sargan test of instrumental variables show that the setting of instrumental variables are reasonable.

For large banks, first of all, from the estimation results of model (1), the securitization of large banks' credit assets is significantly negatively correlated with non-performing loan ratios, indicating that banks' non-performing loan ratios decrease with increasing participation in the securitization business. Secondly, from the estimation results of model (2), there is a significant negative relationship between the credit asset securitization variables and the bank loan loss growth rate. According to the comprehensive estimation results, the non-performing loan ratio has decreased significantly when the moral hazard does not exist, indicating that banks choose to securitize assets with poor quality, that is, large banks have adverse selection, accept Hypothesis 1. Among the control variables, asset size and deposit loan ratio are significantly negatively correlated with the

growth rate of loan loss, while capital adequacy ratio and loan loss growth rate are positively related. Banks with more capital have more impulse to expand, but the scale of assets and the proportion of loans restrict the speed of loan loss and ensure the quality of bank credit assets. CPI is significant negatively correlate with the non-performing loan rate, while positively with the growth rate of loan loss, indicating that the expansion of banks in the upward economic cycle leads to the increase of the loan loss, while banks transfer a large number of non-performing assets through securitization, reduces non-performing loans .M2 growth rate has a significant positive impact on non-performing loan ratio. Monetary tightening causes the increase of loan loss provision of banks, but through securitization, non-performing loans can be stripped from the balance sheet and reduced.

TABLE 3. SYSTEM GMM ESTIMATION

	Large banks		Small and Medium-sized banks	
	(1)	(2)	(3)	(4)
	NPL	LLG	NPL	LLG
Y (-1)	1.302***	-0.331***	2.393***	0.0616
	(0.3369)	(0.0582)	(0.2212)	(0.0744)
Y (-2)	-0.761**	-0.284***	-1.671***	-0.159***
	(0.3400)	(0.0666)	(0.1563)	(0.0583)
SEC1	-2.011***	-0.445*	4.751**	-7.726
	(0.6712)	(0.2660)	(2.1181)	(4.7606)
LNSIZE	0.232	-0.319**	0.104	-0.0508
	(0.1726)	(0.1553)	(0.0804)	(0.0596)
LEV	-0.0476	0.0229	0.00137	0.0432***
	(0.0322)	(0.0531)	(0.0097)	(0.0136)
CAR	-2.725	14.56**	-2.338*	7.775**
	(10.6377)	(7.3433)	(1.2170)	(3.1119)
LDR	-0.14	-1.110*	-0.699***	0.00531
	(0.3525)	(0.5718)	(0.1484)	(0.2646)
GDP	3.167	2.235***	4.000***	-0.204
	(2.4097)	(0.8047)	(0.7162)	(0.7595)
CPI	-14.90***	20.2	13.15***	-8.807**
	(4.5310)	(12.9905)	(1.9233)	(3.6472)
M2	3.508**	-2.922	0.976**	2.251**
	(1.6303)	(2.3148)	(0.4699)	(1.0881)
CONS	-1.251	1.91	-0.81	-1.199
	(2.1578)	(2.1254)	(0.8675)	(0.8392)
AR (1)	0.0586	0.0354	0.2949	0.0343
AR (2)	0.7726	0.2953	0.7714	0.203
Sargan	0.9971	0.9455	1	0.9999

Note: ***, **, * indicate significant at the level of 1%, 5%, and 10%, respectively. All standard errors are reported in parenthesis.

For small and medium-sized banks, first of all, from the estimation results of model (3), the non-performing loan rate of small and medium-sized banks is significantly positively correlated with the securitization of credit assets. Secondly, from the estimation results of model (4), the bank's credit asset securitization variable and bank loan loss growth rate are not significant related, indicating that moral hazard does not exist. In this case, the increase in the non-performing loan rate of banks indicates that banks tend to securitize loans with better quality or take certain risk retention measures, that is, there is no adverse selection in small and medium-sized banks. Reject Hypothesis 1. Large banks not only have reputation protection, but also have too large and invisible protection, which makes their securitization products more favored by investors. However, small and medium-sized banks do not have the high reputation protection and are limited by their own strength. it is useful to improve the quality of asset pool, taking risk retention behavior as commitment and high-quality loan reputation mechanism, and consequently it will alleviate the information asymmetry between investors and issuers.

Among the control variables of small and medium-sized banks, capital adequacy ratio and loan-to-deposit ratio have a significant negative impact on the non-performing loan ratio, indicating that the bank with more sufficient capital and the greater the proportion of loans are more likely to strip non-performing loans, and with more sufficient the capital, higher the leverage ratio and greater the proportion of loans are more inclined to expand credit led to poor loan quality. Leverage ratio, capital adequacy ratio, loan-to-deposit ratio and loan loss growth rate show significant positive relationship. Small and medium-sized banks, GDP and CPI have significant positive correlation with non-performing loan rate. CPI is significant negative related with loan loss growth rate. When the economy prospers, commercial banks are more likely to obtain liquidity and accelerate the expansion of risky assets. And the inflation reduces the real income leading to a reduction in local deposits, restricting the ability of lending. The growth rate of M2 growth rate showed significant positive correlation with non-performing loan ratio and loan loss growth rate.

4.2 Robustness test

4.2.1 Change the measurement method of credit asset securitization.

We replace the core explanatory variable calculation method for stability test, that is, use SEC1 to replace SEC2. The results are shown in Table 4. The Arellano-Bond test shows that there is no second-order autocorrelation, and the Sargan test shows that the instrumental variables are set reasonably. The estimation result is basically consistent with the Table 1, which further shows that our conclusion is robust.

4.2.2 Excluding the regression results of the 2012-2014 samples.

Considering that the securitization of credit assets began to grow rapidly after 2014 and there were few participating banks before, in order to ensure the reliability and robustness of the model estimation results, the data of 2015-2020 were selected for stability test. The results of the robustness estimation are shown in Table 5. From the results of the robustness test, the coefficients and significance of variables are basically consistent with Table 1. all the models have passed Arellano-Bond test and Sargan test.

5. THE DISCUSSION OF ADVERSE SELECTION MOTIVATION

5.1 Motivation based on risk transfer profit

The above results confirm that large banks have adverse selection, but the motivation for its existence is not clear. Therefore, we further analyze the adverse selection motivation of large banks. Firstly, we take LNZ as the bank risk-taking variable. The higher the LNZ, the higher the bank risk-taking tendency. The models all have passed the Arellano-Bond test and the Sargan test. According to the Arellano-Bond test, the first-order lag of LNZ is selected as instrumental variable. The estimation result of model (1) in Table 6 shows that the credit assets securitization has positive but not significant impact on the risk-taking of large banks, that is, the credit assets securitization has not significantly promoted banks to increase their risk-taking propensity. Secondly, the loan growth rate represents the bank credit expansion. The estimated result of model (2) in Table 6 shows that there is a positive but not significant correlation between credit asset securitization and the loan growth rate of large banks, indicating that credit asset securitization is not an influencing factor to promote the significant expansion of credit scale of China's commercial banks, reject Hypothesis 2. In the case of no significant increase in loan scale, the decline of non-performing loan rate caused by credit asset securitization of medium and large banks in the previous empirical analysis can only prove that it is caused by the change of non-performing loans, rather than the change of total loans, which once again proves the robustness of our conclusion.

TABLE 4. SYSTEM GMM ESTIMATION RESULTS OF SEC2

	Large banks		Small and Medium-sized banks	
	(1)	(2)	(3)	(4)
	NPL	LLG	NPL	LLG
Y (-1)	1.297***	-0.331***	2.385***	0.07
	(0.3410)	(0.0626)	(0.2160)	(0.0775)

	(1)	(2)	(3)	(4)
Y (-2)	-0.763**	-0.286***	-1.672***	-0.144***
	(0.3412)	(0.0707)	(0.1515)	(0.0309)
SEC2	-1.219***	-0.239	1.439*	-2.67
	(0.3560)	(0.1685)	(0.8675)	(1.9313)
LNSIZE	0.243	-0.328**	0.1	-0.0491
	(0.1769)	(0.1510)	(0.0803)	(0.0490)
LEV	-0.0449	0.0261	0.00176	0.0388***
	(0.0328)	(0.0514)	(0.0096)	(0.0148)
CAR	-2.42	15.16**	-2.117*	7.512**
	(10.7031)	(6.6782)	(1.1754)	(2.9621)
LDR	-0.118	-1.038**	-0.720***	-0.0441
	(0.3575)	(0.4890)	(0.1405)	(0.1955)
GDP	3.095	2.172***	3.925***	-0.305
	(2.3699)	(0.7466)	(0.7702)	(0.7106)
CPI	-14.96***	19.83	13.45***	-7.981**
	(4.5185)	(12.9300)	(1.6936)	(3.2133)
M2	3.489**	-3.31	0.935**	1.795*
	(1.6644)	(2.1015)	(0.4733)	(1.0491)
CONS	-1.442	1.874	-0.788	-1.043
	(2.2007)	(2.1686)	(0.8589)	(0.7757)
AR (1)	0.0595	0.0329	0.2889	0.0413
AR (2)	0.7903	0.2723	0.5971	0.1888
Sargan	0.9974	0.9405	1.0000	0.9999

Note: ***, **, * indicate significant at the level of 1%, 5%, and 10%, respectively. All standard errors are reported in parenthesis.

TABLE 5. SYSTEM GMM ESTIMATION RESULTS FROM 2015 TO 2020

	Large banks		Small and Medium-sized banks	
	(1)	(2)	(3)	(4)
	NPL	LLG	NPL	LLG
Y (-1)	1.292***	-0.334***	2.378***	0.0637
	(0.3219)	(0.0575)	(0.2198)	(0.0710)
Y (-2)	-0.759**	-0.287***	-1.669***	-0.161***
	(0.3492)	(0.0661)	(0.1565)	(0.0563)
SEC1	-1.953***	-0.457*	4.715**	-8.043*
	(0.6331)	(0.2702)	(2.1028)	(4.4712)
LNSIZE	0.253	-0.338**	0.103	-0.0414
	(0.1759)	(0.1619)	(0.0801)	(0.0638)
LEV	-0.0479	0.0223	0.000619	0.0424***
	(0.0386)	(0.0550)	(0.0096)	(0.0136)
CAR	-3.89	15.16**	-2.344*	7.636**

	(1)	(2)	(3)	(4)
	(12.0004)	(7.6136)	(1.2109)	(2.9881)
LDR	-0.113	-1.182*	-0.690***	0.0132
	(0.4411)	(0.6328)	(0.1473)	(0.2658)
GDP	3.214	2.245***	4.016***	-0.211
	(2.3669)	(0.8178)	(0.7133)	(0.8094)
CPI	-14.13***	19.88	13.09***	-9.253***
	(4.1354)	(12.6818)	(1.9183)	(3.4523)
M2	3.798**	-2.954	0.945**	2.151*
	(1.6871)	(2.4964)	(0.4671)	(1.1497)
CONS	-1.382	2.12	-0.787	-1.218
	(2.3647)	(2.0822)	(0.8647)	(0.8635)
AR (1)	0.0426	0.036	0.2917	0.0341
AR (2)	0.8301	0.297	0.8942	0.1973
Sargan	0.9947	0.9244	1.000	0.9997

Note: ***, **, * indicate significant at the level of 1%, 5%, and 10%, respectively. All standard errors are reported in parenthesis.

TABLE 6. MOTIVATION OF ADVERSE SELECTION OF LARGE BANKS

	(1)	(2)	(3)
	LNZ	LG	CAR
Y (-1)	0.945***	0.946***	0.794***
	(0.0442)	(0.1567)	(0.1908)
Y (-2)		0.164	0.210**
		(0.1005)	(0.0889)
SEC1	0.0032	0.159	0.00889***
	(0.0022)	(0.4090)	(0.0044)
Control Variable	Control	Control	Control
AR (1)	0.0028	0.0622	0.0132
AR (2)	0.3591	0.8058	0.4122
Sargan	0.9724	0.998	0.9976

Note: ***, **, * indicate significant at the level of 1%, 5%, and 10%, respectively. All standard errors are reported in parenthesis. Control variables are the remaining variables except for CAR.

5.2 Motivation based on regulatory capital arbitrage

For the motivation test of regulatory capital arbitrage, we use capital adequacy ratio as the dependent variable to measure changes in bank regulatory capital. The result of model (3) in Table 6 shows that credit asset securitization of large banks has a significant positive correlation with the capital adequacy ratio, indicating that the credit asset securitization is conducive to banks to improve their own capital adequacy ratio significantly, and banks have more sufficient motivation for regulatory capital arbitrage. Accept Hypothesis 3.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper mainly uses the data of China's commercial banks from 2012 to 2020 and the system

generalized moment estimation model (GMM) to study the adverse selection of China's credit asset securitization by analyzing the correlation between non-performing loan rate, loan loss growth rate and credit asset securitization of large, medium and small banks. It is found that, first, large banks tend to choose poor quality loans for securitization, which means there is adverse selection. Second, as for small and medium-sized banks, they tend to choose loans with better quality for securitization or take certain risk retention measures, that is, there is no adverse selection. Third, risk transfer profit is not the main motivation of adverse selection in China's commercial banks, while arbitrage based on regulatory capital is the main motivation of adverse selection.

The above conclusions have some enlightenment for preventing the credit asset securitization risks of Chinese banks. First, we should prevent the adverse selection of banks in the process of asset securitization, and implement differentiated supervision on banks. Second, the establishment of a restraint and incentive mechanism can establish a bank credit asset securitization credit information system, strengthen the relevant information disclosure standards of asset securitization products and restrict banks' adverse selection behavior. Third, the bank's non-performing loan ratio does not fully reflect the bank's credit risk level. It is important to establish reasonable on-balance-sheet and off-balance-sheet comprehensive credit risk monitoring indicators to judge the bank's true risk level and adjust in time. Fourth, strengthen the supervision of bank securitization and regulatory capital, and set minimum capital adequacy requirements for credit asset securitization risk assets to restrict banks from using securitization as a means to circumvent capital regulation.

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