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Management incentive, intermediate business innovation and operation efficiency: empirical study on China listed commercial bank

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ABSTRACT

This paper selects the data from the 14 listed commercial banks from the year of 2007 to 2012 in order to study the influence of management incentive and intermediate business innovation on the commercial bank's operation efficiency. In this way, we can find the internal law and solve the problem of encouraging managers at the lowest risk to a certain degree. The core innovation in this research is that there is a new factor of intermediate business innovation. Compared to previous work, we studied the relationship between management incentive and intermediate business innovation. In addition, we studied the interaction effect of the two factors on bank's operation efficiency. According to a large number of literatures and our own analysis, we established several models and did regression analysis to study this problem.

KEYWORDS

Management incentive; Intermediate business innovation; Operation efficiency.

INTRODUCTION

The ownership and management authority of the commercial banks are commonly separated, easily leading to moral risk and adverse selection. So owners should formulate the most appropriate management incentive way to motivate managers' work actively and restrain their behaviors. Then it will improve bank performance and reduce risks. Intermediate business has become the important focal point to occupy the market and an important source to create profit. It is important for banks to remain invincible in the fierce competition in the future of interest rates liberalization. In recent years, many people have been focused on the point that whether through the implementation of effective incentives to the managers can promote its expanding efforts in intermediate business innovation, then reduce risks and advance performance in such a new environment. In this article, the operation efficiency of commercial banks is defined as both performance and risk. Based on the data of 14 listed commercial banks in 2007-2012, the article conducts an empirical analysis about the effects on bank performance and risks made by average salary, salary gap, the level of shareholding and intermediate business innovation to provide the decision-making reference for the business development and corporate governance of commercial banks in the future.

LITERATURE REVIEW

Literature about salary incentive

As early as mid-70s of 20century, Meckling and Jenson found that offering proper rewards to the operator helps promoting corporate performance by reducing agency cost[1]. Sierra(2006)believed that salary incentive can improve performance through the analysis of data from 76 banks in America in 6 years[2]. But several scholars hold the different viewpoint. Pang(2012)analyzed China's listed commercial banks from 2006 to 2011, concluding that bank's top three managers' salary has a negative effect on bank performance[3]. Liu(2010)analyzed 28 listed banks in China, found that there are no correlation between performance and executive salary in financial firms[4]. After the financial crisis, more scholars concentrated on salary incentive and bank risks. By analyzing American private banks, Cooper(2009)thought that the degree of bank risk supervision has a significant effect on bank performance. There is little relationship between management salary incentive and bank performance[5]. By the deep research in American 172 banks in 5 years, Hagendorff(2011)found that managers which are sensitive to compensation risk are willing to merge banks which are willing to take the risk. And managerial incentive mechanism will make the latter take greater risks[6].

Literature about equity incentive

Gao(2011)did a research on China's 16 listed commercial banks, believing that the state ownership and the performance have an asymmetric u-shaped relationship[7]. Based on balanced panel data from China's 14 banks in nearly 3 years, Yang(2012)had an empirical research, found that a higher percentage of the first largest shareholder within a certain range will be beneficial to the company's operating decisions. A negative effect on profitability will be produced if beyond this range[8].

Literature about intermediate business

Evanoff(2002)thought that banks should expand the intermediate business vigorously to lead the non-interest income growth when the risk is controllable in a certain range[9]. By analyzing the data from European banks, Laetitia(2008)found that there is a positive relationship between bank risks and the proportion of non-interest income[10].

THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESIS

Effect of management incentive on the efficiency

Combining salary with performance can make managers work hard and create higher achievements for banks. But if beyond the range, it may lead to a non-positive effect even a negative effect on their enthusiasm. It must result in agent risk and resource waste, signally increasing the risk unit pay takes. But Song(2011)analyzed China's 13 commercial banks from the listed year to 2010[11] and found that there is an inverted U shape relationship between managers' salary and risk-taking. There is a problem of information asymmetry between owners and managers. If owners use performance to evaluate managers' work, they may pursue only short-term profit, leading to the ignorance of risk. So risk will be greatly increased.

Managerial ownership makes managers become shareholders, solving the information asymmetry problem to a certain degree. Palia and Lichtenber(1999)found that there is a positive relationship between management shareholding and performance. They also found that managers' benefit will be connected with owners because of share holding, effectively reducing the abuse of resources[12]. Fama and Jenson(1983)raised that higher managers' share-holding proportion will create a more firmly position. Market cannot allocate resources effectively through merger and acquisitions, leading to loss of value, and easily leading to the board of directors being under control of managers, occupy other investors' wealth[13].

Through the above analysis, hypothesis 1 is put forward:

H_{11}: There is an inverted U shape relationship between salary incentive and risk-taking. There is a positive relationship between equity incentive and performance.

$H_{12:}$ There is a positive relationship between management incentives and banks' risks.

Effect of intermediate business innovation on banks' operation efficiency

Sillber believes that financial firms must get rid of internal and external limit by financial innovation to seek more profit. Non-interest business is the result. Applying product innovation to intermediate business will be more profitable for banks. Bank's wide business scope is able to meet customers' demand. Simultaneously, banks apply technology widely to promote its development, greatly strengthened the competitiveness of the bank. The increasing narrowing of traditional business urges to make great efforts in developing intermediate business which is the key way for banks to increase profit.

However, it was found that the impact on the performance of the intermediate business innovation will not achieve the desired effect in many cases, but incur risks. Wang (2012) analyzed 11 listed commercial banks and found that intermediate business innovation will bring certain risk for banks[14]. There is no need to use their own funds, they just have to provide services. Meanwhile, since the intermediate business is not required to disclose in the annual report, making the public and regulators cannot clearly know the operating conditions of intermediate business. This is the risk of low transparency.

Through the above analysis, we propose hypothesis 2:

H_{21}: Intermediate business innovation is positively correlated to commercial bank performance.

H_{22}: Intermediate business innovation is positively correlated to commercial bank risk.

The cross effect of management incentive and intermediate business innovation on the efficiency of commercial banks

We found that the training of relevant managers is very important in intermediate business. But the transmission mechanism between management incentive and intermediate business innovation doesn't work well. If we could fully establish the mechanism, we will mobilize the enthusiasm of managers to make innovations on intermediate business and achieve their own needs. Silber(1983)found that the motivation of developing intermediate business is to maximize profits and reply to external and internal repression[15]. Based on the principal-agent theory, managers may use all methods which can enhance performance. The intermediate services can deal with internal and external repression and allow banks to invest to new projects, which is more profitable than traditional business. Therefore, management incentive can promote the intermediate business.

Through the above analysis, we propose hypothesis 3:

$H_{3:}$ Management incentive can promote the development of intermediate business innovation.

Zhang(2007)found that non-interest income business has a more significant economies of scope. The diversification strategy can effectively enhance the profitability of banks, especially in large banks[16]. With the changes of financial market, the traditional banking business has been unable to cope with a rat race. Intermediate business's appearance is an opportunity to develop the bank. Innovation on it can increase income and profits, which is also benefits to the bank performance. The combination of management incentive and intermediate business innovation is bound to have great effect on bank performance and work together to enhance the performance of banks.

In the above analysis, we think that management incentive and intermediate business innovation both have positive effect on the bank risk, so the cross effect on commercial bank risk must be more notable.

So we propose hypothesis 4:

$H_{41:}$ The cross effect of management incentive and intermediate business innovation on the performance of bank is positive.

$H_{42:}$ The cross effect of management incentive and intermediate business innovation on bank risk is positive.

THE EMPIRICAL STUDY DESIGN

Sample selection

Because the Agricultural Bank of China and China Everbright Bank are listed in 2010, we weed out their data. The data changed a lot in 2006 because China carried out the shareholding system reform, so we choose the data of 2007-2012 from 14 banks listed in Shanghai and Shenzhen A-share market, consisting of a balanced panel data. There is certain limitation on data collection because of the special nature of banks, which leads to a small sample, so we see the 84 observations as mixed data.

Model and variables

To clearly express the effect of management incentive on operation efficiency, we established four models:

$$ROE=\alpha_0+\alpha_1 SA+\alpha_2 S^2+\alpha_3 SD+\alpha_4 PE+\alpha_5 C+\varepsilon_0 \quad (1)$$

$$EPS=\beta_0+\beta_1 SA+\beta_2 S^2+\beta_3 SD+\beta_4 PE+\beta_5 C+\varepsilon_1 \quad (2)$$

$$CAR=\gamma_0+\gamma_1 SA+\gamma_2 S^2+\gamma_3 SD+\gamma_4 PE+\gamma_5 Cl+\varepsilon_2 \quad (3)$$

$$PC=\delta_0+\delta_1 SA+\delta_2 S^2+\delta_3 SD+\delta_4 PE+\delta_5 C+\varepsilon_3 \quad (4)$$

Then, in order to examine the impact on the operating efficiency of the intermediate business innovation, we established the following four models:

$$ROE=\alpha_0+\alpha_1 IB+\alpha_2 C+\varepsilon_0 \quad (5)$$

$$EPS=\beta_0+\beta_1 IB+\beta_2 C+\varepsilon_1 \quad (6)$$

$$CAR=\gamma_0+\gamma_1 IB+\gamma_5 Cl+\varepsilon_2 \quad (7)$$

$$PC=\delta_0+\delta_1 IB+\delta_5 Cl+\varepsilon_3 \quad (8)$$

Finally, in order to express the cross effect on operation efficiency, we established this four models:

$$ROE=\alpha_0+\alpha_1 SA*IB+\alpha_2 SD*IB+\alpha_3 S^2*IB+\alpha_4 C+\varepsilon_0 \quad (9)$$

$$EPS=\beta_0+\beta_1 SA*IB+\beta_2 SD*IB+\beta_3 S^2*IB+\beta_4 C+\varepsilon_1 \quad (10)$$

$$CAR=\gamma_0+\gamma_1 SA*IB+\gamma_2 SD*IB+\gamma_3 S^2*IB+\gamma_4 C+\varepsilon_2 \quad (11)$$

$$PC=\delta_0+\delta_1 SA*IB+\delta_2 SD*IB+\delta_3 S^2*IB+\delta_4 C+\varepsilon_3 \quad (12)$$

S^2 was to study inverted U-shaped relationship between salary and performance.

TABLE 1 : Variables and definitions

Variables	Definitions
Explanatory variables	
Average salary(SA)	The average total pre-tax salaries for all managers, narrowed a million times.
Salary gap(SD)	Difference between the highest and lowest pre-tax salary, narrowed a million
Managerial stockholding(PE)	Whether managers hold stocks or not.0 represents managers with no
Intermediate business innovation(IB)	Net fee and the proportion of commission revenue in total operating revenue
Control variables(C)	
The holding proportion of strategic	The holding proportion of investors signed a strategic cooperation agreement
The proportion of the managers in board	The proportion of the managers in board
(Vice)Chairman and president is the same	1 is yes,0 is no
The proportion of cash flow rights and	cash flow rights/control rights
Property right nature(pro_right)	1 represents state holding banks, 0 represents Non-state-controlled banks
Explained variable	
Return on net assets(ROE)	Net profit / average shareholders' equity
Earnings per share(EPS)	Net profit / outside common shares
Capital adequacy ratio(CAR)	Total capital / weighted risk total assets
Provision coverage(PC)	Loan loss provisions / nonperforming loans

ROE measures the efficiency of bank applications of own capital and equity investment. EPS represents market value of the bank. So we select these two variables which reflect different aspects to measure bank performance. CAR reflects the ability of the bank using its own capital to take losses when the creditors' assets were lost. PC refers to the capacity to deal with loan risk and the extent to make up for loan losses. It is convincing to use these two indicators to measure bank risk.

Studies have shown that the introduction of strategic investors will help the bank improve performance for they have various advantages. If a manager is also one of the owners, he or she is bound to consider both their own interests and the profit of the bank whether or not there is management incentive. Therefore we must take this factor into account. So is the variable of bi_manager. SC is to control whether the excess holding. Pro_right is to distinguish between state holding banks and non-state-controlled banks. Management incentive in the former is more vulnerable to be constrained by the government.

EMPIRICAL ANALYSIS AND RESULTS

Descriptive statistics

We use stata12.1 to do analysis. As we can see from the TABLE 2, the average salary levels are high and there is a big difference of salary incentive in different banks. Only a small part of the banks implement equity incentive for some managers. The proportion of intermediate business innovation of total operating revenues is stable and with less discrepant. The difference of ROE in each bank is small but EPS is quite big. CAR is relatively stable but PC appears big difference.

TABLE 2: Descriptive statistics

Variables	N	Minimum value	Maximum value	Mean value	Standard deviation
SA	84	0.728	7.349	2.302	1.273
SD	84	0.137	11.007	2.405	2.29
PE	84	0	1	0.381	0.489
IB	84	0.032	0.219	0.118	0.051
outshare	84	0	0.366	0.097	0.089
per_manager	84	0.056	0.4	0.19	0.067
bi_manager	84	0	1	0.464	0.502
sc	84	0	1	0.857	0.352
pro_right	84	0	1	0.714	0.454
ROE	84	0.037	0.3	0.173	0.041
EPS	84	0.2	3.28	1.034	0.706
CAR	84	0.058	0.307	0.127	0.336
PC	84	0.483	4.99	2.303	0.946

The regression results and analysis

Management incentive's impact on the operation efficiency of commercial banks

Hausman test indicates us to make regression analysis by using random effects model for the four models.

TABLE 3: Management incentive and business efficiency

Variable	ROE	EPS	CAR	PC
SA	0.025	0.406*	-0.045***	0.622
	(0.153)	(0.089)	(0.001)	(0.119)
S^2	-0.004**	-0.049*	0.004***	-0.088*
	(0.037)	(0.064)	(0.007)	(0.072)
SD	-0.003	-0.053	0.003	-0.152**
	(0.336)	(0.242)	(0.193)	(0.021)
PE	0.030*	0.137	0.015	-0.390
	(0.068)	(0.589)	(0.243)	(0.174)
outshare			0.033	-0.490
			(0.583)	(0.749)
per_manager	-0.074	-3.202**		
	(0.496)	(0.044)		
bi_manager		0.140	-0.020*	0.645**
		(0.471)	(0.083)	(0.044)
sc	-0.016	-0.386*	-0.020	-0.132
	(0.347)	(0.089)	(0.118)	(0.710)
pro_right	0.017	-0.512	-0.013	0.752*
	(0.493)	(0.274)	(0.505)	(0.072)
R^2	0.3387	0.2434	0.4841	0.6476

In TABLE 3, we can see that the impact of salary on the performance is in the shape of inverted U, and the average salary level in China is still smaller than the extreme value. Performance will increase with the salary incentive in our country. This may be related to a salary cap which imposes a salary cap on executives of state-owned banks issued by Ministry of Finance in 2009 to avoid the excessive pay. Part of the reason for inverted U is substitution effect and income effect of leisure. As the salary increases, the substitution effect was more important than income effect. While the salary increases to a certain point, the managers would like to have extra leisure time to consume high salary. The pay gap has a indistinctive negative impact on performance. This may be because only a part of banks introduce significant compensation incentive. There is a significant positive correlation between PE and ROE. When the managers become owners, they view questions and make decisions from both sides in order to extract the maximum rent for the bank. The above analysis proves hypothesis H_{11} partly.

TABLE 3 shows that the impact of average salary on CAR is in the shape of U, and the average salary level is still smaller than the extreme value. It also shows that the impact of average salary on PC is in the shape of inverted U. The impact of SD on CAR is not significant, while it has significant negative impact on PC. The impact of the PE on CAR and PC is not significant. Judging from China's current situation of the banks, only a part of banks introduce equity incentive, with little effort, the possibility of bringing risk to banks is small. So the above analysis proves hypothesis H_{12} partly.

The intermediate business innovation's impact on the commercial banks' operation efficiency

From TABLE 4, the coefficient of EPS reaches 8.821, which means intermediate business innovation can signally improve bank performance. The negative impact of IB on CAR is not significant, but it has a significant positive impact on PC instead of expected negative impact. This proves the hypothesis H_{21} and negates H_{22}.

TABLE 4 : The intermediate business innovation and business Efficiency

Variable	ROE	EPS	CAR	PC
IB	0.386***	8.821***	-0.127	18.827***
	(0.003)	(0.000)	(0.237)	(0.000)
outshare		1.097	0.030	3.698***
		(0.203)	(0.635)	(0.001)
per_manager	-0.038	-1.741		2.599*
	(0.661)	(0.165)		(0.057)
bi_manager		-0.081	-0.010	0.646***
		(0.584)	(0.368)	(0.005)
sc	-0.014	-0.320**	-0.010	-0.397
	(0.349)	(0.041)	(0.386)	(0.138)
pro_right	-0.200	-1.316***	0.020	-2.577***
	(0.316)	(0.000)	(0.319)	(0.000)
R^2	03722	0.4795	0.0502	0.6292

Interaction effect of management incentive and intermediate business innovation on operation efficiency

To study interaction effect, we study the impact of the management incentive on IB first. Then multiplying IB by SA, SD and S^2 severally and do regressions for performance and risk variables. We see equity incentive as a dummy variable, so we didn't consider their interaction on the performance. From TABLE 5, we can see that the relationship between SA and IB is inverted U. This supports the hypothesis H_3. But SD has no significant effect on IB.

TABLE 5 : The impact of management incentive on intermediate business innovation

Variable	per_ib	per_ib
SA	0.021*	
	(0.096)	
S^2	-0.003*	
	(0.066)	
SD		0.003
		(0.165)
outshare	-0.191***	-0.181***
	(0.002)	(0.002)
per_manager	-0.159*	-0.161*

	(0.056)	(0.053)
bi_manager	-0.011	0.011
	(0.342)	(0.329)
sc	0.01	0.015
	(0.478)	(0.259)
pro_right	0.083***	0.071***
	(0.000)	(0.000)
R^2	0.7661	0.7735

From TABLE 6, we can see that SA*IB has a greater significant positive impact on performance. SD*IB has a significant negative impact on ROE and EPS, while there is no significant correlation between SD and performance variables. It states that increasing the pay gap and the intermediate business innovation may lead to the decline in business efficiency. Besides, we can see that increasing executive pay or intermediate business income ratio or both will decrease risks. SD*IB has a significant negative impact on PC, and the impact is greater than the pay gap's impact on PC alone. It states that their interaction on risk is extreme. The above analyses support the hypothesis H_{41} and negate the H_{42}.

TABLE 6 : Interaction

Variable	ROE	EPS	CAR	PC
SA*IB	0.306***	4.980***	-0.072	10.793***
	(0.000)	(0.000)	(0.268)	(0.000)
SD*IB	-0.045***	-0.640***	0.006	-1.550***
	(0.007)	(0.008)	(0.724)	(0.000)
S^2*IB	-0.045***	-0.535***	0.004	-1.4452***
	(0.000)	(0.000)	(0.705)	(0.000)
outshare	-0.035		0.037	0.699
	(0.548)		(0.544)	(0.538)
per_manager	-0.032	-2.631**		1.567
	(0.697)	(0.044)		(0.275)
bi_manager		0.055	-0.014	0.719***
		(0.733)	(0.253)	(0.004)
sc	-0.024*	-0.332*	-0.016	-0.318
	(0.086)	(0.074)	(0.232)	(0.253)
pro_right	0.013	-0.603	0.011	-1.049***
	(0.395)	(0.131)	(0.586)	(0.000)
R^2	0.7034	0.4627	0.1269	0.7231

RESEARCH CONCLUSION

From the above, we found that the common management incentives can promote the bank performance. They will also bring certain risks. But salary only works within limits. It will have negative effects exceeds these limits. Intermediate business innovation also can promote the bank performance. Because of the positive relationship between the management incentives and intermediate business innovation, their positive interaction on performance is greater, but bringing certain risks.

It can be seen that there are several problems in the listed commercial banks in our country: (1) Management incentives keep mainly short-term salary incentive, only few banks are conducting long-term equity incentive. This may be related to a short time of bank's market-oriented operation.(2)The commercial banks don't link the management incentives to intermediate business. (3)The system to measure the performance of banks is inadequate. Banks mostly use single financial indicator to evaluate the performance in our country, they often lose sight of the risks.

This paper raises the following suggestions :(1) Enhance the long-term incentives such as equity incentive. It is certain to perfect award mechanism by combining equity incentive with short-term salary incentive. However, equity incentive has a negative effect on some risk indicators, so we must take the risk into full consideration when it is conducted. (2)Banks should consider the impact of management incentive on intermediate business and reinforce their correlation and

transmission effect to maximize the performance. (3)Perfecting the evaluation criterion of bank performance. The listed commercial banks in our country should establish a set of comprehensive performance evaluation system by considering profitability, liquidity, security and other factors instead of using the single financial index. Otherwise, it may lead managers blindly pursue the maximization of financial index and lose sight of the risks.

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