A study on relationship between non-interest based activities on performance of Iranian banks

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A R T I C L E I N F O	A B S T R A C T
	In this paper, we study the effects of non-interest activities on return of some Iranian banks over the period of 2006-2011 using Pearson correlation as well as regression analysis. The paper uses two independent variables where the first one is obtained as a difference between other non-interest incomes with commission fee and the second one is the commission fee income. There are three dependent variables including return on investment, return of equities and risk, leading us to setup three regressions analysis. The result of our survey indicates that non-interest based activities have meaningful effects on the performances of banks. In addition, there are some meaningful relationships among interest free activities, which are mostly in terms of negative relations.

1. Introduction

Commercial banks assist their customers to manage the financial risks they could face and one of the most important is interest rate risk. For instance, consider a case where we wish to obtain a fixed rate mortgage from a particular bank and our goal is to remove most of the interest rate risk related to this mortgage. In real-world case studies, the risk is shifted from customer to the bank, when the rate is fixed but the bank may lose from changes in interest rates. These changes influence the costs to the bank of providing the mortgage and for instance, if market interest rates go up, customer mortgage payment to the bank does not change because the rate is fixed. However, the expenditure to the lending bank does increase unless it actively manages its cost components. This rise in market interest rates increases the bank's funding cost components, that is, the interest rate the bank pays on the money it uses to "fund" our mortgage loan.

Changes in funding expenditures are normally part of the interest rate risk related to a fixed rate mortgage loan. Managing this interest rate risk plays important role for the bank as it lessens the

likelihood of extreme fluctuations in the bank's financial circumstances and thus decreases the possibility of the bank becoming insolvent. Lessening the likelihood of insolvency permits the bank to hold less capital although capital is expensive. Thus, interest rate risk management is an essential task for most banks in that it lessens the amount of expensive capital that a bank must hold. A typical bank has several methods for managing interest rate risk. Brewer (1989) is one of the people who investigated the relationship between bank holding company risk and nonbank activity and the focus was on the use of certain interest rate derivative instruments to offset the inherent interest rate risk in fixed rate lending.

An interest rate swap is a financial contract, which allows one party to exchange a set of interest payments (say, fixed rate) for another set of interest payments owned by another party (say, floating rate). Brewer (1989) investigated the major differences in the financial characteristics of banking organizations, which implement derivatives relative to those that do not. The results recommended that the performance of users was not better or worse than that of nonusers. De Young and Roland (2001) considered product mix and earnings volatility at commercial banks by investigating the evidences from a degree of total leverage model. They performed an empirical study of US banks and argued that the trend to off-balance sheet activity could increase bank earnings volatility because of high competitive rivalry in these markets.

Stiroh and Rumble (2006) in another investigation found that interest income can be correlated with non-interest income because of possible cross-selling of different products to the same customer. They also explained that when customers obtain financing from banks they also worry about how to repay it and an easy retail payment service can facilitate repayment and attract more customers to borrow money from banks. Marcucci and Quagliariello (2006) investigated the relationships between credit risk and the business cycle for financial stability and risk management purposes. They argued that many previous studies generally neglected the presence of asymmetric effects, i.e., the likelihood that the influence is dissimilar over various phases of the business cycle. They tried to use threshold regression models with two or more regimes both at the aggregate and at the individual level, exploiting a unique dataset on Italian bank borrowers' default rates. The study tried to figure out whether the relationship between business cycle and credit risk was subject to regime switches, determining endogenously the thresholds. The results recommended that the effect of the business cycle was more pronounced when starting credit risk levels were higher and during downturns.

Discrete regime switching models may disclose unsatisfactory for dynamic credit risk management. For instance, Lucas and Klaassen (2005) explained that the combination of an insufficient distinction between multiple economic regimes as well as a lacking identification of these regimes could weaken on the capability of these tools to discriminate between default regimes. They also explained that implied asset correlations and default rate volatilities were biased towards zero and implausibly low. Laeven and Majoni (2003) performed another survey on the effects of macro economical factors on banking industry and concluded that macro economic factors play important role on increasing credit risk on the market.

Kraft and Galac (2007) performed a survey in CROEtia and explained that deposit interest rates, asset risk and bank failure in that country. In fact, they examined the aftermath of deregulation in CROEtia, which incorporated rapid growth of both deposits and deposit interest rates, followed by numerous bank failures. They used panel regression techniques and found some evidence of "market-stealing" via high deposit interest rates. They connected high deposit interest rates to bank failure using Logit models. High deposit interest rates were a reliable signal of risk-taking and when supervisory capabilities and powers were weak, deposit interest rate regulation could be worth considering.

Liadaki and Gaganis (2010) investigated whether the stock performance of EU listed banks was associated with their efficiency. They selected a sample consists of 171 banks operating in 15 EU markets over the period 2002–2006. They first used stochastic frontier analysis to evaluate the cost and profit efficiency of banks, while controlling for environmental factors. Then, they investigated whether changes in profit and cost efficiency were reflected in changes in stock prices. The results indicated that the change in profit efficiency had a positive and significant effect on stocks prices; however, there was no association between changes in cost efficiency and stock returns.

Ho (2012) investigated the impacts of market reform on consumers and state commercial banks in China. He jointly estimated a system of differentiated product demand and pricing equations under alternative market structures and reported some mixed results. Although there was a welfare gain from more consumers participating in the deposit market, the existing consumers suffered welfare losses because of declined service quality. The welfare impacts were unevenly distributed, with losses skewed toward inland provinces and certain consumer groups. There was no clear evidence that the pricing of banking services had become more competitive after the reform, and such pricing remains subject to government intervention.

In this paper, we present an empirical study to measure the effects of two important factors of non-interest income as well as commission-based income on return on equities, return on investment and risk structure in banking system. The organization of this paper first present detail of our regression models in section 2 and section 3 presents the results of applying three regression models. Finally, concluding remarks are given in the last section to summarize the contribution of the paper.

2. The proposed study

The proposed study of this paper uses the information of 17 commercial banks including 6 governmental bank and 11 private banks. To extract the necessary information, official reports including statement and balance sheet are used and the data were analyzed using some software packages. The proposed study uses three linear regression models. The first one is as follows,

$$ROI = \beta_0 + \beta_1 NET + \beta_2 COM + \varepsilon, \tag{1}$$

where NET is the difference between other non-interest incomes with commission fee (COM), ROI is the return of investment, β_0, β_1 and β_2 are the estimated regression function and ε is the error term. The second model considers return of equities (ROE) with the same independent variables as follows,

$$ROE = \beta_0 + \beta_1 NET + \beta_2 COM + \varepsilon, \tag{2}$$

And finally the third model uses R is the primary risk of assets and studies the relationship between risk (R) with similar independent variables as follows,

$$R = \beta_0 + \beta_1 NET + \beta_2 COM + \varepsilon, \tag{3}$$

where R is calculated based on the model proposed by Lepetit et al. (2008) as follows,

$$R = R_1 + R_2 = \frac{ROE}{SD\,ROA} + Average\left(\frac{Total\ Equites/Total\ Asset}{SD\,ROA}\right), \tag{4}$$

where R_1 is the risk of portfolio, R_2 is the leverage risk, ROE is the return of equities, SDROE is the standard deviation of ROE.

The hypotheses investigate whether interest-free activities could impact ROI and ROE and it consists of two parts.

1. NET and COM impact ROI, significantly.
2. NET and COM impact ROE, significantly.

3. The results

The proposed study of this paper has used the information of 17 banks and the mean of each variable is calculated for six consecutive fiscal years. Table 1 demonstrates some of the descriptive information.

Table 1
Descriptive information of 17 banks within 6 fiscal years

Variable	COM	NET	ROI	ROE	R
Mean	0.139	0.355	0.138	0.178	43.24
Standard deviation	0.248	0.241	0.277	0.153	70.99

$$ROI = 0.026471 + 0.071189 NET + 0.011544 COM$$

Standard deviation	0.010603	0.012123	0.015691	(5)
t-value	2.496437	5.872097	0.735330	
P-value	0.0144	0.00000	0.4638	

D-W=1.691418   S.E. $= 0.131006$ F=21.87337 $R^2 = 0.837692$

As we can observe from the results, the first independent variable (NET) is statistically meaningful (Freedman, 2005) but the second variable does not represent meaningful value. T-student is relatively large for NET and the null hypothesis is rejected even when the level of significance is one percent. R-square is around 0.84, which means the model can describe 84% of the changes on ROI.

$$ROE = 0.222426 + 0.076671 NET + 0.193857 COM$$

Standard deviation	0.046399	0.016623	0.097693	(6)
t-value	4.612278	4.612278	1.984345	
P-value	0.000000	0.000000	0.0406	

D-W=2.284038   S.E. $= 0.316671$ F=18.62813 $R^2 = 0.987526$

As we can observe from the results of the regression estimation for the second model, all statistical values are meaningful. In other word, all t-student values are meaningful when the level of significance is five percent. In addition, Durbin Watson value is located within an acceptable limit and F-value indicates the whole regression estimation is valid. Finally, $R^2 = 0.9875$, which means the model could describe 99 percent of the changes on ROE.

$$R = 42.20905 - 0.0474624 NET + 2.595541 COM$$

Standard deviation	0.219230	0.249360	1.248275	(7)
t-value	192.5328	-1.903368	2.079303	
P-value	0.000000	0.0405	0.040700	

D-W=1.731328   S.E. $= 1.071894$ F=26357.74 $R^2 = 0.999836$

Finally, the third model also represents some values for NET and COM, which are statistically meaningful when the level of significance is five percent. Durbin-Watson is within the acceptable value and F-value is highly valuable, which confirms the overall model. Finally, $R^2 = 0.9998$, which means the model can present over 99 percent of the changes on risk factor. The other observation is that NET maintains a negative impact on risk (R) but commission itself increases the risk and this results are consistent with the findings of Lepetit et al. (2008).

Table 2
The summary of the test results

Hypothesis	Independent Variables	Regression analysis		Results
		$\beta=0$	$\beta\neq0$	
First	NET	✗	✔	Accept
	COM	✔	✗	Reject
Second	NET	✗	✔	Accept
	COM	✗	✔	Accept
Third	NET	✗	✔	Accept
	COM	✗	✔	Accept

4. Conclusion

In this paper, we have presented an empirical study to measure the effects of two important factors of non-interest income as well as commission-based income on return on equities, return on investment and risk structure in banking system of Iran. The proposed study obtained the necessary information over the period of 2006-2011 and using regression analysis investigated the effects of two mentioned variables on three different variables. The results of our survey indicated that non-interest based activities had meaningful effects on the performances of banks. In addition, there are some meaningful relationships among interest free activities, which are mostly in terms of negative relations.

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