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The Impact of Exchange Rate volatility on Banking Performance (case of Iran)

Nafiseh Keshtgar[1] Mosayeb Pahlavani[2] Seyed Hossein Mirjalili[3]

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Abstract
Banks play an important role in the Iranian economy which has a bank-based financial system. We examined the impact of exchange rate volatility as a determinant of banks' performance. In recent years, the exchange rate has been volatile in the Iranian economy and have an adverse effect on banks' performance. This study, investigate the issue for the period 2007-2017 for 14 Iranian banks. Exchange rate fluctuations are derived by GARCH method and the effect of its fluctuations on bank performance examined using panel data method. In order to evaluate banks' performance, we used two criteria, namely liquidity and profitability. Estimation of econometric model using panel data by random effects indicated that exchange rate volatility has a negative and statistically significant effect on banks' capital return ratio. Exchange rate volatility is also a determinant in increasing the ratio of lending to total bank deposits, as it increases the financial gap and creates the credit risk that the gap entails.

1. Introduction

In the bank-base financial system of Iran, banks play a decisive role in financing for investment and growth of national product. Exchange rate growth is an element in rising the production costs and commodity prices, increasing the need for banking finance and affects banks' performance. It also raise uncertainty in the economy and has an adverse effect on economic outcome which exacerbate recession and non-performing loan (NPL).

Exchange rate volatility affects the performance of banks both directly and indirectly. The direct effect of exchange rate volatility on banks' performance is due to the banks operating in the foreign exchange related activities.

[1] - Ph.D. Student, University of Sistan and Baluchestan, Email: n.keshtgar@gmail.com
[2] - Associate Prof. of Economics, University of Sistan and Baluchestan,(Corresponding Author) Email: pahlavani@eco.usb.ac.ir
[3] - Associate Prof. of Economics, Institute for Humanities and Cultural Studies, Email: h.jalili@ihcs.ac.ir

All foreign exchange activities require an examination of the exchange rate behavior and the risks arising from exchange rate fluctuations and its impact on the Bank's foreign currency liabilities and the profitability of its banking operations.

Indirectly, exchange rate volatility affects the behavior and performance of depositors and borrowers and adversely affect on banking risk and its performance.

On the other hand, the process of supply chain of firms' products is affected by exchange rate volatility. Uncertainty about the level of currency fluctuations for any firm is a type of risk that can affect the firm's activities. In fact, exchange rate volatility affects aggregate demand (net exports) and aggregate supply (costs of imported intermediates, production of goods and services).

In general, in the commodity market, positive exchange rate shocks will make imported commodities more expensive and export commodities cheaper, thereby increasing demand for domestic commodities.

Therefore, the more risk averse foreign trade factors are and the greater the share of foreign trade in GDP, the fluctuating exchange rate will have a greater impact on lowering output, raising prices and limiting foreign trade.

On the other hand, a change in the exchange rate can change the competitive position of domestic producers. As the exchange rate rises, the price of imported commodities in terms of national currency rise's and the demand for foreign goods declines. Moreover domestic goods become relatively cheaper abroad.

Foreign exchange volatility also has a negative impact on the return on banks' assets. Banks are exposed to a variety of risks due to foreign exchange volatility including transaction risk, conversion risk, credit risk, interest rate risk, and inflation risk, thereby reducing the profitability of the banks.

Exchange rate volatility is an important factor in explaining the ratio of non-performing loan to total lending of the banks and create credit risk for the banks, which in turn increases the non-performing loan of the banks.

So the question is, what is the effect of exchange rate volatility on banking performance?

The hypothesis is that exchange rate volatility has a statistically significant effect on banking performance.

The purpose of the study is to identify the effect of exchange rate volatility on the performance of Iranian banks. Accordingly, the focus is on nominal exchange rate fluctuations.

The paper is organized as follows: Section 2 devoted to literature review on exchange rate volatility, bank credit growth, and non-performing loans. The third section presents the data and variables used for the model estimation. The fourth section provides the interpretation of the model results and the final section is concluding remarks.

2. Literature review

Studies on exchange rate volatility could be divided into two parts: First, analysis of the effects of exchange rate volatility and second, macroeconomic determinants of exchange rate volatility. In the international banking, currency operations have a central role. Therefore, the foreign exchange needed for the settlement of international transaction for import and export of goods and services. Ongor and kusa (2013) examined the impact of macroeconomic variables such as exchange rate, GDP and inflation rate on bank performance.

Ani et al. (2013) indicated that due to the central role of banks in the financial intermediation, banks are heavily influenced by the foreign exchange market.

Forex operation is an important component of banking operations and has significant impact on the banks lending to the domestic economy and the bank's internal reserves (Negrbo, 2012).

Most of the research focuses on the exchange rate fluctuations and macroeconomic variables such as GDP and inflation. Lambe (2015) also indicated that exchange rate fluctuations has a significant effect on banks' performance.

Babazadeh and Farokhnejad (2012) find that exchange rate is an important determinant of bank's profit in Iran. Kiganda (2014) concludes that macroeconomic variables such as real GDP, inflation and exchange rate have affected banks' profitability in Kenya.

A similar argument is made about the effect of the real exchange rate on credit growth based on the Fischer channel of capital transfer (von Hagen and Siedschlag, 2010).

In countries with a fixed exchange rate regime, the relative price of non-tradable commodities rises following the exchange rate rises, and central banks try to stabilize the exchange rate nominal value. Therefore, the demand for credit will increase.

For the countries with flexible exchange rates, it is less likely that exchange rate volatility leads to credit growth. While in the fixed exchange rate regime, exchange rate volatility leads to credit growth. (Megood et al., 2014).

Another argument by Montiel and Reinhart (2001) suggest that in a fixed exchange rate regime, banks may consider the exchange rate regime as a guarantee for foreign borrowing and seek more external funding. As the exchange rate rises, so does the amount of foreign exchange debt for banks. Rising exchange rate make debtor less able to repay the debt, and less willing to repay the foreign exchange loan they receive.

When a customer open a letter of credit (L/C) and pay the prepaid amount based on the exchange rate at the time of opening L/C, the customer carry out the business based on the previous exchange rate. when the exchange rate rises

sharply, the customer may be incapable of paying the obligations. As a result, the bank's credit risk increases.

The borrower, in addition to the interest rate is required to pay a fee, depending on the exchange rate changes. In this situation, borrowers may refuse to repay the loan because of the financial burden or in the hope of lower exchange rate and repayment at the previous rate. Thus, in the banks with foreign exchange activities, one of the most important banking risks is the exchange rate risk.

As exchange rate volatility affects bank's forecast of asset value, liabilities and income and their associated costs, exchange rate volatility affects bank assets and liabilities and thus bank performance.

Developing countries' financial institutions are more vulnerable to financial crises. Most financial and economic analysts agree that banks' earnings, costs and profitability are directly affected by exchange rate changes (Sanders et al., 1990).

Babazadeh and Farrokhnezhad (2012), examined "The Impact of Short and Long-term Changes in exchange Rates on Banks' Profit", using short and long-term error correction model. Exchange rates and interest rate data extracted from financial reports and balance sheets of one of the commercial banks for the five-year period 2006-2010. The results indicated that a short-term increase in the exchange rate has a reaction at the expected level, while in the long run the banks profit appears when the exchange rate is more than the equilibrium rate. Significant short-term and long-term exchange rate behavior exists for banks' profits. Although exchange rate and profit from foreign exchange operation are non-stationary, but there is a co-integration between two variables. The effect of exchange rate volatility on short-term foreign exchange earning is more than its long-term effect. The error correction factor is 1.23 and we achieve long-run equilibrium, when the short-term and long-term equilibrium are overlapped.

Taiwo & Adesola (2013) examined "Exchange Rate volatility and Bank Performance in Nigeria" using loan loss to total advances ratio and capital deposit ratio as proxies for bank performance. The results of two models indicated that the effect of exchange rate on the bank's performance is sensitive to the type of proxy used for the bank's performance. The loan loss to total advances ratio indicates that exchange rate volatility may adversely affect the ability of lenders to manage loans due to the high level of bad loans, while capital deposit ratio has no significant relationship with the exchange rate.

Kasman et al. (2011), explored "The Impact of Interest Rate and Exchange Rate Volatility on Bank Stock Returns in Turkey," Using OLS and GARCH Models. The results indicated that interest rate and exchange rate changes has a negative and significant effect on bank stock returns. The sensitivity of bank stock returns to market returns is stronger than interest rates and exchange rates, which implies that market return plays an important role in determining the

dynamics of bank stock return. They concluded that exchange rate and interest rate volatility are the main determinants of bank stock return volatility.

kemisola et al (2016), investigated "Currency Rate Volatility and Banking Performance in Nigeria". They empirically explored the issue over the period 2005 to 2014. The exchange rate fluctuation is measured by the average annual return of the US dollar to the Nigerian currency over the ten-year period. Exchange rate volatility measured by ARCH LM test to show its volatile nature. The result indicated that exchange rate volatility has a negative and significant effect on banks' profitability. In addition, the depreciation of the Nigerian currency deteriorated the liquidity of the banks.

Caballero and Krishnamurthy (2005) examined Currency and Credit Channel Volatility in Emerging Markets by a Vertical View. They put forwarded that firms in emerging markets are subject to severe financial friction and credit constraints which intensifies by an adverse shock in the capital inflows. The paper shows that although monetary policy can counteract external credit contraction, this can be true during a moderate contraction period. The expansionary effect of monetary policy during the period of severe external crisis is undermined by exchange rate jump due to U.S dollar depreciation and expansionary monetary policy under these conditions intensifies the exchange rate depreciation.

Mbutor (2010), explored "Exchange rate Volatility, Stock Price Fluctuations and Bank Lending Behavior in Nigeria", using VAR method. The Granger causality test confirmed that the volatility of the exchange rate has led to fluctuations in the value of banks' stocks and lending behavior of the banks in Nigeria.

Kariuki and Washington (2014) examined "The Impact of Macroeconomic Variables on Credit Risk in the Banking System of Kenya" as a determinant of non-performing loans during 1990 to 2013, using OLS method and error correction model. The results suggest that Kenyan shilling fluctuation against U.S dollar created a significant negative credit risk for the Kenyan banks.

Munib and Yasmin Javid (2013) examined the impact of macroeconomic variables such as exchange rate on non-performing loans during January 2002 to December 2011 on commercial banks of Pakistan. The results of Granger causal relationship indicated that inflation and exchange rates caused non-performing loans.

Ozcelebi (2018) investigated "The Effects of Exchange Rate volatility on Financial and Macroeconomic Variables, using PVar Model for 10 OECD countries. Variance decomposition indicated that exchange rate volatility leads to changes in the interest rates and Exchange rate volatility has no significant effect on inflation.

Mohammadi et al. (2016) examined the effect of exchange rate volatility on the non-performing loans over the period 2005-2013 for 18 Iranian banks. estimating panel data model with fixed effects indicated that exchange rate volatility has a positive impact on NPL.

Keshtgar et al. (2019) examined the financial cycle in Iran to identify its relationship to exchange rate fluctuations over the period 2006 to 2017. To this end, they used structural time series model with unobserved components and the Kalman filter and also the maximum likelihood method. The results indicated that, first, financial markets have many fluctuations and gave rise to the prolongation and deepening of the boom and bust in these cycles and made the ground for financial crisis. Second, the vector autoregressive model indicates granger causality of the exchange rate fluctuations towards the financial cycle, which suggests that exchange rate fluctuations lead to financial instability.

3- Deriving exchange rate volatility by GARCH model

Given the heterogeneity of variance in the exchange rate, we used autoregressive conditional hetroskedasticity (ARCH) and derived exchange rate volatility by using a GARCH model. But before that, we estimated ARIMA model for the exchange rate variable.

The steps of GARCH model estimation are as follows:

Step One: Estimating the ARIMA Model: To this end, stationary test has done. (Table 1). The time series are not stationary but the first order difference is stationary. Therefore, exchange rate differentials are used.

Table 1: stationary test for the time series of exchange rate

Variable	Variable Position	T-Statistic	Probability	stationarity
exchange rate	Level	-0.583	0.97	non-stationary
	First order difference	-4.382	0.006	Stationary

Source: Research Findings

Then different ARIMA models with different autoregressive orders and moving average are estimated and the final model is selected based on the least Akaike value in the estimation.

Accordingly, the lowest value of the Akaike statistic pertaining to the model with intercept and the autoregressive model of order 1 and the moving average of order 1. This model is selected as the best ARIMA model for the time series of exchange rate difference. The results of estimating the parameters of final model illustrated in table (2).

Table 2: Estimated ARIMA Model for Exchange Rate Difference Variable

Variable		coefficients	standard deviation	T statistic	Probability
Intercept	C	18444.57	19885.89	0.927	0.35
First order autoregressive	AR(1)	0.985	0.077	12.76	0.000
first-order moving average	MA(1)	0.681	0.145	4.68	0.000
r^2	0.969				
d-w	1.688				

Source: Research Findings

Step two: Estimating the GARCH Model: After estimating the ARIMA model, the Arch variance heterogeneity test is conducted and depicted in Table 3. It indicates the effects of variance heterogeneity at the 5% confidence level in the first order difference of the exchange rate.

The existence of variance heterogeneity means the possibility of using GARCH model in this study. Given the significant coefficient of the estimated GARCH, we decide about utilizing arch or GARCH models. Conditional variance heterogeneity test was conducted on ARIMA model residuals. The results are illustrated in Table (3). It indicates that there is a heterogeneous effect of conditional variance.

Table 3: ARCH-LM test results:Results of variance homogeneity test (Arch effects)

Statistic	statistic value	Probability
F	54.67	0.000
LM	23.26	0.000

Source: Research Findings

The process of modeling the GARCH model carried out based on the Akaike statistic. The Akaike value is equal to 18.3.

Table 4: Results of the Arch Model Estimation

Variable		Coefficient	Standard deviation	t statistic	Probability
Intercept	C	270.537	20.068	13.481	0.0000
First order autoregressive	AR(1)	0.117	0.033	3.525	0.0004
First order moving average	MA(1)	0.371	0.006	61.498	0.0000
The variance equation					
	C	8.862	3.512	2.523	0.011
Arch process	RESID^2	2.835	0.999	2.836	0.0046
GARCH first order	GARCH(1)	2.195	0.559	3.921	0.0001
GARCH second order	GARCH(2)	0.698	0.475	1.468	0.142

Source: Research Findings

In Table 4, the t-statistic value for the independent variables in the above model is greater than 2, thus confirming both the Arch and the Garch effects in the model.

In this case, the effect of GARCH is preferred to Arch and the final model is GARCH. The next step is deriving the exchange rate uncertainty from the GARCH model.

The time series of the uncertainty of the exchange rate is illustrated in Chart (1). After the estimation of the Arch model, in order to overcome the variance heterogeneity, the Arch test is conducted again as presented in Table (5).

In addition, the Jargh-Bara test used to check the specification of the model. Since the statistic value of the test is 4.66 and its probability is 0.096, then the null hypothesis is accepted at 95% level. the distribution of disturbance terms is normal.

Table 5: Arch effect test results

ARCH TEST		
Statistic	**statistic value**	**Probability**
F	0.248	0.621
nR^2	0.261	0.609

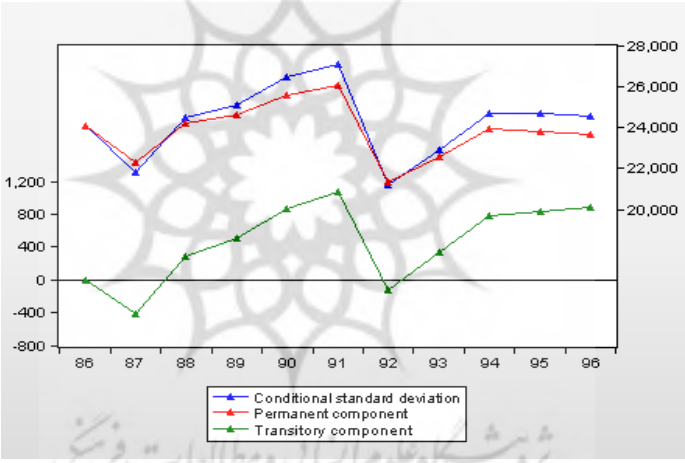

Chart 1: exchange rate Uncertainty Values derived from Garch Model

4. Data and Variables

For evaluating banks' performance, we used two criteria, LTD and ROI.

ROI_{it}: The ratio of bank's capital return i at time t. This ratio indicates the rate of return on investment and the potential for capital formation.

$$\text{Capital Return ratio} = \frac{\text{Net Income}}{\text{Average Equity}}$$

This ratio is one of the most important benchmarks for bank profitability and reflects the stock return of shareholders.

LTD_{it}: The ratio of loans to total deposits for the bank i at time t.
It shows the ratio that the bank is able to equip deposits to support lending operations, as well as the amount it can lend from deposits. Higher ratios are associated with higher risk. (Chart 2)

$$\text{loans to Deposits Ratio} = \frac{\text{Total Credits and Loans}}{\text{Total Deposits}}$$

Total deposits include: current deposits, savings deposits,
short-term and long-term investment deposits. Total Loans and Credits include all loans have paid in the form of Islamic contracts such as, installment sale, mudarabah, civil Musharakah, joalah and Modharea.

In financial studies, the bank performance variable is indicated by loan to deposit ratio, which is plotted as a dependent variable in Chart 3 for the Iranian banks during the period (1996-2006).

This variable could be an indicator of banks' performance. The banks include: Eqtesad Novin, Pasargad, Tejarat, Export Development,Welfare, saman, Sepah, sarmayeh, saderat, Industry and Mine, karafarin, Agriculture, Housing and mellat.

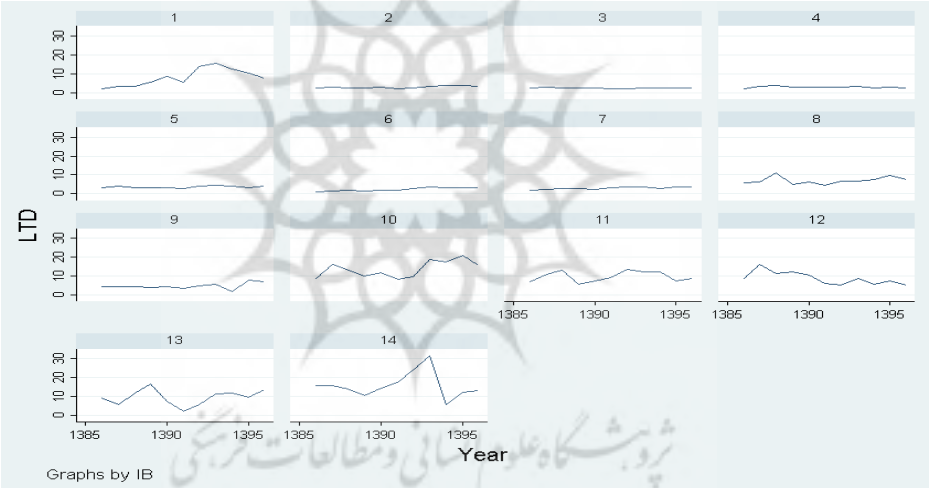

Chart 2: Ratio of return on capital in the Iranian banking system (1996-2006)

Source: Banking Institute of Iran (STATA software output)

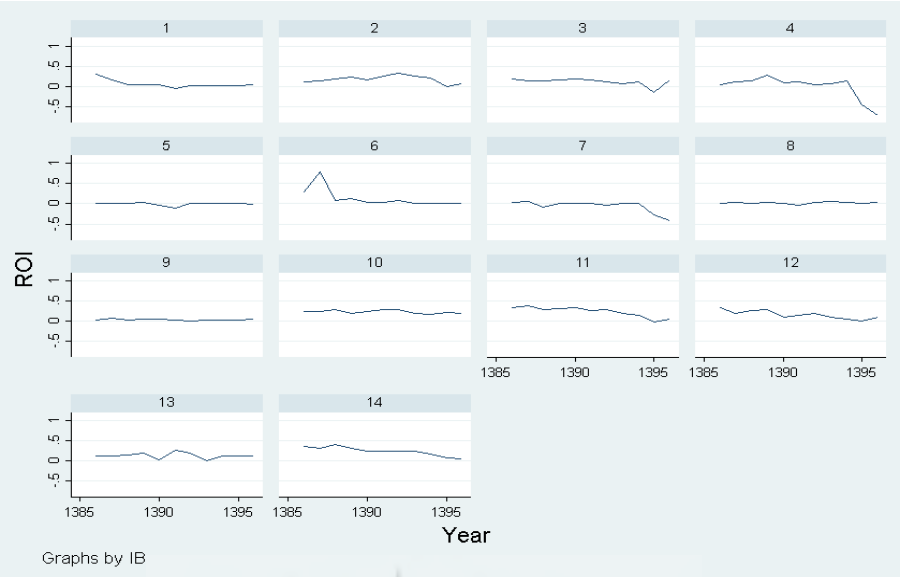

Chart 3: Loan-to-deposit ratio in the Iranian banking system (1996-2006)

Source: Banking Institute of Iran (STATA software output)

We used gross lending for measuring loan-to-deposit ratio. Gross lending is the amount of domestic loan and credit granted by banks. For the deposit variable, customer deposits are used in the bank's balance sheet. Table (6) provides the definitions of the variables.

Table 6: Definitions of the Variables in the model

Variable	Description
LTD	ratio of loans to deposits
ROI	Return on investment
Inf	Inflation rate
Er	Exchange rate
Liq	Liquidity growth
BP	ratio of gross loans to customer deposits
Eff	Banking efficiency
Equ	Equity
Dep	Customer deposits

5- The model

The regression model of the panel data is as follows:

$$\Delta LTD_{it} = c + \sum_{k=1}^{m} \alpha_k macrolevel_{it}^{k} + \sum_{j=1}^{n} \beta_j \; banklevel_{it}^{j} + \varepsilon_{it}$$

$$\Delta ROI_{it} = c + \sum_{k=1}^{m} \alpha_k macrolevel_{it}^{k} + \sum_{j=1}^{n} \beta_j \; banklevel_{it}^{j} + \varepsilon_{it}$$

ΔLTDit: ratio of loan to deposit i at time t
ΔROIit: ratio of capital return at time t
m: number of macro level variables
N: number of bank level variables
ER and INF are macro level variables.
For bank variables, various banking variables are used.
Bank variables include: deposits, liquidity, loan to deposit ratio, equity and deposit to cost ratio which represent efficiency. The estimated regression is from the random effect using annual data. Before estimating the model, the Hausman test conducted to decide on fixed versus random effects. According to the result, the null hypothesis of random effect is not rejected. Therefore, we estimated the model by random effects.
Efficiency variable measures the bank's ability to convert excess capital into lending. It is expected that both variables have a positive impact on credit growth. Money stock growth measures the impact of monetary constraints and expected to have a positive sign.
Macro variables are included in the model to represent Iran's economic conditions. It is expected that the increase in nominal exchange rate affect on loan to deposit ratio and financial gap.
Although inflation enhances nominal credit volume, it also associated with declining credit growth. This is due to its negative impact on growth, creating uncertainty due to high inflation rate and banks' unwillingness to lend when the inflation rate is high.
Deposit growth measures the impact of bank's financing conditions on credit growth. It is expected that a bank with a good financing condition has higher credit growth rate. Other banking variables are added to the regression as control variables.

6- Estimation Results

In order to estimate the model, first of all, we conducted stationary test for panel data.

Table 7: Panel unit root test results (Levin, Lin & Chu)

Variable	T-statistic	Probability	Result
LTD	-3.18	0.000	Stationary
ROI	-15.11	0.000	Stationary
ERV	-7.66	0.000	Stationary
Inf	-3.32	0.000	Stationary
Lev	-3.34	0.000	Stationary
Equ	-3.05	0.001	Stationary
Eff	-3.95	0.000	Stationary
Liq	-4.49	0.000	Stationary
Pro	-3.96	0.000	Stationary
Dep	-3.04	0.001	Stationary

Source: Research Findings

The results are presented in Table (8). Accordingly, stationary variables are all stationary at the level, meaning that the null hypothesis (unit root) is rejected and all the accumulated variables are zero (I (0)). In Table (10), the results of the model estimation are reflected.

Table 8: F-Lemmer test for panel and pooling models

F statistic	**Probability**
5.92	0.000

Table 9: Hausman test for fixed vs. random effects

Chi-Sq Statistic	3.58
Prob	0.82
RE or FE*	RE

*FE denotes fixed effects and RE denotes random effects.

Table 10: Model Estimation Results for LTD

Variable	**Coefficient**	**Standard deviation**	**Statistic**	**Probability**
Constant	23.31	5.04	4.63	**0.000**
ERV	0.00026	0.00014	*1.83	**0.06**
INF	-0.052	0.035	-1.47	**0.14**
EQU	1.46	0.46	3.18	**0.001**
EFF	-0.45	0.14	*3.22	**0.001**
LIQ	1.204	0.284	*4.23	**0.000**
DEP	-3.65	0.49	**-7.37	**0.000**
LEV	4.70	1.43	**3.28	**0.001**
PRO	0.428	0.262	1.63	**0.10**
R^2	0.70			
$\overline{R2}$	0.71			
D-W	1.71			

Notes:

1- Table statistic with 99% confidence level and 90% are shown with ** and * respectively.

2- Table findings were derived using STATA and Eviews software

According to the results of the first model by random effects method, exchange rate volatility has a positive and significant effect on the loan-to-deposit ratio.

In analyzing the impact of this variable, it can be argued that the increasing exchange rate volatility and the potential increase in the benefits of foreign exchange market has led to a situation that a portion of banking resources being channeled to foreign exchange market. As a result it leads to the increase of loan to deposit ratio. Because by appearing potential market gains in the first phase, some borrowers are persuaded to use the loan for speculative purposes in the foreign exchange market rather than repayment of loan, and in the second phase, they encourage others who have not yet received the loan to get money from the bank and enter the foreign exchange market. They also encourages depositors to invest in the foreign exchange market by withdrawing their deposits.

On the other hand, the increase in the exchange rate will reduce the ability of borrowers to repay. As the exchange rate rises, borrowers who receive foreign exchange loan to import will have the incentive to sell the cheap foreign exchange received in the free market instead of importing commodities.

In addition, instead of importing goods, foreign exchange loan may be used in the other activities such as in the housing or in the activities with higher expected profits. Overall, all of these channels mean a positive relationship between the exchange rate volatility and the expansion of credit and the deepening of financial gap.

Variables such as equity, deposits, efficiency, bank liquidity and financial leverage ratio are entered in the model as specific banking variables. Accordingly, customer deposits and bank efficiency have the coefficients of -3.65 and -0.45, respectively, both of which are significant, indicating that as each of these variables increases, the bank performance (measured by the loan-to-deposit ratio) decreases.

The coefficients for equity, bank leverage, bank liquidity and gross profit are 1.46, 4.70, 1.204 and 0.428, respectively, indicating a direct and positive relationship between these variables and banking performance.

Inflation as a macro variable has a coefficient of -0.052 and insignificant. Therefore, it can be argued that increasing or decreasing inflation rate will not have a significant effect on the banks' performance.

On the other hand, deposit-to-cost ratio, which represents banking efficiency, is negatively correlated with the loan-to-deposit ratio, indicating that increased efficiency reduces the loan-to-deposit ratio. Equity variable is also significant with a coefficient of 1.46 at 90% level, indicating that as equity increases, banks' performance also increases.

Table 11: F-Lemmer test for panel and pooling models

F statistic	Probability
13.24	0.000

Table 12: Hausman test for fixed vs. random effects

Chi-Sq Statistic	4.18
Prob	0.84
RE or FE*	RE

*FE denotes fixed effects and RE denotes random effects.

Table 13: Model Estimation Results for ROI

Variable	Coefficient	Standard deviation	Statistic	Probability
Constant	0.67	0.118	5.67	**0.000**
ERV	-0.077	0.029	***-2.63	**0.009**
INF	0.0009	0.0003	***2.87	**0.004**
EQU	-0.055	0.034	-1.61	**0.11**
EFF	0.006	0.0038	*1.77	**0.07**
LIQ	0.016	0.0034	***4.57	**0.000**
DEP	-0.027	0.014	*-1.83	**0.06**
LEV	0.067	0.028	**2.18	**0.03**
PRO	0.057	0.014	***4.03	**0.000**
R^2	0.54			
$\overline{R2}$	0.52			
D-W	1.77			

Notes:

1- Table statistic with 99%, 95% and 90% confidence level are indicated by ***, ** and *, respectively.

2- Table findings were derived using STATA and Eviews software

According to the results of the second model estimated on random effects method, exchange rate volatility has a significant and negative effect on the ratio of return on capital.

The coefficient of this variable is -0.07. In analyzing the impact of this variable, it can be argued that increasing exchange rate volatility and increasing the Likelihood of gain in the foreign exchange market has led to a situation where a portion of banking resources in the form of loan and credit being directed to this market, which may result in a reduction in the ratio of return on capital. Inflation rate as one of the macro variables with coefficient of 0.0009 has positive and significant sign indicating that the increase in inflation leads to the increase in the ratio of return on capital.

Banking variables i.e liquidity, financial leverage ratio, profit rate and efficiency have coefficient of 16%, 0.057 and 0.067 respectively which are significant, indicating that as each of these variables increases, the rate of bank performance measured by the index of capital return ratio increases.

Customer deposit has a coefficient of -0.027, indicating a negative and significant relationship with 90% confidence level. Deposit-to-cost ratio, which represents banking efficiency has a positive and significant coefficient of 0.006, indicating that increasing the efficiency will increases the return on capital ratio.

Equity is also significant with a coefficient of 1.46 at 90% confidence level, indicating that as equity increases, bank's performance improves.

7. Conclusion

The results of estimating the econometric model using panel data by random effects method indicated that exchange rate volatility has a positive effect on increasing the ratio of lending to total bank deposits (banks' lending behavior), as it leads to the increase of financial gap and create the credit risk that this gap entails. Exchange rate volatility has also a positive and significant effect on the loan-to-deposit ratio. Because it has led some of the loans into the foreign exchange market which results in the increase of loan-to-deposit ratio. Overall, uncertainty in the exchange rate leads to credit expansion and a decline in deposits and eventually leads to a deepening financial gap. Exchange rate instability encourage speculators to enter into foreign exchange market and adversely affect on the rate of exchange, and thereby reducing the ability to repay loans or even deviate the allocation of funds, which increases the loan-to-deposit ratio. Also, the exchange rate volatility has a negative and statistically significant effect on banks' return on capital. Exchange rate volatility provides the banking system with a variety of risks and thereby reducing the profitability of the banks.

The effect of inflation on the loan-to-deposit ratio is negative and significantly low. Inflation adversely affected on the performance of the banking system. Inflation has also increased the cost of financing for the banks, because the net benefits of their investments depend on inflation. The higher the bank liquidity index and the higher the rate of profit, the higher the rate of return on capital. As the bank liquidity ratio and equity ratio increase, so does the loan-to-deposit ratio. There is a positive and significant relationship between banks' financial leverage and banking performance (loan to deposit ratio and return on capital).

Ultimately, as bank efficiency increases, the ratio of return on capital increases as well. In addition, the coefficient of deposit-to-cost ratio is negative.

References

1. Ani, W., Ugwunta, D., & Okanya, O. (2013). The effect of FOREX reforms on financial deepening evidence from Nigeria. *American Journal on Business and Management, 2(3),* 204-209.

2. Babazadeh, M., & Farrokhnejad, F. (2012). Effects of Short-run and Long-run Changes in Foreign Exchange Rates on Banks' Profit. *International Journal of Business and Management, 7(17)*.

3. Caballero, R., & Krishnamurthy, A. (2004). Exchange Rate Volatility and the Credit Chanel in Emerging Markets: A Vertical Perspective. *NBER WORKING PAPER SERIES*, Working Paper 10517.

4. Hagen J von, Siedschlag I (2010): Managing capital flows: Experiences from Central and Eastern Europe. In: Kawai M., Lamberte M. B (Eds): Managing capital flows: The search for a framework, pp. 192–216. Edward Elgar Publishing.

5. Kariuki Washington, G. (2014). Effects of Macroeconomic Variables on Credit Risk in the Kenyan Banking System. *International Journal of Business and Commerce, 3(9),* 1-26.

6. Kasman, S., Vardar, G., & Tunç, G. (2011). The impact of interest rate and exchange rate volatility on banks' stock returns and volatility: Evidence from Turkey, *Economic Modelling. 28 (2011),* 1328–1334.

7. Kemisola, O. C., Olamide, J. O., & Moses, O. I. (2016). Exchange Rate Volatility and Banks Performance: Evidence from Nigeria. *International Journal of Economics and Business Management, 2(4)*.

8. Keshtgar, N., pahlavani, M. & Mirjalili, S. H. (2019). Identification of financial markets' cycle and its relationship to exchange rate fluctuations in Iran. *Iranian Economic Journal: Macroeconomics (IEJM).* 14(28).

9. Kiganda, E. O. (2014). Effects Of Macroeconomics Factors on Commercial Banks Profitability in Kenya: Case study of Equity Bank Limited. *Journal of economic and sustainable development, 5(2),* 46-56.

10.Lambe, I. (2015). Assessing the Impact of Exchange Rate Risk on Banks Performance in Nigeria. *Journal of Economics and Sustainable Development, 6(6)*.

11.Magud N. E., Reinhart C., Vesperoni E. (2014). Capital inflows, exchange rate flexibility and credit booms. *Review of Development Economics, 18(3),* 415–430.

12.Mbutor O. M. (2010). Exchange rate volatility, stock price fluctuations and the lending behaviour of banks in Nigeria. *Journal of Economics and International Finance, 2(11),* 251-260.

13.Mohammadi, T., shakeri, A., eskandari, F., & karimi, D. (2016). The effect of exchange rate volatility on the non-performing loans in Iran. *Journal of planning and budget, 21(2),* 3-24.

14.Munib, B., & Yasmin, A. J. (2013). Impact of Macroeconomic Forces on Non-performing Loans: an Empirical Study of Commercial Banks in Pakistan. *WSEAS Transaction on Business and Economics, 10(1)*, 40-48.
15.Ngerebo, T. A. (2012). The impact of foreign exchange fluctuation on the intermediation of banks in Nigeria (1970 – 2004). *African Journal of Business Management, 6(11)*, 3872-3879.
16.Ongore, V. O., & Kusa, G. B. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *International journal of Economica and Financial issues, 3(1)*, 237-252.
17.Ozcelebi, O. (2018). Impacts of Exchange Rate Volatility on Macroeconomic and Financial Variables: Empirical Evidence from PVAR Modeling. In book: *Trade and Global Marke*.
18.Reinhart C. & Montiel P., (2001): The dynamics of capital movements to emerging economies during the 1990s. In: Griffith-Jones S, Montes M (Eds): Short-term capital movements and balance of payments crises, pp. 3–28. Oxford University Press.
19.Saunders, A., & Yourougou, P. (1990). Are banks special? The separation of banking from commerce and interest rate risk. *Journal of Economics and Business, 42(2)*, 171–182.
20.Taiwo, O., & Adesola, O. A. (2013). Exchange Rate Volatility and Ban Performance in Nigeria. *International Journal of Asian Economic and Financial Review, 3(2)*, 178-185.

بررسی تاثیر بی‌ثباتی نرخ ارز بر عملکرد بانک‌ها در ایران

چکیده

امروزه بانک‌ها به عنوان مهمترین عنصر نظام مالی نقش بسیار مهمی را در اقتصاد کشورها، به ویژه ایران که نظام مالی پایه بانکی دارد، ایفا می‌کنند. هدف از این تحقیق مطالعه نظام بانکی و بررسی عوامل موثر بر عملکرد آن است که یکی از عوامل اثرگذار آن، نرخ ارز است. در سال‌های اخیر نرخ ارز در اقتصاد ایران از نوسان‌های زیادی برخوردار بوده است. نوسان‌های نرخ ارز می‌تواند تاثیر نامساعدی بر عملکرد بانکها داشته باشد. در این تحقیق، تأثیر بی‌ثباتی نرخ ارز بر عملکرد بانک‌ها در اقتصاد ایران در دوره زمانی ۱۳۸۶ تا ۱۳۹۶ برای ۱۴ بانک منتخب ایران بررسی شده است. نوسانات نرخ ارز توسط روش ناهمسانی واریانس خود رگرسیونی شرطی عمومی (GARCH) استخراج شده و اثر نوسان های نرخ ارز بر عملکرد نظام بانکی ایران با استفاده از رویکرد داده‌های تابلویی بررسی شده است. که برای ارزیابی عملکرد بانکی از دو معیار نقدینگی و سودآوری و برای ارزیابی هردو معیار به ترتیب از نسبت مانده تسهیلات اعطایی به سپرده‌ها و نسبت بازدهی سرمایه استفاده شده است. برآورد مدل اقتصادسنجی با روش داده‌های تابلویی به روش اثرات تصادفی نشان داد که نوسان نرخ ارز اثر منفی و به لحاظ آماری معنی‌دار بر نسبت بازده سرمایه بانک‌ها داشته است. همچنین نوسان نرخ ارز عاملی تاثیرگذار و مثبت در افزایش نسبت تسهیلات پرداختی به کل سپرده‌های بانکی است، زیرا موجب افزایش شکاف مالی می شود که افزایش این شکاف نیز ریسک اعتباری را به دنبال دارد.

کلمات کلیدی: بی‌ثباتی، نرخ ارز، عملکرد بانک‌ها، داده‌های تابلویی، اقتصاد ایران.

طبقه‌بندی JEL: C22, E44, G01, N10.