



## **Effects of Real Exchange Rates Disequilibrium on Banking System Lending**

**Mahboobeh Taebi**

Master of Economic Sciences (corresponding author)

**Gholam reza abbasi**

member of scientific board of economic faculty of Islamic Azad University of Tehran Center

**Roya seifi poor**

member of scientific board of economic faculty of Islamic Azad University of Tehran Center

### Abstract

Recently, many countries, including Iran have experienced monetary and banking crises and exchange rate shocks manifested as bank capital erosion and a reduction in bank lending. Banks credits and lending may play great significant role in economic boom. So it is worthy to note that the behavior of bank lending to the economy is very important and positive and negative factors on bank lending rates should be considered. This paper examines the impact of deviations of real exchange rate from the equilibrium and on bank lending rates using vector regression model. The research period was from 2003 to 2013 in quarter manner. The results of the research model estimates reflects the fact that deviation of real exchange rate had a negative impact on Parsian bank lending rates.

**Keywords:** Real exchange rate – deviation from equilibrium path - lending rates - GARCH - VAR

**JEL CLASSIFICATION:** C32, Q47, Q41, Q40, E35



## Introduction

Nowadays, substantial role and impact of banks in the economy has been accepted in the form of financial intermediaries and facilitators of credit payment system. As a whole, banks use loans to income generation and their income is obtained from gap between deposit rates and loan granted. The volume of loans granted by banks is a function of their internal characteristics such as size, margin, liquidity, credit policies and other internal factors. Studies show that the Bank's internal policies largely dependent on the macroeconomic environment so that the lending behavior of banks reflecting the economic signs.

It seems that if banks assume stable macroeconomic conditions they will expect borrowers to meet repayment of their debts, because their predictions in these circumstances is indicative of the appropriate return of investment projects.

Because banks do not operate in a vacuum, lending behavior of them in most cases is affected by environmental factors, especially the rules and macroeconomic factors. Economic conditions is economic elements of risk that affects each company or firm. The overall economic performance of each country through macroeconomic factors such as GDP, employment, industrial capacity employed, inflation, money supply and the exchange rate is determined. The banks' lending behavior in response to moderate the symptoms. Positive (negative), symptoms encourages lend more (less) loan. Bank loan portfolio may also be influenced by expectations of economic performance. Researches by authors e.g. Zulu, Thespien and Talavara (2006) suggest that banks in the economic boom and the reduction of macroeconomic uncertainty, grant more loans, and vice versa reduce their lending during the recession.

Risks arising from exchange rate fluctuations, including issues that always as a problem for the economy, the country is particularly money market and the importance of this issue so that the risk of some heavy irreversible losses and will affect their economy. Applying the right strategies adopted strategies of foreign exchange and foreign exchange policies and activities of economic logic cannot guarantee success. The aim of this study was to determine the influence bank lending rates from real exchange rate misalignment of the balance. In recent years, due to excessive fluctuations exchange rate from its equilibrium path and the kind of instability in the exchange rate of the instability of economic sectors have and this kind of instability caused large fluctuations in private sector investment various economic sectors and can affect the volatility in bank lending behavior.<sup>1</sup> Based on the foregoing discussion, that bank lending behavior is affected by the macroeconomic environment and according to the unstable exchange rate in Iran, the present research aims to assess how exchange rate deviation from equilibrium path to influence the behavior of bank lending

<sup>1</sup> The effect of exchange rate uncertainty on private sector investment (Case Study : Iran), Kazerooni 2007



and whether such non-equilibrium reduces banking lending or not. In other words, this study aims to shed lights on impact of exchange rate deviation on lending

#### Literature review

Exchange rate serves as a national currency of a country as a benchmark value against the currencies of other countries, Reflect the economic situation of the country compared with other countries' economic conditions. In an open economy the exchange rate due to its interaction with other internal and external factors, the key variable considered which is affected by internal and external economic policy and economic development In contrast, the exchange rate is a variable that can affect the performance of the economy and economic variables. In past years given importance and the role of the exchange rate on macroeconomic variables, numerous research and studies have been conducted.

#### Deviation of the real exchange rate and bank lending rates

Toward growth and sustainable development, paying attention to organizational development is a policy of concern to all managers. Banks are not exempt from this modern banking, there are many factors that affect the allocation of financial resources banks and financial institutions. To identify and determine the effectiveness and relevance of these factors with the success of banks in the allocation of financial resources, is an important issue. Today, financial institutions and banks are not the same situations and it is possible factors affecting the allocation of funds even for each of the different branches of a bank. But what is certain banking resource allocation or the amount of bank lending conditions and macroeconomic variables is concerned. One of the factors that can have a significant impact on bank lending rates is the currency volatility in the community. Therefore, in this study the effect of deviation from the equilibrium real exchange rate will be paid on bank lending rates. Banking industry, including the important industries in the world and increasing human knowledge in the field of electronic science has made industry also have a great benefit from this knowledge. Today, banks in advanced countries as the key, Senior Consultant, specializing in corporate finance and gathering and exchange of information to increase resources to serve our customers and one of the economic engines of the country. This has led to intense competition among them. Bank lending rates to their customers can apply one of the reasons for bank customers. But consideration in this context pay off loans received from customers is one of the reasons that economic causes of bad loans and foreign exchange market is also one of the markets in recent years have fluctuated greatly. The same can be said for if the exchange rate increases the bank's claims to be, banks will have to avoid more losses in their behavior towards lending to banking customers more accurate and more obsessed with the act. The banking system in the economy, is a very heavy responsibility and one of the most important economic pillars of the country. Economic growth and prosperity or stagnation of workmanship financial institutions, especially banks, is closely related. indeed credits granted by banks, the main source of demand for goods, services and loans, the source of credit for many entities, including households, businesses, companies and the government. Therefore, the optimal activity of banks and the effective use of capital equipment, in various sectors and



economic activity in general, the economy is very important. in the complex world of business and finance, capital accumulation, the fundamental pillars of the organization, .banks community macroeconomic decision-making and planning is also an important instrument for capital accumulation are a turn. Flowing in collecting deposits and the bank's actions in economic activity, the transfer of capital from an inactive (depositors) to other groups that are active in the field of employment, and banks and intermediaries operating between the two groups. such deposits, needs to adopt its own practices and procedures. In other words, the factors included in the allocation of deposits that as far as practicable, they should be well known. One of the important factors that determine the allocation of resources is a bank or bank lending rates is the bank resources. Any monetary economy, the financial system is an essential component of the financial system banks by offering financial services credit from banks and numerous diverse as financial services referred as supermarket. Survival of bank deposits subject to the, mistakenly, in fact, deposits, banking operations constitute a centered column. Perform other duties and banking operations to attract deposits. In other words, the basic task is ahead of other banking functions. Growth and prosperity or stagnation of the economy, is closely associated with the workings of the banking institutions. The banking system, which provides services to the country's economic system moving without it fails. The main source of capital in the banks and the loans they purchase products and services, source of credit for all economic units such as families, businesses, corporations and government. Therefore, optimal activity of the bank, the country's economic activities is very important. Commercial banks, financial institutions and funds still attract people to their financial and other borrowers. In fact, banks with operations resulted in the transfer of funds from those who for various reasons-including the Bank expects today's knowledge society which also attempt to attract deposits, choose the healthiest method of allocation of funds to different economic sectors. Upon little expertise, capital inadequacy and fear of investment risk and does not or cannot participate in economic activity, to those who need funds for investment and in this way contribute to the country's economic growth. Given the important role that effective banking network and today's money, banks and banking communities in economic and social development plays in reaching the goals of the country, plays a very big task and should try to effectively and efficiently contribute to the realization of the ideals of the Islamic Republic of Iran more than before. Society today demands that the country's banking network also attempt to attract deposits, credit allocation to the different economic sectors to choose the healthiest way. In other words, the tools are money savers to the bank, to the benefit of the country. Another factor which affects banking lending, is interest rate of credits. For this purpose, following section deals with factor affecting interest rate of banking credit among others.

"Gambekerta and Eun" 2005 evaluated asymmetry speed quickly on interest rates (lending, domestic bank deposits and stuff) on monetary policy changes in Italy from 1985 to 2002 examined in the years in Italy asymmetric design vector used to study the possibility of short-term and long-term. The investigation showed that the pace of change to changes in monetary policy interest rates dramatically increased after the introduction of banking law. Interest rate changes in response to positive and negative changes in the short term and in the long term



lopsided balance is unique. They also found that banks in the period of monetary tightening in lending rates adjust faster process. (Somoye) Van den Howell explained that the monetary policy on bank lending system affects the two channels. They argue that by lowering bank reserve tightening policy to reduce the amount of money is money. That banks can accept deposits accumulated and the legal reserve is subject to availability. If banks can easily choose alternative financing methods or assets to settle rather than loans, a decrease in accumulated debt leads to reduced bank lending system.

"Punita and Somoye" 2006, studied impact of monetary policy on bank profits in India between 1995 and 2000 were examined. Monetary variables including bank rate, loan rate, cash reserve ratio and ratio of law, and impacts which are independently on the profitability of banks. The investigation revealed that an important and positive impact on the profitability of banks' lending rates, which show a drop in lending rates, the low profitability of banks. The bank rate and cash reserve ratio was found to have a negative impact on profitability legal relationship puts banks. Studies have shown that when the relationship between the loan rate, bank rate, cash reserve ratio and bank profitability legal relationship on monetary policy instruments in the private sector were examined and similar results were obtained. "Amid and the Wolf" 2008 offered a brief description of the monetary policy on lending system in Ghana between 1998 and 2004, respectively. The investigation revealed that Ghana's system of bank lending dramatically affected by changes in the money supply were the government's economic support. The study, previous findings about negative effects of the central bank base interest rate and inflation rate on bank lending system acknowledges the debt. Base interest rate was statistically significant if inflation was not so important. Features According to reliable studies revealed that a significant impact on the ability of banks to increase the size and liquidity of the bank's credit requirements. "M & Simon" in 2008, the same studies carried out for Ghana. In a research by "somoye and Ilo" in 2009, the impact of macroeconomic instability in the banking system lending in Nigeria between 1986 and 2005 on the transmission mechanism of monetary policy changes on the performance of banks. This review describes the relationship vector error correction long-term inter-bank lending system and macroeconomic instability is revealed.

### Model estimation

In this paper, the effects of deviation of exchange rate on bank lending rates (Parsian Bank) in Iran using time series data from 2003 to 2013 using ARCH and GARCH method for measuring and using software Eviews software. For the introduction of bank lending and a regression model using an experimental model Punita and Somoye<sup>2</sup>, 2006 to introduce the model variables. as to influence bank lending rates from real exchange rate misalignment (crr) of the variables save money ( crr), the statutory liquidity ratio (slr), stock exchange index (ind) and inflation (inf) will be used. (Parsian bank lending rates: fac)

<sup>2</sup> . Monetary Policy and Bank Performance in Nigeria: A Two-Step Cointegration Approach



It might then wrote:

$$Fac=f(crr , slr , inf , ind , crer)$$

$$FAC_t = \beta_0 + \beta_1 CRER_t + \beta_2 CRR_t + \beta_3 SLR_t + \beta_4 IND_t + \beta_5 INF_t + U_t$$

According to the paper the tests also indicate that the model for convergence and vector regression model VAR will be used.

Exchange rate deviation is defined as in the form of conditional variance and standard deviation  $\sqrt{h_t}$  is defined. It should be noted that the coefficient  $\alpha_1$  Arch and  $\beta_1$  Garch factor. After calculating the deviation of the real exchange rate from its equilibrium path, to estimate the Bank's lending operation Regressive (VAR) is used. The data are collected in quarterly manner and in the period 2003: Q1 to 2014: Q4.

Estimation of real exchange rate deviation from path

According to the base paper mentioned at the beginning of the season to evaluate the deviation of the real exchange rate from its equilibrium path variable GARCH models will be used. For this purpose, the real exchange rate as regression modeling is your breaks. This action is necessary to estimate the model by model. Results GARCH estimate the real exchange rate on its timeouts are shown in Table 1.

Table 1: the real exchange rate regression on lags

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	12533.08	119.1017	105.2300	0.0000
AR(1)	1.904775	0.048745	39.07600	0.0000
AR(2)	-0.928992	0.047389	-19.60343	0.0000
MA(1)	0.106847	0.070959	1.505760	0.1321
R-squared	0.987077	Mean dependent var		13531.34
Adjusted R-squared	0.986057	S.D. dependent var		3139.885

Source: author findings

However, after modeling the real exchange rate to estimate the real exchange rate deviation from its equilibrium path should be conditional variance and standard deviation  $\sqrt{h_t}$  is defined and measured. It should be noted that the action is done by using GARCH family patterns. The results of measuring the standard deviation of the real exchange rate conditional variance is as Table 2.



Table 2: estimation of real exchange rate deviation from path using EGARCH

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	12533.08	119.1017	105.2300	0.0000
AR(1)	1.904775	0.048745	39.07600	0.0000
AR(2)	-0.928992	0.047389	-19.60343	0.0000
MA(1)	0.106847	0.070959	1.505760	0.1321
<b>Variance Equation</b>				
C(5)	14.83360	1.034857	14.33396	0.0000
C(6)	1.913929	0.388217	4.930042	0.0000
C(7)	-0.603651	0.081067	-7.446284	0.0000
R-squared	0.987077	Mean dependent var		13531.34
Adjusted R-squared	0.986057	S.D. dependent var		3139.885

Source: author findings

After estimating the model, the real exchange rate deviation from its equilibrium path has been calculated and then the impact of these variables on bank lending rates is estimated that the main hypothesis. But before estimating the model by model variables var should be evaluated in terms of reliability. Phillips-Perron unit root test has been used for this purpose. Of course it should be noted if the variables are non-stationary model should be used to fix the problem and estimate the model VECM model. So initially Phillips-Perron test is used to check the stability variables.

#### Variable reliability test

Before estimating model by model variables var should be evaluated in terms of reliability. If the time series data led to spurious regression is not valid and returned to the same pattern vector (VAR) If endogenous variables are non-stationary models, results of the analysis of impulse response function and analysis of variance function is invalid for the purposes of Phillips-Perron unit root test is used. It should be noted if the variables are non-stationary model should be used to fix the problem and estimate the model VECM model. So at first to study the stationary variables Perron unit root test was performed for each variable once differencing all variables were steady at 5%. Test results are as follows.



Table 3: reliability test of variables in levels

Probability level					variable
probability	10% Level	5% Level	1% Level	Test statistics	
0.13	-2.60	-2.93	-3.59	-2.46	Crr
0.97	-2.60	-2.93	-3.59	0.33	Fac
1.00	-2.60	-2.93	-3.59	4.98	Ind
0.83	-2.60	-2.93	-3.59	-0.71	Inf
0.01	-2.60	-2.93	-3.59	-3.36	Slr
0.00	-2.60	-2.93	-3.60	-5.72	ENRER

Source: author findings

As can be seen from the above table, unit root test results for variables bank lending rates, the money supply, stock index stock exchange and inflation is not significant. for two variables slr (statutory liquidity ratio) and ENRER ( deviation of the real exchange rate from its equilibrium path) is sustainable level.

Table 4: variables reliability test in first order differentiation

Probability by first order differentiation					variable
probability	10% level	5% Level	1% Level	Test statistic	
0.00	-2.60	-2.93	-3.59	-3.84	Crr
0.01	-2.60	-2.93	-3.59	-3.33	Fac
0.08	-1.61	-1.94	-2.62	-1.71	Ind
0.02	-2.60	-2.93	-3.59	-3.27	Inf





The results also show non-stationary unit root the first difference variables, variables are unstable with time differencing reliability.

Estimation of average bank lending:

The model is as follow

$$= \beta_0 + \beta_1 ENRER_t + \beta_2 CRR_t + \beta_3 SLR_t + \beta_4 IND_t + \beta_5 INF_t + U_t FAC_t$$

Bank lending rates (fac)

Deviation of the real exchange rate from its equilibrium path (ENRER)

Save money ratio (crr)

Statutory liquidity ratio (slr)

Stock Exchange index (ind)

Inflation rate (inf)

Johansen and Joselius Cointegration

However, to estimate the model, as was observed variables are not reliable and so as to avoid spurious regression between variables in the first stage should be done unreliable collective test pattern.

Table 5: Johansen and Joselius Cointegration

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.536288	63.85261	55.24578	0.0072
At most 1	0.374331	33.11299	35.01090	0.0788
At most 2	0.300847	14.35567	18.39771	0.1679
At most 3	0.001005	0.040232	3.841466	0.8410
<b>Trace test indicates 1 cointegrating eqn(s) at the 0.05 level</b>				

To determine the optimal number of criteria such as Akaike information criterion, Schwartz information criterion, Hanan Quinn criterion information, and the ratio of maximum likelihood and autocorrelation curves plotted for the X components disorder equation, we use different models Lag estimate to determine the best model.



Table 6: results of determination of optimum lag

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-977.0353	NA	5.86e+15	53.31765	54.86904*	53.86962
2	-918.3858	80.25717	2.00e+15	52.12557	55.22836	53.22952
3	-893.7118	25.97266	5.20e+15	52.72167	57.37587	54.37760
4	-818.6869	55.28151*	1.57e+15*	50.66773*	56.87332	52.87563*

\* represents optimum lag

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

They are seen as in the above table, the amount of Hanan-Quinn, Schwartz, Akaike, and likelihood ratios. An asterisk indicates optimal lag based on desired criteria. In this study, according to the most standards-4 is optimal. After re-estimating the interval to determine the optimal lag estimate.

Thus resulting estimate the optimal model is as follows:



Table 7: model estimation in optimum lag

Cointegrating Eq:	CointEq1
LOG(FAS(-1))	1.000000
LOG(ENRER(-1))	0.125189
	(0.05361)
	[2.46985]
LOG(CRR(-1))	-1.277166
	(0.10343)
	[ -12.3480]
LOG(SLR(-1))	0.912182
	(0.18043)
	[ 5.05571]
LOG(INDEX(-1))	0.434575
	(0.19591)
	[2.27857]
LOG(INF(-1))	0.833901
	(0.37218)
	[ 2.24059]
C	-4.659454
	(1.24162)
	[-3.75273]
Error Correction:	D(LOG(FAS))
CointEq1	-0.057057
	(0.00552)
	[-10.3418]



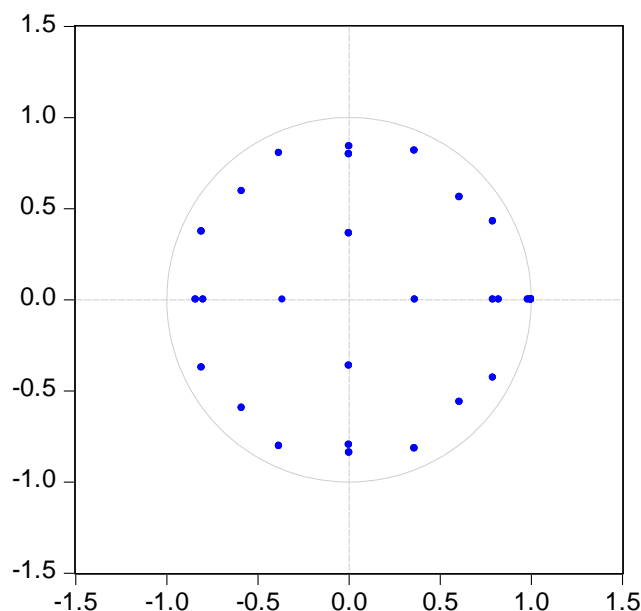
As can be seen from the above table Effect of the real exchange rate from its equilibrium path on bank lending rates are negative. Given to the resulting estimates of the equilibrium real exchange rate misalignment effects model reverse impact on bank lending rates. The impact of these increases can be explained by exchange rate misalignment true to their equilibrium path in their profit margins reduced. Iran, due to its dependence on imports of intermediate goods capital when the exchange rate deviation from its equilibrium path find because the cost of other firms is not estimated correctly corporate profit margins declined as a result of reduced investment in the economy. For two reasons this impact reduced lending rates at banks. On the one hand by reducing investments in firms, the firms' demand for loans from reduced and from the other by reducing firms' profit margins, increases the risk of losses and ultimately bankruptcy of the economic unit nightfall and as a result, the borrower of the bank is not able to pay your installments to the bank as a result of the economic situation, banks are less willing to grant loans to businesses. In connection with the negative impact of inflation on bank lending rates also, it can be said that in terms of inflation, bank borrowers is in their interests which has not paid its debts and become debt thus be deferred and in these circumstances, banks do not have much willingness to supply loans, resulting in reduced bank lending rates.

#### Model validity

After estimating the model to investigate the stability of the model using Lag Structure discussed. This characteristic polynomial root reverse test reports. If all the roots have absolute value smaller than the unit is inside the circle with a radius of VAR model is stable. The results suggest that the model is valid.



Inverse Roots of AR Characteristic Polynomial



Analysis of variance

Analysis of variance variables in the first period, up to tenth in the table below. The first column represents the standard error (SE) in different eras. The source of the error and changes in the values of current and future shocks because of this error can be calculated each year based on last year's errors increases over time.

Table 8 Analysis of variance for the dependent variable of bad loans

Variance Decomposition of LOG(FAC)							
LOG(INF)	LOG(INDEX)	LOG(SLR)	LOG(CRR)	LOG(ENRER)	LOG(FAC)	S.E.	Period
0.000000	0.000000	0.000000	0.000000	0.000000	100.0000	0.038090	1
0.544535	0.120388	4.212207	15.78486	0.234099	79.10391	0.053614	2
1.342318	0.296764	10.38339	38.91081	0.577071	48.48965	0.074225	3
1.897524	0.419511	14.67814	55.00497	0.815757	27.18410	0.101688	4
15.26589	1.670289	9.697729	50.50938	2.370836	20.48588	0.162373	5
16.99531	1.945787	9.801390	52.30288	2.680823	16.27381	0.203834	6
16.73258	2.037866	10.79863	54.65484	2.756377	13.01970	0.237453	7
15.80258	2.054610	12.08848	56.79776	2.736679	10.51989	0.266898	8
14.16480	1.748968	16.83399	56.24870	2.613398	8.390150	0.300365	9
12.98940	1.507027	19.55728	56.35122	2.517694	7.077382	0.327170	10

Source: research findings



As can be seen in the table represents results

Changes in the first period of close to 100 percent of bank lending rates due to changes in these factors and during this period, the changes do not affect the independent variable. But in the next period and in the medium term impact of the fluctuation of the bank lending model for other independent variables increases. But the real exchange rate misalignment variable than other independent variables has the least impact on changes in lending. In the tenth, 7% of their variable lending rate changes FAC and 93% the impact of changes in the independent variables of the model and the view changes FAC is only 56 percent.

#### Recommendations

According to the results of model estimation and the negative impact of the real exchange rate misalignment from its equilibrium path lending rates, due to the positive impact of investment on economic growth and on the other hand, given the financing businesses of credit (lending) and as a result of a reduction in lending rates is expected in the wake of the economic slowdown. It is suggested that economic agents for foreign industrial firms (not in the form of currency) loans and the loans received in foreign currencies to prevent negative impact of real exchange rate deviation and economic growth.

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