

Interest Elasticity of Banks Deposits: A Study of Pakistan

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Abstract: *We have estimated real interest rate elasticity of real private remunerative bank deposits for the case of Pakistan using a multiple regression model. We have used time series data for the period of 1979 to 2016. In addition to real interest rate, real income, workers' remittances, and government borrowing turned out to be significant determinants of real private remunerative deposits level in Pakistan. We found that a 1.0 percentage increase in real interest rate was associated with 0.3 percent increase in real private (remunerative) bank deposits in Pakistan during 1979-2016.*

JEL Classification: C3 and E4

Key Words: Elasticity, Interest Rate, Deposits

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1. Introduction

In neoclassical Economics, economic growth of a country is a function of its savings. In other words, the rate of growth of a country depends upon preferences of its people between current and future consumption. The real rate of return is the core determinant of how much consumption can be made in future by forgoing today's consumption. Higher real return should discourage current consumption and encourage savings to have extra consumption in future. There are various channels to invest one's forgone consumption to earn returns in future. Two main channels are banks and stock markets. However, in developing countries, there is another place to invest savings and that is with the government. In Pakistan, government borrows from people through 'Central Directorate of National Savings (CDNS)' using its various schemes (National Saving Schemes or NSS) like 'Prize Bonds,' 'Regular Income Certificates', etc. Pakistan's financial system is traditionally a bank based system². Banks have their branches even in remote areas of country.

Does return to bank deposits really matter to reduce consumption expenditures, and to increase savings to eventually raise deposits for the case of Pakistan? If yes then, how much? Answers to these questions are important for the central bank, the State Bank of Pakistan (SBP). From the policy perspective, if there are demand pressures in the economy, SBP increases the policy rate in order to cool the economy. Raising the policy rates should impact private consumption expenditures negatively by making savings more attractive. The other channel of SBP's success in its pursuance to reduce the aggregate demand pressures is to impact private investment expenditures in the country by influencing the cost of borrowing from the banking system.

After financial sector reforms and restructuring in 1990s, SBP has been using market based policy instruments to guide the economy in desired direction/level (Hanif, 2003). Incomplete and slow pass-through of changes in policy rate to money market and bank's retail interest rates impairs the effectiveness of monetary policy transmission mechanism. Recent study (Khan and Hanif, 2012) shows that while there is a swift pass-through from the policy rate to money market rates, the impacts of changes in money market rates on the bank deposit rates is not only sluggish, but also incomplete³. More specifically, response of returns on deposits is confined to only 60 to 68 bps following 100 bps changes in money market rates and it takes 2 to 6 months to realize this impact. Despite revealing about the sluggishness of banks' return to

² A system where financial intermediaries, like banks, play greater role in increasing the saving rate and allocating savings amongst different competing sectors of the economy is called a bank based (financial) system as in Germany and Japan. If stock markets are more active in playing such role then it is called a market based (financial) system as in USA. In an ideal situation, it is the combination of effective legal and judicial infrastructure of the country with both the banks and the stock markets which ameliorates market imperfections and provides 'competitive and sound financial services' to promote economic growth by channeling financial resources in response to price signals.

³ However, banks' lending rates are more responsive to changes in money market rates.

depositors in response to changes in SBP policy rate and money market rates; this study does not guide anything about the responsiveness of the bank deposits to changes in returns to depositors.

Only one study⁴ in the past attempted to estimate such elasticity of bank deposits in Pakistan but that study is about 25 years old. Nishat and Bilgrami (1989) estimated (interest) elasticity of time deposit to be 0.3 for the period of 1959-60 to 1985-86. Most of this duration (particularly 1972-73 to 1989-90) was marked with suppressed financial sector characterized by credit ceiling, directed and subsidized credit, control on deposit and lending rates, etc. Financial landscape of Pakistan has significantly changed during the past quarter century; particularly after financial sector reforms and restructuring which started in 1990. The restructuring process in Pakistan included two types of actions: one for strengthening financial institutions and the other for developing efficient financial markets. Other than incorporation of new commercial banks, nationalized commercial banks have been privatized and today more than four-fifths of banking sector assets are in private sector. Pricing structure has been completely rationalized. It is important now to have a fresh look at the return⁵ elasticity estimate for bank deposits (and investment accounts, in case of Islamic Banking Institutions).

In the next section, we discuss the conceptual framework used in this study to estimate the interest elasticity of banks deposits in Pakistan while considering other determinants. Then we provide a brief about data used and methodology applied, before we brief about behavior of banks deposits and interest rate, and discuss the empirical estimate of interest elasticity of private remunerative banks deposit in Pakistan during the period under study. This study is concluded with some remarks based on the discussion in the main text.

⁴ Nishat and Bilgrami, 1989.

⁵ Pakistan is an Islamic Republic State. In Islamic Shariah 'interest' is prohibited. SBP introduced Islamic Banking, in parallel to conventional banking, in the country during early 2000s as a choice to people. After more than a decade, almost one-sixths of overall people's deposits with banks in Pakistan are in Islamic Banking Institutions (IBIs) of the country. Except those that are kept in current accounts, all other amounts in IBIs are in 'investment accounts'. IBIs do not offer interest to their investment accounts holders (IAHs). Rather, they share *profits (loss)* with IAHs; earned by investing the pool(s) of all investment accounts and IBIs' equity in Shariah compliant products like Murabaha, Ijarah, Musharaka etc. Points to be noted are the facts that: a) IAHs are not depositors of IBIs, a) money of IAH with the IBIs is not guaranteed (conceptually, as loss is possible) and thus no longer liability of IBIs (unless some negligence and/or lack of good faith in investment of such money is found). We will use the term 'interest' instead of return in remaining part of this study mainly because about 5/6th of overall banks' deposits in Pakistan are interest based. We suggest SBP to compile and disseminate these and other important variables' data for IBIs and conventional banks separately.

2. The Conceptual Framework

Banks are financial institutions that keep deposits (or maintain investment accounts in case of IBIs), and use this money to purchase assets (or invest in, say, Musharaka in case of IBIs). Main objective of people for maintaining remunerative bank deposits is not to use the same as medium of exchange (other services offered by banks). These are rather for earning return on the savings. Banks assume the function of portfolio management as in Fama (1980). In addition to facing a downward sloping demand curve for lending (and Musharaka type) activities, banks face an upward sloping deposit (and investment accounts) supply curve which depends mainly upon return on deposits. Assuming a linear deposit supply function, we can write its dynamic equation as an ARDL model:

$$\Delta D_t = \delta + \beta r^d + \varphi_i \sum_{i=1}^p \Delta D_{t-i} + \gamma_j \sum_{j=0}^q \Delta X_{t-j} + \epsilon_t \quad (1)$$

$$D = \alpha + \beta r^d + \gamma X + \varepsilon \quad (2)$$

Where D is the volume of the deposits; r^d is the contemporaneous real deposit rate/return; X is the set of conditioning information to control for other factors associated with (supply of bank) deposits; δ , β , φ & γ are parameters; and ε is the stochastic error term. The value of δ gives the supply of deposits at no return and it is expected to be positive when deposits include remunerative demand deposits (like saving accounts) because such deposits are used for cash payments. Non-negative β is the slope of the deposit supply curve. $\beta = 0$ means perfectly inelastic supply of deposits with respect to associated interest rate. Higher value of β indicates relatively higher interest elasticity of banks deposits. Sign of estimated coefficients in γ depends upon the associated variable (as we discuss below).

Banks are not alone in managing the people wealth accumulated through savings. Other institutions (like CDNS in Pakistan) are also interested in managing people's wealth and rather sometimes offer higher returns. Competition induces banks to stay in the market by offering other services associated with banking, sometime free of charge. Banks may offer no explicit returns to depositors which need such services more and frequently. Such non remunerative accounts are classified as current accounts in Pakistan⁶. Other than placing with the government and in the banks, people do have another choice of investment and that is in the country's stock market (Pakistan Stock Exchange (PSX)) which may offer higher returns but principal is not

⁶ Subsidized or free banking services to such account holders are implicit interest payments. Because of non-availability of data on such implicit interest payments, we will be considering only explicitly remunerated bank deposits in our study.

guaranteed there⁷. While estimating the deposit supply function for banks, we may consider either the returns offered by the alternate money placement opportunities (in NSS or in PSX) or the quantities attracted by such institutions being competitors of banks. Government borrowing directly from people through NSS (and the return related to such borrowings) also affects deposit mobilisation by banks negatively. Similarly, the return offered by PSX (and the market capitalisation thereof) would be negatively associated with the banks' deposit attraction schemes.

Other than the variables (like returns on deposits/investments) pertaining to the financial institutions, which compete for their pie in the overall accumulated savings (wealth) in the country, we need to see what actually raises the size of the wealth itself. Given the motives (as in the macroeconomics literature) for savings, there are several factors that are likely to influence the savings, particularly in the context of Pakistan economy.

According to permanent income / life cycle hypothesis people make their current consumption on the basis of their view about their going to be permanent income over their life period and they prefer smooth consumption patterns. It clearly means that such people will save (dis-save) when income is above (below) their permanent levels. One can use gross domestic product (GDP) as a proxy for income⁸. In case of Pakistan where a large number of Pakistanis are working abroad and send remittances to their families; and thus these remittances are a major (and in some cases only) source of income for their family. So, for the case of Pakistan, it would be better to analyse gross national product⁹ (GNP) instead of GDP. But with this approach we may not be able to see separate impacts of GDP and Workers' remittances (WR) upon banks' deposits. Increase in the gross domestic product and inflow of workers' remittances positively affects banks deposit collection.

If we assume that savings are (only) for rainy days, savings becomes function of (expected) income (Alessie and Lusardi, 1997). Permanent income postulation means there is persistence in production. In order to [re]produce persistence in the output data, habit formation is introduced in consumption by Dusenberry (1969)¹⁰. Alessie and Lusardi (1997) shows that habit formation affects not only the level of consumption but also that of saving. In other words, savings not only depends upon permanent (expected) income but also upon past savings. Deposits being part of savings, we think it is important to consider past deposits as one of the determinants of the level of deposits in the country. By past, in this study, we mean with one year lag. Furthermore, from Econometrics point of view, it also takes into account the

⁷ Principal is not guaranteed in IBI's investment accounts as well.

⁸ And we can use smoothed income as a proxy for permanent income.

⁹ According to National Income Accounts of Pakistan for FY2014, as reported by Pakistan Bureau of Statistics, net factor income from abroad is 5.4 percent of overall gross national product.

¹⁰ See Choudhary and Levine (2006)

dynamics and control for omitted variable in the model to be estimated, if any (Kemal, Qayyum and Hanif, 2007).

It is not only the income of people which is important for them to (consume and) save; it is also the process of income generation like through use of credit, for working capital and capital expenditures, offered by the banks to private sector. Since credit to private sector also becomes the deposit for the issuing bank, credit creation is also associated with the deposit growth. But in developing countries sometimes government becomes the largest users of banks' credit and (in some cases) crowd outs private sector. It is also pertinent to note here that credit to the government by banks does not become part of banks' deposit, unlike the credit to private sector becomes part of banks' deposits, and goes to the government account. Government deposits are usually excluded from the type of analysis we are doing in this study. In such situation government borrowing from banking system negatively affects the deposit supply for banks.

Branches (BR) network of bank is the main source for banks to collect deposits. Furthermore, 'Number of Accounts' opened in these branches (other than the current accounts) is also an indicator of financial inclusion in the country. Wider the branches network and higher the number of accounts in the banks, larger could be the volume of deposits in the country.

As discussed above, Pakistan has undergone significant changes in the financial sector during the last 25 years. Some of which are crucial to be considered (for example using a dummy variable approach) to account for structural change(s). Significant of those are: initiation of financial sector reforms in 1989-90, introduction of (foreign) payments reforms in 1992 (when resident Pakistanis were allowed to open and maintain bank accounts in foreign currency), interest rate liberalization in 1995, introduction floor for deposit rates for banks from June 1, 2008¹¹, sensitisation of the fixed deposits in 2006 by exempting fixed deposits of maturity 1 year and longer from Cash Reserve Requirement. We consider these year(s) using dummy variable(s) to see if these have any profound impact on banks' deposits in Pakistan.

3. Data and Methodology

One of the important issues pertaining to the determinants of bank deposits and estimation of interest elasticity of bank deposits is to define what constitutes the bank

¹¹ This floor was later raised to 6 percent on May 1, 2012. Even with these directives banks had been paying minimum deposit rates to most of their depositors and that too upon minimum monthly balances. Effective from April 1, 2013 banks have been advised by SBP to pay return on saving deposits on average monthly balances. And, rather than paying the monthly fixed minimum deposit rates banks have also been advised to pay not lower than '50 basis point minus the prevailing repo rate'. Repo rate is the rate upon which SBP is willing to have banks deposits if there is no one to get money from the banks.

deposit (in the case of Pakistan) and which interest rate is more relevant for this study. The objective of this study is estimate the real interest rate (r^d) elasticity of real bank deposits (D). Most suitable measure for bank deposits is ‘private remunerative bank deposits’ for which we have been able to find consistent data for the period 1979-2016. From overall bank deposits we exclude current accounts, interbank deposits and government deposits to arrive at ‘private remunerative bank deposits’. Real interest rate is calculated by subtracting inflation from the nominal interest rate. For the nominal interest rate we have used the most relevant rate available for remunerative deposit and that is weighted average deposit rate. To obtain real interest rate upon remunerative deposits we subtracted 12-month average of YoY change in Consumer Price Index (CPI) which is compiled by Pakistan Bureau of Statistics (PBS). As mentioned above we have used contemporaneous real interest rate in this study¹². One may argue that supply of deposits depends upon expected interest rate rather than current. This may sound relevant but there are at least three practical reasons, which suggest using contemporaneous nominal interest rate rather than expected nominal interest rate to estimate real interest rate in this study. First, this study is based upon annual frequency; and not monthly or quarterly frequency because in Pakistan we do not have monthly or quarterly bank deposit data for longer history. Second, a significant part of the private remunerative deposits are for fixed term in which case the interest rate is agreed by the bank with the deposit holders and thus it is the current offered interest rate that matters (rather than future). In most of such fixed deposits schemes banks pay interest on monthly basis. Third, even in the case of savings accounts (or in case of IAHs in IBIs) though return is paid on six monthly bases; it is calculated on monthly basis.

We now move to other variables associated with deposit supply function as discussed in the conceptual framework. Gross Domestic Product (Y), Workers Remittances (WR) data is used from annual national income accounts as published by PBS. Banks’ credit offered to private sector (CP) and the number of overall private remunerative bank accounts in the country (AC) is obtained from different publications of SBP. Data on government borrowing from public (GBP) and government borrowing from banking system (GBB) is obtained from annual budget documents of government of Pakistan. We have also used different dummy variables for different years (like D1992 for 1992) as discussed in the previous section.

We converted all the nominal variables like nominal private remunerative bank deposits, nominal government borrowings, and workers’ remittances etc. into real ones by dividing them by CPI. We also took logarithm of all the variables used in this

¹² We have not adjusted the return for a) tax upon profits (which is different for income tax return filer and non-filer but we will not be able to get separate dataset), and b) zakat upon deposits held on Ramzan 1 of each Islamic calendar year which is 2.5 percent of nominal deposit amount if it is greater than a threshold level which is announced annually by the government of Pakistan (but again we do not have separate data for deposits for which depositors have obtain exemption by submitting an affidavit that they will pay the applicable zakat amount themselves).

analysis except dummy variables and different rates of return (like real interest rate, real PSX returns etc.).

Moving toward econometric methodology, we first test for the order of integration of all the variables used in this study using Augmented Dickey Fuller Test (Dickey and Fuller 1979, Dickey and Fuller 1981). Depending upon the order of integration of variables, which we can expect to be 1 (except for the rate or return) based upon economic intuition of the variable we consider here, we may be looking if there is long run relationship between the private remunerative bank deposits and its determinants. For the rate of return we expect order of integration to be zero. If one of the variables amongst the explanatory variables is found to be $I(0)$ and rest of explanatory variables and the dependent variables are all $I(1)$, we can explore if there is cointegration between the variables using ARDL model (Pesaran and Shin (1998, PS(1998)) and Pesaran, Shin and Smith (2001, PSS(2001)). In case we find the evidence of long term relationship between private remunerated bank deposits and its determinants, we will use Fully Modified OLS (FMOLS) approach for the estimation of cointegration equation. It gives efficient and asymptotically unbiased estimates of parameters; the statistics thus obtained can also be used for hypothesis testing even if errors are correlated. We will also perform necessary coefficients' stability tests upon the estimated cointegration equation.

4. Results and Discussion

Time span used in the study is 1979-2016 and we have used annual time series data. We conduct the univariate analysis of all the variables pertaining to the final model estimated in this study. For this purpose we have used ADF unit root test. The results are reported in Table 1 of the Appendix. We can see that all the variables are integrated of order 1 except weighted average real interest rate. The Bounds test for the existence of co-integration is reported in the Table 2. The calculated test statistic higher than the reported critical values implies the existence of co-integration. The test statistic turned out to be significant providing evidence in the favour of co-integration among the variables.

The estimated ARDL model explaining the real private remunerative bank deposit in Pakistan is presented in Table 4 of the Appendix. We can see that real interest rate, real GDP, real workers' remittances, real government borrowing from banks, real government borrowing from public, savings habit (deposit inertia) are found to be statistically significant determinants of real private remunerative bank deposit in Pakistan for the period of 1979 to 2016. This estimated ARDL model also passes goodness of fit and coefficients' stability tests (as shown in Figures 1 and 2 of the Appendix).

All the variables are in log form except real interest rate. Such models are called semi logarithmic model. The estimated coefficient (which is 0.003 in our long run model in

Table 6) of interest rate thus cannot directly be termed as (interest) elasticity (of deposits). In order to use this as an estimated elasticity, we need to multiply this by 100. Thus, estimated interest elasticity of deposit in long run model (Table 6) is 0.3 percent. Or in other words, a 1 percentage increase in real interest rate is associated with 0.3%¹³ increase in real private (remunerative) bank deposits in Pakistan. We have found evidence of long term relationship between real private remunerative bank deposits, real interest rate, real GDP, real workers' remittances, real government borrowing from banks, real government borrowing from public, savings habit (deposit inertia) during 1979 to 2016; as presented in Table 3 of the Appendix. If we look at the estimated coefficients of variables as presented in Table 2 of the Appendix, we can see that all have their signs as per economic intuition as we discussed in the conceptual framework section. However, we could not find private sector credit, return on NSS of CDNS, return from investment in PSX, and financial inclusion indicator (like number of remunerative bank accounts) to be statistically significant explanatory variables for real private remunerative banks deposits in Pakistan during 1979-2016.

We have also estimated an error correction model (ECM) model incorporating both short run disturbances and long run level information (Table 5). The coefficient of error correction term shows the speed of adjustment, here it is very high showing that 80 percent of last year's disequilibrium is made up in the current year that is a quick adjustment. In another model (Model 2), we have also looked if there is any impact upon interest elasticity of deposits if we consider estimated real permanent income instead of actual real GDP. In order to smooth GDP time series we have used Fully Modified HP Filter of Hanif, Iqbal and Choudhary (2017)¹⁴. It turns out that interest elasticity of deposits remains almost the same. It suggests robustness of our estimated results. One may argue that the real interest elasticity of banks' deposits is low. It may be the case this elasticity is underestimated because the deposits data contain not only those deposits which are "collected" by banks in response to any increase in real interest rate in the country but also those deposits which are "generated" by banks in response to any decrease in real interest rate in the country. Currently, deposit data from banks does not distinguish between the two types of deposits that are generated by the two opposite forces and thus use of such "overall" deposits may lead to an underestimation of the real interest elasticity of deposits.¹⁵

¹³ Recent study on Indian data (Q2:2006 to Q3:2018, using real data) reveals that interest elasticity of deposits is 0.5% (RBI Bulletin, May 2019)

¹⁴ There are certain issues with conventional HP filter (Hodrick and Prescott, 1997) including a) fixed value of λ across the series/countries/time and b) end points bias. Fully Modified HP filter (FMHP) of Hanif et al. (2017) addresses these two issues by suggesting an endogenous and a sort of time varying smoothing parameter to estimate a trend of a macroeconomic time series.

¹⁵ We would like to suggest Statistics Department of SBP to collect deposit data from banks considering above distinction between deposits "collected" and "generated". It may now be an easy task for banks to report overall deposits as per suggested bifurcation because the computer software currently in use of banks may mark the deposits generated by loans separately (by minor changes in the code).

5. Future Research Agenda

In this study, we have estimated the impact of changes in (real) interest rate upon bank deposits, i.e. interest elasticity of deposits, through country level dataset. However, real interest rates could be different in different regions/districts of a country depending upon differences in inflation rates in different districts. This could be one of the possible reasons for different deposit growth rates in different districts of Pakistan. Even if we exclude 12 districts showing triple digit deposit growth rate, deposit growth varied in the range of 7% to 77% during the last decade in 127 districts of Pakistan compared to country level average deposit growth rate of around 13% during the same period. Notwithstanding the fact that nominal interest rate is a sort of regulated price this may or may not be the same across different commercial banks having branches spread all over the country depending upon the composition of various “account types” - saving and fixed - in different districts¹⁶. Real interest rate, however, would vary from district to district depending upon district level CPI inflation rate. Using these varying real interest rates along with available data on district wise commercial banks deposits, we can estimate real interest elasticity of deposits in Pakistan at district level. If we can use the “collected” deposits data set for such study, as suggested above, that may give us a relatively more accurate estimate of real interest elasticity of banks deposits that too across different districts or we may conduct a panel study on Pakistan.

6. Concluding Remarks

Before the introduction of financial sector reforms in Pakistan the interest elasticity of banks deposits was considered to be too low. According to Nishat and Bilgrami (1989), estimated interest elasticity of deposit was 0.3 percent during 1960 to 1986. Considering significant changes in Pakistan’s financial sector landscape, we have estimated a real private bank deposits supply function for different period within 1979-2016. We found that real weighted average deposit rate, real GDP, real workers’ remittances, real government borrowing from banks, real government borrowing from public, savings habit (deposit inertia) and foreign payments reforms dummy (for the year 1992) are statistically significant determinants of real private remunerative bank deposit in Pakistan. We found the interest elasticity of banks deposits to be 0.3 percent for 1979-2016. We can say that the interest elasticity of bank deposits in the country has not increased even after the introduction of different financial sector reforms in the country.

¹⁶ Further, share of different maturities of fixed deposits could also be different for different districts which may have implications for weighted average deposit interest rates.

References

- Alessie, R. and Lusardi, A. (1997). Consumption, Saving and Habit Formation. *Economic Letters*, 55, 103-108.
- Choudhary, A. and Levine, P. (2006). Idle Worship. *Economics Letters*, 90, 77-83.
- Dickey, D. A. and Fuller, W. A. (1979). Distributions of estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association* 74, 427-431.
- Dickey, D. A. and Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49, 1057-1072.
- Dusenberry, J.S. (1969). *Income, Savings and Theory of Consumer Behaviour*. Oxford University Press, New York.
- Engle, R. R. and Granger, C. W. J. (1987). Co-integration and error correction representation, estimation and testing. *Econometrica* 55, 251-276.
- Fama, Eugene F. (1980). Banking in the Theory of Finance. *Journal of Monetary Economics*, 6, 39-57.
- Hanif, M. Nadim (2003). Restructuring of Financial Sector in Pakistan. Institute of Banker in Pakistan, January, 43-74.
- Hanif, M. Nadim, J. Iqbal and M.A. Choudhary (2017). Fully Modified HP Filter. SBP Working Paper 88.
- Hodrick, R. J. and Prescott, E. C. (1997). Post-war U.S. Business Cycles: An Empirical Investigation. *Journal of Money, Credit and Banking*, 1-16.
- Kemal, A.R., A. Qayyum and M. Nadim Hanif (2007). Financial Development and Economic Growth: Evidence from Heterogeneous Data of High Income Countries. *Lahore Journal of Economics* (12), 1-34.
- Khan, M. Hassan, and M. Nadim Hanif (2012). Pass through of SBP Policy Interest Rates to Market Rates: An Empirical Investigation. *Journal of Independent Studies and Research*, MSSE (10, 1) of SZABIST, Karachi, 97-112.
- Nishat, M. and Bilgrami, N. (1989). Determinants of Growth of Bank Deposits in Pakistan. *Savings and Development* (4), 391-400.

Pesaran, M. H., and Shi n, Y. (1998). An autoregressive distributed-lag modelling approach to conintegration analysis. *Econometric Society Monographs*, 31, 371-413.

Pesaran, M. H., Shin, Y., and Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 289-326.

Bank Deposits: Underlying dynamics. RBI Bulletin May 2019.

Appendix

Table 1: Results of Unit Root Test (H_0 : Series has Unit Root)

	ADF test value at level	ADF test value at first difference
Log (D)	-1.16 (0.90)	-3.90 (0.01)
r^d	-3.04 (0.04)	- - -
Log (Y)	-1.00 (0.93)	-2.99 (0.05)
Log (WR)	-0.81 (0.95)	-4.92 (0.00)
Log (GBB)	1.13 (0.99)	-4.80 (0.00)
Log (GBP)	-2.42 (0.15)	-3.38 (0.02)
Log (Y^{hp})	3.49 (1.00)	-3.65 (0.04)
p-value in the parenthesis		

Table 2: Chow Break Point Test (Break Date: 1992)

Null Hypothesis: No break at specified breakpoints		
Statistics	Value	P-Value
F-statistic	9.63	0.00
Log likelihood ratio	57.16	0.00

Table 3: Bounds Test

Test Statistic	Value	K
F-statistic	6.21	5
Critical Value of Bounds Test		
significance	Lower Bound	Upper Bound
10%	2.08	3.00
5%	2.39	3.38
2.5%	2.70	3.73
1%	3.06	4.15

Table 4: ARDL Model

Variable	Coefficient	P-Value
r^d	-0.004	0.02
LOG(RDEP)	1.49	0.00
LOG(RGBP)	0.35	0.00
LOG(RGOVB)	-0.43	0.00
LOG(RWREM)	0.12	0.00
LOG(RPSC)	-0.90	0.00
LOG(RGDP)	-0.84	0.00
$\Delta(\text{LOG}(\text{RDEP}(-1)))$	-0.50	0.00
$\Delta(\text{LOG}(\text{RGBP}))$	-0.18	0.04
$\Delta(\text{LOG}(\text{RGBP}(-1)))$	-0.13	0.02
$\Delta(\text{LOG}(\text{RGBP}(-2)))$	-0.20	0.00
$\Delta(\text{LOG}(\text{RGOVB}))$	0.36	0.00
$\Delta(\text{LOG}(\text{RWREM}))$	-0.22	0.00
$\Delta(\text{LOG}(\text{RWREM}(-1)))$	-0.20	0.00
$\Delta(\text{LOG}(\text{RWREM}(-2)))$	-0.18	0.00
$\Delta(\text{LOG}(\text{RPSC}))$	0.47	0.00
$\Delta(\text{LOG}(\text{RPSC}(-1)))$	-0.007	0.96
$\Delta(\text{LOG}(\text{RPSC}(-2)))$	-0.08	0.18
$\Delta(\text{LOG}(\text{RGDP}))$	-0.34	0.53
$\Delta(\text{LOG}(\text{RGDP}(-1)))$	-0.40	0.43
$\Delta(\text{LOG}(\text{RGDP}(-2)))$	-0.60	0.13

r^d : real deposit rate, RDEP: real deposits, RGBP: real government borrowing from public; RGOVB: real government borrowing; RWREM: real worker's remittances, RPSC: real private sector credit, RGDP: real GDP.

Table 5: ECM

Variable	Coefficient	P-Value
E(-1)	-0.80	0.00
$\Delta(\text{LOG}(\text{RDEP}(-1)))$	0.16	0.15
$\Delta(\text{LOG}(\text{RGBP}))$	0.01	0.82
$\Delta(\text{LOG}(\text{RGBP}(-1)))$	-0.13	0.06
$\Delta(\text{LOG}(\text{RGBP}(-2)))$	-0.04	0.45
$\Delta(\text{LOG}(\text{RGOVB}))$	0.09	0.05
$\Delta(\text{LOG}(\text{RWREM}))$	0.07	0.00
$\Delta(\text{LOG}(\text{RWREM}(-1)))$	-0.01	0.58
$\Delta(\text{LOG}(\text{RWREM}(-2)))$	-0.07	0.00
$\Delta(\text{LOG}(\text{RPSC}))$	0.55	0.00
$\Delta(\text{LOG}(\text{RPSC}(-1)))$	-0.07	0.39
$\Delta(\text{LOG}(\text{RPSC}(-2)))$	-0.10	0.08
$\Delta(\text{LOG}(\text{RGDP}))$	0.78	0.02
$\Delta(\text{LOG}(\text{RGDP}(-1)))$	-0.51	0.07
$\Delta(\text{LOG}(\text{RGDP}(-2)))$	0.32	0.024

Table 6: Long Run relationship derived from ARDL Model in Table 4

Variable	Coefficient	P-Value
RDR	0.0027	0.00
log(RGOVB)	0.29	0.00
log(RGBP)	-0.23	0.00
log(RWREM)	-0.08	0.00
log(RPSC)	0.60	0.00
log(RGDP)	0.56	0.00

Figure 1: Model Diagnostics

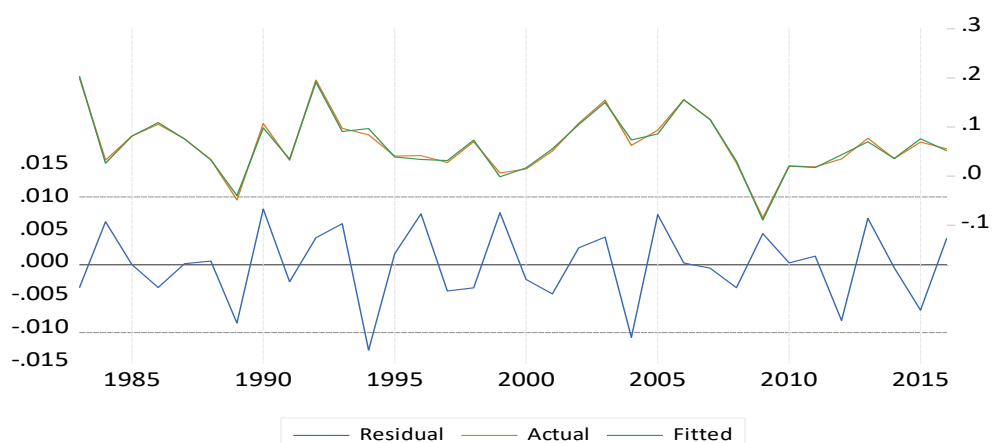


Figure 2: Stability of Model

