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Bank of Albania

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# FOREIGN RESERVE HOLDINGS: AN EXTENDED STUDY THROUGH RISK-INSPIRED MOTIVES

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(2017)

## ABSTRACT

*This paper examines the demand for foreign reserve holdings for the Albanian small open economy. The model is estimated through the Vector Error Correction Model approach. Results provide supportive evidence that reserve accumulation is more sensitive to precautionary motives rather than mercantilist ones. Other results reconfirm that current account patterns and fiscal imbalances are the main driving forces behind reserve holding. By contrast, reserve was yet again found less sensitive regarding the opportunity cost and mercantilist motives.*

*Keywords: Foreign reserve holdings, trade openness; short-term capital movements, VECM.*

*JEL Classification: C52, F32,*

## I. INTRODUCTION

The accumulation of foreign reserve holdings has been an integral part of the Albanian monetary policy to balance of payment approach, outlined as a bottom rule-of-thumb level sufficient to cover four months of imports. Over the past two decade, the level held by monetary authorities in Albania has satisfied this ratio throughout each period, even exceeding it. However, in the recent years, this level is even higher than the other performing rule-of-thumb related to the intermediate money and national output. During this time, holdings rose from only 13% in early 2000s' to nearly 20% - 21% along the period 2010 – 2013. In addition, in the last decade, the Bank of Albania has accumulated stock that covered on average nearly 145% of total short-term debt (private plus public (external)). This ratio was around 110% in the year 2012. However, the actual stock exceeds more than four times the Guidotti-Greenspan rule-of-thumb<sup>2</sup> relating to the precautionary motives to short-term external debt coverage.

Furthermore, over the years, but mostly in the future the stock of reserve faces a fivefold challenge<sup>3</sup>. First, under an inflation targeting regime and flexible exchange rate regime, the monetary policy strategy is continuously reflecting more the Friedman's approach, even though money continue to play a crucial role in the long run. Second, the operational policy has recently moved from targeting money circulation to targeting short-term interest rates. Thirdly, Albania has not received high foreign direct investments like other transition countries, but it is potentially attractive and a great opportunity for capital market investment. Fourthly, in the case of Albania, raising the level might exceed the precautionary motives and place more forgone earnings, since it has an opportunity cost. Further,

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The views expressed herein are of the authors and do not necessarily reflect the views of the Bank of Albania.

<sup>2</sup> See also Greenspan, A., (1999).

<sup>3</sup> Shijaku, (2012).

many research papers<sup>4</sup> emphasise the fact that demand reserve is also sensitive to capital account patterns, especially to sudden stop episodes. In a recent work, Shijaku (2013) supports the view that Albania has experienced episodes of sudden stops, but they have been more frequent after the financial and global crises. As such, the extensive accumulation of foreign reserves naturally prompted questions whether current levels can be justified on economic grounds and risk-inspired indicators..

In general, reserve accumulation patterns present both a theoretical and an empirical challenge, but as yet there is little consensus and only modest success on either front. Most research on the international reserve coverage has so far concentrated on the precautionary motives. In the Albanian context, research on reserve has received attention only recently. An earlier work by Shijaku (2012a), using the buffer stock model of Frenkel and Jovanovic (1981), has interpreted the precautionary motive of reserve accumulation central to that specification in terms of the theoretical balance of payment needs literature. Therefore, this paper first, extends the time span of the empirical work by Shijaku (2012a). Second, it includes a broader set of macroeconomic conditions, namely current and capital account patterns, economic size, sovereign risk, opportunity cost and money disequilibrium. Third, we assess demand for reserve holdings through means of Vector Error Correction Mechanism (VECM) techniques using quarterly data.

Results provide supportive evidence that reserve accumulation is more sensitive to precautionary motives rather than mercantilist ones. Other results reconfirm that current account patterns and fiscal imbalances are the main driving forces behind reserve holding. By contrast, reserve was yet again found less sensitive regarding the opportunity cost and mercantilist motives.

The rest of the paper is organised as follows. Section 2 presents the methodology and the data. Section 3 summarizes the results. The paper concludes in section 4.

## II. THE METHODOLOGY AND THE DATA

### A. MODEL SPECIFICATION

The majority of studies<sup>5</sup> argue that matters of reserve demand more directly correspond to the balance of payments needs. In this sense, the reserve holdings are seen as a principal component to guarantee and to pursue domestic policy goals in the face of temporary external sector shocks. By contrast, other studies<sup>6</sup> justify that reserve demand is linked to a broader concept than the balance of payment's determined definition of reserve assets. Thus, they suggest assessing the adequacy demand by shedding light on the relative importance of other different variables. IMF, (2003) identifies five categories of variables, namely: economic size; exchange rate flexibility; opportunity cost; and current and capital account vulnerability. Through this paper we try to estimate the demand for reserve taking to account the motivation of holding them. We follow the methodology by Sehgal and Sharma (2008)<sup>7</sup> and investigate the demand for reserve in the case of Albania by means of VECM techniques, for the period 1998:01 – 2012:04, as follows:

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<sup>4</sup> Calvo et. al. (2004, 2008), Cavallo and Frankel (2008), Jeanne and Rancière (2006).

<sup>5</sup> Frenkel and Jovanovic (1981), Aizenman and Marion, (2002), Calvo (1998), Prabhesh, et. al., (2007), Bernard (2011).

<sup>6</sup> Edwards (1985), Ramachandran (2004), Jeanne and Rancière, (2006), Ramachandran (2006), Gonçalves (2007), Jeanne and Rancière (2006), Obstfeld, Shambaugh and Taylor (2008), Prabhesh (2009), Moghadam, Ostry and Sheehy (2011).

<sup>7</sup> The paper considers a set of scale variables for transactions motive, precautionary motive, mercantile motive, and the sensitive components of capital account, namely quarterly GDP, average propensity to import, exports, short-term external debt, capital inflows and the opportunity cost of holding reserves.

$$\Delta X_{i_t} = \beta_0 + \alpha_i \left( X_{i_{t-1}} + \sum_{i=1}^{p-1} \beta_i X_{i_{t-1}} \right) + \sum_{i=1}^{p-1} \beta_j \Delta X_{i_{t-1}} + \beta_j Z_{i_t} + \varepsilon_{i_t} \quad (1)$$

Where,  $\Delta$  is the difference operator,  $\beta_0$  is a vector of constant terms,  $\beta_i$  and  $\beta_j$  are the matrices of the coefficients measuring the long-run and short-run lagged effect of variables on each other,  $\alpha_i$  is the parameter for the speed of adjustment towards equilibrium,  $\varepsilon_t = [\varepsilon_{st}, \varepsilon_{bt}]$  is the vector of error terms and  $\varepsilon_i \sim iid(0, \sigma^2)$ ;  $X_{it}$  is a vector of  $\kappa$  observable endogenous variables used to explain reserve demand such as trade openness, economic activity, level of debt burden and opportunity cost of holding reserve by the monetary authority;  $Z_{it}$  is a set of exogenous variables such as the volatility in Foreign Direct Investment (FDI) and money market disequilibrium.

The proxy on trade openness does not seem unreasonable for a country whose balance of payments is mainly dominated by the current account. Traditionally, this variable has been based on the prospective of imports. But, in our model, this proxy is extended to include also the level of exports. From a current account perspective, exports are important because they generate foreign exchange income which, in turn, is used to finance imports [Steiner, (2009)]. Thus, including exports allow to fully account for the current account developments<sup>8</sup>. Following Frenkel and Jovanovic (1981), it is expected that reserve holdings will increase with respect to trade openness and the raising level of foreign transaction payments in monetary value. Similarly, it is expected that reserve will rise with respect to economic size. In return, reserves generally are exposed to opportunity costs, expressed through forgone earnings. A higher opportunity cost is expected to lead to a reduction in reserve, because alternative investments become comparatively less attractive<sup>9</sup>.

Many studies take into account the sovereign risk of a country to estimate the adequacy level of reserve holdings. Closely linked to the Guidotti-Greenspan rule, it is argued that short-term foreign debt (STED) is an important well-establish source of vulnerabilities link to crisis and sovereign risk, and as such has a key role in any assessment of reserve adequacy<sup>10</sup>. But, due to the data limited issues<sup>11</sup>, we considered the three other indicators, respectively: the stock level of total debt, domestic and foreign debt. Therefore, all the three components are used separately in the model. Larger size of these variables indicates for higher probability of liquidity at risk; therefore, in a case of precautionary motive of reserves holding, the sign of the coefficient should be positive [Sehgal and Sharma, (2008)].

Following other empirical studies<sup>12</sup>, we also test the monetary approach in the model<sup>13</sup>. But, three specification issues come up. First, based on Calvo (1996), the Albanian vulnerability to crisis is measured by the size of its money supply, as it is a natural upper limit on the extent of possible asset withdrawal. Second, according to Badinger, (2004) the effect of money disequilibrium is likely to affect only in the short run. Third, referring to the monetary policy strategy of the Bank of Albania, reserve holdings is managed under the Monetary Approach to Balance of Payment strategy carried out in light of the IMF arrangements. Money has and will continue to play an important indicative role on monetary policy in the long run, but inflation forecasting and expectation have already the leading

<sup>8</sup> Obstfeld, et. al. (2008) used this variable because of its robustness as an explanatory variable in other empirical studies.

<sup>9</sup> Frenkel and Jovanovic (1981) and Ben-Bassa and Gottlieb, (1992).

<sup>10</sup> See: Furman and Stiglitz, (1998), Radelet and Sachs (1998), Sehgal and Sharma (2008).

<sup>11</sup> A problem with STED is that the time period for which data are available are annually and starts from 2006.

<sup>12</sup> See: Edwards, (1984), Elbadawi (1990) and Badinger (2004).

<sup>13</sup> Theoretically, excess supply of money may affect the reserves flows. According to Edwards, (1984) this approach suggests a country's balance of payments disequilibrium is directly related to disequilibrium in country's domestic money market. In a case of an excess demand for money, it must be satisfied by an increase in foreign exchange holdings of a country's central bank.

role in setting policy in the short and medium run<sup>14</sup>. Therefore, based on Sehgal and Sharma, (2008) we have included the money disequilibrium indicator, *M3*, as an exogenous variable. Another exogenous variable in short analysis is volatility of foreign capital inflows. Accordingly<sup>15</sup>, capital inflows are volatile in nature and flows could revert back any point of time that would need a sufficient reserves backup, otherwise the economy may face serious financial crisis. We accommodate this variable in the demand function through including the EGARCH estimation for the volatility of capital inflows, *FDI*. We expect a positive sign for both coefficients of these variables.

## B. THE DATA

In our specified reserve regression model, the dependant variable, *IR*, represents the total stock level of reserve holdings, excluding the stock value of gold. Data on trade openness index, *TB*, represent the sum of total import plus exports of goods and services to nominal GDP ratio. *GDP* represents information on the nominal Gross Domestic Product. *Debt* represents the stock level of public debt to nominal GDP ratio. The estimated variable of opportunity cost, *OC*, expresses the difference between the 3, 6 and 12-month weighted average bill rates and 10-year Eurobonds monthly rate of return to the yield of investing reserves measured by 1-3 year German emissions index. Regarding other data, *M3* represent the estimated residual of the long-run equilibrium money demand evaluated by Shijaku (2012) and *FDI* is an EGARCH volatility estimated index for the Foreign Direct Investment. Data, besides *OC*, enter the model specification in logarithm form. The data on quarterly GDP are taken from the Albanian Institute of Statistics (INSTAT) and those on Debt are taken from the Ministry of Finance. Data on Eurobonds are taken from the official website of the European Central Bank (ECB). The rest is taken from the Bank of Albania.

## III. RESULTS

This section presents the main empirical results on the variables used to determine the main indicators of foreign reserve holdings in the case of Albania. First, the results of the Unit root (ADF and PP) test (reported in Table 2 in Appendix) provide supportive evidence in favour of our choice to use the VECM approach as an estimation technique. Second, the VECM estimation approach considers a 3 lags length specification model based on the results of stability and LM-test for serial correlation for a 4 lags length VAR model. The JCT results (Table 3 in Appendix), based on an unrestricted constant and a linear trend in the variables, but not in the co-integration relationship, reveals that there is one co-integrating vector present in specified model.

The empirical results of the main determinants of the demand for foreign reserve holdings (*IR*) are given in Table 7<sup>16</sup>. First, model [1] reports the results of the model specification as specified in Equation (1)<sup>17</sup>. The normalised co-integrating equation shows the standard statistical values in parenthesis indicate that the explanatory variables are significant at 1 per cent level, except the *OC*. Therefore, we re-estimate Equation 1, but we use *OC* as an exogenous variable by excluding it from the long-run relationship. The results are reported in Table 7 (Model [2]). The diagnostics tests (Table 4 – 6 in Appendix) in both cases reveal no evidence of serial correlation, heteroskedasticity and non-normality of the VAR residuals, while the stability test was successfully passed.

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<sup>14</sup> See Bank of Albania Monetary Policy Document and Shijaku (2012).

<sup>15</sup> Sehgal and Sharma, (2008).

<sup>16</sup> Further, based on the joint weak-exogeneity LR-test tests on the non-significant  $\alpha$ -coefficients, we report the elasticities of a more parsimonious model.

<sup>17</sup> Meanwhile, based on Sørensen, Ibáñez and Rossi (2009), Johansen (1991, 1992, 1995) and Juselius (2003), the LR-test of restrictions and the p-value, rejected the null hypothesis on the stationary I(0) properties of *OC*.

With regards to the results of our main model specification they indicate that all the coefficients of the explanatory variables have the expected theoretical signs. First, as in the case of Shijaku (2012a), TB continues to exhibit the highest impact on the demand for reserve in the long run equilibrium. The size of the coefficient indicates that 1pp increase in trade openness results in less than 0.39pp raise in reserve holdings. This is consistent with an increasing role of self-insurance and precautionary holding of reserves motives against the persistent current account deficit in Albania during the sample period. This is consistent with other empirical estimates for transition and developing economies<sup>18</sup>, where current account dynamics are the main affecting force on the movements and accumulation of reserve holdings. Similarly, fiscal instruments are found to be positively correlated with reserves demand. But, besides total debt (*DEBT*), others<sup>19</sup> are found to be statistically insignificant. This impact is estimated to be nearly 0.32pp for every 1pp raise in debt to GDP ratio, which imply that Bank of Albania might have taken 'Liquidity at Risk' very seriously and adjusts reserves holding according to the total size of risk. Such results also enforce the argument of the self-insurance and precautionary motive of reserve holdings. Likewise, as an income indicator, the measure of *GDP* has positive relationship with reserves holdings. This result very much follow the theoretical assumptions, as income of the economy increases, more reserves holdings is required. Reserve would respond by nearly 0.16pp to an increase economic size by 1pp. The opportunity cost (*OC*) enters the un-restricted co-integrating vector none significantly. The impact was found relative low compared to other variables.

Furthermore, results on exogenous variables are mixed. The measure of volatility in capital inflows (*FDI*) is found to have a negative small and non-statistically significant coefficient. A preliminary assumption might be that Bank of Albania puts more attention to current account patterns than to developments in financial account. Similarly, as in Shijaku (2012a) it might confirm the non-mercantilist reserve management strategy by the Bank of Albania. Money disequilibrium indicator (*M3*) has the expected positive sign and is statistically significant<sup>20</sup>. Excess demand for (supply of) money leads to an increase in reserves with an elasticity of 0.35. From a monetary point of view, based on Sehgal and Sharma (2008), this result infers upon two main responses. First, the monetary authority does not take measures to correct the money market disequilibrium by changing rate of the interest rate and domestic credit. Second, the monetary authority leaves correction completely on the market forces to restore the equilibrium.

Others results demonstrate the coefficient of time trend is statistically significant and has the expected positive sign. This evidence, as in Shijaku (2012a), reconfirms that in time, further improvement of managerial and investment skills will eventually lead to higher reserve holdings. The dummy measure to account for the financial and economic post-crisis effect has a relative small positive sign and is significant at 5 per cent. But, this impact should be viewed cautiously. We also find a relatively higher, but still small positive impact, significant at 10 per cent, when an alternative dummy variable to account for the effect of liberalising capital account fully was used instead. However, both of these results emphasises more the precautionary motive of reserve holdings. Moreover, the readjustment coefficient (*ECM*) has a negative sign and is significant at 1 per cent. However, the magnitude is higher than the reported coefficient by Shijaku, (2012a). On the one hand, this might be the case due to greater availability of data on real time, given the empirical estimation is based on quarterly data. On the other hand, it might be a hint towards a relatively more active reserve management strategy, in the verge of raising uncertainties due to financial and economic crisis. Meanwhile, based on Prabheesh, *et. al.* (2007), this provides evidence the return to equilibrium will require the use of relatively less amount of reserves to finance the balance of payments needs.

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<sup>18</sup> See Prabheesh (2007), Sehgal and Sharma (2008) and Frenkel and Jovanovic (1981).

<sup>19</sup> Namely the stock of domestic, external and short term external debt.

<sup>20</sup> We also evaluated money market indicators [money supply (*M3*) or intermediate money (*M2*)] as endogenous variables. But, both coefficients are found to be statistically insignificant, even with a positive sign.

## IV. CONCLUSIONS

The monetary authority in Albania has accumulated foreign reserve based on the Monetary Policy to Balance of Payment approach. Over the years, the stock level has been relatively higher than the four months of import coverage rule-of-thumb criteria. Recently, it has exceeded other benchmark levels relating to the national output, intermediate money and the Guidotti-Greenspan rule-of-thumb. For these reason, this paper investigates empirically the main determinants of the demand for foreign reserve holdings in the case of Albania. The model is estimated using the VECM techniques. It consists of a sample for the period 1998 - 2012.

Results confirm previous findings that support the theoretical assumption of the demand for foreign reserve holding suggesting that there is a long-run co-integration relationship between the level of foreign reserve and considered explanatory variables. Other results provide also supportive evidence that current account developments still exhibit a high influence and is the main force affecting the movements and accumulation of reserve holdings. Taking to account the effect of fiscal indicators, findings confirm the precautionary motives for reserve accumulation in the verge of persistent current account deficit and raising debt burden. Reserve was yet again found less sensitive regarding the opportunity cost and mercantilist motives, but a higher adjustment coefficient implies a relatively more active reserve management strategy, in the verge of raising uncertainties due to financial and economic crisis.

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## APPENDIX I

Table 1. Variable definition and description.

Variable	Description	Source
<i>IR</i>	Logarithm of the total stock level of reserve holdings excluding the stock value of gold.	BoA
<i>TB</i>	Logarithm of the sum of total import plus exports of goods and services to nominal GDP ratio.	BoA
<i>GDP</i>	Logarithm of the nominal Gross Domestic Product.	INSTAT
<i>Debt</i>	Logarithm of the stock level of public debt to nominal GDP ratio.	MoF
<i>OC</i>	Logarithm of the difference between the 3, 6 and 12-month weighted average bill rates and 10-year Eurobonds monthly rate of return to the yield of investing reserves measured by 1-3 year German emissions index.	BoA, MoF, ECB
<i>FDI</i>	An EGARCH volatility estimated index for the Foreign Direct Investment.	Authors calculations
<i>M3</i>	The estimated residual of the long run equilibrium money demand.	Shijaku (2012b)

Table 2. Unit Root Test<sup>a</sup>, period 1998 Q01 – 2012 Q04.

Variable	Level			First difference		
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None
<i>Augmented Dickey Fuller (ADF) test</i>						
<i>IR</i>	[0.0052]	[0.7773]	[0.9996]	[0.0000]	[0.0000]	[0.0000]
<i>TB</i>	[0.7341]	[0.8149]	[0.9945]	[0.0000]	[0.0001]	[0.0000]
<i>GDP</i>	[0.0002]	[0.4582]	[0.9994]	[0.0000]	[0.0000]	[0.0367]
<i>Debt</i>	[0.2147]	[0.4612]	[0.2387]	[0.0000]	[0.0000]	[0.0000]
<i>OC</i>	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
<i>M3</i>	[0.0717]	[0.0234]	[0.0063]	[0.0006]	[0.0041]	[0.0000]
<i>FDI</i>	[0.0000]	[0.0000]	[0.0002]	[0.0000]	[0.0000]	[0.0000]
<i>Phillips-Peron (PP) test</i>						
<i>IR</i>	[0.0039]	[0.7780]	[1.0000]	[0.0000]	[0.0000]	[0.0000]
<i>TB</i>	[0.0844]	[0.0000]	[0.8632]	[0.0000]	[0.0000]	[0.0000]
<i>GDP</i>	[0.0007]	[0.4923]	[1.0000]	[0.0000]	[0.0000]	[0.0002]
<i>Debt</i>	[0.0018]	[0.0076]	[0.0739]	[0.0000]	[0.0000]	[0.0000]
<i>OC</i>	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
<i>M3</i>	[0.1003]	[0.0293]	[0.0098]	[0.0000]	[0.0000]	[0.0000]
<i>FDI</i>	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

<sup>a</sup> automatic lag selection based on Schwarz Info Criterion (SIC)

Source: Author's calculations

Table 3. Johansen Co-integration Test.

Sample (adjusted): 1999 Q1 – 2012 Q4				
Included observations: 56 after adjustments				
Trend assumption: Linear deterministic trend				
Series: IR TB GDP Debt OC				
Exogenous series: M3 Δ(FDI) @TREND				
Warning: Critical values assume no exogenous series				
Lags interval (in first differences): 1 to 3				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.501435	85.67830	69.81889	0.0016
At most 1	0.357256	46.70107	47.85613	0.0639
At most 2	0.251766	21.94856	29.79707	0.3013
At most 3	0.091962	5.706358	15.49471	0.7299
At most 4	0.005416	0.304112	3.841466	0.5813
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.501435	38.97723	33.87687	0.0113
At most 1	0.357256	24.75251	27.58434	0.1105
At most 2	0.251766	16.24220	21.13162	0.2110
At most 3	0.091962	5.402246	14.26460	0.6904
At most 4	0.005416	0.304112	3.841466	0.5813
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's calculations

Table 4. VEC Residual Serial Correlation LM Tests.

Null Hypothesis: no serial correlation at lag order h		
Sample: 1998 Q1 – 2012 Q4		
Included observations: 56		
Lags	LM-Stat	Probability
1	41.03835	0.2270
2	24.22980	0.5061
3	27.27140	0.3425
4	28.01961	0.3070
Probabilities from chi-square with 25 degree of freedom.		

Source: Author's calculations

Table 5. VEC Residual Normality Tests.

Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: residuals are multivariate normal				
Sample: 1998 Q1 – 2012 Q4				
Included observations: 56				
Component	Skewness	Chi <sup>2</sup>	Degree of freedom	Probability
1	0.800638	5.982867	1	0.0144
2	0.344352	1.106731	1	0.2928
3	-0.174025	0.282658	1	0.5950
4	0.073072	0.049836	1	0.8233
5	0.268609	0.673407	1	0.4119
Joint		8.095499	5	0.1511
Component	Kurtosis	Chi <sup>2</sup>	Degree of freedom	Probability
1	3.584665	0.797610	1	0.3718
2	3.783925	1.433923	1	0.2311
3	3.637518	0.948336	1	0.3301
4	2.575675	0.420121	1	0.5169
5	3.351019	0.287500	1	0.5918
Joint		3.887490	5	0.5657
Component	Jarque-Bera		Degree of freedom	Probability
1	6.780477		2	0.0337
2	2.540654		2	0.2807
3	1.230993		2	0.5404
4	0.469957		2	0.7906
5	0.960907		2	0.6185
Joint	11.98299		10	0.2862

Source: Author's calculations

Table 6. VEC Residual Heteroskedasticity Tests:

No Cross Terms (only levels and squares)		
Sample: 1998 Q1 – 2012 Q4		
Included observations: 56		
Joint test:		
Chi-sq	df	Prob.
594.6	570	0.2303

Source: Author's calculations

Table 7. Long run estimation of IR demand through VECM approach.

Sample (adjusted): 1999 Q1 – 2012 Q4

Included observations: 56 after adjustments.

	Model [1]	Model [2]
C	3.001	2.86
TB	.4055 [3.38]	0.38 [3.45]
GDP	.1456 [2.6]	0.153 [8.43]
DEBT	.2764 [1.2]	0.450 [4.65]
OC	-0.0032 [-0.2]	
ECM	-0.629 [-3.18]	-0.659 [-3.56]
	Exogenous Variable	
M3	0.338 [ 2.59]	0.398 [ 2.98]
FDI	-0.008 [-0.83]	-0.007 [-0.70]
@TREND	0.005 [ 2.95]	0.005 [ 3.03]
R <sup>2</sup>	0.65	0.65
R <sup>2</sup> -Adj	0.47	0.47

t-statistics in [ ]

<sup>a</sup>Co-integration Restrictions:  $B(1,1)=1$ ,  $B(1,5)=0$ ,  $A(2,1)=0$ ,  $\text{Chi}^2=0.064471$ ; Prob. = 0.97

Source: Author's calculations